NCC Tender File #	LW031
Project Description	NCC – Residence Front Entrance Rehabilitation
Site Visit	A site visit is **MANDATORY.** Two (2) site visits will be held. One on Thursday, May 26 and the other on Friday, May 27. Both will be held at 11:00am. The site visit will be at 1 Sussex Drive via the Princess Avenue Gate entrance. The meeting point (parking lot) is indicated on the map attached. **Your attendance (and sub-contractors) must be confirmed beforehand.** Please communicate with NCC Corporate Security at **613-239-5222** or securityscreening@ncc-ccn.ca at least 48 hours prior to the visit to ensure you are on the list. All costs incurred by the Bidder to attend the site visit will be at their expense. The NCC will not reimburse any Bidder for expenses related to the site visit.
Closing Date and Time	Tuesday, June 21, 2016 at 3pm Ottawa time
Qualification	**Qualification is required** for: 1) General Contractor 2) Heritage Masonry 3) Exterior Architectural Fountain Installation


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Entrée ici
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tourner à gauche -
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Meeting Point/
Point de rencontre
Job site: Front Entrance
to Main Building next to
fountain/
Lieu des travaux: Entrée
principale du batiment
principale à côté de la
fontaine
Governor Bay
Rockcliffe Driveway
Sir George-Étienne
Ottawa River Pathway
Princess Ave
Mariposa Ave
Lisgar Rd
Minto Pl
Howick St
Manor Ave
Maple Ln
Rideau Terrace
Dufferin Rd
Noel St
24 Sussex
Embassy of France
MacKay St
Alexander St
Thomas St
John St
Charles St
School Ln
Avon Ln
Union St
St Bartholomew's Church
Queen Victoria St
Stanley Ave
River Ln
Crichton St
Embassy of Spain
Sussex Dr
Rideau Falls
Taylor Ln
Crichton Cultural
Community Centre
Ivy Crescent
93

NCC CCN Canada

INVITATION TO TENDER & ACCEPTANCE FORM

RETURN TENDERS TO:	National Capital Commission 40 Elgin Street, Security Office on the 2nd floor Ottawa, ON K1P 1C7	**NCC Tender Number** **LW031**
TENDER CLOSING DATE AND TIME:	**Tuesday, June 21, 2016** at 3:00 p.m., Ottawa time	**NCC Contract Number**

DESCRIPTION OF WORK:

NCC Residence Front Entrance Landscape Rehabilitation

1. BUSINESS NAME AND ADDRESS OF BIDDER

Name: _____

Address: _____

_____

Telephone number: _____ **Fax number:** _____

E-mail address: _____

2. THE OFFER

The Bidder offers to the National Capital Commission (NCC) to perform and complete the work for the above mentioned project in accordance with the tender documents for the total tender amount (to be expressed in numbers only) of:

Sub Total $ _____

HST – 13% $ _____

TOTAL $ _____

3. TENDER VALIDITY PERIOD

The tender shall not be withdrawn for a period of 60 days following the date and time of tender closing.

4. CONTRACT DOCUMENTS

1. The following are the contract documents:
   (a) Invitation to Tender & Acceptance Form when signed by the NCC;
   (b) Duly completed Invitation to Tender & Acceptance Form and any Appendices attached thereto;
   (c) Drawings and Specifications;
   (d) General Conditions (GC1 to GC10);
   (e) Supplementary Conditions, if any;
   (f) Insurance Terms;
   (g) Occupational Health and Safety Requirements;
   (h) Addenda
   (i) Any amendments issued or any allowable tender revision received before the date and time set for tender closing;
   (j) Any amendment incorporated by mutual agreement between the NCC and the Contractor before acceptance of the tender; and
   (k) Any amendment or variation of the contract documents that is made in accordance with the General Conditions;
   (l) Security Requirements.

2. The language of the contract documents shall be the language of the Invitation to Tender & Acceptance Form submitted.

NCC Tender Number **LW031**	NCC Contract Number

5. APPENDICES

The tender includes Appendix(ces) Nos II and III to the Invitation to Tender & Acceptance Form.

6. ACCEPTANCE AND CONTRACT

Upon acceptance of the Contractor's offer by the NCC, a binding Contract shall be formed between the NCC and the Contractor. The documents forming the Contract shall be the contract documents referred to in 4 – CONTRACT DOCUMENTS.

7. CONSTRUCTION TIME

The Contractor must commence work on July 4, 2016 and be completed by December 23, 2016.

8. REQUEST FOR QUALIFICATION

Bidders must also complete the request for qualification document (see appendix III) and submit with this Invitation to Tender & Acceptance Form.

9. BASIS OF AWARD

The basis of award is low total cost to the NCC including all taxes if the Bidder passes the Request for Qualification. (Appendix III)

10. UNIT PRICE TABLE

The Bidder agrees that

(a) the Unit Price Table designates that part of the Work to which a Unit Price Arrangement applies.

(b) the Price per Unit and the Estimated Total Price must be entered for each item listed;

(c) the Price per Unit as tender governs in calculating the Total Estimated Amount, and any errors in the extension of the Price per Unit and in the addition of the Estimated Total Prices shall be corrected by the NCC in order to obtain the Total Estimated Amount; and

(d) the following table is the Unit Price Table for the purposes of the tender and the Contract:

UNIT PRICE TABLE

Note: Transfer the Total Estimated Amount from the Unit Price Table to item 2 – THE OFFER of this Invitation to Tender & Acceptance Form

Item		Qty.	Unit	Unit Price	Total Price
1.0 General					
1.1	Mobilization and General Requirements	1	l.s.		
1.2	Selective Demolition and Removals	1	l.s.		
1.3	Excavation, Backfilling and Site Grading	1	l.s.		
1.4	Tree Protection Fencing	1	l.s.		
1.5	Commissioning Review and Adjustment	1	l.s.		
1.6	Stop Work Order (allowance)	1000	hours		
2.0 Civil					
2.1	Rock Excavation	200	m3		
2.2	150mm dia. Perforated Sub-drain	325	lin. m		
2.3	Subdrain Outlet Treatment: Rip-rap	50	m2		
2.4	Directional Drilling	1	l.m.		
2.5	Irrigation	1	Allowance		
2.6	19mm Clear Stone & Geotextile	100	m3		
2.7	Storm Manhole (1200mm dia.)	1	ea		
3.0 Mechanical					
3.1	Mechanical Fountain Components	1	l.s.		
3.2	Mechanical Building Components	1	l.s.		
3.3	Glycol Heating Lines in Slab	1410	m2		
3.4	Demolish Walk-in Cooler	1	l.s.		
3.5	Removal Disposal Asbestos Type 1	10	m2		
3.6	Removal Disposal Asbestos Type 2	10	m2		
4.0 Architectural					
4.1	Removal of Foundation parging and membrane	52	m2		
4.2	Masonry wall cleaning	112	m2		
4.3	New parging and Damp-proofing	112	m2		
4.4	New Acrylic Stucco	25	m2		
4.5	Dismantling /Rebuilding Outer Wythe	37	m2		
4.6	Deep Re-pointing	75	m2		
4.7	Stone Replacement	21	m2		
4.8	Typical Penetration Damp-proofing	4	ea		
4.9	Non Masonry Work	1	l.s.		
5.0 Structural					
5.1	Slab on grade	1410	m2		
5.2	Precast Retaining Wall & Backfill	32	lin. m		
5.3	Trench Metal Grating at Building Exterior Wall	1	l.s.		
5.4	Cast-In Place Concrete Fountain	1	l.s.		

	Chamber & Structural Slab				
5.5	Bilco Trap Door Ladder	1	l.s.		
6.0 Fountain					
6.1	Fountain Mechanical & Electrical System	1	l.s.		
6.2	Fountain Custom Grating	1	l.s.		
6.3	Fountain Waterproofing	1	l.s.		
7.0 Electrical & Site Lighting					
7.1	Electrical Power and systems	1	l.s.		
7.2	Exterior PVC Raceway Conduits & Pull Boxes	1	l.s.		
7.3	Existing Light Standards: Relocate	3	each		
7.4	Smart Pole	1	ea		
7.5	Architectural Lighting	-	-	N.I.C.	N.I.C.
8.0 Landscape					
8.1	Existing Flag Poles: Relocate and Refinish	2	each		
8.2	Existing Drinking Fountain: Salvage & Reinstall	1	l.s.		
8.3	Existing Cobble Stone Edging: Salvage & deliver to NCC yard	1	l.s.		
8.4	Reinstate Existing Cobble Stone Edging	20	lin. m		
8.5	Stone Dust paving	60	m2		
8.6	River Stone Maintenance Edge	55	lin m.		
8.7	Asphalt Paving	915	m2		
8.8	550mm Granular Paving Base	1000	m2		
8.9	1200mm Granular Paving Base	1410	m2		
8.10	Granite: P1 & P2 Stones	1205	m2		
8.11	Granite: P3 Dias	1	each		
8.12	Granite: P4 Flag Pole	2	each		
8.13	Granite: P5 Radiused Stones	32	m2		
8.14	Granite: B1 to B3 Border Stones	230	lin. m		
8.15	Granite: B4 Border Stone	155	lin. m		
8.16	Granite: F1 to F8 Fountain Pavers	107	m2		
8.17	Granite: S1 to S2.3 Steps	31	m2		
8.18	Port-Cochere Granite: Salvage and Reinstall	27	m2		
8.19	Concrete Paving	30	m2		
8.20	Concrete Curb Reinstatement	8	lin.m		
8.21	Planting: Sod	950	m2		
				SUBTOTAL:	

11. I/We acknowledge receipt of the following addenda and have included for the requirement of it/them in my/our tendered price: _____ (Bidder to ender number of addenda issued, if any).

12. TENDER SECURITY

1. The Bidders shall enclose tender security with its tender in accordance with GI08 TENDER SECURITY REQUIREMENTS.

2. If the security furnished does not comply fully with the requirements referred to in paragraph 1) herein, the tender shall be disqualified.

3. If a security deposit is furnished as tender security, it shall be forfeited in the event that the tender is accepted by the NCC and the Contractor fails to provide Contract Security in accordance with GC9 CONTRACT SECURITY, provided that the NCC may, if it is in the public interest, waive the forfeiture of the security deposit.

13. INVOICING

Send the original invoice and 1 copy to:

Accounts Payable
National Capital Commission
202-40 Elgin Street
Ottawa, ON K1P 1C7

Or by email at the following address: **payables@ncc-ccn.ca**

To ensure prompt payment, please prepare your invoice in accordance with the prices quoted. Errors in invoicing can cause delay of payment. Submit your invoice to the address shown above and clearly indicate the Purchase Order number.

We hereby offer to supply to the NCC in accordance with the terms and conditions set out herein, the construction work listed above and on any attached sheets at the submitted price(s).

Name and title of person authorized to sign on behalf of Bidder (please print or type)	Signature	Date

Your tender is accepted to supply to the NCC, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the construction services listed herein and on any attached sheets at the price(s) set out therefore.

Name and title of the person authorized to sign on behalf of the NCC (please print or type)	Signature	Date

NATIONAL CAPTIAL COMMISSION

NCC RESIDENCE FRONT ENTRANCE
LANDSCAPE REHABILITATION
NCC DC-2611-110

CONSTRUCTION SPECIFICATIONS

ISSUED FOR TENDER

26 April 2016

BID FORM

Item		Qty.	Unit	Unit Price	Total Price
1.0 General					
1.1	Mobilization and General Requirements	1	l.s.		
1.2	Selective Demolition and Removals	1	l.s.		
1.3	Excavation, Backfilling and Site Grading	1	l.s.		
1.4	Tree Protection Fencing	1	l.s.		
1.5	Commissioning Review and Adjustment	1	l.s.		
1.6	Stop Work Order (allowance)	1000	hours		
2.0 Civil					
2.1	Rock Excavation	200	m3		
2.2	150mm dia. Perforated Sub-drain	325	lin. m		
2.3	Subdrain Outlet Treatment: Rip-rap	50	m2		
2.4	Directional Drilling	1	l.m.		
2.5	Irrigation	1	Allowance		
2.6	19mm Clear Stone & Geotextile	100	m3		
2.7	Storm Manhole (1200mm dia.)	1	ea		
3.0 Mechanical					
3.1	Mechanical Fountain Components	1	l.s.		
3.2	Mechanical Building Components	1	l.s.		
3.3	Glycol Heating Lines in Slab	1410	m2		
3.4	Demolish Walk-in Cooler	1	l.s.		
3.5	Removal Disposal Asbestos Type 1	10	m2		
3.6	Removal Disposal Asbestos Type 2	10	m2		
4.0 Architectural					
4.1	Removal of Foundation parging and membrane	52	m2		
4.2	Masonry wall cleaning	112	m2		
4.3	New parging and Damp-proofing	112	m2		
4.4	New Acrylic Stucco	25	m2		
4.5	Dismantling /Rebuilding Outer Wythe	37	m2		
4.6	Deep Re-pointing	75	m2		
4.7	Stone Replacement	21	m2		
4.8	Typical Penetration Damp-proofing	4	ea		
4.9	Non Masonry Work	1	l.s.		
5.0 Structural					
5.1	Slab on grade	1410	m2		
5.2	Precast Retaining Wall & Backfill	32	lin. m		
5.3	Trench Metal Grating at Building Exterior Wall	1	l.s.		
5.4	Cast-In Place Concrete Fountain Chamber & Structural Slab	1	l.s.		

GENERAL

0.1 Basis of Payments

.1 Payment at the price per item listed in the Tender Form shall be full compensation for all labour, services and equipment as well as the supply, delivery and installation of all materials required for the proper execution of this contract.

PAY ITEMS DESCRIPTION

1.0 General

1.1 Mobilization and General Requirements

.1 This item includes all general requirements to complete the project including general instructions, shop drawings, safety measures, environmental protection, installation of temporary protective fencing, hoarding and temporary facilities (including temporary access roads where required), traffic control (permits, signage, public notification of lane closures, and flag men at site entrance as required for public safety, etc.), maintenance of access roads where required including water for dust control as directed and cleaning.

.2 Included in this lump sum price are all the general requirements identified on the drawings and specifications and all those required to complete the work of this contract not covered under specific items. Including the removal of all objects and materials required to undertake to work of this contract.

.3 Included in this lump sum price are the completion of record drawings at the end of the Contract for provision to the NCC Representative

.4 This item will be paid on a lump sum basis.

1.2 Selective Demolition and Removals

.1 This item includes all demolition indicated including demolition of existing water feature, existing concrete, interlock, and asphalt paving structures; salvage of existing light standards and flag poles; removal of concrete curbs, existing sod, salvage riverstone and cobblestone; demolition of existing fountain mechanical and electrical equipment and mechanical and electrical room equipment.

.2 This item consists of disposing off site of all surplus and of and/or storing removed materials according to the NCC Representative.

.3 This item includes delivery of all surplus salvaged materials to the NCC storage facility at 1740 Woodroffe Avenue, Ottawa, Ontario.

.4 This item will be paid on a lump sum basis.

1.3 Excavation, Backfilling and Site Grading

.1 This item consists of the stripping, common excavation, backfilling and rough grading allowing for finished ground elevations, specified surface treatments and site servicing.

.2 This item includes the hauling, handling, placement, shaping, compacting and trimming of earth and the management of excess material.

.3 This item includes the proof rolling of the exposed surface, and the sub-excavation as required of any soft areas encountered during proof rolling.

.4 This item includes the stripping and reuse of approved earth fill material including compaction.

.5 This item includes the stockpiling of acceptable and reusable topsoil material.

.6 This item also includes the removal of all excavated non-reusable or surplus material, from the site.

.7 This item will be paid on a lump sum basis.

1.4 Tree Protection Fencing

.1 This item consists of the supply, installation, and maintenance of:
  .1 Tree protection fencing required for all of the trees within the limits of the construction area as shown on plans.
  .2 Tree protection signage as specified.
.2 This item will be measured on a lump sum basis and paid in two equal installments. 50% upon installation of all specified protection measures, and 50% at end of contract for proper maintenance and adherence to protection zones.

1.5 Commissioning Review and Adjustment
.1 This item consists of coordination with the NCC's 3rd party Commissioning Agent and performance and quality adjustments to meet the recommendations of the Commissioning Agent.
.2 This item includes the coordination of construction activities with the Commissioning Agent to facilitate the execution of commissioning activities. Such activities may include inspection, operation, verification, testing, adjusting, and balancing of equipment and systems at pre-determined times during the progress of work, site review with sub trades and equipment manufacturers, and demonstrations and instructions to owner's personnel.
.3 This item includes the prompt provision of submittals and shop drawings to the Commissioning Agent for the identified systems.
.4 This item includes on site review of electrical, mechanical, and structural systems and coordination with sub trades as specified.
.5 This item includes correction of construction errors, and adjustment of systems to meet performance requirements established by the Commissioning Agent.
.6 This item includes consideration for commissioning activities in the Contractor's construction schedule and as an item for discussion at weekly construction meetings.
.7 Inspections and testing by the Commissioning Agent must be completed prior to concealing equipment and systems.
.8 Except where otherwise specified, all start-up and testing must be completed by the Commissioning Agent prior to acceptance and hand-over of the project.
.9 This item will not be measured and will be paid on a lump sum basis.

1.6 Stop Work/ Outside Hours Allowance
.1 This allowance will cover the eventuality of stop work orders, or work required to be performed outside of regular working hours as defined in section 01 10 00 General Instructions.
.2 This item includes only work directed to be performed at a delayed or accelerated schedule within a specified period at the direction of the NCC Representative.
.3 The contractor shall submit an itemized breakdown of costs for approval by the NCC representative prior to payment under this item.

2.0 Civil

2.1 Rock Excavation
.1 This item consist of the breaking, extraction, and disposal of bedrock material as required for services and structures.
.2 This item includes the hauling, handling and management of excess material. It also includes the removal of all excavated non-reusable or surplus material, from the site.
.3 This item will be measured and paid per metric ton of material removed from site.
.4 Weigh bills will be collected from the disposal facility.

2.2 150mm Dia. Perforated Sub-drain

.1 This item consists of the supply and installation of perforated sub-drains as shown on drawing C1-1.
.2 This item includes a filter sock and clear stone bedding as shown.
.3 This item includes all labour, materials, and equipment as required to make connections to existing utilities and structures as shown on plans.
.4 This item will be measured and paid on a linear meter basis of drains installed.

2.3 Sub-drain Outlet Treatment: Rip-rap
.1 This item consists of the supply and installation of rip-rap erosion protection as shown on drawing C1-1.
.2 This item includes work outside of the primary construction zone as shown on plans and reinstatement of all disturbed areas after work is completed.
.3 This item will be measured and paid on a square meter basis.

2.4 Directional Drilling
.1 This item consists of directional drilling to install the outlet pipe from the proposed storm manhole to the outlet location as shown on the C1-1 drawing and specified in section specification 31 23 33.01.
.2 This item includes any additional protection measures to ensure the health of the surrounding trees.
.3 This item includes rigid piping, fittings, rodent grating and incidental materials as specified.
.4 This item will be measured and paid on a linear meter basis of piping installed.

2.5 Irrigation
.1 This item consists of a construction allowance to cover the selective demolition of the existing irrigation system, temporary measures to maintain operation during construction, and reinstatement at completion of the project.
.2 This work must be completed by the irrigation specialist recommended by the NCC representative.
.2 The contractor will be required to provide an itemized quote for the work once site conditions have been determined.

2.6 19mm Clear Stone & Geotextile
.1 This item consists of the supply and installation of 19mm clear stone drainage material and enveloping geotextile as shown on drawing C1-1.
.2 This item will be measured and paid on a cubic meter basis of stone installed.

2.7 Storm Manhole (1200mm dia.)
.1 This item consists of the supply and installation of a new 1200mm dia storm manhole as shown on C1-1 drawing and specified in section 33 05 31.
.2 This item will be paid on a unit rate basis per manhole installed.

3.0 Mechanical

3.1 Mechanical Fountain Components
.1 This item consists providing ventilation, heating, domestic cold water, storm and sanitary/vent services for the fountain vault as identified in the issued for tender mechanical drawings M1 to M6 and specifications by Goodkey, Weedmark and Associates dated April 13, 2016.

3.2 Mechanical Building Components

.1 This item consists providing the snow melt system and glycol heating system for the exterior entrance pavers and fountain as identified in the issued for tender mechanical drawings M1 to M6 and specifications by Goodkey, Weedmark and Associates dated April 13, 2016.
.2 Install the zones 2 and 3 manifolds at the foundation wall.

3.3 Glycol Heating Lines in Slab
.1 This item consists of the supply and installation of glycol heating lines cast into the structural paving slab as described in item 5.1.
.2 This item includes all labour, fasteners, couplings, and testing.
.3 This item does not include concrete slab or base (See item 5.1).
.4 This item will be measured and paid in square meters of glycol lines cast into concrete slab.

3.4 Demolish walk-in cooler:
.1 This item includes the demolition and modification of the existing walk-in coolers to accommodate new mechanical piping as described below:

4.0 Demolish evaporator in walk in cooler no. 2. Removal electrical wiring and make safe.
5.0 Cap refrigerant piping.
6.0 Demolish west wall, south wall, part of east wall, and ceiling of walk in cooler no.2.
7.0 Modify condensate drain pipe to suit, install tight to and support from structure. Condensate drainage for walk-in freezer and walk-in cooler no.1 to remain functional.
8.0 Modify/add sprinklers to suit new architectural layout, to NFPA 13.

.2 This item will be clarified during the mandatory site visit
.3 This item will be measured and paid on a lump sum basis.

3.5 Removal and disposal of asbestos Type 1
.1 This item consists of the safe handling, removal, and disposal of type 1 asbestos as required during demolition works.
.2 This item will be measured and paid on a square meter basis of asbestos removed

3.6 Removal and disposal of asbestos type 2
.1 This item consists of the safe handling, removal, and disposal of type 2 asbestos as required during demolition for the mechanical works.
.2 This item will be measure and paid on a square meter basis of asbestos removed

4.0 Architectural

Work of this category includes work perform by a prequalified heritage masonry contractor as specified in the contract documents.

4.1 Removal of Foundation Parging and membrane
.1 Gently and manually remove all existing parging and membranes to fully expose the stone surface. Drawing reference A101 & A 202.
.2 This item includes the removal and off-site disposal of all waste and excess material at an appropriate disposal facility.
.3 This item will be measured and paid on a square face meter basis.

4.2 Masonry Cleaning
.1 Clean the foundation stone surfaces to remove loose mortar and dirt before applying new parging. Drawing reference A101 & A202. Specification section 04 03 06.

.2 This item includes the removal and off-site disposal of all waste
.3 This item will be measured and paid on a square face meter basis.

4.3 New Parging and Damp-proofing
.1 Clean surfaces (see item 4.2) and apply new cementitious parging. After parging has cured apply damp-proofing membrane. This item assumes a 25mm thickness for parging coat. Drawing reference A103 & A104. Specifications sections 09 24 33 & 07 14 13.
.2 This item will be measured and paid on a square face meter basis.

4.4 New Acrylic Stucco
.1 Remove existing parging and apply new Acrylic Stucco system. Drawing reference A103 & A104. Specification section 07 24 00.
.2 This item will be measured and paid on a square face meter basis.

4.5 Dismantling / Rebuilding Outer Wythe
.1 Rake mortar joint and dismantle outer wythe stones to a depth of 300mm. Store and clean larger stones. Allow to replace smaller stones with new large stone (see item 4.7). Consolidate loose rubble in opening and fill voids with mortar. Rebuild opening with new and retained rubble stones including pointing. Ensure the stability of the wall and surrounding masonry during the process of dismantling and reassembly. Drawing reference A101 & A102. Specifications sections 04 03 42 & 04 03 07.
.2 This item will be measured and paid in square face meter.

4.6 Deep Re-pointing
.1 Allow for the removal of existing mortar and repointing of the wall to 100%, less the area of Dismantling / Rebuilding work. Deep re-pointing to a maximum depth of 150mm Drawing reference A104. Specification section 04 03 07.
.2 This item will be measured and paid in square face meters.

4.7 Stone Replacement
.1 Supply and install new limestone rubble stone for replacement of deteriorated stone units and to replace areas of smaller stones with one large unit. Dimensions will vary assume average replacement unit size of 400x250x300mm (LxHxD). Drawing reference A103. Specifications sections 04 03 42.
.2 This item will be measured and paid in the square face meters.

4.8 Typical Penetration Damp-proofing
.1 Install neoprene collar around existing conduit to remain and install stainless steel heavy duty tie. Drawing reference A104.
.2 This item will be measured and paid on a unit rate basis per penetration.

4.9 Non Masonry Work
.1 This item consist of various architectural works as required to complete the work as shown on drawing A101, A102, A103 & A104.
.2 This item Includes the supply and installation of:
.1 Double layer of drainage panel and geotextile membrane
.2 50mm rigid insulation panel
.3 Flexible flashing at top of drainage panels and insulation
.4 Pipes, Connections and Joints for foundation drainage system
.5 New caulking bead to underside of metal flashing at new acrylic stucco
.6 Installation of 5 copper downspout extensions to match existing
.3 This item will not be measured and will be paid on a lump sum basis.

5.0 Structural

5.1 Slab on Grade

.1 This item consists of the supply and installation of the cast-in place concrete slab with reinforcing steel and rigid insulation as shown on S-series drawings.

.2 This item does not include the glycol heating loops which are paid under item 3.5 Glycol Heating Lines in Slab.

.3 This item includes all rigid insulation, steel reinforcing & poured in place concrete

.4 This item will be measured and paid for on a square meter basis.

5.2 Precast Retaining Wall & Backfill

.1 This item consists of the supply and installation of a custom sub-grade precast concrete retaining wall.

.2 This item includes, shop drawings, excavation to sound bedrock, bedding preparation and placement, fasteners, and backfilling as shown on plans.

.3 This item includes backfilling with compacted granular material behind wall.

.4 This item includes backfilling with 19mm clear stone and geotextile in front of wall.

.5 This item includes finishing surface at bottom of trench with river stone.

.6 This item includes two custom pull box locations in trench cavity connected to a raceway conduit as shown on electrical drawings.

.7 This item will be measured and paid on a linear meter basis.

5.3 Trench Metal Grating at Building Exterior Wall

.1 This item consists of the supply and installation of custom stainless steel grating over the drainage trench and with structural steel supports and anchors (as shown on the L and S series Drawings).

.2 This item includes the preparation of shop drawings, and the manufacture and installation of the grating, brackets, steel supports and anchors.

.3 This item includes all tools, equipment, temporary supports and hardware as required.

.7 This item will not be measured and will be paid on a lump sum basis.

5.4 Cast-in Place Concrete Fountain Chamber & Structural Slab

.1 This item consists of the supply and installation of reinforced poured in place structural concrete foundations for fountain stairs, mechanical room structure, knee walls, upstands, and structural slabs as shown on plans (S series drawings).

.2 This item includes all shop drawings, form work, materials, equipment, release agents, testing and reinforcing materials as required to complete the work of this contract.

.3 This item includes excavation to sound bedrock and preparation of bedding materials for footings and slabs as well as the any compacted fill.

.4 This item includes the installation of all brackets and supports as shown on drawings.

.5 This item includes the installation of a Bilco Trap Door and ladder, including door cladding in matching granite.

.4 This item will not be measured and will be paid on a lump sum basis.

5.5 Bilco Trap Door and Ladder

.1 This item consists of the supply and installation of a cast-in place vehicular rated hatch and fixed ladders shown on plans (S series drawings).

.2 This item includes the Granite cladding of the hatch door as shown on drawing L4-1

.2 This item will not be measured and will be paid on a lump sum basis.

6.0 Fountain

6.1 Fountain: Mechanical & Electrical Systems

.1 This item consists of the supply, installation, testing, and adjustment of the entire fountain mechanical and electrical system commencing at the point of entry into the new mechanical room structure (as shown in the F0 series drawings and specified in Section 13155 Decorative Pool Systems).

.2 This item includes all of the fountains mechanical components including: pumps, nozzles, control panels, water treatment and filtrations units, automatic filling, winter drain valves and slab penetrating fittings, pipe work, valves, sensors, conduit and wiring between the pool and equipment room and electrical room located within the Residence as required for the water feature.

.3 This item includes all of the fountains electrical and lighting components including: submersible lights and junction boxes, wiring, controls, and wiring between the pool and equipment room and electrical room located within the Residence as required for the water feature.

.4 This item includes connection to the B.A.S. as shown on plans.

.5 All items will be paid on a lump sum basis.

6.2 Fountain Custom Grating

.1 This item consists of the manufacture, supply and installation of custom stainless steel grating (as shown in the F0 Series drawings).

.2 This item includes the preparation of shop drawings and the supply of all fasteners, hardware and mounting brackets.

.3 All items will be paid on a lump sum basis.

6.3 Fountain Waterproofing

.1 This item consists of supply and installation of flexible plasticized waterproofing membrane as specified.

.2 This item will be measured and paid on a square face meter basis of waterproofing completed.

7.0 Electrical & Site Lighting

7.1 Electrical Power and Systems

.1 This item consists of the power, systems and lighting indicated on project drawings E1 to E9. This includes, but is not limited to, the following major system components:

a. Normal and emergency lighting within the fountain service pit.

b. Power to both fountain control panels.

c. 50A receptacles for use by temporary power boxes during broadcast events. This includes two receptacles in the new mechanical room below the fountain. This includes two 50 amp extension cables from the mechanical room to the ventilation shafts. This excludes the boxes and, which are to be supplied by the NCC.

d. Power to all mechanical equipment associated with the fountain pit operations.

e. New 175A disconnect switch, 225A/600V splitter, 75kVA 600-120/208V step down transformer and a 400A, 120/208V, 42 circuit, 3phase 4wire electrical panel within the fountain pit.

f. Power to all components associated with slab heating system.

g. New lighting control panel, c/w astronomical time clock, manual controls as well as 0-10V control units mounted adjacent to each electrical panel feeding the new fixtures mounted to the building façade.

h. Demolition lighting and power as required for project.

.2 This item will not be measured and will be paid as a lump sum.

7.2 Exterior PVC Raceway Conduits & Pull Boxes
- .1 This item consists of the supply and installation of all exterior PVC buried conduits.
- .2 This item includes all incidental work under other items as a result of the installation of conduits such as penetrations through footings and in-ground pull boxes.
- .3 This item will not be measured and will be paid on a lump sum basis.

7.3 Existing Light Standards: Relocate
- .1 This item consists of the removal, relocation and reinstallation of the existing light standards.
- .2 This item will be measured and paid on a unit rate basis per relocated light.

7.4 Smart Pole
- .1 This item consists of the supply and installation of new Smart poles as specified in contract documents.
- .2 This item includes the installation of 50A receptacles for use by temporary power boxes during broadcast events. (This excludes the boxes which are supplied by the NCC)
- .3 This includes the running of electrical wiring to power future HID pole mounted lights. Wiring to be coiled and left unconnected for future works by others.
- .4 This item will be measured and paid on a unit rate basis per pole installed.

7.5 New Architectural Lighting
- .1 This item is not included in contract. References to lighting, drivers, and wiring specific to the illumination of the building façade is for information purposes only and will not constitute part of this work.

8.0 Landscape

8.1 Existing Flag poles: Relocate and refinish
- .1 This item consists of the removal, refinishing and reinstallation of two (2) flagpoles as shown on plans.
- .2 This item includes two new concrete footings as shown on plans as well as cleaning, handling, painting, and fasteners as required to complete the work.
- .2 This item will be paid for on a unit price basis installed.

8.2 Existing Drinking Fountain: Salvage and deliver to NCC yard
- .1 This item consists of the removal, protection and delivery of the existing drinking fountain (as shown on the L1-1 drawing) to a storage location as described under item 1.2 Selective Demolition.
- .2 This item will not be measured and will be paid on a lump sum basis.

8.3 Existing Cobble Stone Edging: Salvage and deliver to NCC yard
- .1 This item consists of the installation of the salvaged cobblestone edging as shown in the drawings.
- .2 Surplus cobbles not required for the execution of this contract will be transported to a storage location as described under item 1.2 Selective Demolition.
- .3 This item will not be measured and will be paid on a lump sum basis.

8.4 Reinstate Existing Cobble Stone Edging
- .1 This item consists of the installation of the salvaged cobblestone edging as shown in the drawings.
- .2 This item will be measured and paid for on a linear meter basis of cobble stone re-installed.

8.5 Stone Dust Paving

.1 This item consists of the reinstatement of the 100mm depth stonedust pathway on the south corner of the Residence to meet and match the existing stonedust pathway (as shown on the L2-1 drawing).

.2 This item includes the supply, installation and compaction of 200mm depth base course of Granular 'A'.

.3 This item includes the fine shaping and grading of surrounding grades to meet and match existing surfaces as well as the reinstatement of disturbed landscape areas.

.4 This item will be measured and paid for on a square meter basis installed.

8.6 River Stone Maintenance Edge

.1 This item consists of the installation of the 300mm wide maintenance edge (as shown on the L2-1 and L3-5 drawings).

.2 This item will be measured and paid for on a linear meter basis of river stone maintenance edge installed.

8.7 Asphalt Paving

.1 This item consists of the supply and installation of new asphalt driveway at the north and west side of the Residence to meet and match the existing asphalt driveway (as shown on the L2-1 drawing).

.4 This item does not include the granular base course which is paid under item 8.8 – 550mm Granular Paving Base.

.3 This item will be measured and paid for on a square meter basis installed.

8.8 550mm Granular Paving Base

.1 This item consists of the installation of granular A and granular B base courses for asphalt and granite paving as shown on plans.

.2 This item includes the supply, placement, grading and compaction of the base course material.

.3 This item will be measured and paid for per square meter of granular base installed.

8.9 1200mm Granular Paving Base

.1 This item consists of the installation of granular A and granular B base courses below the concrete slab on grade (line item 5.1); the cast-in-place concrete fountain chamber and structural slab with backfill (line item 5.4).

.2 This item includes the supply, placement, grading and compaction of the base course material.

.3 This item will be measured and paid for per square meter of granular base installed.

8.10 Granite: P1 & P2 Stones

.1 This item consists of the supply and installation of 100mm thick granite paving stones cut to the profiles and geometries shown on the L4-1 drawing.

.2 This item includes a 25mm sand laying bed, and polymeric sand jointing material.

.3 This item includes field cutting of the typical stone modules as required to achieve the layout pattern as shown and all labour under the supervision of a qualified mason.

.4 This item includes all shop drawings confirming modules, sizes and finishes.

.5 This item will be measured and paid for on a square meter basis installed.

8.11 Granite: P3 Dias (Bronze Medallion) Stone

.1 This item consists of the supply and installation of 100mm thick granite stone with an epoxied bronze medallion as shown on drawings L4-1 and L4-2.

.2 This item includes a 25mm sand laying bed, and polymeric sand jointing material.
.4 This item includes all shop drawings confirming modules, sizes and finishes.
.3 This item will be measured and paid for on a square meter basis installed.

8.12 Granite: P4 Flag Pole Stones
.1 These items consist of the supply and installation of 100mm thick granite paving stones cut to the profiles and geometries as shown on the L4-1 drawing.
.2 These items include a 25mm sand laying bed, and polymeric sand jointing material.
.3 These items includes a cored hole in the center to suite the flag poles mounting hardware.
.4 These items include all shop drawings confirming modules, sizes and finishes.
.5 These items will be paid for on a unit price basis installed.

8.13 Granite: P5 Radiused Stones
.1 This item consists of the supply and installation of 100mm thick granite paving stones cut to the profiles and geometries shown on the L4-1 drawing.
.2 This item includes a 25mm sand laying bed, and polymeric sand jointing material.
.3 This item includes field cutting of the typical stone modules as required to achieve the layout pattern as shown and all labour under the supervision of a qualified mason.
.4 This item includes all shop drawings confirming modules, sizes and finishes.
.5 This item will be measured and paid for on a square meter basis installed.

8.14 Granite: B1 & B3 Border Stones
.1 These items consist of the supply and installation of 100mm thick granite paving stones cut to the profiles and geometries shown on the L4-1 drawing.
.2 These items include a 25mm sand laying bed, and polymeric sand jointing material.
.3 These items include field cutting of the typical stone modules as required to achieve the layout pattern as shown and all labour under the supervision of a qualified mason.
.4 These items include all shop drawings confirming modules, sizes and finishes.
.5 These items will be measured and paid for on a linear meter basis installed.

8.15 Granite: B4 Border Stone
.1 This item consists of the supply and installation of 400mm thick granite border cut to the profiles and geometries shown on the L4-1 drawing.
.2 This item includes granular bedding, leveling shims, lean concrete and granular backfill as shown on plans.
.3 This item includes field cutting of the typical stone modules as required to achieve the layout pattern as shown and all labour under the supervision of a qualified mason.
.3 This item includes all shop drawings confirming modules sizes and finishes.
.4 This item will be measured and paid for on a linear meter basis installed.

8.16 Granite: F1 to F8 Fountain Pavers
.1 These items consist of the supply and installation of 100mm thick granite paving stones cut to the profiles and geometries shown on the L4-2 and FO-02 drawings.
.2 These items include mortared stone in place using epoxy based mortar and grout suitable for submerging in chemically treated water. Pavers at drain chamber to be removable for maintenance access to fittings.
.3 These items includes the supply of a stone lifting mechanism for removable pavers as noted on FO series.
.4 These items include field cutting of the typical stone modules as required to achieve the layout pattern as shown and all labour under the supervision of a qualified mason.
.5 These items include all shop drawings confirming modules, sizes and finishes.
.6 These items will be measured and paid for on a square meter basis installed.

8.17 Granite: S1 to S2.3 Steps

.1 These items consist of the supply and installation of 200mm thick radial granite steps cut to the profiles and geometries shown on the L4-2 & L4-3 drawings.
.2 These items include backer rod, caulking, shims, dowels and epoxy adhesive as shown.
.3 These items include field cutting of the typical stone modules as required to achieve the layout pattern as shown and all labour under the supervision of a qualified mason.
.4 These items include all shop drawings confirming modules, sizes and finishes.
.5 These items will be measured and paid for on a square meter basis installed.

8.18 Porte-Cochere Granite: Salvage and Reinstall

.1 This item consists of the careful removal, salvage and reinstallation of the existing granite surface under the porte-cochere.
.2 This item includes the supply and installation of 4 new pieces of granite to match the existing paving as shown on 2/L3-4.
.2 This includes the removal and disposal of the concrete slab below.
.3 This item includes the cleaning, labeling, and safe storage of the existing stone during construction.
.4 This item will be measured and paid on a square meter basis of stone reinstalled.

8.19 Concrete Paving

.1 This item consists of the supply and installation of new concrete paving surface (as shown on the L2-1 and L3-4 drawings).
.2 This item does not include the granular base course, which is paid under line item 8.8.
.3 This item will be measured and paid for on a square meter basis of concrete paving installed.

8.20 Concrete Curb Reinstatement

.1 This item consists of the pouring of flush concrete curbs to meet and match existing surfaces on site (as shown on the L2-1 and L3-4 drawings).
.2 This item includes all formwork, bedding material, and reinforcing.
.3 This item does not include the granular base course, which is paid under line item 8.8.
.4 This item will be measured and paid on a linear meter basis of curb installed.

8.21 Planting: Sod

.1 This item consists of the supply and installation of a sod area on either sides of the Residence entrance (as shown on drawing L2-1) and all disturbed landscape areas along both sides of the drive.
.2 This item includes the supply and installation of topsoil to the depths shown.
.3 This item will be measured on a square meter basis of sod installed.

END OF SECTION

5.5	Bilco Trap Door Ladder	1	l.s.		
6.0 Fountain					
6.1	Fountain Mechanical & Electrical System	1	l.s.		
6.2	Fountain Custom Grating	1	l.s.		
6.3	Fountain Waterproofing	1	l.s.		
7.0 Electrical & Site Lighting					
7.1	Electrical Power and systems	1	l.s.		
7.2	Exterior PVC Raceway Conduits & Pull Boxes	1	l.s.		
7.3	Existing Light Standards: Relocate	3	each		
7.4	Smart Pole	1	ea		
7.5	Architectural Lighting	-	-	N.I.C.	N.I.C.
8.0 Landscape					
8.1	Existing Flag Poles: Relocate and Refinish	2	each		
8.2	Existing Drinking Fountain: Salvage & Reinstall	1	l.s.		
8.3	Existing Cobble Stone Edging: Salvage & deliver to NCC yard	1	l.s.		
8.4	Reinstate Existing Cobble Stone Edging	20	lin. m		
8.5	Stone Dust paving	60	m2		
8.6	River Stone Maintenance Edge	55	lin m.		
8.7	Asphalt Paving	915	m2		
8.8	550mm Granular Paving Base	1000	m2		
8.9	1200mm Granular Paving Base	1410	m2		
8.10	Granite: P1 & P2 Stones	1205	m2		
8.11	Granite: P3 Dias	1	each		
8.12	Granite: P4 Flag Pole	2	each		
8.13	Granite: P5 Radiused Stones	32	m2		
8.14	Granite: B1 to B3 Border Stones	230	lin. m		
8.15	Granite: B4 Border Stone	155	lin. m		
8.16	Granite: F1 to F8 Fountain Pavers	107	m2		
8.17	Granite: S1 to S2.3 Steps	31	m2		
8.18	Port-Cochere Granite: Salvage and Reinstall	27	m2		
8.19	Concrete Paving	30	m2		
8.20	Concrete Curb Reinstatement	8	lin.m		
8.21	Planting: Sod	950	m2		

SUBTOTAL:

13% HST:

TOTAL BID:

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Wherever the term "NCC Representative" appears throughout this specification, it shall be construed to mean an Inspector representing the National Capital Commission and including a duly name consultant on their behalf.

.2 Where ever the terms "or equal", "or approved equivalent" appear after specific types of materials and items throughout this specification, they shall be construed to mean as being equal in the opinion of the NCC Representative, in material content, workmanship and quality to that designated as being the minimum acceptable standard, and that the NCC Contractor's written approval must be obtained prior to submitting an alternative, **3 days before close of tender.**

1.2 TIME OF COMPLETION

.1 The present contract must commence July 4th 2016, and have achieved substantial completion by November 28th 2016. All site work must be complete by December 23rd 2016 without the possibility of extension.

.2 Work to be performed **during regular day time hours between 7:00 – 18:00 hours** . Work hours between 18:00 to 22:00 hours, and on Saturdays, Sundays and statutory holidays will be considered upon request at no additional cost to the NCC. The work schedule must adhere to the parameters outlined in section 1.7 Construction schedule unless otherwise indicated by NCC Representative.

.3 Refer to 1.5 Construction Schedule for periods when work will be prohibited / restricted.

.4 The contractor is advised that the work site is located in Ottawa in the province of Ontario. Contractor must coordinate the use of site and work scheduling with government related activities and demands, most notably the work schedule and demands of occupants. Works likely to cause a disturbance must be scheduled and approved in advance by the NCC Representative. Works likely to be considered a disturbance are created by vibrations, impacts, noise, dust, fumes, road closures, or unsightly conditions; perceptible to the building's occupants. Disturbances may entail stop work orders issued to the contractor as elaborated in paragraph 1.12.

.5 The contractor is advised that there will be various construction sites running simultaneously on site during the summer and Fall 2016. Coordination will be required around deliveries and construction traffic in general, associated traffic control measures are required and part of this contract.

1.3 SCOPE OF WORK

.1 The site is located in front of the Residence. **The contractor must take extreme care working within this site to minimize damage and disruption. The NCC Representative is to be consulted prior to any site disturbance to ensure that functions are not negatively impacted. The Contractor will be limited to the footprint of the work area, and to the staging areas as defined in the contract documents.**

.2 Works under this contract cover the supply of all materials, labour, equipment and services required to perform the works described in the tender package for the present contract. This includes but is not limited to:

- .1 Protection Measures for the adjacent areas including heritage elements and trees;
- .2 Temporary Facilities, hoarding fencing, and traffic control temporary access to building as required to complete the work;
- .3 Selective demolition, removal and disposal / salvage of existing structures and surfaces;
- .4 Grading, drainage, and servicing works;
- .5 Mechanical and electrical improvements;
- .6 Installation of a new fountain and sub-grade equipment chamber;
- .7 Installation of a new a new fountain including pumps, nozzles, filters, and lighting;
- .8 Architectural foundation repairs and damp-proofing under the supervision of a

pre-qualified heritage stone mason;

.9 Granite paving performed under the supervision of a Landscape Stone Mason

.10 Site reinstatement

3. Site Supervisor: Provide competent site supervisor (minimum 10 years of experience), capable of managing the site operations of this Contract on a full-time basis during the duration of the implementation of the work of this Contract at the site.

.4 Site Safety Officer: Appoint a Site Safety Officer responsible for health and site safety for activities and duration of the implementation of the work of this Contract.

1.4 SECURITY CLEARANCE

.1 In accordance with the Security Policy of the Government of Canada, all persons undertaking work or services at the property covered by this contract shall be required to meet the requirements of a Site Access Clearance.

.2 The NCC reserves the right to refuse access to personnel not passing a Site Access Clearance.

.3 Unless otherwise indicated, access to the site (employees, deliveries, visitors and pick-ups of materials, etc.) must be approved by NCC Representative and coordinated by NCC Corporate Security.

.4 Reasonable care must be exercised to ensure the security of any material prepared or received in handling this project. No part of this project may be discussed, published, or displayed without the written permission of the NCC.

1.5 SECURITY AND CONFIDENTIALITY

.1 Exercise utmost care to ensure the security of any material prepared or received in handling this project.

.2 Without the prior written permission of the NCC Representative, do not distribute, publish, display or reproduce any documents, photographs, site plans, maps or information related to the project (or collected during the project), in any medium, including the internet.

.3 Without the prior written permission of the NCC Representative, do not disclose any documents, photographs, site plans, maps or information related to the project unless such disclosure:

.1 Is reasonably required to obtain necessary permits and approvals to perform the work;

.2 Is reasonably required to facilitate the contracting and performance of sub-contractors, consultants and other parties involved in completing the contracted work;

.3 Is required by law.

.4 When requested by the NCC, return to the NCC all copies of all site photographs and construction documents, site plans and maps related to the project.

.5 All the above restrictions apply to all sub-contracts for work and services related to the project.

1.6 RELICS AND ANTIQUITIES

.1 Protect relics and antiquities, items of historical or scientific interest and similar objects found during the course of work.

.2 Immediately notify NCC Representative of any findings and await NCC Representative's written instructions before proceeding with work adjacent to findings.

.3 If any vestiges of early human occupancy of the land are uncovered during construction, suspend construction activity and notify the NCC Representative.

.4 Relics, antiquities and items of historical or scientific interest shall remain the property of the Crown.

1.7 CONSTRUCTION SCHEDULE

.1 Construction schedule will be determined by the Contractor and the NCC Contract Administrator and must respect the following parameters.

.2 A schedule prescribing the activities and associated timeframes acceptable to complete this work will be provided to the successful bidder. This will be update at weekly Monday morning site meetings.

.3 Contractor to prioritize work during week days when possible.

.4 Unforeseen events may occur, in which case a stop work order or an order to work outside regular hours will be issued as per section 1.12 (Stop Work Order)

.5 The Contractor must submit an acceptable work schedule within 5 days of the award of contract.

.1 The accepted work schedule shall become the baseline for on-going discussion at regular site meetings, where measures to regain control of activities that are falling behind schedule shall be agreed upon.

.2 The contractor will be deemed to be in breach of contract if an acceptable work schedule is not provided within the specified 5 day period.

1.8 PRE-CONTRACT AWARD CONDITIONS

.1 Bidders must demonstrate the aptitude and experience required and meet all qualification requirements stipulated for this scope of work at the time of submitting their bid. Refer to the General Conditions for the submission criteria.

.2 Prior to the award of contract, the contractor must submit:

.1 **A site specific health and safety plan**,

.2 **Corporate health and safety policy**, and all other documents required by the letter of notification (Performance & Labour & Material bonds, insurance certificate, WSIB certificate) within 10 days of receiving the letter of notification.

If the requested documentation is not received within 10 business days of receiving the letter of notification, the NCC reserves the right to proceed on to the next lowest compliant bidder.

.3 Prior to the award of contract, the Contractor must submit:

.1 **Traffic Management Plan for Construction Safety**, deemed acceptable by the NCC Representative, within 10 business days of receiving the letter of notification.

.2 The Contractor will be considered to be in default of contract if the accepted Traffic Management Plan for Construction Safety is not being executed as approved and/or the work methods being used are determined by the NCC Representative to be causing unnecessary or irreparable damage to the project site.

If acceptable plans are not received within 10 business days, the NCC reserves the right to proceed on to the next lowest compliant bidder.

.4 Prior to the award of contract, the Contractor must submit:

.1 **Work Methodology Plan**, deemed acceptable by the NCC Representative, within **5 business days** of receiving the letter of notification.

.2 The Work Methodology Plan must clearly outline the primary construction challenges to

be overcome for this specific project and the approach that will be taken to execute the work, including but not limited to: sequencing of work and strategy to meet timeline, staging, mitigation and protection measures, delivery scheduling and frequencies, material lead times, site specific training and quality control measures.

.3 The plan should take the form of a drawing and/or written manual and along with the construction schedule it will serve as the baseline for the planning of the construction works.

.4 If acceptable plans are not received within 5 business days, the NCC reserves the right to proceed on to the next lowest compliant bidder.

.5 The Contractor will be considered to be in default of contract if the accepted Work methodology Plan is not being executed as approved and/or the work methods being used are determined by the NCC Representative to be causing unnecessary or irreparable damage to the project site.

.6 Consult sections 1.9, 1.10, 1.11, 1.20 below for more details.

1.9 SITE ACCESS

.1 Primary access to the construction site for all personnel, equipment and materials will be via the Eastern entrance Gate.

.2 Traffic route to construction site passes through a public zone. And past adjacent construction sites as shown on L1-2 Circulation and staging plan. Public health and safety is critical. Identify necessary mitigation procedures and protocols as part of **Work Methodology Plan.**

.3 The entrance to the site will be restricted to a single 4.9m lane as identified on L1-2 Circulation and Staging Plan.

.4 There are secondary entrances with restricted use. Contractor must obtain written permissions from the NCC Representative prior to the use of this entrance.

1.10 PUBLIC USE OF SITE

.1 The surrounding grounds of the Residence will be open to the public during the day throughout the construction period.

.2 The Eastern Entrance will remain in operation as a service and public entrance throughout the contract. The contractor is responsible for maintaining continuous universally accessible access to the Eastern Entrance as shown on the L1-2 Circulation & Staging Plan. Coordinate works in this area to limit disturbances to the building's operation and identify mitigation measures in the **Work Methodology Plan**.

.3 The contractor will construct and maintain a temporary pathway and stairs leading to the west side of Residence as shown on the L1-2 Circulation & Staging Plan. The path and stairs will be removed at end of contract and the landscape will be reinstated. Submit Shop drawings of the temporary stair structure for approval by the NCC Representative.

1.11 CODE OF CONDUCT

.1 The work site is located directly in front of the Residence and will be visible to the public at all times. The behavior of the construction crew will be under constant vigilance and a strict code of conduct will be enforced.

.2 The contractor is responsible for appropriate training and enforcement of code of conduct for all personnel working on site. Identify the measure for training and enforcing the code of conduct as part of the approved **Work Methodology Plan.**

.3 Construction personnel are expected to conduct themselves in a professional manner. The code allows zero tolerance for the following by any of the contractor's personnel or sub-contractors:

- .1 profane or abusive language of any kind in any language;
- .2 clothing with inappropriate wording or graphics;
- .3 smoking;
- .4 shouting, fighting, & horseplay;
- .5 heckling, whistling or fraternization towards Residence staff or public.

1.12 STOP WORK ORDER

.1 A stop work order may be issued at any point during the contract. Stop work orders will be initiated by the NCC Representative and will take the form of a written order.

.2 Stop work orders may include the directive to halt work for a specified period of time, or to complete specific types of work during off hours, weekends, or statutory holidays.

.3 A cash allowance for stop work orders is included in the unit price table reflecting a value of 1000 hours where one (1) hour equals one person.

1.13 CODES, PERMITS AND STANDARDS

.1 Standards referred to in this specification (CGSB, CSA, ASTM, OPSD,CHBDC etc.) may be examined at the following location:

Public Works and Government Services Canada
Standards and Specifications Branch
Place du Portage – Phase 3, 11 Laurier Street
K1A 0S5

.2 Perform work in accordance with the National Building Code of Canada (NBC) 2010 and any other code or provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.3 Execute work to satisfy all requirements as indicated in:

.1 Contractual documents

.2 Standards and codes specified as well as those cited in reference.

.4 Obtain and pay for permits, inspector's approvals, and other licenses required for this project and also pay any charges incidental to such permits. Provide copy of permits to NCC Representative.

1.14 QUALTIY CONTROL

.1 It is a requirement of this contract that qualified tradesmen execute each type of work specified. Example: Landscape contractor for landscape work, Stone Building mason for architectural work, Landscape Stone mason for stone paving work, irrigation specialist for irrigation work, carpenter for carpentry work, etc.

.2 Work quality will be inspected by a 3rd party Commissioning Agent hired by the NCC. The Commissioning Agent will inspect and review the work being performed, especially with respect to the fountain's electrical and mechanical systems and the glycol heating system. The contractor will be responsible for coordinating the works with the Commissioning agents and for making all necessary modifications and adjustments to maximize the performance and quality of the system according to the testing and inspection results of the agent.

.3 Work unsatisfactorily completed by unqualified tradesmen will be redone and paid for by the contractor.

.4 Alternatives

.1 The NCC Representative will only consider Alternatives

.1 for materials, products or processes specified with the term "and/or approved equivalent" applied and;

.2 submitted in accordance with the "General Instructions for Tendering".

.2 The NCC Representative will approve alternatives that are in his opinion equal in material content, workmanship and quality to the materials, products or processes identified and at least conformant to the standards specified.

.3 Assume the cost of additional work or modifications to the design due to the use of NCC Representative approved alternatives.

1.15 SPECIAL CONSTRCUTION REQUIREMENTS

.1 The work area is located within the hard paved roadway surface in front of the Residence. A staging area of approximately 250sq.m is allocated within the construction boundaries as

shown on plan.

.2 A second (temporary) staging area of approx. 450 m2 is located at the bottom of the escarpment for potential use during the concrete pour. There is an elevation gain of approximately 7m between this area and the construction site.

.3 Lay-down space for temporary facilities is allocated at the bottom of the escarpment as shown on L1-2 Circulation and Staging Plan. This area is adjacent to other construction works, and is accessed via shared roadways. There is no direct access between the construction site and the temporary facilities.

.4 The contractor will be responsible to ensure that the equipment utilized for site preparation, excavation, removals including stripping of topsoil and rock breakage does not cause any damage or disturbance to the subgrade. The subgrade must be protected at all times during construction and in particular following moderate to heavy rainfall.

.5 A detailed plan of underground infrastructure will be provided by the NCC to the winning bidder before the onset of construction. The contractor will be responsible for confirming the location of all underground infrastructure and services that will require protection for the duration of the contract.

.6 Any damaged subgrade areas caused as a result of construction traffic or construction techniques must be repaired by the contractor as part of this contract and at no additional cost to the National Capital Commission.

.7 Reinstatement of all areas damaged by construction activity and by equipment circulation as part of this contract to their original condition or better, to the satisfaction of the NCC Representative and at no additional cost to the NCC.

.8 The Contractor shall be responsible as part of the tender price for stripping and reuse of topsoil and approved fill material , or the removal from the site of all excavated non-reusable or excess material as well as the supply and placement of all required imported fill material required to execute the work of this contract.

.9 The Contractor will not be compensated for any additional stripping and/or additional earth or granular backfill materials required as a result of over-excavations not approved or authorized by the NCC Representative prior to undertaking work.

1.16 TAXES

.1 Include in the tender amount, all sales and other taxes levied by the Federal, Provincial and Municipal government or other authority. There will be no refunds made by the National Capital Commission to the Contractor for Taxes paid by the Contractor.

1.17 PROTECTION

.1 The Contractor shall be responsible for all damages to public services, services, property, structures, or buildings adjacent to or in the general area of work caused by earthworks, vibrations, impacts, and shocks resulting from the construction works of the present contract. The Contractor will reinstate damaged areas and all elements to the satisfaction of the NCC contract administration and at no additional cost to the NCC.

.2 The contractor will supply and install appropriate protection measures for public services, services, property, structures, or buildings adjacent to the general area of work for the duration of construction. Associated costs to protection measures shall be included in the submission at no additional cost to the NCC.

.3 The Contractor will supply and install protective barriers, fencing, barricades, lighting, and other required equipment for the protection of the public, the occupants and for work site safety in conformity with provincial and municipal regulations and the Canadian Code for Construction Site Safety. Associated costs for such measures will be included in the submission and at no additional cost to the NCC.

.4 Protect all existing structures for duration of construction.

.5 Take all necessary measures to ensure no damage to vegetated areas and specimen trees.

1.18 DAMAGES

.1 Damages caused to existing plant material, landscaping, lawns, roadways, pathways, structures, finishes, and public utilities due to work of this contract will be restored to their

original condition, replaced or adequate compensation made to affected parties by the Contractor.

.2 It is understood that restored or replaced work includes labour, equipment, and material costs.

.3 The restored or replaced work shall be completed within **seven days** of notification by the NCC Representative.

1.19 FIRE SAFETY

.1 Provide fire extinguishers to protect the work in progress.

.2 Advise NCC Representative of any work that would impede fire apparatus / personnel response.

.3 Know the location of nearest fire alarm box and telephone, including the emergency phone number.

.4 Observe at all times smoking regulations. There is no smoking in or near the Work. The NCC Representative will designate a smoking area.

1.20 CUTTING FITTING AND PATCHING

.1 The aesthetic quality of existing surfaces and structures to remain at the end of contract is of utmost importance. Contractor should identify in the approved **Work Methodology Plan** which surfaces and structures will be retained and the protection and mitigation measures to be employed for their modifications and adjustment to match new works.

.2 Execute cutting, fitting and patching of work that may be a requirement to make work fit properly together, to receive or be receive by other work.

.3 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

1.21 SITE VISIT

.1 A mandatory site visit will be organized during the tender period.

.2 It is the contractor's responsibility to visit the site and familiarize themselves with the existing site conditions prior to the tender close.

.3 The submission of a tender shall be deemed as proof that the tenderer and his sub-trades have are aware of existing site and the scope of work associated with this contract. After claims for additional compensation will not be entertained for any items of labour, equipment or materials required to complete the work that could have been reasonably ascertained by a site examination.

1.22 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each of following in conformity to the standards of Document Safeguarding Capability (DOS) and other stipulated security requirements:

- .1 Contract Drawings;
- .2 Specifications;
- .3 Addenda;
- .4 Change orders;
- .5 Other modifications to Contract;
- .6 Field test reports;
- .7 Manufacturer's installation and application instructions;
- .8 Copy of current and approved work schedule;
- .9 Health and Safety Plan approved by NCC Representative;
- .10 Work Methodology Plan approved by NCC Representative;
- .11 Traffic Control plan approved by NCC Representative

1.23 WORK SCHEDULE

.1 Provide within 10 working days after contract award, in form acceptable to NCC Representative, a detailed schedule showing anticipated progress stages and final completion of work within time period specified in Contract Documents.

.2 Interim reviews for work progress based on work schedule will be conducted as decided by NCC Representative and schedule updates by the Contractor in conjunction with and to approval of the NCC Representative.

1.24 CONTRACTOR'S USE OF SITE

.1 Limited to area immediately surrounding work and areas designated by the NCC Representative for material stockpiling and parking of work equipment.

.2 On-site parking is severally limited. Only critical vehicles and equipment will be permitted to park on the site at the written approval by the NCC Representative.

.3 Do not unreasonably encumber site with materials or equipment during construction.

.4 Where safety or security is reduced by work, provide temporary means to maintain safety and security of area at all times.

.5 If required for the execution of works find supplemental staging and parking areas outside of the site, all associated costs and permissions will be assumed by the contractor.

.6 In the event that safety or security measures must be modified as a result of a contract modification assure that site safety and security measures are maintained.

.7 Contractor Facilities: Contractor shall make provision for an administrative and lunch area with adequate lighting, heat, and ventilation for use by the Contractor and sub-contractors workforce.

.8 Storage: NCC Representative will establish on-site areas for storage of material.

.9 Waste bin shall be permitted in area designated and pre-approved by NCC Representative and shall be planned for minimal duration. Waste containers for potential designated substances shall be in accordance to applicable regulations.

.10 Materials and equipment shall not be permitted to encumber any area outside of the designated work site area unless pre-authorized by NCC Representative.

.11 Execute work with least possible interference or disturbance to the normal use of the building's operations. Confine the Work and operations of employees to limits indicated by Contract Documents and as directed by the NCC Representative. Make arrangements with NCC Representative to facilitate work as stated.

.12 Ventilation

- .1 Provide ventilation to prevent accumulation of dust, fumes, mists, vapours, or gases in areas of Work.
- .2 Provide ventilation through portable fan(s) exhausted to the out of doors to prevent migration of dust and debris within the building.
- .3 Dispose of exhaust materials in manner that does not contaminate adjacent areas.
- .4 Continue operation of ventilation and exhaust systems for sufficient time after cessation of operations to ensure removal of pollutants.

.13 Temporary Heating

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Building electrical supply may be used. Ensure capacity is adequate prior to imposing loads. Connect, use and disconnect at own expense and responsibility. Coordinate with NCC Representative. Owner will pay for Electrical Utility usage costs except for temporary electricity generator(s) that shall be provided by Contractor where required for the work.

.14 Deliveries to the site shall be within pre-arranged and authorized time frames by NCC Representative and site security with a minimum 24 hours' notice.

.15 Waste Disposal: unloading and disposing of waste is only allowed after working hours: before 7:00am and after 6:00pm.

.16 The use of a boom trucks or lifts is only allowed after working hours: before 7:00am and after 6:00pm.

1.25 SETTING OUT OF WORK

.1 The Commission shall furnish the Contractor with the reference co-ordinates necessary for layout out the work of this contract to the successful bidder. The contractor shall employ survey personnel with experience in the use of co-ordinates to physically layout work utilizing a

total station survey system.

.2 Contractor shall assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.3 Provide devices needed to layout out and construct work. Supply such devices as required to facilitate NCC Representative's Inspection of work.

.4 Supply stakes and other survey markers required for layout out work.

.5 Contractor must obtain NCC Representative's approval of limit of work for granite paving, stone dust pathway, granite borders and fountain foundations prior to commencing work.

1.26 PROJECT MEETINGS

.1 NCC Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

1.27 EXISTING SERVICES

.1 Before commencing work, establish location and extent of underground service lines in area of work and notify NCC Representative of findings.

.2 Where unknown services are encountered, immediately advise NCC Representative and confirm findings in writing.

.3 Where work involves adjusting of existing services, Where work involves disruption of existing services:

.4 Execute work at times directed by NCC Representative,

.5 Submit schedule to and obtain approval from NCC Representative for any shutdown or closure of active services,

.6 Notify NCC Representative at least 14 days before service disruption,

.7 Adhere to approved schedule.

.8 Make good and pay for damage to existing service lines resulting from work.

1.28 TRAFFIC CONTROL

.1 Under no circumstances should the contractor infringe upon the Eastern Entrance Road

.2 Do not infringe on adjacent roads, walkways or parking areas or interfere with normal vehicular circulation in carrying out the work. If it is necessary to occupy thoroughfares for purposes of unloading materials, etc., obtain permission from the NCC Representative by writing **fifteen days** before hand. Contractor to abide by their instructions regarding the manner, time and delays necessary to carry out these operations. Incidental costs for conforming to these requirements will be paid by the Contractor.

.3 Carry out protection in accordance with the requirements of the Provincial and Local-by-laws having jurisdiction over this type of work.

.4 All signs must be provided in English and French. Use pictograms where possible.

.5 Install signage where it is necessary to advise of road and pathway closures.

1.29 ADDENDA

.1 Answers to questions directed to the NCC Representative, and any amendments to the drawings and specifications during the tender period will be communicated in the form of addenda to all general contractors tendering; such addenda to be considered as and read as part of the specifications and thereby included in the contract documents.

1.30 ADDITIONAL DRAWINGS

.1 The National Capital Commission may furnish additional drawings to the contractor to assist in the proper execution of the work. These additional drawings will be issued for clarification purposes only. Such drawings shall have the same meaning and intent as if they were included with the plans referred to in the 1.28 Contract Documents.

1.31 CONTRACT DOCUMENTS

.1 Drawings and specifications are complementary. Items shown on plans or mentioned in one and not in the other are deemed to be included in the contract work.

.2 If the drawings and specifications differ, the NCC Representative shall give preference to the Contact document thereof, which best insures the attainment of this contract's objectives.

1.32 PAYMENT

.1 This is a unit price contract. Any minor or miscellaneous items indicated on the drawings as being part of the work of this contract must be included by the Contractor in his overhead and indirect charges and incorporated into the unit price bid.

.2 No separate payment will be made for work performed in respect to any of the special provisions where there is no specific pay item on the schedule of prices. The cost of these works must be appropriated among, and included in the lump sum bid.

1.33 ADVERTISING & SIGNAGE

.1 No advertising will be permitted on this project.

.2 No promotion signage will be permitted.

.3 No signage representing supply and installations companies and/or contractors and consultants shall be permitted.

1.34 CO-OPERATION WITH OTHERS and PUBLIC RELATIONS

.1 At all times during the design and construction activities of the work of this contract, the Contractor shall permit and facilitate access to the work site to NCC construction services and to NCC contracted consultants for design and implementation phases of this work.

.2 The Contractor may be in contact with users/visitors on site. If interacting with users/visitors to the site, the Contractor shall, at all times, be courteous, helpful and respectful to the users/visitors.

.3 Behaviour, demeanor and conduct at the work site shall be in good practices. Profane language from the Contractor's workforce is not acceptable at the work site.

.4 The Contractor shall at all times during work of this contract, respect traffic regulations of the site.

.5 Co-operate with site operations and maintenance staff and services at all times.

.6 Co-operate with Other Contractors retained for site operations and maintenance services.

1.35 COMPACTION OF MATERIALS

.1 The thickness of granular and crushed stone materials shown on the drawings shall be the real thickness after the materials have been compacted as specified.

.2 Compaction tests for granular and for concrete works will be supervised by the NCC Representative.

.3 Contractor to assume all costs for compaction tests and for material testing.

1.36 TEMPORARY INSTALLATIONS

.1 Contractor to assume all costs associated with temporary installations such as site trailers, portable washrooms, site fencing, jersey barriers, signage, construction lighting as required to complete the works as prescribed in the tender package and until the date of final completion.

.2 Any temporary services such as water, electrical, fuel and sanitary facilities must be self-contained and all costs for installation and removal at the end of contract are the responsibility of the contractor.

1.37 RECORD DRAWINGS

.1 As work progresses, maintain accurate records to show deviations from contract documents.

.2 Just prior to NCC Representative's inspection for issuance of final certificate of completion, supply one set of white prints with all major and minor deviations neatly inked in. The NCC Representative will provide two sets of clean white prints for this purpose.

1.38 GUARANTEES AND WARRANTIES

.1 Before completion of work, collect all manufacturer's guarantees and warranties, and deposit to NCC Representative.

PART 1 – GENERAL

1.1 Section Includes

.1 Inspecting and testing by inspecting firms or testing laboratories approved by NCC Representative.

1.2 Related Requirements Specified Elsewhere

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by NCC Representative are specified under various sections.

1.3 Appointment and Payment

.1 Contractor will submit preferred inspecting firm or testing laboratory for approval of NCC Representative. Contractor will appoint and pay for services of approved testing laboratory, including:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.

.4 Mill tests and certificates of compliance.

.5 Tests specified to be carried out by Contractor under the supervision of NCC Representative.

.6 Additional tests specified in the following paragraph.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, Contractor will pay costs for additional tests or inspections as required by NCC Representative to verify acceptability of corrected work.

1.4 Contractor's Responsibilities

.1 Provide labour, equipment and facilities to:

.1 Provide access to Work to be inspected and tested.

.2 Facilitate inspections and tests.

.3 Make good Work disturbed by inspection and test.

.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify NCC Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by NCC Representative.

END OF SECTION

PART 1 - GENERAL

1.1 Submit to NCC Representative for review, shop drawings, product data and samples specified.

1.2 Until submission is reviewed, work involving relevant product may not proceed.

1.3 References
- .1 Canadian Construction Documents Committee (CCDC)
  - .1 CCDC 2-[94], Stipulated Price Contract.

1.4 Shop Drawings
- .1 Drawings to be originals supplied by contractor, subcontractor, supplier or distributor, illustrating appropriate portion of work:
  - .1 Showing fabrication, layout, setting or erection details as specified in appropriate sections.
  - .2 Identify details by reference to sheet or detail number shown on contract documents.
  - .3 Maximum sheet size 610 x 915 mm.
  - .4 Reproductions for submissions opaque diazo prints.

1.5 Shop drawings review

The review of shop drawings by the NCC Contract Administrator is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean that the NCC Contract Administrator approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents. Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades.

1.6 Product Data
- .1 Manufacturer's standard schematic drawings, catalogue sheets, diagrams schedules, performance charts, illustrations and other standard descriptive data may be accepted in lieu of shop drawings.
- .2 Above will only be accepted if they conform to following:
  - .1 Delete information not applicable to project;
  - .2 Supplement standard information to provide additional information applicable to project;
  - .3 Show dimensions and clearances required;
  - .4 Show performances characteristics and capacities.

1.7 Samples and Mock-ups
- .1 Submit samples in sizes and quantities specified.
- .2 Where colour, pattern or texture is criterion, submit full range of samples.
- .3 Reviewed samples will become standards of workmanship and material against which installed work will be checked on project.

1.8 Co-ordination of Submissions

.1 Review shop drawings, product data and samples prior to submission.
.2 Verify:
  .1 Field measurements;
  .2 Field construction;
  .3 Catalogue numbers and similar data.
  .4 Co-ordinate each submission with requirements of work and contract documents.
  .5 Individual shop drawings will not be reviewed until all related drawings are available.
  .6 Contractor's responsibility for errors and omissions in submission is not relieved by NCC Representative's review of submittals.
  .7 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by NCC Representative's review of submission, unless NCC Representative gives written acceptance of specified deviations.
  .8 Notify NCC Representative in writing at time of submission, of deviations from requirements of Contract documents.
  .9 After NCC Representative's review, distribute copies.

1.7 Submission Requirements
.1 Schedule submissions at least 10 days before dates reviewed submissions will be needed.

.2 Submit an electronic copy of shop drawings and product data requires for distribution, plus 2 paper copies to be retained by NCC Representative.

.3 Accompany submissions with transmittal letter, in duplicate, containing:
  .1 Date;
  .2 Project title and number;
  .3 Contractor's name and address;
  .4 Number of each shop drawings, product data and sample submitted;
  .5 Other pertinent data.

1.8 Submissions shall include:
.1 Date and revisions dates;
.2 Project title and number;
.3 Name of:
  .1 Contractor;
  .2 Subcontractor;
  .3 Supplier;
  .4 Manufacturer;
  .5 Separate detailer when pertinent.
.4 Identification of product or material;
.5 Relation to adjacent structure or materials;
.6 Field dimensions, clearly identified as such;
.7 Specification Section number;
.8 Applicable standards, such as CSA or CGSB numbers;
.9 Contractor's stamp, initialed or signed, verifying review of sub-mission, verification of field measurements and compliance with Contract documents.

END OF SECTION

PART 1 GENERAL

1.1 REFRENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Province of Ontario Occupational Health and Safety Act and Regulations for
Construction Projects, R.S.O. [1990 as amended 213/91].

1.2 SUBMITTALS

.1 Plan Prior to award of Contract submit a **site specific Health and Safety Plan** comprised of two parts :

.1 The Constructor's General Safety Plan.

.2 The Site Specific Safety Plan.

.2 Submit copies of reports or directions issued by Federal and Provincial Health and safety inspectors.

.3 Submit copies of incident and accident reports.

.4 Submit Material Safety Data sheets (MSDS) to NCC Representative conforming to the Workplace Hazardous Materials Information System (WHMIS)

1.3 PART 01 – CONSTRUCTOR`S GENERAL SAFETY PLAN

.1 Part 1 of the plan, the constructor`s general safety plan shall include, but not limited to the following:

.1 Health and Safety Policy;

.2 Health and Safety Program that supports the Health and Safety Policy;

.3 Roles and responsibilities; and

.4 General rules and procedures for all tasks that the Constructor performs.

1.4 PART 02 – SITE SPECIFIC SAFETY PLAN

.1 Part 2, the Site Specific Health and Safety Plan must only contain information specific to this project and must observe and enforce all provincial, territorial and local laws, ordinances and regulation.

.2 The plan shall include but not limited to the following:

.1 Description of Project (a brief overview of the project);

.2 Site Plan identifying emergency evacuation plan/procedures, routes, meeting areas, safety board location, site office, etc.;

.3 Written procedures to address site specific accidents/emergencies (must incorporate existing building emergency procedures);

.4 Emergency phone numbers list;

.5 Health and Safety Representative/Committee/Workers Trade Committee;

.6 Applicable permits from the authorities having jurisdiction (i.e. building, electrical, etc.)

.7 Hazard Assessment/Analysis (Task - Hazard - Control);

.8 Designated Substances Report (DSR), identify location and provide written procedures on how they will be addressed;

.9 Copy of mandatory Training Certificates:

- .1 First aid certification;
- .2 Copy of Trade Qualifications and Apprenticeship Certificates;
- .3 Fork lift truck certificate and other security certificates;
- .4 All other certificates require for the project
- .5 WHMIS, Fall Protection, First Aid, Confined Space, Cement Truck Certificate, JPO, etc.);

.10 The obligation of the employer to provide equipment, material and protective devices and to keep them in good condition for all staff, including sub- contractor;

.11 List of the emergency team members, according to the WHMIS regulation;

.12 List of all Sub Contractors, Contact Names & Address;

.13 Copy of all Sub Contractors "Competency and Health and Safety Acknowledgment Statement"

.14 Worker orientation for this Project;

.15 Copy of all applicable contractor licenses, including, but not limited to the following:

- .1 Notice of Project
- .2 Registration Form
- .3 Liability Insurance
- .4 WSIB Clearance Certificates from all companies
- .5 Job Protection Office (JPO) registration
- .6 Hot work procedures

.16 Controlled products, WHMIS/MSDS

.17 Communications plan;

.18 Emergency plan taking into consideration all potential problems or situations which could arise for the duration of the project.

1.5 GENERAL REQUIREMENTS

.1 Submit a Site Specific Health and Safety Plan within seven (7) days of receiving the letter of notification.

.2 NCC Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

.3 If the requested documentation is not received within 7 business days of receiving the letter of notification, the NCC reserves the right to proceed on to the next lowest compliant bidder.

.4 Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

1.6 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Assume responsibility for health and safety of all other contractors present on site under the prescriptions of the present section

.3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Health and Safety Act and Regulations for Construction Projects.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.8 UNFORESEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province of Ontario having jurisdiction. Advise NCC Representative verbally and in writing.

1.9 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario having jurisdiction, and in consultation with NCC Representative.

1.10 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by NCC Representative.

.2 Provide NCC Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 NCC Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.11 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

1.12 PERSONNEL HEALTH, SAFETY, AND HYGIENE

.1 Training: Ensure personnel entering site are trained in accordance with specified personnel training requirements.

.2 Personal Protective Equipment:

.1 PPE and protective clothing must be kept clean and well maintained.

1.13 EXCAVATING

.1 The Contractor shall ensure no person enters an excavation unless another worker is working above ground close to the excavation or to the means of access to it.

.2 The Contractor shall arrange the locating and marking of gas, electrical and other services prior to commencing an excavation.

.3 The Contractor shall obtain approval from Consultant before arranging the shut off and disconnection of a service that may pose a hazard.

.4 The Contractor shall comply with the requirements of Section 230 to 242, O. Reg. 213/91, OHSA.

1.14 CHEMICALS

.1 The Contractor must provide a list of all chemicals to be used on site and a copy of the Material Safety Data Sheet (MSDS) for each chemical to the Consultant prior to being brought onto the job site.

.2 The Contractor must ensure each chemical container brought on site is clearly labelled with the identity of the chemical, information for the safe handling of the chemical and the location of the MSDS.

.3 The Contractor must ensure adequate measures are taken to control the distribution, within the application area or throughout the building, of fumes/vapours before applying flammable, noxious or volatile materials.

.4 The Contractor may be required to schedule the application of hazardous materials which might affect the well-being of any workers or disrupt work of other Contractors and cannot be adequately controlled to prevent such occurrences to evening or weekend periods.

.5 The Contractor must ensure workers wear the required personal protective equipment (respiratory protection, protective clothing, hand protection, eye/face protection, etc.) when working with chemicals.

.6 The Contractor must ensure the safe use and disposal of all chemicals that they are using. No chemicals and/or chemical waste product shall be disposed of on site without prior approval of Consultant.

.7 The Contractor may not store chemicals and compressed gas cylinders on site without approval of the Consultant. If approved, the Contractor must ensure incompatible chemicals are stored separately.

1.15 BLASTING

.1 Blasting of any other use of explosives is not allowed.

1.16 NOISE

.1 Contractor shall include in its agenda all noisy work and indicate them clearly in his work schedule.

.2 Noisy work shall only be executed according to the General Requirements Specification.

.3 The NCC Representative may stop at any time the work too noisy and ask to contractor to postpone a subsequent phase.

1.17 STOP WORK

.1 Prioritize the health and safety of the public and site personnel, and the protection of the environment, on issues related to the cost and the schedule of work.

PART 2 PRODUCT

2.1 NA

PART 3 EXECUTION

3.1 NA

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Management and Disposal of Excess Material: Section 01 61 10

.2 Excavation and Backfilling : Section 31 23 33.01

.3 Tree and Shrub Preservation : Section 32 01 90.33

1.2 DEFINITION

.1 Pollution and damage to the environment: presence of elements or chemical, physical or biological agents which have a detrimental effect on the health and well-being of people, which alter the ecological balance important for humans and which constitute an infringement of the species playing an important role in the latter or degrading characters aesthetic, cultural or historical environment

.2 Environmental protection: prevention/control of pollution and disturbance to habitat and the environment during construction. The prevention of pollution and damage to the environment covers the protection of soil, water, air, biological and cultural resources; It also includes the management of Visual aesthetics, noise, solids, chemical, gaseous and liquid waste of radiant energy, radioactive materials and other pollutants.

1.3 SUBMITTALS

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

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by NCC Contract Administrator. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

.3 Address topics at level of detail commensurate with environmental issue and required construction task[s].

.4 Environmental protection plan: to include:

.1 Name[s] of person[s] responsible for ensuring adherence to Environmental Protection Plan.

.2 Name[s] and qualifications of person[s] responsible for manifesting hazardous waste to be removed from site.

.3 Name[s] and qualifications of person[s] responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings showing locations of proposed temporary excavations or enclosures for material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources plan that defines procedures for identifying and protecting historical, archaeological and cultural resources.

1.4 FIRE

.1 Fires and burning of rubbish on site is not permitted.

1.5 DIPOSAL OF WASTE

.1 Burying of rubbish and waste materials on site is not permitted.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

.3 Waste materials to be as per Section 01 61 10 - Management and Disposal of Excess Material.

1.6 DRAINAGE

.1 Provide a plan of measures against erosion and sediment transport, indicating the means that will be implemented, including monitoring of the work and the production of reports, to ensure that these measures are consistent with the laws and federal, provincial and municipal regulations.

.2 A storm water pollution prevention plan can replace the plan of measures against erosion and sediment transport.

.3 Ensure the drainage and pumping temporary, needed to keep the excavations and the site dry.

.4 It is forbidden to pump water containing suspended solids to a watercourse, a sewer or drain or drainage system.

.5 Ensure the evacuation or the elimination of wastewater containing substances in suspension or harmful substances in accordance with the requirements of local authorities.

.6 Control and exhaust particulate-laden waters pending or containing any other hazardous material according to the requirements of the responsible authorities. Cover from storage piles of contaminated and uncontaminated land with a tarp to prevent runoff from entering the sewer system or waterways.

1.7 SITE CLEARING AND PLANT PROTECTION

.1 Minimize stripping of soil during sod removal.

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities emission requirements.

.3 Build temporary shelters to prevent sanding materials and other foreign materials contaminate air and waterways beyond the area of application.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.9 PRESERVATION OF HISTORICAL / ARCHAEOLOGICAL CHARACTER

.1 The excavation work related to the installation of the Residence Front Entrance Project will be monitored for archaeological resources by the NCC professional archaeologist;

.2 The archaeologist conducting monitoring is authorized to halt excavation work temporarily, in order to record archaeological features and to collect archaeological artifacts the may be exposed by the work.

.3 Contractor to advise the NCC Representative ten (10) day prior to beginning of excavation

.4 The contractor shall provide for the protection of historical, archaeological, cultural and biological resources known or discovered during the duration of the work.

.5 If the protection of these resources is not appropriate, the NCC Representative will order stop work until satisfactory corrective measures are taken.

.6 No additional time, no fees or no adjustment will be awarded for the work stoppage.

1.10 REVIEW AGENCIES

.1 Various concerned Government agencies may be on site during construction and the Contrac or shall provide easy access and meet the requirements of those agencies without delay.

PARTIE 2 PARTIE 2 – PRODUCTS

2.1 NA

PARTIE 3 PARTIE 3 – EXECUTION

3.1 NA

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes
- .1 Construction aids.
- .2 Office and sheds.
- .3 Parking.
- .4 Project identification.

1.2 Related Sections
- .1 Section 01 51 00 - Temporary Utilities.
- .2 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 References
- .1 Canadian Standards Association (CSA International)
  - .1 CAN3-A23.1-/A23.2-94, Concrete Materials and Methods for Concrete Construction/Method of Test for Concrete.
  - .2 CSA-0121-M1978, Douglas Fir Plywood.
  - .3 CAN/CSA-Z321-96, Signs and Symbols for the Occupational Environment.

1.4 Installation and Removal
- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.5 Site Storage/Loading
- .1 Refer to CCDC 2, GC 3.12.
- .2 Confine work and operations of employees to the limits of work by Contract Documents except for access to the Work sites. Do not unreasonably encumber premises with products.
- .3 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.6 Construction Parking
- .1 Parking will be permitted on site within the limits of construction in accordance with the approved construction staging and traffic control plan provided in accordance with Section 10 35 30 Traffic Control, and it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.7 Security
- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.9 Equipment, Tool and Materials Storage
- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.10 Sanitary Facilities

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 Construction Signage

.1 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321.

.2 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by the NCC Representative.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes
- .1 Barriers
- .2 Environmental Controls
- .3 Traffic Controls
- .4 Fire Routes

1.2 Related Sections
- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 52 00 – Construction Facilities
- .3 Section 01 74 19 – Waste Management
- .4 Section 32 01 91 – Tree Preservation

1.3 References
- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.
  - .2 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-O121-[M1978 (R2003)], Douglas Fir Plywood.
- .3 Public Works and Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.4 Installation and Removal
- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.5 Hoarding
- .1 Erect temporary modular construction fencing to secure the Work Area and any hoarding areas outside of the Work Area in accordance with the drawings and to the approval of the NCC Representative. Fencing shall be securely anchored to the ground.
- .2 Provide minimum one (1) lockable truck entrance gate and at least one (1) pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .3 Fabricate and install weather resistant signage on the public side of the construction fence at the Princess Anne Entrance and at the driveway by the western limit of the work yard to inform the public of project objectives. Final design will be provided by the NCC Representative. Securely fasten signage at eye level. Maintain public side of enclosure in clean condition.
- .4 The modular construction fencing shall also act as the tree protection fencing. Protect existing trees and vegetation from damage by equipment and construction procedures. Refer to Section 32 01 91 – Tree Preservation.
- .5 Install weather resistant signage on the inside of the construction fence that reads "TREE PROTECTION ZONE – Do Not Enter / AIRE DE PROTECTION D'ARBRES – accès interdit". Height of lettering to be minimum 100mm. Ensure high contrast between lettering and background surface. Final design to be approved by the NCC Representative. Fabricate and install signage prior to commencing construction activities. Securely fasten signage at eye level every 12m for the length of the protective fencing.
- .6 Maintain hoarding in good repair.

1.6 Guard Rails and Barricades
- .1 Provide secure, rigid guard rails and barricades around deep excavations.
- .2 Provide all security elements as required by governing authorities.

1.7 Dust Tight Screens
- .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Install screens on all construction fence panels.
- .3 Maintain and relocate protection until such work is complete.

1.8 Access to Site
- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
- .2 Maintain access to the Princess Anne entrance.

1.9 Public Traffic Flow
- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.10 Fire Routes
- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.11 Protection for Off-Site Property
- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.12 Protection of Building Finishes
- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with NCC Representative locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.13 Waste Management and Disposal
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management.

PART 2 – PRODUCTS

2.1 Construction Fencing
- .1 Modul-loc Temporary Fence panels or approved equivalent. Panels shall be 1.8m high x 3m wide, powder coated green finish, constructed with square structural steel tubing and 9 gauge welded wire mesh.

2.2 Dust Tight Screens
- .1 Norseman WeatherShield Debris Netting or approved equivalent. The netting shall be green transparent to allow site security to see the interior of the Work Area.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections
- .1 Section 01 33 00 - Submittal Procedures.

1.2 Submittals
- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
  - .1 Structural integrity of elements of project.
  - .2 Integrity of weather-exposed or moisture-resistant elements.
  - .3 Efficiency, maintenance, or safety of operational elements.
  - .4 Visual qualities of sight-exposed elements.
  - .5 Work of Owner or separate contractor.
- .3 Include in request:
  - .1 Identification of project.
  - .2 Location and description of affected Work.
  - .3 Statement on necessity for cutting or alteration.
  - .4 Description of proposed Work, and products to be used.
  - .5 Alternatives to cutting and patching.
  - .6 Effect on Work of Owner or separate contractor.
  - .7 Written permission of affected separate contractor.
  - .8 Date and time work will be executed.

1.3 Materials
- .1 Required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Preparation
- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.5 Execution
- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Remove samples of installed Work for testing.
- .6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not

allowed on masonry work without prior approval.

.10 Restore work with new products in accordance with requirements of Contract Documents.

.11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes
- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 Related Section
- .1 Section 01 74 19 - Waste Management and Disposal.

1.3 Project Cleanliness
- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by NCC Representative.
- .3 Clear snow and ice from access if required for site access.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
- .7 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .8 Dispose of waste materials and debris off site.
- .9 Clean areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.4 Final Cleaning
- .1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by NCC Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Remove stains, spots, marks and dirt from fencing.
- .8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .9 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds disturbed by the work of this contract.

.10 Remove dirt and other disfiguration from exterior surfaces.
.11 Sweep and wash clean paved areas disturbed by the work of this contract.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes
- .1 Text, schedules and procedures for systematic Waste Management Program for construction, deconstruction, demolition, and renovation projects, including:
  - .1 Diversion of Materials.
  - .2 Canadian Governmental Responsibility for the Environment Resources - Schedule - E.

1.2 Related Sections
- .1 Section 01 33 00 - Submittal Procedures.

1.3 Definitions
- .1 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.
- .2 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .3 Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .4 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2 Returning reusable items including pallets or unused products to vendors.
- .5 Salvage: Removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .6 Separate Condition: Refers to waste sorted into individual types.
- .7 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

1.4 Submittals
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
  - .1 Failure to submit could result in hold back of final payment.
  - .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled co-mingled and separated off-site or disposed of.
  - .3 For each material reused, sold or recycled from project, include amount in tonnes and the destination.
- .3 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.5 Quality Assurance – Site Visit
- .1 Pre-bid site visit:
  - .1 Walk-through of project site prior to completion of bid tender submittal is mandatory.

1.6 Waste Processing Sites
- .1 Provide waste processing site destination locations.

1.7 Storage, Handling and Protection
- .1 Store, materials to be reused, recycled and salvaged in locations as directed by NCC Representative
- .2 Unless specified otherwise, materials for removal do not become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect surface drainage, mechanical and electrical from damage and blockage.
- .6 Separate and store materials produced during dismantling of structures in designated areas.
- .7 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off-site processing facility for separation.
  - .3 Provide waybills for separated materials.

1.8 Disposal of Wastes
- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
  - .1 Number and size of bins.
  - .2 Waste type of each bin.
  - .3 Total tonnage generated.
  - .4 Tonnage reused or recycled.
  - .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.9 Use of Site and Facilities
- .1 The facilities will not be used until construction is complete.

1.10 Scheduling
- .1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 3 - EXECUTION

3.1 Application
- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 Cleaning
- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

3.3 Diversion of Materials
- .1 Separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by NCC Representative and consistent with applicable fire regulations.
  - .1 Mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

.2 On-site sale of materials is not permitted.

.3 Demolition Waste shall be disposed off site if not scheduled for re-use or salvage and deliver to Owner. Provide a schedule of diversion of demolition waste.

.4 Construction Waste

Material Type	Recommended Diversion	Actual Diversion %
Cardboard	100	_____
Plastic Packaging	100	_____
Rubble	100	_____
Steel	100	_____
Wood (uncontaminated)	100	_____
Other	_____	

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 Inspection and Declaration

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify NCC Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request NCC Representative's Inspection.

.2 NCC Representative's Inspection: NCC Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and are fully operational.

.4 Certificates required by Utility companies and regulating bodies have been submitted.

.5 Operation of systems have been demonstrated to NCC Representative's personnel.

.6 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by NCC Representative, and Contractor If Work is deemed incomplete by NCC Representative, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: NCC Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: Date of NCC Representative's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: When NCC Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by NCC Representative, complete outstanding items and request re-inspection.

.8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount.

END OF SECTION

PART 1 – GENERAL

1.0 Scope

.1 This section is to be used for the relocation and refinishing of the existing flagpoles. Footings, anchorage, and accessories shall be new, as indicated, and existing flagpoles shall be refinished, as indicated.

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures
.2 Section 01 74 21 - Waste Management and Disposal
.4 Section 03 30 00 - Cast-in-Place Concrete
.5 Section 31 23 10 – Excavating, Trenching & Backfilling

1.2 References

.1 The Aluminum Association (AA).
  .1 AA DAF-45-R03, Designation System for Aluminum Finishes - 9th Edition.
.2 American Society for Testing and Materials International, (ASTM).
  .1 ASTM B 241/B241M-02, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
.3 Canadian Standards Association (CSA International).
  .1 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 Design Requirements

.1 Bases and anchorage devices to resist minimum wind velocity of 130 km/h unflagged, 115 km/h flagged.
.2 Description:
  .1 Acceptable Manufacturer: Flag Outlet Ltd. 457 Commissioner Rd E, London, ON, 1-800-596-0999, www.flagpole.ca
  .2 Model: Step Tapered Aluminum Flagpole
  .3 Exposed Height: 25 feet
  .4 Butt Diameter: 3.5 inches
  .5 Top Diameter: 3 inches
  .6 Wall Thickness: 0.250 inches
  .7 Options and Accessories:
    1. Stationary Shoe Base Anchor complete with galvanized anchor bolts.
    2. Revolving ball
    3. Internal Halyard (lock door) including: counterweight and 5/16" aluminum retaining ring; flag attachment cable with bronze swivel snap hooks, 1/8" stainless steel 7/19" cable, internal plastic chain with cleat, aluminum flush mounted door and S/S lock. Include all halyard fittings and flag fastenings.
    4. Matching aluminum domed base cover.

1.5 Submittals

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit manufacturer's technical data and installation instructions for flagpole.
.3 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  .1 Indicate dimensions, finishes, base jointing, anchoring and support systems, cleats, halyard boxes, trucks, finials and base collar for flagpoles.
  .2 Submit shop drawings of flagpoles and bases, showing general layout, jointing and complete anchoring and supporting systems.

1.6 Quality Assurance

.1 Provide each flagpole as complete unit, including fittings, accessories, bases and anchorage devices.

1.7 Delivery and Storage
- .1 Store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Storage on site:
  - .1 Flagpole must be stored unwrapped as wet or damp cardboard wrapping will stain the flagpole.

1.8 Waste Management and Disposal
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 – PRODUCTS

2.1 Materials
- .1 Isolation coating: alkali-resistant bituminous paint or epoxy resin solution. Flagpoles to be sanded and repainted prior to installation.
- .2 Concrete Footings: Concrete mixes and materials to Section 03 30 00 – Cast-in-Place Concrete.

2.2 Fabrication
- .1 Supply Base mounting brackets, anchorage and fittings.

2.3 Accessories
- .1 Truck assembly: cast aluminum, stainless steel ballbearing, nonfouling, revolving double truck assembly, finish to match flagpole.
- .2 Shield: Aluminum shield for 3.5” pole. Finish to match flagpole.
- .3 Anchor Base: Cast Aluminum
- .4 Halyard: Internal Halyard (lock door) including: counterweight and 5/16" aluminum retaining ring; flag attachment cable with bronze swivel snap hooks, 1/8" stainless steel 7/19" cable, internal plastic chain with cleat, aluminum flush mounted door and S/S lock. Include all halyard fittings and flag fastenings.

2.4 Finishes
- .1 Aluminum.
  - .1 Finish exposed surfaces of aluminum components in accordance with AA-M12-C22-A31.
    - .1 Finish: Clear anodize.

2.5 Field Fabrication
- .1 Fabricate ground-set foundation assembly for flush installation of flagpole as indicated.

PART 3 – EXECUTION

3.1 Layout and Footings
- .1 Layout flagpoles as indicated or as directed by NCC Representative.
- .2 Excavate as indicated and install concrete footings.

3.2 Installation

.1 Shop apply isolation coating to metal surfaces of flagpole and base that will be encased in concrete.
.2 Install flagpoles, base assemblies and fittings as per shop drawings and manufacturer's instructions.
.3 Check and adjust installed fittings for smooth operation of halyards.

3.3 Cleaning
.1 The contractor shall clean the jobsite of excess materials and dispose off site.
.2 Touch-up damaged finishes in accordance with manufacturer’s instructions and to approval of NCC Representative. Remove and replace damaged components that cannot be successfully repaired as determined by NCC Representative.
.3 Clean flagpoles promptly after installation in accordance with manufacturer’s instructions. Do not use harsh cleaning materials or methods that could damage finish.
.4 Protect installed flagpoles to ensure that, except for normal weathering, site furnishings will be without damage or deterioration at time of substantial completion.

3.4 Warranty
.1 The flagpole accessories and bases shall be warranted for materials and workmanship for 2 years.
.1 Manufacturer's limited 2-year warranty shall be supplied to the NCC Representative.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Total demolition and removal of site elements indicated on drawings and in this section.
.2 Salvage and relocation of site elements and utilities as indicated on the drawings.

1.2 Related Sections

.1 Section 01 35 43 - Environmental Procedures.
.2 Section 01 74 19 - Waste Management.
.3 Section 01 74 11 - Cleaning.

1.3 References

.1 Department of Justice Canada (Jus).
  .1 Canadian Environmental Assessment Act (CEAA), 1997, c. 37.
  .2 Canadian Environmental Protection Act, 1999 (CEPA), c. 33.
  .3 Refer to sections F2020 - Hazardous Components Abatement and G1040 –
.2 Hazardous Waste Remediation for environmental protection, removal, and disposal procedures for designated contaminated or hazardous substances.
.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
.4 Material Safety Data Sheets (MSDS).
.5 Transport Canada (TC).
  .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.
.6 Canadian Standards Association (CSA)
  .1 CSA S350-M1980(R2003),, Code of Practice for Safety in Demolition of Structures.
.7 Underwriters Laboratories of Canada (ULC)
  .1 ULC/ORD-C107.19-1992, Secondary Containment of Underground Piping.

1.4 Definitions

.1 Demolition: rapid destruction of building, structure or built elements preceded by the removal of hazardous materials if present.
.2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well-being or environment if handled improperly.
.3 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

1.5 Submittals

.1 Submittals in accordance with Section 01 33 00 – Shop drawings, Product data and Samples
.2 Shop drawings :
  .1 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.
.3 Prior to beginning of Work on site submit for approval the name and address of facilities accepting construction waste material.
.4 Submit copies of weigh bills or receipts from authorized disposal sites and reuse and recycling facilities for material removed from site at the end of the work or upon request of the NCC Representative.

1.6 Quality assurance

.1 Regulatory Requirements : ensure work is performed in compliance with all applicable Provincial and territorial regulation.

.2 Site Meeting :
- .1 Convene pre-installation meeting one week prior to beginning to:
  - .1 Verify project requirements.
  - .2 Review installation conditions.
  - .3 Co-ordination with other subtrades.

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

.4 Hold project meeting every week.

.5 Reporting requirements: WMC must provide written report and other required documents.

.6 The WMC must provide verbally report on status of waste diversion activity at each meeting.

.7 NCC Representative will provide notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.8 Health and safety
- .1 Respect health and safety regulation for construction professional in accordance with section 01 35 30 Health and Safety.

1.7 Delivery, storage and handling

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

.2 Storage and protection
- .1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of the NCC Representative and at no cost to the NCC.
- .2 Remove and store materials to be salvaged, in manner to prevent damage.
- .3 Handle salvaged materials as new materials.

1.8 Site conditions

.1 Site environmental Requirements
- .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures
- .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .3 No waste is to be burned on site.
- .4 No waste of waste material should be buried on site.
- .5 Do not dispose of waste, volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
  - .1 Ensure proper disposal procedures are maintained throughout the project.
- .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities and as directed by the NCC Representative.
.8 Protect vegetation (trees, plants, shrubs, foliage) on site and adjacent properties as indicated.
.9 During execution of the demolition work, erect temporary protection enclosure to prevent substances of foreign materials contaminating the air outside work area.
.10 Cover dry waste and wet down debris before removal to prevent the uprising of dust and debris. Apply a dust suppressant on all the temporary access road.
.11 Temporary erosion and sediments in accordance with section 01 52 00 – Temporary barriers and enclosure.

.1 After completion of demolition work, remove control measure and stabilized all surfaces disturbed by demolition work.

.2 Existing conditions
.1 List of hazardous materials
.1 free silica is present in the concrete and asphalt
.2 asbestos may be present interior walls.
.3 No other hazardous material found to date
.2 If materials resembling hazardous substances or any other controlled dangerous substance are discovered during the performance of the work, the latter must be interrupted, appropriate prevention measures must be taken and the NCC Representative must be informed right away. Do not resume work before having received written instructions from NCC Representative
.3 Existing conditions refers to the conditions of the structure or site elements to be demolished on the day of the acceptance of tender.
.3 Protection of existing work
.1 Perform work in accordance to section 01 35 43 Environmental Protection and erosion and sediment control plan.
.2 Take the necessary measures to prevent damage, displacement or the collapse of structures, utilities, sidewalks, pavement, trees and landscaping.
.1 Provide and install the necessary bracing and shoring parts.
.2 Where appropriate, repair works damaged during demolition work according NCC Representative's directive.
.3 Properly shore up structure and works. If the demolition work seem to constitute a danger to the rest of the structure or of the work or for structures or adjacent structures or utility lines, take the appropriate precautionary measures, stop work and notify the NCC Representative.
.4 Ensure that demolitions do not obstruct the surface water drainage, elevators, lifts as well as electrical and mechanical systems must remain in service.
.5 Do not interrupt public service lines which are in service or under voltage and which cross sites or should not be moved.

1.9 Performance Requirements
.1 Existing Conditions
.1 Should material resembling spray or trowel applied asbestos or other designated substance listed be encountered in course of demolition, stop work, take preventative measures, and notify NCC Representative immediately. Do not proceed until written instructions have been received.
.2 List of items to be salvaged for reuse:
.1 Stone from fountain and cobblestone
.2 Existing flag poles, as indicated

.3 Existing light standards, as indicated
.4 Existing drinking fountain, as indicated
.5 Any site furnishings identified by NCC Representative
.1 Remove, protect and store salvaged items as directed by NCC Representative. Salvage items for re-use as identified by NCC Representative and NCC. Deliver to NCC as directed.

.2 Perform work in accordance with requirements of this section.
.3 Protection:
.1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades parts of existing building to remain. Provide bracing, shoring as required. Repair damage caused by demolition as directed by NCC Representative.
.2 Support affected structures and, if safety of structure being demolished or adjacent structures or services appears to be endangered, take preventative measures and then cease operations and notify NCC Representative.
.1 Perform work in accordance with Section - Environmental Protection.
.3 Prevent debris from blocking surface drainage system, mechanical and electrical systems which must remain in operation.
.4 Ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
.5 Fires and burning of waste or materials is not permitted.
.6 Do not dispose of waste or volatile materials such as: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.
.7 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
.8 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
.9 Protect trees, plants and foliage on site and adjacent properties where indicated.
.10 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
.11 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on temporary roads.
.12 Take precaution to protect adjacent structures, paving, services and planting from damage, movement, or settlement during demolition work. Make good damage caused by demolition.

1.10 Propping, Support and Underpinning

.1 Protect excavation with proper methods and in accordance with section 01 35 30 Health and Safety and with Health and Safety Act of the Province of Ontario.
.1 When conditions are unstable, the NCC Representative must first conduct necessary inspections and indicate the best methods to be used.
.2 Build temporary structures at the depth, height and in the location authorized by the NCC Representative.

1.11 Scheduling

.1 Employ necessary means to meet project time lines without compromising prescribed minimum rates of material recycling.
.1 Notify NCC Representative in writing when unforeseen delay[s] occur.

PART 2 - EXECUTION

2.1 Material and Equipment
- .1 Materials and Heavy Machinery
  - .1 road vehicles must comply with the requirements of the regulations on emissions of road vehicles and their engines, SOR/2003-2, taken under CEPA and the regulations amending the regulations on emissions of road vehicles and their engines, SOR/2006-268, made under CEPA
  - .2 Shut down machinery when not in use, except when extreme temperatures require that machinery be kept in operation.

2.2 Preparation
- .1 Inspect site with NCC Representative and verify extent and location of site elements designated for demolition, relocation, removal, disposal, and salvage. Identify and mark new location for items to be relocated. Verify source, capacity, and routing for utilities required to service relocated items.
- .2 Identify and protect items designated to remain.
- .3 Disconnect, cap, and re-route utilities entering proposed building extension. Co-ordinate with NCC Representative to minimize disruption to base when work on active or energized utilities traversing premises and designated to remain is required.
- .4 Do not disrupt active or energized utilities traversing site work ware designated to remain undisturbed.
- .5 Prior to commencement of demolition work remove contaminated or hazardous materials listed as defined by authorities having jurisdiction from site and dispose of at designated disposal facilities in safe manner and in accordance with the TDGA. Refer to 1.4.1, Existing Conditions.
- .6 Use natural lighting to work by wherever possible. Shut off lighting except those required for security purposes at end of day.

2.2 Site Elements Demolition
- .1 Demolish and remove site elements indicated in drawings, as required by work.
- .2 In removal of pavements, curbs and gutters:
  - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by NCC Representative.
  - .2 Protect adjacent joints and load transfer devices.
- .3 At end of day's work, leave work in safe condition so that no part is in danger of toppling or falling.
- .4 Demolish to minimize dusting. Keep materials wetted as directed by NCC Representative.
- .5 Dispose materials not designated for salvage or reuse off site daily in designated landfill site.
- .6 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

2.3 Site Elements Relocation
- .1 Coordinate execution of work with NCC Representative to minimize interruptions to daily operation of base.
- .2 Relocate site elements indicated on drawings as required by Work.
- .3 Provide relocated site elements with required utilities and services. Co-ordinate with NCC Representative to minimize disruption to base when work on active or energized utilities

traversing premises designated to remain is required. Make good damage caused by this work. Record location of new and rerouted services.

.4 Perform excavation, trenching, and backfilling for foundations in accordance with specified requirements.

.5 Connect required services to relocated items.

.6 Dispose material not designated for salvage or reuse off site daily in designated landfill sites.

2.4 Utility Relocation

.1 Locate utilities prior to starting demolition and relocation work. Verify location of existing services and review routing of proposed relocation with NCC Representative and obtain approval prior to commencing work.

.2 Co-ordinate execution of work with NCC Representative to minimize disruptions to daily operations.

.3 Disconnect and cap utilities to be abandoned. Reroute utilities required by work in subsections 3.3 and 3.4 as indicated on drawings and as follows:

.1 relocation of existing watermain. The watermain must be re connected using a pipe diameter and lengths and slopes as to meet and match existing.

.4 Reroute utilities in accordance with requirements of technical performance specification sections in Level II Group Elements G30 - Site Plumbing Utilities, G40 - Site Electrical Utilities and G50 - Other Site Construction.

.5 Maintain services to other buildings and properties entering work area operational. Make good damage caused by this work. Record location of rerouted services.

2.5 Relocation Clean-Up

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to commencement of work match condition of adjacent, undisturbed areas.

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

.3 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.

.4 At end of day's work leave work in safe and stable condition. Protect interiors of parts not to be demolished from exterior elements at all times.

2.6 Environmental

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

PART 3 EXECUTION

3.1 Preparation

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

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

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

3.2 Removal of hazardous waste

.1 As prescribed by environmental protection authorities having jurisdiction, remove contaminated or dangerous materials from site and dispose of in such a manner as to minimize danger on site and during disposal.

3.3 Removal Operations

.1 Remove items as indicated.
.2 Do not disturb items designated to remain in place.
.3 Removal of Pavements, Curbs and Gutters:
  .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by NCC Representative.
  .2 Protect adjacent joints and structures from load transfer.
  .3 Protect underlying and adjacent granular materials.
  .4 Dispose of concrete and asphalt materials at a local disposal facility approved by the NCC Representative.
  .5 Protect asphalt that is to remain on site, lighting and other work from deterioration. If elements to remain on site are damaged during work, immediately replace or repair to the satisfaction of the NCC Representative at no cost to the NCC.
  .6 Remove existing asphalt as per limits and elevations indicated on the contract document or established on site by NCC Representative.
  .7 Remove existing fountain chamber as indicated in specs and drawings.
  .8 Use materials and methods of removals that do not move of damage the underlying layers unless otherwise indicated.
  .9 Prevent removed asphalt to be mixed with soil, underlying gravel or any other material.
  .10 Provide a way to remove or at least to limit dust produced during the removal work
  .11 Clean all asphalt surface to remain on site from debris cause by removal works using motorized rotary brooms or hand brushes, as required.
    .12 Remove and provide temporary connection to the irrigation line as required and reinstalled as indicated in the contract document.

.4 Stockpile topsoil for final grading and landscaping as per section 01 61 10 – Management and disposal of excess materials.
  .1 Provide erosion control if not immediately used.

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

3.4 Demolition

  .1 Remove items indicated on drawings to allow for indicated work.
  .2 Execute demolition work to
    .1 create least amount of dust possible. Keep materials wet according to the NCC Representative's directions.
  .3 Contractor can't remove materials with other than by ecological methods specified by the NCC Representative.
  .4 Except otherwise specified, remove and evacuate the construction demolition material according to the requirements of the competent authorities.
  .5 Perform the work in day light as much as possible.
    .1 At the end of each working period, close all light sources except those that are used for security purposes.

3.5 Stockpiling

  .1 Stockpiling on site will be very limited.

.2 Label stockpiles, indicating material type and quantity.
.3 Designate appropriate security resources/measures to prevent public safety issues.
.4 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
.5 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.6 Removal from site

.1 Remove stockpiled material as directed by NCC Representative, when it interferes with operations of project.
.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
.3 Transport material designated for alternate disposal using approved receiving organizations listed in the Waste Reduction Workplan and in accordance with applicable regulations.
.1 Written authorization from NCC Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.
.4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
.1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
.2 Written authorization from NCC Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.7 Restoration

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work .
.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
.3 if necessary, repair without delay the works of other entrepreneurs who have been damaged in the above repair or replacement work.
.4 If, in the opinion of the NCC Representative, it is not appropriate to repair defective works or deemed not conform to the contract documents, the NCC will deduct from the contract amount the difference in value between the executed work and the prescribed work in the contract documents, the amount of this difference being determined by the NCC Representative.

3.8 Cleaning

.1 Remove debris, trim surfaces and leave work site clean, upon completion of Work
.2 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes
.1 Methods for removal of existing asphalt pavement.

1.2 Related Sections
.1 Section 01 52 00 – Construction Facilities
.2 Section 01 74 19 – Waste Management and Disposal
.3 Section 02 41 13 – Selective Site Demolition

1.3 Measurement Procedures
.1 Removal of existing asphalt pavement will be measured in square metres of surface actually removed regardless of depth removed or number of operations required.
.2 Payment under this item will include operations involved in removing, hauling and stockpiling designated pavement and cleaning of remaining pavement surface.

1.4 Waste Management and Disposal
.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management And Disposal.
.2 Divert unused asphalt materials from landfill to local facility approved by NCC Representative.

PART 2 – PRODUCTS

2.1 Equipment
.1 Use cold milling, planning or grinding equipment with automatic grade controls capable of operating from stringline, and capable of removing part of pavement surface to depths or grades indicated.

PART 3 – EXECUTION

3.1 Preparation
.1 Prior to beginning removal operation, inspect and verify with NCC Representative areas, depths and lines of asphalt pavement to be removed.

3.2 Protection
.1 Protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of NCC Representative at no additional cost.

3.3 Removal
.1 Remove existing asphalt pavement to lines and grades as indicated.
.2 Use equipment and methods of removal and hauling, which do not damage or disturb underlying pavement.
.3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.
.4 Provide for suppression of dust generated by removal process.

3.4 Stockpiling of Material
.1 Dispose of removed asphalt pavement by stock-piling in location designated by NCC Representative.

.2 Removed asphalt pavement which is to be recycled in hot mix asphalt concrete under this contract may be stockpiled at designated asphalt plant site.

3.5 Finish Tolerances

.1 Finished surfaces in areas where asphalt pavement has been removed to be within +/-[5]mm of grade specified but not uniformly high or low.

3.6 Sweeping

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 07 84 00 - Fire Stopping.

.3 Section 09 91 23 - Interior Painting.

.4 Section 23 05 93 - Testing, Adjusting and Balancing.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
- .1 ANSI/ASHRAE/IESNA 90.1-2010, Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 National Research Council Canada
- .1 NRCC NBCC-2010, National Building Code of Canada 2010.

1.3 GENERAL

.1 This section covers items common to all sections of Divisions 22, 23 & 25.

.2 Coordinate location & installation of all equipment with all trades to ensure the equipment is serviceable.

.3 Prime mechanical contractor shall be responsible to ensure that all requirements of Divisions 22, 23 & 25 are met and comply with all other divisions and contract documents.

.4 The word "provide" shall mean "supply and install".

.5 Conform to the requirements of Division 00 & Division 01.

.6 It is a requirement of this Contract that there be a single prime mechanical Sub-contractor who shall retain sub-sub-contractors for all the other mechanical sub-contractors work as defined with contract documentation. There shall not be more than one prime mechanical trade sub-contractor directly retained by the Contractor. Sub-sub mechanical contractor shall include but not limited to, insulation, plumbing, HVAC, controls, refrigerations, service, welding, seismic, acoustic, and specialties, etc. The contractor shall not be the mechanical prime sub-contractor.

1.4 EQUIPMENT

.1 General:
- .1 Mechanical equipment that is not regulated by the Green Energy Act, shall carry a permanent label installed by the manufacturers stating the equipment complies with the requirement of ANSI/ASHRAE/IESNA 90.1.
- .2 The minimum equipment efficiency, standard rating and operating conditions shall be as per ANSI/ASHRAE/IESNA 90.1, superceded by Ontario Building Code (OBC) Supplementary Standard SB -10, unless indicated otherwise on contract documents. The higher of the energy efficiencies of the listed equipment shall prevail.
- .3 Provide new materials and equipment of proven design, quality and of current models with published ratings for which replacement parts are readily available.

.4 Uniformity: Use product of one manufacturer unless otherwise specified, for equipment or material of the same type of classification.

.2 Installation:
.1 Unions, flanges and/or couplings: provide for ease of maintenance and disassembly.
.2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer, Code or as indicated; whichever is the more stringent.
.3 Equipment drains: pipe to floor drains in a manner which is non-obstructing.
.4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.
.5 Unless otherwise specified, follow manufacturer's recommendations for safety, adequate access for inspection, maintenance and repairs.
.6 Permit equipment maintenance and disassembly with minimum disturbance to connecting piping and duct systems without interference with building structure or other equipment.
.7 Lubrication: Provide accessible lubricating means for bearings, including permanent lubrication "Lifetime" bearings. Extended grease nipples to be supplied.

1.5 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other divisions.

1.6 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.7 ELECTRICAL

.1 Electrical work to conform to Division 26 including the following:
.1 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems. Refer to Division 26 for quality of materials and workmanship.

.2 Any costs associated with deviation of mechanical equipment rating affecting electrical Division 26 shall be carried by this contract.

.3 All control wiring & conduit associated with Building Automation System & HVAC controls shall be provided by Divisions 22, 23 & 25 including power wiring to all control panels & other field mounted control devices.

1.8 PREPARATION FOR FIRESTOPPING

.1 Firestopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation: specified in Section 07 84 00 - Fire Stopping.

.2 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

1.9 PAINTING

.1 To Section 09 91 23 - Interior Painting.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Prime and touch up marred finished paintwork to match original. Use primer or enamel to match original. Do not paint over nameplates.

.4 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

.5 Hangers, supports and equipment fabricated from ferrous metals shall be given at least one coat of corrosion resistant primer paint before shipment to job site.

.6 Touch-up damaged surfaces of all mechanical equipment and materials, to the satisfaction of NCC Representative. Use primer or enamel to match original. Do not paint over nameplates.

1.10 SPARE PARTS

.1 Furnish spare parts, indicated in various section, and as follows:
- .1 One casing joint gasket for each size pump.
- .2 One head gasket set for each heat exchanger.
- .3 One glass for each gauge glass.
- .4 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

1.11 SPECIAL TOOLS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers.

1.12 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Where specified elsewhere in Divisions 22, 23 & 25, manufacturers to provide demonstrations and instructions.

.3 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Where deemed necessary, NCC Representative may record these demonstrations on video tape for future reference.

.6 Furnish trained instructors to instruct NCC Representative in the operation, maintenance and adjustment of all mechanical equipment; and, instruct personnel on any changes to or modifications of any equipment made under terms of the guarantee.

.7 The instructions shall take place during regular working hours before systems are accepted and turned over to NCC Representative.

.8 Ensure that the NCC Representative's operating personnel have received and been given opportunity to review the Operating and Maintenance Manuals prior to commencing instruction. Allow two full days on site for review of these manuals with NCC Representative and for their instruction in operation and maintenance of all mechanical equipment.

1.13 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance data for incorporation into manual in accordance with Div. 01 - General Requirements.

.2 Operation and maintenance manual (O&M) to be approved by, and final copies deposited with, NCC Representative before final inspection.

.3 For all equipment listed in O&M manuals provide a schedule detailing the supplied component, name, address & phone no. of equipment vendor, parts supplier and warranty agent.

.4 Operation data to include:
- .1 Control schematics for each system including environmental controls.
- .2 Description of each system and its controls.
- .3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
- .4 Operation instruction for each system and each component.
- .5 Description of actions to be taken in event of equipment failure.
- .6 Valves schedule and flow diagram.

.5 Maintenance data shall include:
- .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
- .2 Data to include schedules of tasks, frequency, tools required and task time.

.6 Performance data to include:
- .1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
- .2 Equipment performance verification test results.
- .3 Special performance data as specified elsewhere.
- .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing.

.7 Approvals:
- .1 Submit electronic format (pdf) copy of draft Operation and Maintenance Manual to NCC Representative for approval. Submission of individual data will not be accepted unless so directed by NCC Representative.
- .2 Make changes as required and re-submit as directed by NCC Representative.
- .3 Upon acceptance by NCC Representative submit one (1) electronic format (pdf) and three (3) hardcopies of O&M manuals .

.8 Additional data:
- .1 Prepare and insert additional data into operation and maintenance manual when the need becomes apparent during demonstrations and instructions specified above.

1.14 ACCEPTABLE PRODUCTS

.1 Design is based on first manufacturer's name under acceptable products. Subsequent manufacturer's names indicate that those named are acceptable providing they meet specifications and space limitations and are subject to acceptance by Shop Drawing Review.

1.15 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit single electronic (pdf) copy of shop drawings and product data along with transmittal, in accordance with Section 01 33 00 - Submittal Procedures. Hard copy shop drawings shall not be accepted.

.2 Shop drawings and product data shall show:
- .1 Mounting arrangements.
- .2 Operating and maintenance clearances. eg. access door swing spaces.

.3 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.
.2 Acoustical sound power data, where applicable.
.3 Points of operation on full equipment performance curves.
.4 Manufacturer to certify as to current model production.
.5 Certification of compliance to applicable codes.

.4 The information to be indicated on manufacturers' shop drawings submitted for review shall include the following:
.1 General arrangement drawings showing component parts. Where the equipment proposed, or a component part thereof, includes modifications to a manufacturers' standard to meet the requirements of a specification, a complete assembly drawing must be submitted.
.2 Overall dimensions, roughing-in dimensions and clearance dimensions of all major components.
.3 Mounting details and dimensions.
.4 Complete certified performance data for the specified application with particular reference to rate of flow, operating pressure and temperatures, entering and leaving conditions of air or fluid, operating weights, operating limitation, electrical characteristics and BHP requirements.
.5 Gauge of fabricated material and finish specification.
.6 Vibration isolators and resilient hangers stating locations and weight distribution.
.7 Electrical wiring diagrams, control panel boards, motor test data, motor starters and controls for electrically-operated equipment furnished by mechanical trades.

.5 Review of shop drawings or detail drawings will not relieve the obligation of ensuring that the equipment, materials, or layouts meet the functional requirements of the specifications, and that all necessary mounting space and clearance requirements are met. Thus, the NCC Representative's review is for assistance only.

.6 No equipment will be accepted on the job site without shop drawings having been reviewed by the NCC Representative.

1.16 CLEANING

.1 Prior to turnover to client, clean interior and exterior of all new systems. Replace all air & hydronic filters on new & modified systems. Vacuum interior of new and modified ductwork and air handling units.

1.17 AS-BUILT DRAWINGS

.1 Site records:
.1 Mechanical sub-contractor shall mark all changes as work progresses and as changes occur.
.2 On a weekly basis, transfer information to record set of documents, revising to show all work as actually installed.
.3 Use different colour waterproof ink for each service.
.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings:
.1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of as-built drawings.
.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

.3 Submit copies of as-built drawings for inclusion in final TAB report.

1.18 FEES AND PERMITS

.1 Pay all fees and obtain all permits, taxes relating to the mechanical scope of work.

1.19 WARRANTY

.1 Unless indicated otherwise provide one (1) year warranty starting at substantial completion for all new systems including materials, equipment & labour.

1.20 LOCATION OF MECHANICAL EQUIPMENT

.1 Allow for 1500 mm of adjustment for exact location of air handling units, pumps, ducts, piping, etc. at no extra cost or credit.

1.21 CUTTING, PATCHING & CORING

.1 Provide cutting, patching and coring of all walls, ceiling & concrete slabs and other surfaces as required for mechanical work. Check with NCC Representative prior to core drilling and cutting of structure regarding building requirements and policies. Provide notification, clearance & protection.

.2 The following procedure shall be followed for cutting & core drilling:
- .1 Contractor to coordinate and summarize all new cores and openings in building structure. Contractor to investigate on site and locate any existing available hole which may be re-used for new systems.
- .2 Contractor to prepare a layout sketch showing all existing openings & holes and required new openings & holes, with size and locations to the closest grid line in both directions, and submit for review and approval by the NCC Representative.
- .3 NCC Representative to provide written report outlining acceptance of the openings, as well as specific requirements for reinforcing at each location.
- .4 Contractor to proceed with reinforcing tracing as per report and scanning for electrical conduit. Scanning to be completed using ground penetrating Radar (GPR) technology.
- .5 Contractor shall identify at each location prior to coring and cutting the location, direction and layer of each reinforcing bar and conduit.
- .6 Any core or opening where reinforcing steel was cut during the cutting & coring process must be retained on site, and the Contractor must inform the engineer with the following information: size of the reinforcing bar, reinforcing layer location (top steel or bottom slab steel) and direction of the bar (east - west or north - south).

.3 Patch and make good surfaces cut, damaged or disturbed, to NCC Representative's approval. Match existing material, colour, finish and texture or as indicated otherwise.

.4 Provide dust tight screens or partitions to localize dust generating activities and for protection of finished areas of work, workers and public.

1.22 FINAL INSPECTION

.1 Do not request final inspection until:
- .1 Deficiencies are less than 25 items.
- .2 All systems have been tested and are ready for operation.
- .3 All air & water balancing has been completed as applicable.
- .4 The NCC Representative's operating personnel have been instructed in the operation of all systems and equipment.
- .5 The complete operation and maintenance data books have been delivered to the NCC Representative.
- .6 All inspection certificates have been furnished including but not limited to seismic certification, City's final plumbing inspection.
- .7 All record drawings have been completed and approved.
- .8 All fire extinguishers have been installed.
- .9 All spare parts and replacement parts have been provided and receipt of same acknowledged.
- .10 The cleaning up is finished in all respects.

.11 Upon completion of above, contractor to request in writing for final site review with a minimal 72 hour notification.

.2 Final installation shall be subject to the approval of the NCC Representative.

- END OF SECTION -

PART1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 35 30 - Health and Safety.

.4 Section 01 78 00 - Closeout Submittals

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.

.3 Shop Drawings.
- .1 Submit shop drawings to indicate:
  - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
  - .2 Wiring and schematic diagrams.
  - .3 Dimensions and recommended installation.
  - .4 Pump performance and efficiency curves.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturers' Field Reports: manufacturers' field reports specified.

.7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:
- .1 Manufacturers name, type, model year, capacity and serial number.
- .2 Details of operation, servicing and maintenance.
- .3 Recommended spare parts list with names and addresses.

1.3 QUALITY ASSURANCE

.1 Pre-Installation Meeting:.

- .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
  - .1 Verify project requirements.
  - .2 Review installation conditions.
  - .3 Co-ordination with other building subtrades.

.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.2 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

PART 2 - PRODUCTS

1.1 STORM WATER SUBMERSIBLE SUMP PUMP

.1 Capacity: reference schedule.

.2 Construction: duplex CSA approved, housing epoxy coated cast iron, 416 stainless steel shaft, non-clog bronze or cast iron impeller, suitable for effluent pumping, double mechanical seals for additional motor protection, stainless steel hardware, extra long ULC listed power cord, continuous duty operation in submerged conditions, Buna-n square rings & seals, and 50 mm (2") NPT vertical discharge.

.3 Motor: 60 cycle, 1750 RPM, oil filled, hermetically sealed, with automatic overload.

.4 Duplex Control: ULC listed, alternating duplex pump control panel with hand-off-auto toggle switches for each pump, green pump run pilot lights, alarm test & silence switches, red pilot off light, audible alarm for high water condition, auxiliary dry contacts for high water alarm, motor protective switches with overload protection, magnetic starter for each pump, alternating mechanism, numbered terminal strip for pump connections & float switches, NEMA 1 general purpose enclosure, auxiliary terminal board for remote alarm and five (5) variable level float switches.

.5 Float Switch: PVC plastic encased variable level switch, 115 Volt 5 Amp rated, 16/2 type SJ0WA Neoprene cord length to suit, 54°C (130°F) maximum temperature, 13 mm level differential for float switch activation.

.6 Electrical: 120 Volt single phase, 60 Hertz.

PART 3 - 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 data sheet.

2.2 INSTALLATION

.1 Make piping and electrical connections to pump and motor assembly and controls as indicated.

.2 Ensure pump and motor assembly do not support piping.

2.3 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Check power supply.
.2 Check starter protective devices.

.2 Start-up, check for proper and safe operation.

.3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 11 - Cleaning.

.3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 22 05 00 - Mechanical General Requirements.

.6 Section 23 05 05 - Installation of Pipework

.7 Section 23 05 23 - Valves.

1.2 REFERENCES

.1 American Society of Mechanical Engineers International (ASME)
- .1 ASME B16.15-2013, Cast Bronze Threaded Fittings, Classes 125 and 250.
- .2 ASME B16.18-2012, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ASME B16.22-2013, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .4 ASME B16.24-2011, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 ASTM International Inc.
- .1 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 ASTM B88-14, Standard Specification for Seamless Copper Water Tube (Metric).

.3 American Water Works Association (AWWA)
- .1 AWWA C111/A21.11-12, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International)
- .1 CSA B242-05(R2011), Groove and Shoulder Type Mechanical Pipe Couplings.

.5 National Research Council (NRC)/Institute for Research in Construction
- .1 NRCC NPCC-2010, National Plumbing Code of Canada (NPC) - 2010.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Closeout Submittals:
- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 - PRODUCTS

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.
.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to /ASME B16.24.

.2 Cast bronze threaded fittings, Class 125: to ASME B16.15.

.3 Cast copper, solder type: to ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ASME B16.22.

.5 NPS 2 and larger: roll grooved to CSA B242.

2.3 JOINTS

.1 Rubber gaskets, 1.6 mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 lead free solder.

.4 Teflon tape: for threaded joints.

2.4 VALVES

.1 Refer to Section 23 05 23 - Valves.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with NPC, Provincial Plumbing Code and local authority having jurisdiction.

.2 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.

.3 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.

.4 Assemble piping using fittings manufactured to ASME standards.

3.3 PRESSURE TESTS

.1 Conform to requirements of Section 22 05 00 - Mechanical General Requirements.

.2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.4 FLUSHING AND CLEANING

.1 Flush system for 8 h.

3.5 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.

.2 Verify that system can be completely drained.

3.6 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of NCC Representative.

3.7 START-UP

.1 Timing: start up after:
- .1 Pressure tests have been completed.
- .2 Disinfection procedures have been completed.

3.8 OPERATION REQUIREMENTS

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 05 - Installation of Pipework.

3.9 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety.

.3 Section 01 35 43 - Environmental Procedures.

.4 Section 01 47 15 Sustainable Requirements: Construction.

.5 Section 01 61 00 - Common Product Requirements.

.6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.7 Section 07 92 00 - Joint Sealants.

.8 Section 23 05 05 - Installation of Pipework.

1.2 REFERENCES

.1 ASTM International Inc.
- .1 ASTM D2235-04(2011), Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- .2 ASTM D2564-12, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.

.2 Canadian Standards Association (CSA International)
- .1 CSA B1800-15, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 South Coast Air Quality Management District (SCAQMD), California State
- .1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Provide two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 30 - Health and Safety and Section 01 35 43 - Environmental Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Store at temperatures and conditions recommended by manufacturer.

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

PART 2 - PRODUCTS

2.1 PIPING AND FITTINGS

.1 DWV PVC (Polyvinyl Chloride):
- .1 Application: below grade sanitary, storm & vent piping & fittings and above grade where combustible piping is permitted excluding OBC 3.2.6 (High-rise) applications
- .2 Pipe and Fittings: Drain, waste and vent pipe and fittings shall be certified to CSA B181.2. When combustible pipe and fittings are used in buildings required to be of noncombustible construction, they shall be listed by ULC to the Standard CAN/ULC S102.2 and clearly marked with the certification logo indicating a flame-spread rating not exceeding 25.
- .3 Acceptable material: IPEX System 15 DWV.

.2 Fire & smoke resistant coated DWV PVC (Polyvinyl Chloride) piping & fittings:
- .1 Application: Above grade sanitary, storm & vent piping & fittings where combustible piping is permitted including OBC 3.2.6 High-rise applications and within ceiling plenums.
- .2 Pipe and Fittings: Drain, waste and vent pipe and fittings shall be certified to CSA B181.2 and when used in noncombustible construction, high-rise buildings and air plenums, they shall be tested and listed in accordance with CAN/ULC S102.2 and clearly marked with the certification logo indicating a flame-spread rating not exceeding 25 and a smoke-developed classification not exceeding 50.
- .3 Acceptable material: IPEX System XFR 15/50 PVC-DWV.

.3 Firestopping Devices:
- .1 All combustible pipe penetrations shall comply with the requirements described in the O.B.C. 3.1.9.4.(1) through (8) and provide a firestop system that has been Tested and Listed to the test Standard CAN/ULC S115 with a pressure differential of 50 Pa. In addition, the manufacturer shall provide a documentation confirming compliance with the Listed system.

.4 Solvent Welding:
- .1 Solvent cements shall be CSA certified and meet the requirements of ASTM D2564. One-step cement may be used for sizes from NPS 40 to 150. Two-step cement must be used in conjunction with primer on larger pipe sizes. Proper solvent cementing procedures must be followed at all times.
- .2 The manufacturer, shall be consulted prior to installation for proper solvent welding procedures and proper solvent cement requirements.

.5 Expansion/Contraction:
- .1 Compensation shall be made to accommodate expansion/contraction on the drainage system. It is recommended that there be compensation on every second floor for the vertical piping system. Consult pipe system manufacturer for specific details regarding approved compensation methods.

.6 Compatibility:
- .1 To ensure compatibility, performance and material quality, all pipe and fitting drainage system shall be produced by the same manufacturer.

.7 Quality Control:
- .1 The manufacturer of the pipe and fitting system shall be contacted prior to the installation to obtain precise installation instructions. Site meetings shall be arranged and include, the Contractor, Manufacturer and Building Inspector.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install in accordance with Canadian Plumbing Code, Provincial Plumbing Code and local authority having jurisdiction.

.2 Install buried pipe on 150 mm (6") bed of compacted clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. (If trench bottom is unstable, bring to Engineers attention before bedding is laid). Limit vertical deflection and increase pipe support by compacting soil in both directions away from the pipe toward trench walls. Initial backfill to begin at springline of pipe to 300 mm (12") above pipe with clean washed sand. Final backfill shall be free of stones 150 mm (6") and larger. Bedding and backfill shall be provided by this division and in accordance with Div. 02 - Site Work.

3.2 TESTING

.1 Test in accordance with OBC Part 7 requirements.

.2 Pressure test buried systems before backfilling.

.3 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

.1 Cleanouts:
- .1 Ensure accessible and that access doors are correctly located.
- .2 Open, cover with linseed oil and re-seal.
- .3 Verify cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system and effectively vented.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety.

.3 Section 01 47 15 - Sustainable Requirements: Construction.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM).
- .1 ASTM A126-04(2014), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .2 ASTM B62-15, Specification for Composition Bronze or Ounce Metal Castings.

.2 Canadian Standards Association (CSA International).
- .1 CSA-B64 Series-11, Backflow Preventers and Vacuum Breakers.
- .2 CSA B64.10-11/B64.10.1-11, Selection and Installation of Backflow Preventers/Maintenance and Field Testing of Backflow Preventers.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Co-ordinate submittal requirements and provide submittals required by Section 01 47 15 - Sustainable Requirements: Construction.

.3 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
- .2 Indicate dimensions, construction details and materials for specified items.

.4 Manufacturers' Field Reports: manufacturers' field reports specified.

.5 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:
- .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
- .2 Details of operation, servicing and maintenance.
- .3 Recommended spare parts list.

1.4 QUALITY ASSURANCE

.1 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by NCC Representative.
- .5 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Materials and resources in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

2.2 FLOOR DRAINS

.1 FD1: combination funnel floor drain concrete floor; cast iron body round with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral funnel and trap priming connection.

2.3 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

2.4 BACK FLOW PREVENTERS

.1 Preventers: to CSA-B64-10.1 Series, application [as indicated], [double check valve assembly]. Backflow preventers to be full line size, bronze body construction with replacement seats, and ball valve tests cocks.

2.5 BACKWATER VALVES

.1 Coated extra heavy cast iron body with bronze seat, revolving bronze flapper and threaded cover.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada, provincial codes, and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.4 BACK FLOW PREVENTORS

.1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.

.2 Pipe discharge to terminate over nearest drain.

.3 Test and certify backflow preventer and provide report for inclusion.

3.5 BACKWATER VALVES

.1 Install where indicated.

3.6 TESTING AND ADJUSTING

.1 Floor drains:
- .1 Verify operation of trap seal primer.
- .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
- .3 Check operations of flushing features.
- .4 Check security, accessibility, removeability of strainer.
- .5 Clean out baskets.

.2 Backflow preventers, backwater valves:
- .1 Test tightness, accessibility for O&M of cover and of valve.
- .2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
- .3 Verify visibility of discharge from open ports.

.3 Cleanouts:
- .1 Verify covers are gas-tight, secure, yet readily removable.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 11 - Cleaning.

.3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.4 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer as indicated without interrupting operation of other system, equipment, components.

3.4 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain.
.1 Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.5 AIR VENTS

.1 Install automatic air vents to at high points in piping systems.

.2 Install isolating ball valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

.4 Air units must have minimum connect of 13 mm (½").

3.6 DIELECTRIC COUPLINGS

.1 General: compatible with system, to suit pressure rating of system.

.2 Locations: where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

3.7 PIPEWORK INSTALLATION

.1 Screwed fittings jointed with Teflon tape.

.2 Protect openings against entry of foreign material.

.3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.4 Assemble piping using fittings manufactured to ANSI standards.

.5 Weldolets, sockolets, saddle type branch fittings may be used on mains if branch line is no larger than half size of main.
.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle. Provide isolation valves at each branch connection.

.6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.7 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

.8 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.9 Install, except where indicated, to permit separate thermal insulation of each pipe.

.10 Group piping wherever possible and as indicated.

.11 Ream pipes, remove scale and other foreign material before assembly.

.12 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.13 Provide for thermal expansion as indicated.

.14 Valves:
- .1 Install in accessible locations.
- .2 Remove interior parts before soldering.
- .3 Install with stems above horizontal position unless indicated.
- .4 Valves accessible for maintenance without removing adjacent piping.
- .5 Install globe valves in bypass around control valves.
- .6 Use ball or butterfly valves at branch take-offs for isolating purposes except where specified.
- .7 Install butterfly valves between weld neck flanges to ensure full compression of liner.
- .8 Install plug cocks or ball valves for glycol service.

.15 Check Valves:
- .1 Install swing check valves in horizontal lines on discharge of pumps and as indicated.

3.8 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:
- .1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
- .2 Other floors: terminate 25 mm above finished floor.
- .3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:
- .1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
- .2 Elsewhere:
  - .1 Provide space for firestopping.
  - .2 Maintain fire rating integrity.
- .3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.
- .4 Ensure no contact between copper pipe or tube and sleeve.

3.9 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws.
- .1 Chrome or nickel plated brass or type 302 stainless steel..

.3 Sizes: outside diameter to cover opening or sleeve.
- .1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.10 FLUSHING OUT OF PIPING SYSTEMS

.1 Flush system in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

.3 Provide test results upon completion and return within report on status after completion .

3.11 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise NCC Representative 48 hours minimum prior to performance of pressure tests.

.2 Pipework: test to 1½ times operating pressure to a maximum of the piping systems working pressure including devices (i.e. valves, fittings, accessories). Minimum test pressure to be 862 kPa (125 psi).

.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Conduct tests in presence of NCC Representative.

.6 Pay costs for repairs or replacement, retesting, and making good. NCC Representative to determine whether repair or replacement is appropriate.

.7 Insulate or conceal work only after approval and certification of tests by NCC Representative.

3.12 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by NCC Representative .

.2 Request written approval by NCC Representative 10days minimum, prior to commencement of work.

.3 Be responsible for damage to existing plant by this work.

3.13 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Electrical motors, drives and guards for mechanical equipment and systems.
- .2 Supplier and installer responsibility indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
- .3 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 22 and 23. Refer to Division 26 for quality of materials and workmanship.

.2 Related Requirements
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 78 00 - Closeout Submittals.
- .3 Section 01 74 11 - Cleaning.

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
- .1 ASHRAE 90.1-10, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).

.2 Electrical Equipment Manufacturers' Association Council (EEMAC)

.3 National Electrical Manufacturers' Association (NEMA)
- .1 NEMA MG 1-2014, Motors and Generators.

.4 Ontario Regulation
- .1 ONTARIO OBC-2012, 2012 Ontario Building Code Compendium.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Closeout Submittals
- .1 Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Motors to be premium efficiency, in accordance with NEMA 1 premium motor standards and the requirements of ANSI/ASHRAE/IESNA 90.1 unless superceded by Ontario Building Code (OBC) Supplementary Standard SB-10.

2.2 MOTORS

.1 Provide premium efficiency motors for mechanical equipment to NEMA MG 1 Part 30 & 31 and as specified.

.2 Motors efficiency must exceed the following:

Open Drip-Proof (ODP) Type

Motor Speed (RPM)

HP	NEMA Preminum	Nominal Efficiency	
1 & below	82.5%	85.5%	77.0%
1.5	86.5%	86.5%	84.0%
2	87.5%	86.5%	85.5%
3	88.5%	89.5%	85.5%
5	89.5%	89.5%	86.5%
7.5	91.0%	91.0%	88.5%
10	91.7%	91.7%	89.5%
15	91.7%	93.0%	90.2%
20	92.4%	93.0%	91.0%
25	93.0%	93.6%	91.7%
30	93.6%	94.1%	91.7%
40	94.1%	94.1%	92.4%
50	94.1%	94.5%	93.0%
60	94.5%	95.0%	93.6%
75	94.5%	95.0%	93.6%
100	95.0%	95.4%	93.6%
125	95.0%	95.4%	94.1%
150	95.4%	95.8%	94.1%
200	95.4%	95.8%	95.0%

1 & below	82.5%	85.5%	77.0%
1.5	87.5%	86.5%	84.0%
2	88.5%	86.5%	85.5%
3	89.5%	89.5%	86.5%
5	89.5%	89.5%	885%
7.5	91.0%	91.7%	89.5%
10	91.0%	91.7%	90.2%
15	91.7%	92.4%	91.0%
20	91.7%	93.0%	91.7%
25	93.0%	93.6%	91.7%
30	93.0%	93.6%	91.7%
40	94.1%	94.1%	92.4%
50	94.1%	94.5%	93.0%
60	94.5%	95.0%	93.6%
75	94.5%	95.4%	93.6%
100	95.0%	95.4%	94.1%
125	95.0%	95.4%	95.0%
150	95.8%	95.8%	95.0%
200	95.8%	96.2%	95.4%

.3 Motors under 373 W (½ HP): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.

.4 Motors 373 W (½ HP) to 14.92 kW (20 HP): EEMAC Class B/F, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 45°C/60°C over ambient of 30°C, 3 phase, 600 V, unless otherwise specified or indicated.

.5 Motors 18.65 kW (25 HP) and larger: EEMAC Class B/F, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 45°C/60°C over ambient of 30°C, 3 phase, 600 V, c/w integral thermistor protection, unless otherwise specified or indicated. Thermistors shall be factory installed, copper RTD type, one on each phase, wired to identified terminals in motor terminal box and wired to starter/VFD (wiring, conduit & connections by Div. 26).

.6 Two speed motors shall be double winding type.

.7 Motors coupled with VFD shall be premium efficiency, inverter duty type to NEMA MG 1 Part 31 and shall have as a minimum EEMAC Class F insulation. There shall be no restrictions on the cable length between the VFD and the motor. Inverter ready motors shall not be acceptable.

2.3 TEMPORARY MOTORS

.1 If delivery of specified motor will delay completion or commissioning work, install motor approved by Consultant for temporary use. Work will only be accepted when specified motor is installed.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Fasten securely in place.

.2 Make removable for servicing, easily returned into, and positively in position.

3.3 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 01 78 00 - Closeout Submittals.

.6 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and operation data in accordance with Section 01 78 00 - Closeout Submittals.
- .1 Data to include:
  - .1 Servicing requirements, including special requirements, stuffing box packing, lubrication and recommended procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

PART 2 - PRODUCTS

2.1 FLEXIBLE CONNECTION

.1 Application: to suit motion.

.2 Minimum length in accordance with manufacturer's recommendations to suit offset.

.3 Inner hose: bronze corrugated.

.4 Braided wire mesh stainless steel outer jacket.

.5 Diameter and type of end connection: as indicated.

.6 Operating conditions:
- .1 To match system requirements.

2.2 EXPANSION JOINTS, PIPE GUIDES AND PIPE ANCHORS

.1 Expansion compensator for pipe size NPS 3/4 up to NPS 3, bronze model bellow-two ply, stroke 75 mm compression, 6 mm extension. Rated for 1034 kPa maximum working pressure. All bronze construction for copper pipes; steel construction for steel pipes. Acceptable material: Flexonics, Hyspan, Pathway.

.2 Expansion joint NPS 4 and NPS 6, controlled flexing expansion joint, Class 150, steel flanged ends, single type, rate for 1034 kPa maximum working pressure, maximum temperature range -28°C to 454°C, axial and lateral movement, 8 corrugations, 304 stainless steel bellows. Acceptable material: Flexonics, Hyspan, Pathway.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install expansion joints and flexible connections in accordance with manufacturer's instructions.

3.3 PIPE CLEANING AND START-UP

.1 In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

3.4 CLEANING

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

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

- END OF SECTION -

PART1 - GENERAL

1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
- .1 ASME B31.1-2014, Power Piping.
- .2 ASME B31.3-2014, Process Piping.
- .3 ASME Boiler and Pressure Vessel Code-2015:
  - .1 BPVC 2015 Section I: Power Boilers.
  - .2 BPVC 2015 Section V: Nondestructive Examination.
  - .3 BPVC 2015 Section IX: Welding and Brazing Qualifications.

.2 American Water Works Association (AWWA)
- .1 AWWA C206-11, Field Welding of Steel Water Pipe.

.3 Canadian Standards Association (CSA International)
- .1 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
- .2 CSA B51-14, Boiler, Pressure Vessel and Pressure Piping Code.
- .3 CSA-W117.2-12, Safety in Welding, Cutting and Allied Processes.
- .4 CSA W178.1-14, Certification of Welding Inspection Organizations.
- .5 CSA W178.2-14, Certification of Welding Inspectors.

1.2 QUALIFICATIONS

.1 Welders:
- .1 Welding qualifications in accordance with CSA B51.
- .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
- .3 Submit welder's qualifications to NCC Representative.
- .4 Each welder to possess identification symbol issued by authority having jurisdiction.

1.3 INSPECTOR QUALIFICATIONS

.1 Inspectors qualified to CSA W178.2.

1.4 WELDING PROCEDURES

.1 Registration of welding procedures in accordance with CSA B51.

.2 Copy of welding procedures available for inspection.

.3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

PART 2 - PRODUCTS

2.1 WELDING CONSUMABLES

.1 Certified to ASME SFA specifications.

2.2 ELECTRODES

.1 Electrodes: in accordance with CSA W48 Series.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 QUALITY OF WORK

.1 Welding: in accordance with ASME B31.1, ASME B31.3, ASME Boiler and Pressure Vessel Code, Sections I and IX and AWWA C206, using procedures conforming to ASME BPVC, Section IX.

3.3 INSTALLATION REQUIREMENTS

.1 Identify each weld with welder's identification symbol.

3.4 INSPECTION AND TESTS - GENERAL REQUIREMENTS

.1 Review weld quality requirements and defect limits of applicable codes and standards with NCC Representative before work is started.

.2 Formulate "Inspection and Test Plan" in co-operation with NCC Representative.

.3 Do not conceal welds until they have been inspected, tested and approved by inspector.

.4 Provide for inspector to visually inspect welds during pipe joint fit-up and preparation, and welding of circumferential pipe welds after each pass deposited in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

3.5 SPECIALIST EXAMINATIONS AND TESTS

.1 General.
- .1 Perform examinations and tests by specialist qualified in accordance with CSA W178.1 and CSA W178.2 and approved by NCC Representative.
- .2 To ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.
- .3 Inspect and test 100% of pipe welds in accordance with "Inspection and Test Plan" by non-destructive visual examination and by the NDE methods below.

.2 The required NDE will be done on weld joints on all glycol piping welds.
.1 NDE will be as follows.
.1 Piping Welds: All welds in piping will be visually inspected during pipe joint fit-up, and preparation and welding of circumferential pipe welds. Visual welding inspection shall be performed after each pass deposited. All glycol piping welds will be examined by radiographic test.
.2 The acceptance criteria for radiographic particle test and PT is ASME Section V.

.3 Hydrostatically test all other piping welds to requirements of ASME B31.1.

.4 Visual examinations: include entire circumference of weld externally and wherever possible internally.

.5 Failure of visual examinations:
.1 Upon failure of any weld by visual examination, perform additional testing as directed by NCC Representative of a total of up to 20% of all welds, selected at random by the NCC Representative by radiographic particle tests.

3.6 REPAIR OF WELDS WHICH FAILED TESTS

.1 Re-inspect and re-test repaired or re-worked welds at Contractor's expense as described in ASME B31.1 and ASME BPVC.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME).
- .1 ASME B40.100-2013, Pressure Gauges and Gauge Attachments.
- .2 ASME B40.200-2008, Thermometers, Direct Reading and Remote Reading.

.2 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-14.4-M88, Thermometers, Liquid-in-Glass, Self Indicating, Commercial/Industrial Type.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit shop drawings and product data.

.3 Submit manufacturer's product data for following items:
- .1 Thermometers.
- .2 Pressure gauges.
- .3 Ball valves.
- .4 Syphons.
- .5 Wells.

1.4 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Design point to be at mid point of scale or range.

2.2 DIRECT READING THERMOMETERS

.1 Industrial, variable angle type, liquid filled, 125 mm scale length: to CAN/CGSB 14.4 & ASME B40.200.

2.3 THERMOMETER WELLS

.1 Copper pipe: copper or bronze.

.2 Steel pipe: brass.

2.4 PRESSURE GAUGES

.1 112 mm, dial type: to ASME B40.100, Grade 2A, stainless steel bourdon tube having 0.5% accuracy full scale, steam mounting.

.2 Provide ball valve and snubber for pulsating operating (pumps).

PART 3 - EXECUTION

3.1 GENERAL

.1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.2 THERMOMETERS

.1 Install in wells on piping. Provide heat conductive material inside well.

.2 Install in locations as indicated and on inlet and outlet of heat exchangers.

.3 Use extensions where thermometers are installed through insulation.

3.3 PRESSURE GAUGES

.1 Install in following locations:
- .1 Suction and discharge of pumps.
- .2 In other locations as indicated.

.2 Use extensions where pressure gauges are installed through insulation.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
- .1 ASME B16.34-2013, Valves Flanged, Threaded and Welding End

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A193/A193M-15a, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
- .2 ASTM A194/A194M-15a, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- .3 ASTM A216/A216M-14e1, Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.
- .4 ASTM A351/A351M-15, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
- .5 ASTM A564/A564M-13, Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes.
- .6 ASTM B16/B16M-10(2015), Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines.
- .7 ASTM B62-15, Specification for Composition Bronze or Ounce Metal Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
- .1 MSS SP-61-2013, Pressure Testing of Valves.
- .2 MSS SP-68-2011, High Pressure Butterfly Valves with Offset Design.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheets for valves and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit data for valves specified in this section.

1.4 CLOSEOUT SUBMITTALS

.1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

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

PART 2 - PRODUCTS

2.1 GENERAL

.1 All valves of the same type to be from one manufacturer.

.2 All valves to have CRN registration numbers.

2.2 BUTTERFLY VALVES - Class 150

.1 Sizes: NPS 2 and over.

.2 Style: Lug body for end of line service in either direction.

.3 Pressure rating: Class 150.

.4 Bolting: ASME Class 150 steel flanges.

.5 Operators: Worm gear operator.

.6 Valves shall be High Performance Butterfly type with offset seat in conformance with MSS SP-68. Valve body shall be Class 150 in conformance with ASME B16.34. Valve seat shall be rated for bubble tight shut-off up to the full body rating (1,965 kPa at 38 degrees C) of the valve with either downstream flange removed.

.7 Valves shall have internal stop to prevent disc over-travel.

.8 Valves shall have retained top and bottom low friction bearings.

.9 Valve shall be equipped with stainless steel nameplate indicating:
.1 Valve make
.2 Valve model
.3 Valve serial number
.4 CRN number
.5 Bi-directional, end-of-line cold water pressure rating

.10 Construction:
.1 Body: ASTM A216 Gr. WCB Cast steel
.2 Disc: ASTM A351 Gr. CF8M
.3 Shaft: ASTM A564 type 630 H1150
.4 All other materials selected by manufacturer for the specified performance rating.

2.3 CHECK VALVES

.1 NPS 2½ and over, cast steel:
- .1 Body and multiple-bolted cap: cast steel to ASTM A216/A216M WCB.
- .2 Cap studs: to ASTM A193/A193M Type B7.
- .3 Cap nuts: to ASTM A194/A194M Type 2H.
- .4 Body/cap joint: male-female face with corrugated metallic gasket.
- .5 Disc: heat treated corrosion and heat resistant 13% chromium steel.
- .6 Seat rings: heat treated corrosion and heat resistant 13% chromium steel, slipped in, seal welded, ground to match disc.
- .7 Provide Class 150 valve.

2.4 BALL VALVES

.1 NPS 4 and under:
- .1 Body and cap: cast high tensile bronze to ASTM B62 or brass to ASTM B16/B16M C36000.
- .2 Stem: tamperproof ball drive.
- .3 Stem packing nut: external to body.
- .4 Ball and seat: replaceable chrome plated brass solid full port ball and teflon seats.
- .5 Stem seal: TFE with external packing nut.
- .6 Operator: removable lever handle.
- .7 Provide Class 150 valve.

2.5 CIRCUIT BALANCING VALVES (CBV)

.1 General:
- .1 Y style globe valve, designed to provide precise flow measurement and control, with valved ports for connection to differential pressure meter.

.2 Accuracy:
- .1 Readout to be within plus or minus 2% of actual flow at design flow rate.

.3 Pressure die-cast dezincification resistant copper alloy construction, Teflon disc, screw-in bonnet.
- .1 Flow control: At least four 4 full turns of handwheel with digital handwheel and tamperproof concealed mechanical memory.

.4 Insulation:
- .1 Use prefabricated shipping packaging of 5.4 R polyurethane as insulation.

.5 Drain connection:
- .1 NPS 3/4 valved and capped, suitable for hose socket.
- .2 Incorporated into valve body or provided as separate item.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Valve and mating flange preparation.
- .1 Inspect adjacent pipeline, remove rust, scale, welding slag, other foreign material.
- .2 Ensure that valve seats and pipe flange faces are free of dirt or surface irregularities which may disrupt flange seating and cause external leakage.
- .3 Install butterfly valves with disc in almost closed position.
- .4 Inspect valve disc seating surfaces and waterway and eliminate dirt or foreign material.

3.2 INSTALLATION OF VALVES

.1 Install in accordance with manufacturer's instructions.

.2 Do not use gaskets between pipe flanges and valves unless instructed otherwise by valve manufacturer.

.3 Verify suitability of valve for application by inspection of identification tag.

.4 Mount actuator on to valve prior to installation.

.5 Handle valve with care so as to prevent damage to disc and seat faces.

.6 Valves in horizontal pipe lines should be installed with stem in horizontal position to minimize liner and seal wear.

.7 Ensure that valves are centered between bolts before bolts are tightened and then opened and closed to ensure unobstructed disc movement. If interference occurs due, for example to pipe wall thickness, taper bore adjacent piping to remove interference.

3.3 TESTING, INSPECTION AND CERTIFICATION

.1 Valve shall be certified in writing by the manufacturer as been tested in conformance to hydrostatic shell and seat tests of SME B16.34 and MSS SP-61 and shall state that its shutoff rating for cold water service is up to 1,965 kPa for Class 150 with either downstream flange removed.

3.4 CLEANING

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

.2 Clean installed products in accordance to manufacturer's recommendation.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Hangers and supports for mechanical piping.

.2 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 30 - Health and Safety.
- .3 Section 01 61 00 - Common Product Requirements.
- .4 Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
- .1 ASME B31.1-2014, Power Piping.

.2 ASTM International
- .1 ASTM A563-15, Standard Specification for Carbon and Alloy Steel Nuts.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
- .1 MSS SP-58-2009, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

.5 Underwriter's Laboratories of Canada (ULC)

1.3 SYSTEM DESCRIPTION

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by MSS SP-58, ASME B31.1.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP-58.

1.4 SUBMITTALS

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

.2 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.3 Submit shop drawings and product data for following items:
.1 Hangers.

.4 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.2 Instructions: submit manufacturer's installation instructions.
.1 NCC Representative will make available 1 copy of systems supplier's installation instructions.

1.5 QUALITY ASSURANCE

.1 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

PART 2 - PRODUCTS

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP-58.

2.2 PIPE HANGERS

.1 Finishes:
.1 Pipe hangers and supports: galvanized after manufacture.
.2 Use electro-plating galvanizing process.
.3 Ensure steel hangers in contact with copper piping are epoxy coated.

.2 Upper attachment structural: suspension from lower flange of I-Beam:
.1 Cold piping NPS 2-1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed to MSS-SP-58.

.3 Upper attachment structural: suspension from upper flange of I-Beam:
.1 Cold piping NPS 2-1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed.

.4 Upper attachment to concrete:
.1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
.2 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP-58.

.5 Shop and field-fabricated assemblies:
- .1 Trapeze hanger assemblies.
- .2 Steel brackets.

.6 Hanger rods: threaded rod material to MSS SP-58:
- .1 Ensure that hanger rods are subject to tensile loading only.
- .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .3 Do not use 22 mm or 28 mm rod.

.7 Pipe attachments: material to MSS SP-58:
- .1 Attachments for steel piping: carbon steel galvanized.

.8 Adjustable clevis: material to MSS SP-58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
- .1 Ensure "U" has hole in bottom for rivetting to insulation shields.

.9 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP 58.

.10 U-bolts: carbon steel to MSS SP 58 with 2 nuts at each end to ASTM A 563.
- .1 Finishes for steel pipework: black galvanized.
- .2 Finishes for copper, glass, brass or aluminum pipework: galvanized, with formed portion plastic coated epoxy coated.

.11 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP 58.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with:
- .1 manufacturer's instructions and recommendations.

.2 Clevis plates:
- .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.3 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.4 Use approved constant support type hangers where:
- .1 vertical movement of pipework is 13 mm or more,
- .2 transfer of load to adjacent hangers or connected equipment is not permitted.

.5 Provide steel saddle for insulated pipe to protect insulation.

3.3 HANGER SPACING

.1 Within 300 mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.4 m	1.8 m
1-1/2	3.0 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.7 m	3.0 m
3	3.7 m	3.0 m
3-1/2	3.7 m	3.3 m
4	3.7 m	3.6 m
5	4.3 m	
6	4.3 m	
8	4.3 m	
10	4.9 m	
12	4.9 m	

.2 Pipework greater than NPS 12: to MSS SP 58.

3.4 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

.1 Adjust hangers:
- .1 Ensure that rod is vertical under operating conditions.
- .2 Equalize loads.

.2 Adjustable clevis:
- .1 Tighten hanger load nut securely to ensure proper hanger performance.
- .2 Tighten upper nut after adjustment.

.3 C-clamps:
- .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:
.1 Hammer jaw firmly against underside of beam.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 74 11 - Cleaning.

.5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.2 National Building Code of Canada.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
  - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .2 Provide separate shop drawings for each isolated system complete with performance and product data.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .2 Instructions: submit manufacturer's installation instructions.
  - .1 NCC Representative will make available 1 copy of systems supplier's installation instructions.
- .3 Manufacturer's Field Reports: manufacturer's field reports specified.

1.4 QUALITY ASSURANCE

.1 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

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

PART 2 - PRODUCTS

2.1 GENERAL

.1 Size and shape of bases type and performance of vibration isolation as indicated.

2.2 SPRINGS

.1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with levelling devices.

.2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.

.3 Cadmium plate for all installations.

.4 Colour code springs.

2.3 SPRING MOUNT

.1 Cadmium plated hardware; housings coated with rust resistant paint.

.2 Type M1 - restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene acoustic pad; built-in resilient limit stops, removable spacer plates.

.3 Performance: to suit application.

2.4 HANGERS

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30 degrees arc without metal to metal contact.

.2 Type H1 - stable spring, elastomeric element, cup with moulded isolation bushing which passes through hanger box.

.3 Performance: to suit application.

2.5 SEISMIC CONTROL MEASURES

.1 General:
.1 Provide seismic restraints for all new work required.
.2 Seismic control systems to work in every direction.
.3 Fasteners and attachment points to resist same maximum load as seismic restraint.
.4 Drilled or power driven anchors and fasteners not permitted.
.5 No equipment, equipment supports or mounts to fail before failure of structure.

.6 Supports of cast iron or threaded pipe not permitted.
.7 Seismic control measures not to interfere with integrity of firestopping.

.2 Static equipment:
.1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
.2 Seismic restraints:
.1 Cushioning action gentle and steady.
.2 Never reach metal-like stiffness.

.3 Vibration isolated equipment:
.1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
.2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.

.4 Piping systems:
.1 Piping systems: hangers longer than 300 mm; brace at each hanger.
.2 Compatible with requirements for anchoring and guiding of piping systems.

.5 Bracing methods:
.1 Approved by NCC Representative.
.2 Structural angles or channels.
.3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Seismic control measures to meet requirements of NBC.

.2 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.

.3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.

.4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm minimum static deflection as follows:
.1 Up to NPS4: first 3 points of support. NPS5 to NPS8: first 4 points of support. NPS10 and Over: first 6 points of support.
.2 First point of support: static deflection of twice deflection of isolated equipment, but not more than 50 mm.

.5 Where isolation is bolted to floor use vibration isolation rubber washers.

.6 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

3.3 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.

.2 Related Requirements
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 30 - Health and Safety.
- .3 Section 01 61 00 - Common Product Requirements.
- .4 Section 01 74 11 - Cleaning.
- .5 Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.
- .2 CAN/CGSB-24.3-92, Identification of Piping Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data to include paint colour chips, other products specified in this section.

.2 Samples:
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.4 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.2 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

PART 2 - PRODUCTS

2.1 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

2.2 VALVES, CONTROLLERS

.1 Brass tags with 12 mm stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.3 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

2.4 LANGUAGE

.1 Identification in English and French.

.2 Use one nameplate and label for both languages.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 TIMING

.1 Provide identification only after insulating and painting.

3.3 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Identify systems, equipment to conform to PWGSC PMSS.

3.4 LOCATION OF IDENTIFICATION ON PIPING SYSTEMS

.1 On long straight runs in open areas in chiller plant: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 On both sides of visual obstruction or where run is difficult to follow.

.4 On both sides of separations such as walls, floors, partitions.

.5 At beginning and end points of each run and at each piece of equipment in run.

.6 At point immediately upstream of major manually operated or automatically controlled valves. Where this is not possible, place identification as close as possible, preferably on upstream side.

.7 Identification easily and accurately readable from usual operating areas and from access points.
.1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

.1 Valves and operating controller: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one copy of flow diagrams, valve schedules mounted where directed by NCC Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively.

3.6 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to NCC Representative within 30 days of award of contract.

.2 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
- .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2002.
- .2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.
- .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.

.3 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.4 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.5 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.6 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.7 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
- .1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
- .2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

.3 Coordinate TAB with controls, mechanical and electrical contractors.

1.6 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to NCC Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to NCC Representative in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.8 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by NCC Representative for verification of TAB reports.

1.9 START OF TAB

.1 Notify NCC Representative 14 days prior to start of TAB.

.2 Start TAB when new work is essentially completed.

.3 Provisions for TAB installed and operational.

.4 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
- .1 Proper thermal overload protection in place for electrical equipment.
- .2 Air systems:
  - .1 Filters in place, clean.
  - .2 Duct systems clean.
  - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
  - .4 Correct fan rotation.
  - .5 Fire, smoke, volume control dampers installed and open.
  - .6 Coil fins combed, clean.
  - .7 Access doors, installed, closed.
  - .8 All outlets installed, volume control dampers open.

.3 Liquid systems:
.1 Flushed, filled, vented.
.2 Correct pump rotation.
.3 Strainers in place, baskets clean.
.4 Isolating and balancing valves installed, open.
.5 Calibrated balancing valves installed, at factory settings.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:
.1 Hydronic systems: plus or minus 10%.
.2 All HVAC systems: plus 5%, minus 5%.

1.11 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2% of actual values.

1.12 INSTRUMENTS

.1 Prior to TAB, submit to NCC Representative list of instruments used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to NCC Representative.

1.13 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of NCC Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
.1 Details of instruments used.
.2 Details of TAB procedures employed.
.3 Calculations procedures.
.4 Summaries.

1.15 TAB REPORT

.1 Format in accordance with Associated Air Balancing Council (AABC/CAABC)

.2 TAB report to show results in SI units and to include:
.1 Project record drawings.
.2 System schematics.

.3 Submit 2 copies of TAB Report to NCC Representative for verification and approval, in English in D-ring binders, complete with index tabs.

1.16 VERIFICATION

.1 Reported results subject to verification by NCC Representative.

.2 Provide personnel and instrumentation to verify up to 30% of reported results.

.3 Number and location of verified results as directed by NCC Representative.

.4 Pay costs to repeat TAB as required to satisfaction of NCC Representative.

1.17 SETTINGS

.1 After TAB is completed to satisfaction of NCC Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.18 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by NCC Representative.

1.19 SYSTEMS

.1 Hydronic Systems: Include both specified and measured data.
- .1 Air Systems: Include both specified and measured data.
  - .1 Air Handling Equipment:
    - .1 Maximum air flow volume.
    - .2 Fan total pressure.
    - .3 Motor volts, amps and power.
    - .4 Minimum outside air volume.
    - .5 Fan rotational speed.
    - .6 Fan Power, calculate fan efficiency.
    - .7 Inlet and outlet dry bulb, wet bulb and dewpoint temperatures.
    - .8 Equipment static pressure profile.
    - .9 Noise.
    - .10 Vibration.
  - .2 Air Outlets:
    - .1 Outlet location and designation.
    - .2 Manufacturers catalogue identification and type.
    - .3 Air outlet flow factors. Use 1.0 when flow hood is used.
    - .4 Air flow volumes.
    - .5 Deflector vane or diffuser cone settings.
- .2 Hydronic Systems: Include both specified and measured data.
  - .1 Pumps:
    - .1 Discharge and suction pressures, at design flow and no flow.
    - .2 Fluid flow rate. Calculate from pump curves if metering not provided.
    - .3 Motor volts, amps, power.
    - .4 RPM.
    - .5 Noise.
    - .6 Vibration.
  - .2 Piping Systems:
    - .1 Supply and return of each primary loop.
    - .2 Supply and return of each secondary loop.

.3 Make-up water inlet.
.4 Domestic hot water recirculation.

.3 Heat Exchanger:
.1 Primary Side:
.1 Heating fluid used. Identify fluid used; water, % water/ethylene glycol mixes, steam, etc.).
.2 Heating fluid flow rate.
.3 Heating fluid Specific Heat, at mean temperature.
.4 Heating fluid Specific Gravity, at mean temperature.
.5 Primary side heat transfer rate.
.2 Secondary Side:
.1 Heated fluid used. Identify fluid used; water, % water/ethylene glycol mixes, etc.).
.2 Heated fluid flow rate.
.3 Heated fluid Specific Heat, at mean temperature.
.4 Heated fluid Specific Gravity, at mean temperature. 11 Heated fluid entering and leaving temperatures and pressures.
.5 Secondary side heat transfer rate.

1.20 POST-OCCUPANCY TAB

.1 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 1 month of termination of Warranty Period.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 BALANCING AND ADJUSTING PREPARATION

.1 Perform testing, adjusting and balancing work after equipment and systems starting procedures have been properly completed.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 74 11 - Cleaning.

.5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- .1 ASHRAE 90.1-10-SI Edition, Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ASTM International Inc.
- .1 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .2 ASTM C335/C335M-10e1, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
- .3 ASTM C449-07(2013), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
- .4 ASTM C547-15, Standard Specification for Mineral Fiber Pipe Insulation.
- .5 ASTM C921-10(2015), Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 Thermal Insulation Association of Canada (TIAC)
- .1 National Insulation Standards 2005.

.5 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Provide two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 30 - Health and Safety.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Store at temperatures and conditions recommended by manufacturer.

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

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING

.1 Fire and smoke ratings to CAN/ULC-S102:
- .1 Maximum flame spread rating: 25.
- .2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre: includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
- .1 Mineral fibre: ASTM C547.
- .2 Maximum "k" factor: ASTM C547.

2.3 CEMENT

.1 Thermal insulating and finish
- .1 To: ASTM C449.
- .2 Hydraulic setting or air drying on mineral wool, to ASTM C449.

2.4 JACKETS

.1 Canvas:
- .1 220 gm/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
- .2 Lagging adhesive: compatible with insulation.

.2 Aluminum:
- .1 To ASTM B209.
- .2 Thickness: 0.50 mm sheet.
- .3 Finish: smooth.
- .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
- .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
- .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

2.5 INSULATION SECUREMENTS

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5 mm diameter stainless steel.

.5 Bands: Stainless steel, 19 mm wide, 0.5 mm thick.

.6 Facing: 25 mm galvanized steel hexagonal wire mesh on one face.

.7 Fasteners: 4 mm diameter pins with 35 mm diameter clips. Length of pin to suit thickness of insulation.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PRE- INSTALLATION REQUIREMENTS

.1 Pressure testing of equipment and adjacent piping systems complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards
- .1 Hot equipment: To TIAC code 1503-H.
- .2 Cold equipment: to TIAC code 1503-C.

.2 Elastomeric Insulation:to remain dry. Overlaps to manufacturer's instructions. Joints tight and sealed properly.

.3 Apply materials in accordance with insulation and equipment manufacturer's instructions and this specification.

.4 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.5 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
- .1 Hangers, supports outside vapour retarder jacket.

.6 Supports, Hangers:
- .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: At expansion joints, valves, flanges and unions at equipment.

.2 Installation to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

3.5 EQUIPMENT INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 Hot Equipment:
- .1 TIAC code A-1 with mechanical fastenings and 13 mm cement reinforced with one layer of reinforcing mesh.
- .2 Thicknesses: 50 mm (2").

.3 Application: pumps, expansion tanks, heat exchangers, air/dirt separator and all associated accessories in heating piping system.

3.6 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 11 - Cleaning.

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- .1 ASHRAE Standard 90.1-10, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).

.2 ASTM International Inc.
- .1 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .2 ASTM C335/C335M-10e1, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
- .3 ASTM C449-07(2013), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
- .4 ASTM C547-15, Standard Specification for Mineral Fiber Pipe Insulation.
- .5 ASTM C921-10(2015), Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)
- .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.5 Manufacturer's Trade Associations
- .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.6 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S702-14, Thermal Insulation, Mineral Fibre, for Buildings

1.3 DEFINITIONS

.1 For purposes of this section:
- .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
- .2 "EXPOSED" - will mean "not concealed" as specified.

.2 TIAC ss:
- .1 CRF: Code Rectangular Finish.
- .2 CPF: Code Piping Finish.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102.
.1 Maximum flame spread rating: 25.
.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
.1 Mineral fibre: to CAN/ULC-S702 & ASTM C547.
.2 Maximum "k" factor: to CAN/ULC-S702.

.4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
.1 Mineral fibre: to CAN/ULC-S702 & ASTM C547.
.2 Jacket: to CGSB 51-GP-52Ma.
.3 Maximum "k" factor: to CAN/ULC-S702 ASTM C547.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5 mm diameter stainless steel.

.5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:
.1 Hydraulic setting or air drying on mineral wool, to ASTM C449.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 JACKETS

.1 Canvas:
- .1 220 gm/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
- .2 Lagging adhesive: compatible with insulation.

.2 Aluminum:
- .1 To ASTM B209.
- .2 Thickness: 0.50 mm sheet.
- .3 Finish: embossed .
- .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
- .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
- .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
- .1 Install hangers, supports outside vapour retarder jacket.

.5 Supports, Hangers:
- .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: at expansion joints, valves, flanges and unions at equipment.

.2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:
.1 Insulation, fastenings and finishes: same as system.
.2 Jacket: PVC .

3.5 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.6 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.
.1 Securements: SS bands at 300 mm on centre.
.2 Seals: lap seal adhesive, lagging adhesive.
.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.
.1 Securements: SS bands at 300 mm on centre.
.2 Seals: VR lap seal adhesive, VR lagging adhesive.
.3 Installation: TIAC Code: 1501-C.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)				
			Run out	to 1	1-1/4 to 2	2-1/2 to 4	5 to 6
Glycol Heating	350 - 94	A-1	25	25	38	38	38
Glycol switch-over	5 - 59	A-3	25	25	38	38	38

.4 Finishes:
.1 Exposed indoors: canvas jacket.
.2 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
.3 Outdoors: water-proof aluminum jacket.
.4 Finish attachments: SS bands, at 150 mm on centre. Seals: wing or closed.
.5 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of contract, including general and supplementary conditions and division. Specification sections, insulation manufacturers shop/installation drawings Design & Installation manual apply to work of this section.

.2 Section 01 33 00 - Submittal Procedures.

1.2 DESCRIPTION OF WORK

.1 Extent of underground piping insulation required by this sections is indicated on drawings and schedules and by requirement of this section.

.2 Types of underground piping insulation specified in this section include the following: Inorganic, engineered granular, underground pipe insulation

1.3 SECTION INCLUDES

.1 Controlled Density Thermal Insulation & Corrosion Protection Pipes & Tanks

.2 Miscellaneous incidental to complete installation of exterior insulation to raw carrier pipe

1.4 CODES AND STANDARDS

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C177-10, Steady-State Heat Flux Measurement and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
  - .1 Thermal Conductivity - material tested at installed/use density
- .2 ASTM D1895-96(2010)e1, Apparent Density, Bulk Factor and Pourability of Plastic Materials
  - .1 Method A: Apparent Density (Bulk Density)
  - .2 Method C: (Applied 400 lbs.) Compaction & Corresponding Density Under Static Load
  - .3 Method C: (Applied 400 lbs.) Percent of compaction of installed density under static load

1.5 SUBMITTALS

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

.2 Product Testing Data: Submit ASTM Industry Standard testing

.3 Long Term Water Retardency Test: Submit passage of 3rd party conducted lab test greater than 30 days withstanding moisture penetration.

.4 Warranty: Submit manufacturer published warranty as designed for the specific purpose for use in load bearing underground installations and as a thermal insulation and corrosion protection product.

.5 Statement from manufacturer indicating if the material is sold based on bulk density or installed/use density.

.6 Manufacturer's Design & Installation Manual and Instructions.

1.6 QUALITY ASSURANCE

.1 Manufacturer's Qualifications: Firm regularly engaged in the manufacture of granular insulation products of size and type required, whose product has been in satisfactory use in similar service for not less than 10 years.

.2 Installers Qualifications: Firm with at least 3 years of successful installation experience on projects with elevated temperature mechanical insulation systems.

.3 Advise manufacturer 7-10 days in advance to allow for observation (if required).

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver insulation, associated adhesives, form work and supplementary steel to site in manufacturer's containers with manufacturer's stamp or label clearly shown.

.2 Protect insulation packaging and associated components against sun, dirt, water and chemical damage.

PART 2 - PRODUCTS

2.1 APPROVED PRODUCT

.1 Gilsulater500XR (Patent 4,231,884) This necessary item is not available under any other product name. No other product shall be directly substituted.

2.2 INSULATION & CORROSION PROTECTION

.1 Provide a system meeting installed guidelines of Unified Facilities Guide Specifications UFGS-33.61.13 (2.4)

.2 Product must consist of insulating minerals (sodium potassium aluminum silicate) and dielectric mineral filler (coated calcium carbonate). Material shall be dry, free-flowing, inert, inorganic, non-toxic, non-flammable, and completely free of asbestos. Material to be chemically treated to render it hydrophobic.

.3 Physical Properties:
- .1 ASTM C177-04 Thermal Conductivity (tested @ use density):
  - .1 K = 0.53 Btu/hr.ft^2°F/in. @ 100°F
  - .2 K = 0.60 Btu/hr.ft^2°F/in. @ 175°F
  - .3 K = 0.65 Btu/hr.ft^2°F/in. @ 300°F
- .2 ASTM D1895A - Bulk Density
  - .1 30-34 lbs./ft^3
- .3 ASTM D1895C (400 lbs.) - Consolidated Cubic Foot Installed/Use Density (CFUD)
  - .1 40-42 lbs./ft^3 CFUD
- .4 ASTM D1895C (400 lbs.) - Percent of compaction of installed density under static load
  - .1 Shall not exceed more than 1% compaction
- .5 Load Bearing Prior Backfill: 12,000 psf
- .6 Particle Sizing Range: "Well-graded" diameter ranging from 1mm to sub-micron sizes
- .7 Temperature Range: 35°F to 800°F
- .8 Electrical Resistivity: Greater than 10 to the 12th Ohm-cm

2.3 ACCESSORIES

.1 Protective Coatings: provide a bitumastic self-priming, heavy duty, cold-applied, waterproof coating made from pitch derived from tar and solvents. Approved product: Carboliner "Bitumastic 50" or equal.

.2 Structural Steel Components: provide steel anchors and guides as required by the contract documents and insulation manufacturer's drawings and Design and Installation Manual.

.3 Expansion Cushions: provide 3 to 5 pound density mineral fiber cushion to accommodate thermal expansion at expansion loops and elbows as required by the contract documents and insulation manufacturer's drawings and Design and Installation Manual.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine area and conditions under which engineered controlled density insulating fill & corrosion protection system is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected. All standing water shall be removed from trench prior to installing insulation.

.2 Pile dirt from trenching on one side of trench and work from opposite side. Insure bottom of trench is free of debris and large stones.

.3 Bottom of trench shall be undisturbed soil.

3.2 INSTALLATION

.1 Install and test carrier pipe: Install and test prior to installing insulation. Inspect welds and pressure test pipe as required by other sections of this specification. Clean pipe of all dirt, scale and foreign materials.

.2 Installation of anchors: Install structural steel and concrete of the size and quantity shown on the contract documents. Pour 2000 psi concrete at 28 days around rebar and anchor post and against undisturbed soil. Insure anchor post and support channel (if required) are at the proper elevation for installation of piping. Insure the rebar and the bottom of the anchor post is within the concrete envelope. Just prior to pouring the insulation coat all exposed steel (anchor post, support channel and knee brace) with bitumastic. Bitumastic must be tacky during insulation.

.3 Installation of guides: Install structural steel and concrete of the size and quantity shown on the contract documents. Pour 2000 psi concrete at 28 days around lower portion of guide brackets and against undisturbed soil. Weld the horizontal guide brackets at the proper pipe elevation. Just prior to pouring the insulation coat all exposed steel guide brackets and spacer angles with bitumastic. Bitumastic must be tacky during insulation installation.

.4 Installation of expansion loop support: Pour concrete support pad of the size indicated on the contract documents. Insure pad elevation is correct for proper pipe elevation when the concrete pipe support is installed. Coat pipe support with bitumastic. Bitumastic must be tacky during insulation installation.

.5 Installation of temporary pipe supports: Provide temporary pipe support wires suspended from lumber bridging the trench. Temporary wood blocks located under the pipe may also be used. These supports must be removed as the insulation is poured and consolidated. No object should be allowed to bridge the gap between the soil and the pipe except the insulation.

.6 Installation of expansion cushions: Wrap mineral fiber cushions around pipe elbows on expansion elbows and expansion loops as indicated on the contract documents. Insure there is sufficient space or flexibility between cushions to allow insulation to pour and be consolidated under piping. Secure cushion to pipe with fiber reinforced tape. Specified Insulation thicknesses need to be maintained around fiber cushion areas.

.7 Installation of forms: Provide gypsum board forms with support posts as shown in Gilsulate International, Inc.'s Design and Installation Manual. Posts must be located on the outside of the forms and spaced to prevent bowing of the gypsum board. After forms are in place, partially backfill outside of form to height of pipe.

.8 Pouring of insulation: Pour insulation in short sections along the pipe axis. Apply bitumastic to structural steel surfaces and fill trench to centerline of pipe. Consolidate insulation using a rod-type concrete vibrator pulled along the sides and between the pipes. Pour and consolidate additional layers of insulation until the design coverage has been achieved. Proper consolidation is achieved when the insulation can be walked on with foot prints less than 1" deep. No wood is to remain in contact with pipe(s) or left in insulation envelope. This could affect overall system efficiency (heat gain/loss) of non-metallic pipe(s) and/or cause corrosion to metallic pipe(s).

.9 Inspector must physically be capable of confirming specified installed/compacted insulation thicknesses prior to placement of any backfill.

.10 Backfill first 6" of soil (no stones) by hand. Complete backfilling and mechanically compact in uniform layers with suitable excavated soil to grade level.

.11 Refer to Gilsulate International Inc. "Design & Installation Manual for Installation Procedures.

.12 Provide concrete trench for heating piping as per drawings and manufacturer's recommendations. Concrete trench and underground product must be able to self support the weight of motor vehicles.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 74 11 - Cleaning.

.5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.6 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM E202-12, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Instructions: submit manufacturer's installation instructions.
  - .1 NCC Representative will make available 1 copy of systems supplier's installation instructions.

1.4 QUALITY ASSURANCE

.1 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.

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

PART 2 - PRODUCTS

2.1 CLEANING SOLUTIONS

.1 Tri-sodium phosphate: 0.40 kg per 100 L water in system.

.2 Sodium carbonate: 0.40 kg per 100 L water in system.

.3 Low-foaming detergent: 0.01 kg per 100 L water in system.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 CLEANING HYDRONIC AND STEAM SYSTEMS

.1 Timing: systems operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.

.2 Cleaning Agency:
- .1 Retain qualified water treatment specialist to perform system cleaning.

.3 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete by water treatment specialist.

.4 Cleaning procedures:
- .1 Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:
  - .1 Cleaning procedures, flow rates, elapsed time.
  - .2 Chemicals and concentrations used.
  - .3 Inhibitors and concentrations.
  - .4 Specific requirements for completion of work.
  - .5 Special precautions for protecting piping system materials and components.
  - .6 Complete analysis of water used to ensure water will not damage systems or equipment.

.5 Conditions at time of cleaning of systems:
- .1 Systems: free from construction debris, dirt and other foreign material.
- .2 Control valves: operational, fully open to ensure that terminal units can be cleaned properly.
- .3 Strainers: clean prior to initial fill.
- .4 Install temporary filters on pumps not equipped with permanent filters.
- .5 Install pressure gauges on strainers to detect plugging.

.6 Report on Completion of Cleaning:
- .1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

.7 Hydronic Systems:
- .1 Fill system with water, ensure air is vented from system.
- .2 Fill expansion tanks 1/3 to 1/2 full, charge system with compressed air to at least 35 kPa (does not apply to diaphragm type expansion tanks).

.3 Use water metre to record volume of water in system to +/- 0.5%.
.4 Add chemicals under direct supervision of chemical treatment supplier.
.5 Closed loop systems: circulate system cleaner at 60 degrees C for at least 36 h. Drain as quickly as possible. Refill with water and inhibitors. Test concentrations and adjust to recommended levels.
.6 Flush velocity in system mains and branches to ensure removal of debris. System pumps may be used for circulating cleaning solution provided that velocities are adequate.
.7 Add chemical solution to system.
.8 Establish circulation, raise temperature slowly to maximum design 82 degrees C minimum. Circulate for 12 h, ensuring flow in all circuits. Remove heat, continue to circulate until temperature is below 38 degrees C. Drain as quickly as possible. Refill with clean water. Circulate for 6 h at design temperature. Drain and repeat procedures specified above. Flush through low point drains in system. Refill with clean water adding to sodium sulphite (test for residual sulphite).

.8 Glycol Systems:
.1 In addition to procedures specified above perform specified procedures.
.2 Test to prove concentration will prevent freezing to minus 40 degrees C. Test inhibitor strength and include in procedural report. Refer to ASTM E202.

3.3 START-UP OF HYDRONIC SYSTEMS

.1 After cleaning is completed and system is filled:
.1 Establish circulation and expansion tank level, set pressure controls.
.2 Ensure air is removed.
.3 Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.
.4 Dismantle system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.
.5 Clean out strainers repeatedly until system is clean.
.6 Check glycol level in expansion tank with cold glycol with circulating pumps OFF and again with pumps ON.
.7 Repeat with glycol at design temperature.
.8 Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.
.9 Bring system up to design temperature and pressure slowly over a 24 hour period.
.10 Perform TAB as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
.11 Adjust pipe supports, hangers, springs as necessary.
.12 Monitor pipe movement, performance of expansion joints, loops, guides, anchors.
.13 Re-tighten bolts using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.
.14 Check operation of drain valves.
.15 Adjust valve stem packings as systems settle down.
.16 Fully open balancing valves (except those that are factory-set).
.17 Check operation of over-temperature protection devices on circulating pumps.
.18 Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

3.4 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Copper piping valves and fittings for hydronic systems.

.2 Related Requirements
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 11 - Cleaning.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 22 05 01 - Mechanical General Requirements.
- .5 Section 23 05 23 - Valves.
- .6 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .7 Section 23 21 13.02 - Steel Piping and Fittings - Hydronic Systems.
- .8 Section 23 22 13 - Steel Piping and Fittings Steam and Condensate up to 860 kPa.
- .9 Section 23 25 00 - HVAC Water Treatment Systems where indicated.
- .10 Section 25 01 11 - Commissioning - Mechanical Systems.

1.2 REFERENCES

.1 American Welding Society (AWS)
- .1 AWS A5.8/A5.8M:2011, Specification Filler Metals for Brazing and Bronze Welding.

.2 American Society of Mechanical Engineers (ASME)
- .1 ASME B16.15-2013, Cast Bronze Threaded Fittings: Classes 125 and 250.
- .2 ASME B16.18-2012, Cast Copper Alloy, Solder Joint Pressure Fittings.
- .3 ASME B16.22-2013, Wrought Copper and Copper-Alloy Solder Joint Pressure Fittings.

.3 American Society for Testing and Materials (ASTM)
- .1 ASTM B32-08(2014), Specification for Solder Metal.
- .2 ASTM B88M-14, Specification for Seamless Copper Water Tube Metric.
- .3 ASTM E202-12, Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
  - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.3 Closeout Submittals:
- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 - PRODUCTS

2.1 PIPING

.1 Type L hard drawn copper tubing: to ASTM B88M.

2.2 FITTINGS

.1 Cast bronze threaded fittings: to ASME B16.15.

.2 Wrought copper and copper alloy solder joints pressure fittings: to ASME B16.22.

.3 Cast copper alloy solder joint pressure fittings: to ASME B16.18.

2.3 DI-ELECTRIC COUPLINGS

.1 Provide wherever pipes of dissimilar metals are jointed.

.2 For pipe sizes 2 NPS and under, provide di-electric unions or couplings.

2.4 JOINTS

.1 Solder, tin-antimony, 95:5: to ASTM B32.

.2 Silver solder BCUP: to AWS A5.8.

.3 Brazing: as indicated.

2.5 VALVES

.1 Refer to Section 23 05 23 - Valves.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

.1 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.2 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping wherever practical.

.3 Slope piping in direction of drainage and for positive venting.

.4 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.5 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.6 Ream pipes, clean scale and dirt, inside and outside, before and after assembly.

.7 Assemble piping using fittings manufactured to ASME Standards.

.8 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main. Hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding saddle.

.9 Install all pipe wells or other devices supplied by Section 25 01 11 - Commissioning - Mechanical Systems.

3.2 FLUSHING AND CLEANING

.1 As per Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

3.3 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified and/or glycol as per Section 23 25 00 - HVAC Water Treatment Systems where indicated.

3.4 TESTING

.1 Test system in accordance with Section 22 05 01 - Mechanical General Requirements.

.2 For glycol systems, retest with specified quality of glycol after cleaning. Repair any leaking joints, fittings or valves.

3.5 BALANCING

.1 Install flow measuring stations and flow balancing valves as indicated.

.2 Refer to Section 23 05 93 - Testing Adjusting and Balancing of Systems for applicable procedures.

3.6 GLYCOL CHARGING

.1 Provide mixing tank and positive displacement pump for glycol charging.

.2 Retest for concentration to ASTM E202 after cleaning.

.3 Provide report to NCC Representative.

3.7 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes.
- .1 Materials and installation for steel piping, valves and fittings for hydronic systems in building services piping.

.2 Related Requirements
- .1 Section 01 35 30 - Health and Safety.
- .2 Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.
- .3 Section 21 05 01 - Common Work Results for Mechanical.
- .4 Section 23 05 05 - Installation of Pipework.
- .5 Section 23 05 17 - Pipe Welding.
- .6 Section 23 05 23 - Valves.
- .7 Section 23 05 53.01 - Mechanical Identification.
- .8 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .9 Section 23 21 13.01 - Copper Piping and Fittings - Hydronic Systems.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME).
- .1 ASME B16.1-2015, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- .2 ASME B16.3-2011, Malleable Iron Threaded Fittings: Classes 150 and 300.
- .3 ASME B16.5-2013, Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
- .4 ASME B16.9-2012, Factory-Made Wrought Buttwelding Fittings.
- .5 ASME B18.2.2-2015, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A47/A47M-99(2014), Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- .3 ASTM A105/ASTM 105M-14, Standard Specification for Carbon Steel Forgings for Piping Applications.
- .4 ASTM A139/A139M-04(2014), Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over).

.3 American Water Works Association (AWWA).
- .1 AWWA C111/A21.11-12, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

1.3 QUALITY ASSURANCE

.1 Health and Safety.
- .1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal.
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
.4 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M & ASTM A139/A139M, welded, Grade B carbon steel, as follows:
.1 NPS 2-1/2 to 10, Schedule 40.

.2 Provide openings & wells for new accessories including thermometers, pressure gauges, BAS sensors, drain/test connections, etc.

.3 Provide pipe identification with flow arrows for all new condenser and chilled water piping in accordance with Section 23 05 53.01 - Mechanical Identification.

2.2 PIPE JOINTS

.1 Application: glycol systems: NPS 2½ and over; NPS 2 and under shall be copper piping only - no steel piping.
.1 NPS 2 and under: shall be copper - refer to Section 23 21 13.01 - Copper Piping and Fittings - Hydronic Systems.
.2 Heating and glycol systems NPS 2½ and over: welded or flanged. Grooved joints are not accepted. All underground piping to be welded.
.3 Welding fittings and flanges to CSA W47.1. Reference Section 23 05 17 - Pipe Welding.
.4 Flanges: full face, weld neck, bored to suit pipe to ASTM A105/105M.
.5 Flange gaskets: to AWWA C111/A21.11.
.6 Pipe thread: taper.
.7 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.
.8 Grooved mechanical couplings as manufactured by Victaulic are acceptable as listed. Style 07; ZeroFlex for rigid connections. Style 77 for flexible connections.

2.3 FITTINGS AND ACCESSORIES

.1 Pipe flanges and flanged fittings:
.1 Cast iron: to ASME B16.1.
.2 Steel: to ASME B16.5.

.2 Butt-welding fittings: steel, to ASME B16.9.

.3 Unions: malleable iron, to ASTM A47/A47M and ASME B16.3.

.4 Steel pipe gaskets, fanges and flanged fittings: to ASME B16.5.

.5 Couplings, caps, plugs:
.1 NPS 1/2 to 1-1/2: Class 3000, 20 MPa, socket weld ends, to ASTM.

.6 Nipples for drains, vents, pressure gauges, similar items:
.1 NPS 1/2 to 1-1/2: Schedule 80, screwed, to ASTM A53/A53M, Grade A.

2.4 VALVES

.1 Connections:
  .1 NPS 2 and smaller: Screwed ends.
  .2 NPS 2-1/2 and larger: Flanged ends.

.2 Refer to Section 23 05 23 - Valves.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

.1 Install pipework in accordance with Section 23 05 05 - Installation of Pipe Work.

3.2 FLUSHING AND CLEANING

.1 As per Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

3.3 TESTING

.1 Test system in accordance with Section 23 05 05 - Installation of Pipe Work.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 11 - Cleaning.

.3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 23 83 13 .01 - Snow Melting System.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
  .1 ASME BPVC, 2015 ASME Boiler and Pressure Vessel Code (BPVC).

.2 American Society for Testing and Materials (ASTM)
  .1 ASTM A278/A278M-01(2015), Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 650 degrees F (350 degrees C).
  .2 ASTM B62-15, Specification for Composition Bronze or Ounce Metal Castings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Provide manufacturer's printed product literature and datasheets for expansion tanks, air vents, separators, valves, and strainers and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Submit maintenance and operation data in accordance with Section 01 78 00 - Closeout Submittals.

PART 2 - PRODUCTS

2.1 EXPANSION TANKS

.1 Vertical steel pressurized removable bladder type expansion tank as per Section 23 83 13.01 - Snow Melting System.

.2 Bladder in EPDM suitable for 115°C (240°F) operating temperature (glycol).

.3 Diaphragm sealed in EPDM suitable for 115°C operating temperature.

.4 Working pressure: 862 kPa (125 psi) with ASME stamp and certification including Canadian Registration Number (CRN).

.5 Air precharged to initial fill pressure of system as per Section 23 83 13 .01 - Snow Melting System.

.6 Base mount for vertical installation.

.7 Supports: Provide supports with hold down bolts and installation templates.

.8 Capacity: Sized for fluid volume & operating temperatures.

2.2 AUTOMATIC AIR VENT

.1 System vents (glycol):
- .1 Industrial float vent: cast iron body and NPS 3/4 connection and rated at 1034 kPa working pressure.
- .2 Float: solid material suitable for 115°C working temperature.

2.3 IN-LINE AIR & DIRT SEPARATOR

.1 Full flow air eliminator for removal of air and microbubbles and separates dirt simultaneously, c/w manual bleed valve. Mild steel construction, with centre line inlet and outlet ports, copper wire woven mesh & copper tubes inside housing, integrated or separate venting mechanism on top, side valve for floating liquids and debris, and bottom flange c/w threaded blow-down. Maximum working pressure 860 kPa (125 psi), maximum working temperature 175°C (350°F), maximum pressure drop 3 kPa (1 ft.) of water. Provide pipe reducers as required.

2.4 PIPE LINE STRAINER

.1 NPS 1/2 to 2: bronze body to ASTM B62, Class 250 screwed connections.

.2 NPS 2-1/2 to 12: cast steel body to ASTM A278M, Class 250, flanged connections.

.3 Blowdown connection: NPS 1.

.4 Screen: stainless steel brass with perforations between 5 mm and 6 mm.

.5 Working pressure: 1034 kPa (150 psi).

.6 Provide contact for output to BAS for system alarm.

2.5 GLYCOL MAKE-UP PACKAGE (GMU)

.1 The contractor shall supply and install, as indicated on the plans and in the specifications, a prefabricated, automatic and autonomous make-up package for the glycol system.

.2 The package shall be wall mounted to operate on a standard 120 V, 15 Amp, 60 Hz electrical circuit, and to maintain a fill pressure in the glycol systems as indicated.

.3 It shall feature a cut-off and alarm arrangement which will stop the pump in case of excessive pressure, or a low solution level, and activate dry contact alarm

.4 A translucent 25L (6 USgal) polyethylene solution container, complete with lid, shall be mounted on the pumping assembly and shall include a strainer and a shut off valve. Built-in glycol solution recovery line shall be piped in from the system relief valve outlet to the solution container, through its lid in such a way that the lid can be removed for filling and mixing.

.5 The assembly shall be mounted in a sturdy steel wall bracket. It shall include a 0.04 L/s (0.7 USGPM) at free flow pump, 120 V to 24 VDC 50W AC motor, a magnetic starter, a pressure tank with a pressure control, a priming valve, a PRV, a shut-off valve and a pressure gauge. It shall be connected to the system with a 6 mm (¼") NPT connection. Provide low level alarm panel and contacts.

2.6 ETHYLENE AND PROPYLENE GLYCOL

.1 Provide pre-mixed ethylene and propylene glycol in 50% concentration by weight as specified in schedules on drawings for glycol heating system.

2.7 HYDRONIC COILS

.1 General:
- .1 Cleanable tube type: cast brass headers and straight copper tubes.
- .2 Plate fin type: tubes mechanically bonded to fins. Spiral wound fin type: mechanically bonded to tubes.
- .3 All non-ferrous tubes and headers: brazed assembly.
- .4 Maximum tube length: 3.6 m unless specified otherwise.
- .5 Factory tested with air under water.

.2 Ratings: ARI Certified. Submit with shop drawings actual heating fluid entering and leaving conditions for stated air side requirements.
- .1 Unless otherwise indicated, preheat coils to be rated for 2.5 m/s (500 fpm).
- .2 Pressure drop through heating coils: as indicated.
- .3 Water velocity: 1.2 m/s maximum. Under 0.6 m/s, turbulators may be used if manufacturer's standard practice.

.3 Coil casings:
- .1 Steel: die formed 1.6 mm thick galvanized zinc coated steel sheet.
- .2 Tube supports: allow for expansion and contraction.
- .3 Supports: steel channel or double angle frames or other approved support. Provide brass supports for copper coils.
- .4 Blank-off plates: of similar material as casing to prevent air bypass. Seal openings where pipes pass through casing using methods recommended by SMACNA.

.4 Heating water coils: cleanable fins.
- .1 Tubes: copper.
- .2 Fins: aluminum.
- .3 Headers: cast brass.
- .4 Pressure tests: 1.7 Mpa.
- .5 Capacities: as indicated.

.5 Acceptable materials: Aerofin, Heatcraft, Rosemex.

PART 3 - EXECUTION

3.1 GENERAL

.1 Install as indicated and to manufacturer's recommendations.

.2 Run drain lines and blow off connections to terminate above nearest drain.

.3 Maintain proper clearance to permit service and maintenance.

.4 Should deviations beyond allowable clearances arise, request and follow Engineer's directive.

.5 Check shop drawings for conformance of all tappings for ancillaries and for equipment operating weights.

3.2 STRAINERS

.1 Install in horizontal or down flow lines.

.2 Ensure clearance for removal of basket.

.3 Install ahead of each pump.

.4 Install ahead of each automatic control valve larger than NPS 1 and as indicated.

3.3 AUTOMATIC AIR VENTS

.1 Install automatic air vents at high points of piping systems.

.2 Install full port ball at each automatic air vent.

.3 Air vents must have minimum connection of 13 mm (½").

3.4 EXPANSION TANKS

.1 Adjust expansion tank pressure to suit design criteria.

.2 Install lockshield type valve at inlet to tank.

3.5 HYDRONIC COILS

.1 Install in accordance with manufacturer's instructions.

.2 Provide double swing pipe joints as indicated.

.3 Hot water units: for each unit, install ball valves on inlet and CB valve outlet of each unit. Install drain valve at low point. Install manual air vent at high point.

.4 Clean finned tubes and comb straight.

.5 Provide supplementary suspension steel as required.

.6 Before acceptance, set discharge patterns and fan speeds to suit requirements.

.7 Provide duct access doors before and after reheat coils.

3.6 PRESSURE SAFETY RELIEF VALVES

.1 Glycol run discharge pipe to terminate at glycol tank.

3.7 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
  .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 01 78 00 - Closeout Submittals.

.6 Section 23 05 13 - Motors, Drives and Guards for Mechanical Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for pump, circulator, and equipment, and include product characteristics, performance criteria, physical size, finish and limitations indicate point of operation, and final location in field assembly.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance and operation data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 MAINTENANCE

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

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

PART 2 - PRODUCTS

2.1 WET ROTOR CIRCULATING PUMP

.1 Wet rotor:
- .1 Integrated pump and motor assembly without shaft seal and with only two gaskets for sealing. The bearings are lubricated by the pumped liquid.
  - .1 Motor with three speeds,
  - .2 Ceramic radial bearings,
  - .3 Carbon thrust bearing,
  - .4 Stainless steel rotor can, bearing plate and rotor cladding,
  - .5 Stator housing in aluminium alloy,
  - .6 Cast iron or bronze housing,
  - .7 Stator with built-in thermal overload switch.

.2 In-line cast iron and bronze spiral pump housing:
- .1 Flange dimensions for USA are according to individual submittal data the flanges have ¼ NPT pressure gauge tappings. Tapped holes are provided on the underside of the pumps. These holes can be used for fitting the pump to a base plate or bracket by means of hexagon screws. The pump housing is provided with a receptacle stainless steel/Teflon neck ring. The ring reduces to a minimum amount of liquid running from the discharge side of the impeller to the suction side.

.3 Impeller:
- .1 The impeller is made of stainless steel, AISI 304 SS.

.4 Motors: High efficiency to Section 23 05 13 - Motors, Drives and Guards for Mechanical Systems.

.5 Design maximum pressure: 860 kPa (125 psi).

.6 Design maximum temperature: 110°C (230°F).

.7 Capacity: as per drawing schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 In line circulators: install as indicated by flow arrows. Support at inlet and outlet flanges or unions. Install with bearing lubrication points accessible. Install motor in orientation as recommended by manufacturer.

.2 Ensure that pump body does not support piping or equipment. Provide stanchions or hangers for this purpose. Refer to manufacturer's installation instructions for details.

.3 Pipe drain tapping to nearest floor drain c/w full port ball valve.

.4 Install volute venting pet cock in accessible location.

.5 Check rotation prior to start-up.

.6 Install ball valves on pump suction & discharge tap-ins for pressure gauge.

.7 All pumps to be installed in accordance with Hydraulic Institute Standards.

3.2 START-UP

.1 General
- .1 In accordance with manufacturer's recommendations & Hydraulic Institute Standards.

.2 Procedures:
- .1 Before starting pump, check that over-temperature and other protective devices are installed and operative.
- .2 After starting pump, check for proper, safe operation.
- .3 Check installation, operation of mechanical seals. Adjust as necessary.
- .4 Run-in pumps for 12 continuous hours.
- .5 Verify operation of over-temperature and other protective devices under low- and no-flow condition.
- .6 Eliminate air from scroll casing.
- .7 Adjust water flow rate through water-cooled bearings.
- .8 Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.
- .9 Adjust alignment of piping and conduit to ensure true flexibility at all times.
- .10 Eliminate cavitation, flashing and air entrainment.
- .11 Adjust pump shaft seals, stuffing boxes, glands.
- .12 Measure pressure drop across strainer when clean and with flow rates as finally set.
- .13 Replace seals if pump used to degrease system or if pump used for temporary heat.
- .14 Verify lubricating oil levels.

3.3 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 National Fire Protection Association (NFPA).
- .1 NFPA (Fire) 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, 2015 Edition.
- .2 NFPA (Fire) 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems, 2015 Edition.

.4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
- .1 SMACNA 1966, HVAC Duct Construction Standard - Metal and Flexible, 3rd Edition.
- .2 SMACNA 016-2012, HVAC Air Duct Leakage Test Manual, 2nd Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE

.1 Certification of Ratings:
- .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

PART 2 - PRODUCTS

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	B
250	B
125	B

.2 Seal classification:
- .1 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.

2.2 SEALANT

.1 Sealant: oil resistant,, polymer type flame resistant duct sealant. Temperature range of -5 degrees C to plus 93 degrees C.

2.3 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.4 FITTINGS

.1 Fabrication: to SMACNA.

.2 Radiused elbows.
- .1 Rectangular: standard radius Centreline radius: 1.5 times width of duct.
- .2 Round: smooth radius five piece. Centreline radius: 1.5 times diameter.

.3 Mitred elbows, rectangular:
- .1 To 400 mm: with single thickness turning vanes.
- .2 Over 400 mm: with double thickness turning vanes.

.4 Branches:
- .1 Rectangular main and branch: with 45 degrees entry on branch.
- .2 Round main and branch: enter main duct at 45 degrees with conical connection.
- .3 Provide volume control damper in branch duct near connection to main duct.
- .4 Main duct branches: with splitter damper.

.5 Transitions:
- .1 Diverging: 20 degrees maximum included angle.
- .2 Converging: 30degrees maximum included angle.

.6 Offsets:
- .1 Full radiused elbows.

.7 Obstruction deflectors: maintain full cross-sectional area.
- .1 Maximum included angles: as for transitions.

2.5 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A 653M, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: to SMACNA.

2.6 HANGERS AND SUPPORTS

.1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.
.1 Maximum size duct supported by strap hanger: 500 mm.
.2 Hanger configuration: to SMACNA.
.3 Hangers: black galvanized steel angle with black steel rods to SMACNA following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 759	25 x 25 x 3	6

.4 Upper hanger attachments:
.1 For concrete: manufactured concrete inserts.

PART 3 - EXECUTION

3.1 GENERAL

.1 Do work in accordance with NFPA (Fire) 90A, NFPA (Fire) 90B and SMACNA.

.2 Do not break continuity of insulation vapour barrier with hangers or rods.
.1 Insulate strap hangers 100 mm beyond insulated duct.

.3 Support risers in accordance with ASHRAE and SMACNA .

.4 Install breakaway joints in ductwork on sides of fire separation.

.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with SMACNA as follows:

Duct Size (mm)	Spacing (mm)
to 1500	3000

3.3 SEALING AND TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  .1 SMACNA 1966, HVAC Duct Construction Standard - Metal and Flexible, 3rd Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame 100 mm thick with fabric clenched by means of double locked seams.

.2 Material:
  .1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m^2.

2.3 ACCESS DOORS IN DUCTS

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: neoprene.

.4 Hardware:
  .1 Up to 300 x 300 mm: two sash locks complete with safety chain.
  .2 301 to 450 mm: four sash locks complete with safety chain.
  .3 451 to 1000 mm: piano hinge and minimum two sash locks.
  .4 Doors over 1000 mm: piano hinge and two handles operable from both sides.
  .5 Hold open devices.

2.4 INSTRUMENT TEST

.1 1.6 mm thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

2.5 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Flexible Connections:
- .1 Install in following locations:
  - .1 Inlets and outlets to supply air units and fans.
  - .2 Inlets and outlets of exhaust and return air fans.
  - .3 As indicated.
- .2 Length of connection: 100 mm.
- .3 Minimum distance between metal parts when system in operation: 75 mm.
- .4 Install in accordance with recommendations of SMACNA.
- .5 When fan is running:
  - .1 Ducting on sides of flexible connection to be in alignment.
  - .2 Ensure slack material in flexible connection.

.2 Access Doors and Viewing Panels:
- .1 Size:
  - .1 300 x 300 mm for viewing.
- .2 Location as indicated.

.3 Instrument Test Ports:
- .1 General:
  - .1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
- .2 Locate to permit easy manipulation of instruments.
- .3 Install insulation port extensions as required.

.4 Locations:
.1 For traverse readings:
.1 Inlets and outlets of other fan systems.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Fans, motors, accessories and hardware for commercial use.

.2 Related Requirements
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 30 - Health and Safety.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 23 05 13 - Motors, Drives and Guards
- .6 Section 23 05 48 - Vibration Isolation and Seismic Control.
- .7 Section 23 33 00 - Duct Accessories.

1.2 REFERENCES

.1 Air Movement and Control Association (AMCA)
- .1 AMCA 99-10, Standards Handbook.
- .2 AMCA 210-07, Laboratory Methods of Testing Fans for Rating.
- .3 AMCA 300-14, Reverberant Room Method for Sound Testing of Fans.
- .4 AMCA 301-14, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

.2 American Bearing Manufacturers Association (ABMA)
- .1 ABMA 9:2015, Load Ratings and Fatigue Life for Ball Bearings.
- .2 ABMA 11:2014, Load Ratings and Fatigue Life for Roller Bearings.

.3 ASHRAE/Air Movement and Control Association
- .1 ASHRAE/AMCA 51-2007, Laboratory Methods of Testing Fans for Rating.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
  - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide:
- .1 Fan performance curves showing point of operation, BHP kW and efficiency.
- .2 Sound rating data at point of operation.

.3 Closeout Submittals:
- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.5 MAINTENANCE

.1 Extra Materials:
  .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
    .1 Spare parts to include:
      .1 Matched sets of belts.
  .2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:
    .1 Bearings and seals.
    .2 Addresses of suppliers.
    .3 List of specialized tools necessary for adjusting, repairing or replacing.

PART 2 - PRODUCTS

2.1 FANS GENERAL

.1 Capacity: flow rate, total static pressure, bhp, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.2 Statically and dynamically balanced. Constructed in conformity with AMCA 99.

.3 Sound ratings: comply with AMCA 301, tested to AMCA 300. Unit shall bear AMCA certified sound rating seal.

.4 Performance ratings: based on tests performed in accordance with AMCA 210, and ASHRAE 51, unit to bear AMCA certified rating seal.

.5 Performance ratings: based on tests performed in accordance with AMCA 210, and ASHRAE 51. Unit shall bear AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.

.6 Bearings: sealed lifetime oilite ball bearings heavy duty grease lubricated ball or roller bearings of self aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 200,000 h in accordance with ABMA L50 life standard. Bearings to be rated and selected in accordance with ABMA 9 and ABMA 11.

.7 Motors:
  .1 In accordance with Section 23 05 13 - Motors, Drives and Guards supplemented as specified herein.
  .2 Sizes as indicated.

.8 Factory primed before assembly in colour standard to manufacturer.

.9 Scroll casing drains: as indicated.

.10 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

.11 Vibration isolation: to Section 23 05 48 - Vibration Isolation and Seismic Control.

.12 Flexible connections: to Section 23 33 00 - Duct Accessories.

2.2 CABINET FANS DIRECT DRIVE

.1 Fan shall have true centrifugal wheel (or wheels).

.2 Fans shall have acoustically insulated housings c/w eggcrate type inlet grille and shall have air deliveries and Sone levels as indicated. All fans shall bear the AMCA Certified Ratings Seal and the UL label. Manufacturer shall submit vibration amplitudes and magnetic motor hum levels in decibels.

.3 Integral backdraft damper shall be totally chatter-proof with no metal to metal contact.

.4 Entire fan, motor, and wheel assembly shall be easily removable without disturbing the housing. Motor speeds shall not exceed 1500 RPM and all fan motors shall be suitably grounded, and mounted on rubber-in-shear vibration isolators.

.5 Fans shall be equipped with disconnect switches.

.6 Supply variable speed controller and turn over to Div. 26 for installation where indicated.

.7 Performance: as indicated on drawing schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

3.2 ANCHOR BOLTS AND TEMPLATES

.1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified in Section 23 05 48 - Seismic Restraint System.

3.3 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Supply, return and exhaust grilles and registers, diffusers and linear grilles, for commercial use.

.2 Related Requirements
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 11 - Cleaning.
- .3 Section 01 78 00 - Closeout Submittals.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
  - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate following:
  - .1 Capacity.
  - .2 Throw and terminal velocity.
  - .3 Noise criteria.
  - .4 Pressure drop.
  - .5 Neck velocity.

1.3 MAINTENANCE

.1 Extra Materials:
- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Include:
  - .1 Keys for volume control adjustment.
  - .2 Keys for air flow pattern adjustment.

PART 2 - PRODUCTS

2.1 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated.

.2 Frames:
- .1 Full perimeter gaskets.
- .2 Plaster frames where set into plaster or gypsum board and as specified.
- .3 Concealed fasteners.

.3 Concealed manual volume control damper operators.

2.2 SUPPLY GRILLES AND REGISTERS

.1 Type SG1: steel construction, double deflection, horizontal face bars c/w integral balancing damper, off-white baked enamel finish. Size: as indicated.

2.3 EXHAUST GRILLES AND REGISTERS

.1 Type EG1: steel construction, 45° deflection, fixed louvres, 13 mm (½") spacing c/w integral balancing damper, off-white baked enamel fin Size as indicated.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with manufacturers instructions.

.2 Install with flat head cadmium plated screws in countersunk holes where fastenings are visible.

3.3 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 01 78 00 - Closeout Submittals.

.6 Section 01 91 13 - General Commissioning (Cx) Requirements

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
  .1 ASME Boiler and Pressure Vessel Code, 2015.

.2 CSA International
  .1 CSA B51-14, Boiler, Pressure Vessel, and Pressure Piping Code.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for heat exchangers for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
  .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  .2 Store and protect heat exchangers from nicks, scratches, and blemishes.
  .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Plate Heat Exchanger:
- .1 Glycol to glycol.
  - .1 Designed, constructed and tested in with accordance ASME Boiler and Pressure Vessel Code, CSA B51 and provincial pressure vessel regulations.
- .2 Frames: carbon steel with baked epoxy enamel paint, stainless steel side bolts and shroud.
- .3 Plates: type 304 stainless steel.
- .4 Gaskets: as recommended by manufacturer to suit fluid temperature.
- .5 Piping connections: as indicated.
- .6 Capacity: as indicated in drawing schedule.
- .7 Dimensions: as indicated in drawing schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 General: install level and firmly anchored to supports in accordance with manufacturer's recommendations.

.3 Plate exchangers: install in accordance with manufacturer's recommendations.

3.2 APPURTENANCES

.1 Install with safety relief valve piped to glycol tank and hose bib drain valve.

.2 Install thermometer wells with thermometers on inlet and outlet of primary and secondary side.

3.3 SYSTEM START-UP

.1 Check installation, settings, operation of relief valves and safety valves.

.2 Check installation, location, settings and operation of operating, limit and safety controls.

.3 Check supports, seismic restraint systems.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

3.5 DEMONSTRATION

.1 Training: provide training in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Training of O&M Personnel, supplemented as follows:

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by heat exchanger installation.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Snow melting tubing, accessories, thermostat and snow sensing controls, and installation.

.2 Related Requirements
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 30 - Health and Safety.
- .3 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM).
- .1 ASTM F876-15a, Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
- .2 ASTM F877-11a, Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.

.2 Canadian Standards Association (CSA).
- .1 CSA B137 Series-13, Thermoplastic pressure piping compendium.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 GENERAL

.1 Provide all labour, materials, products, equipment and services to supply and install underfloor heating systems for snow melting at building entrance and parking garage ramp as indicated on the Drawings and specified in this Section of the Specification.

.2 Manufacturer to provide heating system loop lay-out and control components package design.

1.4 DESCRIPTION

.1 System shall be hydronic type consisting of pumps, glycol-to-glycol heat exchanger, expansion tank, controls, piping & accessories. System shall be designed for a performance capacity of 466 W/m^2 as indicated on mechanical drawings; confirm exact dimensions on architectural drawings.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
  - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Closeout Submittals:
- .1 Submit operation and maintenance data for snow melt system in accordance with Section 01 78 00 - Closeout Submittals.

1.6 QUALITY ASSURANCE

.1 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety.

1.7 WARRANTY

.1 The manufacturer shall furnish, at the completion of installation as described herein, a Certificate of Inspection signed by his authorized representative. The system shall be covered by a five-year System Performance Warranty. This includes parts & labour.

PART 2 - PRODUCTS

2.1 SNOW MELTING HEATING EQUIPMENT

.1 Provide Wirsbo hePEX-Plus underground tubing rated for 82.2°C (180°F) maximum working temperature and 690 kPa (100 psi) working pressure in accordance with ASTM F876 and F877 and CSA B137.5 with an oxygen diffusion barrier. Provide tubing with 12 mm (½") inside diameter.

The pipe shall be manufactured by the "Engel Method". The pipe shall have a 2 layer oxygen diffusion barrier capable of limiting oxygen diffusion through the pipe to no greater than 0.005 g/m day at 4.4°C (40°F).

Pipe shall have 100% thermal memory when heated to 130° (266°F).

The minimum bend radius for cold bending of the pipe shall not be less than 8 times the outside diameter. Bends with a radius less than stated will require the use of a bend support by the pipe manufacturer.

.2 Tubing fittings shall be manufactured of dezincification resistant brass. These fittings must be supplied by the pipe manufacturer. The pipe fitting consists of a barbed insert, a serrated compression ring, and a nut capable of connecting to the manifold.

.3 Manifolds shall be of cast bronze construction and shall have integral loop balancing, and loop control valves. Supply and return manifolds shall be able to vent air from the system and shall be provided with support brackets. Manifolds shall be isolated from supply and turn piping with valves that are suitable for isolation and balancing.

.4 Provide thermometers and pressure gauges as shown on the drawings.

.5 Connect the heating system to the building heating system as shown. New piping shall be Schedule 40 steel, threaded fittings. Thermally insulate new piping; 25 mm (1") fibreglass sleeving with 226.8 g (8 oz). plain weave cotton jacket. At the new branch connection provide ball type isolating valves, bronze, threaded, 1035 kPa (150 psi) rated.

.6 Provide fluid circulator pump as shown on schedule.

.7 Provide air eliminator; Spirovent VSR 200 MT.

.8 Provide brazed plate heat exchangers, stainless steel to AISI 316, rated for 3700 kPa (535 psi), -184°C (-300°F) to 198°C (390°F).

.9 Provide bladder type expansion tanks sized for FWID volume & operating temperatures.

.10 Provide 50 mm thick insulated manifold cabinet c/w locking door. Reference drawing for location.

.11 Provide control panel with microprocessor based controller able to operate the system in setpoint and outdoor reset modes. Controller to provide output to variable duty circulator and send the start-stop signal to system circulator. All zones to be controlled by means of measuring slab temperature by remote sensors. Sensors to be interlock to control units all mounted in Control Panel.Wiring (24 V) and start-up of control package shall be done by system manufacturer.

.12 Sequence of Operation: Controller shall activate the system when ambient temperature is less than 10°C (50°F). Each zone valve will allow flow of 50/50 glycol solution in the slab loops to maintain setpoint temperature. Controller to operate the circulator to maintain maximum temperature of heating glycol at 15.5°C (60°F) based on an outside temperature. BAS To manually turn ON and OFF each snow melt zone. System shall be engaged only if there is an excess heat off the heating system. If no excess heat is available, the snow melting system shall be disabled.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Tubing embedded in concrete shall be secured to a welded wire fabric or approved alternate fabric (provided by others) with wire ties provided by the pipe manufacturer. Spacing of wire ties shall be at 225 mm (9") centre in ramp & 300 mm (12") in the soffit.

.2 Contractor to supply field coordination and supervision of the pressure testing of the field tubing. The system shall be pressure tested at 420 kPa (60 psi) for minimum of 24 hours prior to and during the concrete application. Test equipment to be supplied by and installed by the contractor. Test shall be witnessed by Engineer.

.3 The contractor shall supply and install the 50% + 2% propylene glycol solution to the heating system to prevent any possibility of freezing the tubing system.

.4 The system shall be thoroughly checked for possible tubing punctures by the authorized supervisor and shall be repaired by the contractor prior to and during the concrete application.

.5 Provide complete power wiring, control wiring shall be done by system manufacturer.

3.2 TECHNICAL SUPPORT

.1 Submit shop drawings and installation drawings. As well as Maintenance and Operating Instructions for Department Representative's review as described in the general conditions.

3.3 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 01 79 00 - Demonstration and Training.

.4 Section 25 05 01 - EMCS: General Requirements.

1.2 DEFINITIONS

.1 For additional acronyms and definitions refer to Section 25 05 01 - EMCS: General Requirements.

.2 AEL: ratio between total test period less any system downtime accumulated within that period and test period.

.3 Downtime: results whenever EMCS is unable to fulfill required functions due to malfunction of equipment defined under responsibility of EMCS contractor. Downtime is measured by duration, in time, between time that Contractor is notified of failure and time system is restored to proper operating condition. Downtime not to include following:

- .1 Outage of main power supply in excess of back-up power sources, provided that:
  - .1 Automatic initiation of back-up was accomplished.
  - .2 Automatic shut-down and re-start of components was as specified.
- .2 Failure of communications link, provided that:
  - .1 Controller automatically and correctly operated in stand-alone mode.
  - .2 Failure was not due to failure of any specified EMCS equipment.
- .3 Functional failure resulting from individual sensor inputs or output devices, provided that:
  - .1 System recorded said fault.
  - .2 Equipment defaulted to fail-safe mode.
  - .3 AEL of total of all input sensors and output devices is at least 99% during test period.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Final Report: submit report to NCC Representative.

- .1 Include measurements, final settings and certified test results.
- .2 Bear signature of commissioning technician and supervisor
- .3 Report format to be approved by NCC Representative before commissioning is started.
- .4 Revise "as-built" documentation, commissioning reports to reflect changes, adjustments and modifications to EMCS as set during commissioning and submit to NCC Representative in accordance with Section 01 78 00 - Closeout Submittals.
- .5 Recommend additional changes and/or modifications deemed advisable in order to improve performance, environmental conditions or energy consumption.

1.4 CLOSEOUT SUBMITTALS

.1 Provide documentation, O&M Manuals, and training of O&M personnel for review of NCC Representative before interim acceptance in accordance with Section 01 78 00 - Closeout Submittals.

1.5 COMMISSIONING

.1 Do commissioning of snow melt systems.

.2 Carry out commissioning under direction of NCC Representative and in presence of NCC Representative.

.3 Inform, and obtain approval from, NCC Representative in writing at least 14 days prior to commissioning or each test. Indicate:
- .1 Location and part of system to be tested or commissioned.
- .2 Testing/commissioning procedures, anticipated results.
- .3 Names of testing/commissioning personnel.

.4 Correct deficiencies, re-test in presence of NCC Representative until satisfactory performance is obtained.

.5 Acceptance of tests will not relieve Contractor from responsibility for ensuring that complete systems meet every requirement of Contract.

.6 Load system with project software.

.7 Perform tests as required.

1.6 COMPLETION OF COMMISSIONING

.1 Commissioning to be considered as satisfactorily completed when objectives of commissioning have been achieved and reviewed by NCC Representative.

1.7 ISSUANCE OF FINAL CERTIFICATE OF COMPLETION

.1 Final Certificate of Completion will not be issued until receipt of written approval indicating successful completion of specified commissioning activities including receipt of commissioning documentation.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Provide sufficient instrumentation to verify and commission the installed system. Provide two-way radios.

.2 Instrumentation accuracy tolerances : higher order of magnitude than equipment or system being tested.

.3 Independent testing laboratory to certify test equipment as accurate to within approved tolerances no more than 2 months prior to tests.

.4 Locations to be approved, readily accessible and readable.

.5 Application: to conform to normal industry standards.

PART 3 - EXECUTION

3.1 PROCEDURES

.1 Test each system independently and then in unison with other related systems.

.2 Commission each system using procedures prescribed by a qualified commissioning professional and approved by NCC Representative.

.3 Commission integrated systems using procedures prescribed by a qualified commissioning professional and approved by NCC Representative.

.4 Debug system software.

.5 Optimize operation and performance of systems by fine-tuning PID values and modifying CDLs as required.

3.2 FIELD QUALITY CONTROL

.1 Completion Testing.
- .1 General: test after installation of each part of system and after completion of mechanical and electrical hook-ups, to verify correct installation and functioning.
- .2 Include following activities:
  - .1 Test and calibrate field hardware including stand-alone capability of each controller.
  - .2 Verify each A-to-D convertor.
  - .3 Test and calibrate each AI using calibrated digital instruments.
  - .4 Test each DI to ensure proper settings and switching contacts.
  - .5 Test each DO to ensure proper operation and lag time.
  - .6 Test each AO to ensure proper operation of controlled devices. Verify tight closure and signals.
  - .7 Test operating software.
  - .8 Test application software and provide samples of logs and commands.
  - .9 Verify each CDL including energy optimization programs.
  - .10 Debug software.
  - .11 Provide point verification list in table format including point identifier, point identifier expansion, point type and address, low and high limits and engineering units. Include space on commissioning technician and NCC Representative . This document will be used in final startup testing.
- .3 Final Startup Testing: Upon satisfactory completion of tests, perform point-by-point test of entire system under direction of NCC Representative and provide:
  - .1 2 technical personnel capable of re-calibrating field hardware and modifying software.
  - .2 Detailed daily schedule showing items to be tested and personnel available.
  - .3 NCC Representative's acceptance signature to be on executive and applications programs.
  - .4 Commissioning to commence during final startup testing.
  - .5 O&M personnel to assist in commissioning procedures as part of training.
  - .6 Commissioning to be supervised by qualified supervisory personnel and NCC Representative.
  - .7 Commission systems considered as life safety systems before affected parts of the facility are occupied.
  - .8 Operate systems as long as necessary to commission entire project.
  - .9 Monitor progress and keep detailed records of activities and results.
- .4 NCC Representative to verify reported results.

3.3 ADJUSTING

.1 Final adjusting: upon completion of commissioning as reviewed by NCC Representative, set and lock devices in final position and permanently mark settings.

3.4 DEMONSTRATION

.1 Demonstrate to Commissioning Manager NCC Representative operation of systems including sequence of operations in regular and emergency modes, under normal and emergency conditions, start-up, shut-down interlocks and lock-outs in accordance with Section 01 79 00 - Demonstration and Training.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety.

.3 Section 25 05 54 - EMCS: Identification.

.4 Section 25 90 01 - EMCS: Site Requirements, Applications and Systems.

1.2 REFERENCES

.1 The Instrumentation, Systems and Automation Society (ISA).
- .1 ISA 5.5-2009, Graphic Symbols for Process Displays.

.2 Institute of Electrical and Electronics Engineers (IEEE).
- .1 IEEE 260.1-2004, American National Standard Letter Symbols Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).

.3 Canadian Standards Association (CSA International).

1.3 ACRONYMS AND ABBREVIATIONS

.1 Acronyms used in EMCS:
- .1 AEL - Average Effectiveness Level.
- .2 AI - Analog Input.
- .3 AIT - Agreement on International Trade.
- .4 AO - Analog Output.
- .5 BACnet - Building Automation and Control Network.
- .6 BC(s) - Building Controller(s).
- .7 BECC - Building Environmental Control Center.
- .8 CAD - Computer Aided Design.
- .9 CDL - Control Description Logic.
- .10 CDS - Control Design Schematic.
- .11 COSV - Change of State or Value.
- .12 CPU - Central Processing Unit.
- .13 DI - Digital Input.
- .14 DO - Digital Output.
- .15 DP - Differential Pressure.
- .16 ECU - Equipment Control Unit.
- .17 EMCS - Energy Monitoring and Control System.
- .18 HVAC - Heating, Ventilation, Air Conditioning.
- .19 IDE - Interface Device Equipment.
- .20 I/O - Input/Output.
- .21 ISA - Industry Standard Architecture.
- .22 LAN - Local Area Network.
- .23 LCU - Local Control Unit.
- .24 MCU - Master Control Unit.
- .25 NAFTA - North American Free Trade Agreement.
- .26 NC - Normally Closed.
- .27 NO - Normally Open.
- .28 OS - Operating System.

.29 O&M - Operation and Maintenance.
.30 OWS - Operator Work Station.
.31 PC - Personal Computer.
.32 PCI - Peripheral Control Interface.
.33 PCMCIA - Personal Computer Micro-Card Interface Adapter.
.34 PID - Proportional, Integral and Derivative.
.35 RAM - Random Access Memory.
.36 SP - Static Pressure.
.37 ROM - Read Only Memory.
.38 TCU - Terminal Control Unit.
.39 USB - Universal Serial Bus.
.40 UPS - Uninterruptible Power Supply.
.41 VAV - Variable Air Volume.

1.4 DEFINITIONS

.1 Point: may be logical or physical.
  .1 Logical points: values calculated by system such as setpoints, totals, counts, derived corrections and may include, but not limited to result of and statements in CDL's.
  .2 Physical points: inputs or outputs which have hardware wired to controllers which are measuring physical properties, or providing status conditions of contacts or relays which provide interaction with related equipment (stop, start) and valve or damper actuators.

.2 Point Name: composed of two parts, point identifier and point expansion.
  .1 Point identifier: comprised of three descriptors, "area" descriptor, "system" descriptor and "point" descriptor, for which database to provide 25 character field for each point identifier. "System" is system that point is located on.
    .1 Area descriptor: building or part of building where point is located.
    .2 System descriptor: system that point is located on.
    .3 Point descriptor: physical or logical point description. For point identifier "area", "system" and "point" will be shortforms or acronyms. Database must provide 25character field for each point identifier.
  .2 Point expansion : comprised of three fields, one for each descriptor. Expanded form of shortform or acronym used in "area", "system" and "point" descriptors is placed into appropriate point expansion field. Database must provide 32 character field for each point expansion.
  .3 Bilingual systems to include additional point identifier expansion fields of equal capacity for each point name for second language.
    .1 System to support use of numbers and readable characters including blanks, periods or underscores to enhance user readability for each of the above strings.

.3 Point Object Type: points fall into following object types:
  .1 AI (analog input).
  .2 AO (analog output).
  .3 DI (digital input).
  .4 DO (digital output).
  .5 Pulse inputs.

.4 Symbols and engineering unit abbreviations utilized in displays: to ISA S5.5.
  .1 Printouts: to IEEE 260.1.
  .2 Refer also to Section 25 05 54 - EMCS: Identification.

1.5 SYSTEM DESCRIPTION

.1 Refer to Section 25 90 01 - EMCS: Site Requirements, Applications and Systems.

.2 Work covered by sections referred to above consists of fully operational EMCS, including, but not limited to, following:
- .1 Building Controllers.
- .2 Control devices as listed in I/O point summary tables.
- .3 OWS(s).
- .4 Data communications equipment necessary to effect EMCS data transmission system.
- .5 Field control devices.
- .6 Software/Hardware complete with full documentation.
- .7 Complete operating and maintenance manuals.
- .8 Training of personnel.
- .9 Acceptance tests, technical support during commissioning, full documentation.
- .10 Wiring interface co-ordination of equipment supplied by others.
- .11 Miscellaneous work as specified in these sections and as indicated.

.3 General Requirements:
- .1 Provide conduit and wiring linking elements of system.
- .2 Supply sufficient programmable controllers of types to meet project requirements. Quantity and points contents as reviewed by NCC Representative prior to installation.
- .3 Location of controllers as reviewed by NCC Representative prior to installation.

.4 Language Operating Requirements:
- .1 Provide English and French operator selectable access codes.
- .2 Use non-linguistic symbols for displays on graphic terminals wherever possible. Other information to be in English and French.
- .3 Operating system executive: provide primary hardware-to-software interface specified as part of hardware purchase with associated documentation to be in English and French.
- .4 System manager software: include in English and French system definition point database, additions, deletions or modifications, control loop statements, use of high level programming languages, report generator utility and other OS utilities used for maintaining optimal operating efficiency.
- .5 Include, in English and French:
  - .1 Input and output commands and messages from operator-initiated functions and field related changes and alarms as defined in CDL's or assigned limits (i.e. commands relating to day-to-day operating functions and not related to system modifications, additions, or logic re-definements).
  - .2 Graphic "display" functions, point commands to turn systems on or off, manually override automatic control of specified hardware points.
  - .3 Reporting function such as trend log, trend graphics, alarm report logs, energy report logs, maintenance generated logs.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit for review:
- .1 Equipment list and systems manufacturers at time of tender within 48 h after award of contract.

.3 Quality Control:
- .1 Provide equipment and material from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.
- .2 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.
- .3 Submit proof of compliance to specified standards with shop drawings and product data
- .4 In lieu of such evidence, submit certificate from testing organization, approved by NCC Representative, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.

.5 For materials whose compliance with organizational standards/codes/specifications is not regulated by organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.
.6 Permits and fees: in accordance with general conditions of contract.
.7 Submit certificate of acceptance from authority having jurisdiction to NCC Representative.
.8 Existing devices intended for re-use: submit test report.

1.7 QUALITY ASSURANCE

.1 Have access to local supplies of essential parts and provide 7 year guarantee of availability of spare parts after obsolescence.

.2 Ensure qualified supervisory personnel continuously direct and monitor Work and attend site meetings.

.3 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.8 EXISTING - CONTROL COMPONENTS

.1 All building automation controls shall be performed by Siemens Building Technologies.

.2 All new material and equipmentto be compatible with the existing BAS (Siemens Apogee System).

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 All materials must be selected to ensure full compatability with existing BAS system.

.2 Complete list of equipment and materials to be used on project and forming part of bid tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.

2.2 ADAPTORS

.1 Provide adaptors between metric and imperial components.

PART 3 - EXECUTION

3.1 MANUFACTURER'S RECOMMENDATIONS

.1 Installation: to manufacturer's recommendations.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 73 00 - Execution Requirements.

.3 Section 23 05 23.01 - Valves.

.4 Section 25 01 11 - EMCS: Start-Up, Verification and Commissioning.

.5 Section 25 05 01 - EMCS: General Requirements.

.6 Section 25 90 01 - EMCS: Site Requirements Applications and Systems Sequences of Operation.

1.2 REFERENCES

.1 National Electrical Manufacturer's Association (NEMA).

.2 Canadian Standards Association (CSA International).

1.3 DEFINITIONS

.1 Acronyms and Definitions: refer to Section 25 05 01 - EMCS: General Requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures.

1.5 EXISTING CONDITIONS

.1 Cutting and Patching: in accordance with Section 01 73 00 - Execution Requirements supplemented as specified herein.

.2 Repair surfaces damaged during execution of Work.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Control devices of each category to be of same type and manufacturer.

.2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, heat resistant, assembly.

.3 Operating conditions: -40 - 40 degrees C with 10 - 90% RH (non-condensing) unless otherwise specified.

.4 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.

.5 Transmitters and sensors to be unaffected by external transmitters including walkie talkies.

.6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.

.7 Outdoor installations: use weatherproof construction in NEMA 4 enclosures.

.8 Range: including temperature, humidity, pressure, as indicated in I/O summary in Section 25 90 01 - EMCS: Site Requirements, Applications and System Sequences of Operation.

2.2 TEMPERATURE SENSORS

.1 General: except for VAV box control, to be resistance or thermocouple type to following requirements:
- .1 Thermocouples: to be limited to temperature range of 200°C and over.
- .2 RTD's: 100/1000 ohm at 0°C (plus or minus 0.2 ohms) platinum element with strain minimizing construction, 3 integral anchored leadwires. Coefficient of resistivity: 0.00385 ohms/ohm°C.
- .3 Sensing element: hermetically sealed.
- .4 Stem and tip construction: copper or type 304 stainless steel.
- .5 Time constant response: less than 3 seconds to temperature change of 10°C.
- .6 Immersion wells: NPS 3/4, stainless steel spring loaded construction, with heat transfer compound compatible with sensor. Insertion length 100 or 150 mm as indicated. Strap-on pipe temperature sensors are acceptable only where system shut-down & drainage is not possible.

.2 Sensors:
- .1 Outside air type: complete with probe length 100 - 150 mm long, non-corroding shield to minimize so and wind effects, threaded fitting for mating to 13 mm conduit, weatherproof construction in EEMAC 12 enclosure.

2.3 TEMPERATURE TRANSMITTERS

.1 Requirements:
- .1 Input circuit: to accept 3-lead, 100 ohm at 0°C, platinum resistance detectors type sensors.
- .2 Power supply: 575 ohms at 24 V DC into load of 575 ohms. Power supply effect less than 0.01°C per volt change.
- .3 Output signal: 4 - 20 mA into 500 ohm maximum load.
- .4 Input and output short circuit and open circuit protection.
- .5 Output variation: less than 0.2% of full scale for supply voltage variation of plus or minus 10%.
- .6 Combined non-linearity, repeatability, hysteresis effects: not to exceed plus or minus 0.5% of full scale output.
- .7 Maximum current to 100 ohm RTD sensor: not to exceed 25 mA.
- .8 Integral zero and span adjustments.
- .9 Temperature effects: not to exceed plus or minus 1.0% of full scale/ 50°C.
- .10 Long term output drift: not to exceed 0.25% of full scale/ 6 months.
- .11 Transmitter ranges: Select narrowest range to suit application from following:
  - .1 Minus 50°C to plus 50°C, plus or minus 0.5°C.
  - .2 0 to 100°C, plus or minus 0.5°C.
  - .3 0 to 50°C, plus or minus 0.25°C.
  - .4 0 to 25°C, plus or minus 0.1°C.
  - .5 10 to 35°C, plus or minus 0.25°C.

2.4 ELECTRICAL RELAYS

.1 Requirements:
- .1 Double voltage, DPDT, plug-in type with termination base.
- .2 Coils: rated for 120V AC or 24V DC. Other voltage: provide transformer.
- .3 Contacts: rated at 5 amps at 120 V AC.
- .4 Relay to have visual status indication.

2.5 CONTROL VALVES

.1 Requirements:
- .1 Construction: reference Section 23 05 23.01 - Valves.
- .2 Two or three port as indicated. Normally Open.
- .3 Flow characteristics: linear or equal percentage as indicated.
- .4 Rangeability: 50:1 minimum.
- .5 Performance: refer to drawings for capacities.
- .6 Minimum shut-off pressure: refer to drawings and valve specifications.
- .7 Size for 25% of system pressure drop or 5 psi, whichever is less.
- .8 Two position valves shall be line size.

2.6 ELECTRONIC VALVE ACTUATORS

.1 Requirements:
- .1 Construction: steel, cast iron, aluminum.
- .2 Control signal: 4-20 mA DC.
- .3 Return to normal position on loss of communication.
- .4 Positioning time: to suit application (90 seconds maximum).
- .5 Size actuator to meet requirements and performance of control valve specifications.
- .6 Scale or dial indication of actual control valve position.

2.7 THERMOSTATS

.1 Room thermostats shall be of the gradual acting type with adjustable sensitivity.

.2 They shall have a bi-metal sensing element capable of responding to a temperature change of one-tenth of one degree.

.3 Thermostats shall be arranged for either horizontal or vertical mounting.

2.8 FREEZESTATS

.1 Install freezestats as indicated on the plans. Freezestat to be equipped with local LED indicating light.
- .1 Upon detection of low temperature, the freezestats shall stop the associated supply and exhaust fans. Provide manual reset.

2.9 WIRING

.1 Wiring must be continuous without joints.

.2 All wiring to be in EMT conduits.

.3 Sizes:
.1 Field wiring to digital device: #18AWG or 20AWG stranded twisted pair.
.2 Analog input and output: shielded #18 minimum solid copper #20 minimum stranded twisted pair.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.

.2 Install field control devices in accordance with manufacturers recommended methods, procedures and instructions.

.3 Temperature transmitters, controllers, relays: install in NEMA I enclosure or as required for specific applications. Provide for electrolytic isolation in cases when dissimilar metals make contact.

.4 Support field-mounted panels, transmitters and sensors on pipe stands or channel brackets.

3.2 ELECTRICAL WIRING AND MATERIALS

.1 Install, connect and wire the items included under this Section. This work includes providing required conduit, wire, fittings, and related wiring accessories. All conduit, wiring and equipment to conform to Div. 26 specifications.

.2 Provide wiring between thermostats, aquastats and unit heater motors, all control and alarm wiring for all control and alarm devices for all Sections of Specifications. Controls Contractor shall be responsible for all controls and interlock wiring not covered by Div. 26, including but not limited to air proving switches, end switches, alarm devices and other control components.

.3 All 120V power shall be provided by Div. 26 (hired by BAS contractor) to BAS equipment.

.4 Provide status function conduit and wiring for equipment covered under this Section.

.5 Contractor shall provide conduit where wiring is exposed (e.g. mechanical & electrical rooms, penthouse, garage, etc.), otherwise FT-6 plenum rated wiring shall be used.

.6 Provide conduit and wiring between the BAS panels and the temperature, humidity, or pressure sensing elements, including low voltage control wiring in conduit.

.7 Provide conduit and control wiring for devices specified in this Section.

.8 Provide conduit and signal wiring between motor starters in motor control centers and high and/or low temperature relay contacts and remote relays in BAS panels located in the vicinity of motor control centers.

.9 Provide conduit and wiring between the PC workstation, electrical panels, metering instrumentation, indicating devices, miscellaneous alarm points, remotely operated contractors, and BAS panels, as shown on the drawings or as specified.

.10 All wiring to be compliant to local building code and the NEC.

.11 Provide electrical wall box and conduit sleeve for all wall mounted devices.

3.3 TEMPERATURE SENSORS

.1 Stabilize to ensure minimum field adjustments or calibrations.

.2 To be readily accessible and adaptable to each type of application so as to allow for quick easy replacement and servicing without special tools or skills.

.3 Outdoor installation:
- .1 Protect from solar radiation and wind effects by stainless steel shields.
- .2 Install in NEMA 12 enclosures.

.4 Thermowells: install for piping installations. Where pipe diameter is less than well insertion length, locate well in elbow. Thermowell to restrict flow by less than 30%.

3.4 TESTING AND COMMISSIONING

.1 Calibrate and test field devices for accuracy and performance in accordance with Section 25 01 11 - EMCS: Start-up, Verification and Commissioning.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 At minimum provide detailed narrative description of Sequence of Operation of each system including ramping periods and reset schedules.
  - .1 Control Description Logic (CDL) for each system.
  - .2 Input/Output Point Summary Tables for each system.
  - .3 System Diagrams consisting of the following; EMCS System architectural diagram, Control Design Schematic for each system (as viewed on OWS), System flow diagram for each system with electrical ladder diagram for MCC starter interface.

.2 Related Sections:
- .1 Section 23 83 13.01 - Snow Melting System.

1.2 SEQUENCING

.1 Sequencing of operations for system as follows:
- .1 Refer to Section 23 83 13.01 - Snow Melting System.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety Requirements.

.3 Section 01 45 00 - Quality Control.

.4 Section 01 47 15 - Sustainable Requirements: Construction.

.5 Section 01 61 00 - Common Product Requirements.

.6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.7 Section 02 81 01 - Hazardous Materials.

.8 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
- .2 CAN/CSA-C22.3 No. 1-15, Overhead Systems.
- .3 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
- .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
- .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English and French.

.4 Use one nameplate or label for both languages.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 01 - Hazardous Materials.

.3 Shop drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
- .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
- .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .5 If changes are required, notify NCC Representative of these changes before they are made.

.4 Quality Control: in accordance with Section 01 45 00 - Quality Control.
- .1 Provide CSA certified equipment and material.
- .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to site.
- .3 Submit test results of installed electrical systems and instrumentation.
- .4 Permits and fees: in accordance with General Conditions of contract.
- .5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
- .6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to NCC Representative.

.5 Manufacturer's Field Reports: submit to NCC Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.6 QUALITY ASSURANCE

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

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices as per the conditions of Provincial Act respecting manpower vocational training and qualification.
- .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
- .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 SYSTEM STARTUP

.1 Instruct NCC Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

1.9 OPERATING INSTRUCTIONS

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:
- .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- .3 Safety precautions.
- .4 Procedures to be followed in event of equipment failure.
- .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

PART 2 - PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction.

2.5 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:
- .1 Nameplates: plastic laminate lamicoid 3 mm thick plastic engraving sheet, matt white finish face, black core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.
- .2 Sizes as follows:

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by NCC Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. [_____] " as directed by NCC Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Other Communication Systems	Green	Blue

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do underground systems in accordance with CSA C22.3 No. 1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

.1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.
.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.5 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.
  .1 Wall receptacles:
    .1 General: 400 mm.
    .2 In mechanical rooms: 1200 mm.
  .2 Panelboards: as required by Code or as indicated.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.7 FIELD QUALITY CONTROL

.1 Load Balance:
  .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
  .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
  .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
  .1 Circuits originating from branch distribution panels.
  .2 Lighting and its control.
  .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
  .4 Systems: fire alarm system.
  .5 Insulation resistance testing:
    .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
    .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
    .3 Check resistance to ground before energizing.

.3 Carry out tests in presence of NCC Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.8 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Section 26 05 00 - Common Work Results for Electrical.

.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.4 Section 33 65 76 - Direct Buried Underground Cable Ducts.

.5 Section 33 71 73.02 - Underground Electrical Service.

1.2 DELIVERY, STORAGE AND HANDLING

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

PART 2 - PRODUCTS

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with thermoplastic insulation type RW90 rated at 600 V. RWU90 for exterior and underground applications.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Conductors:
- .1 Grounding conductor: copper.
- .2 Circuit conductors: copper, size as indicated.

.3 Insulation:
- .1 Ethylene propylene rubber EP.
- .2 Cross-linked polyethylene XLPE.
- .3 Rating: 600 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking galvanized steel.

.6 Fastenings:
- .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .2 Threaded rods: 6 mm diameter to support suspended channels.

.7 Connectors:
- .1 Watertight, approved for TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from galvanized steel strip.

.4 Type: ACWU90 jacket over thermoplastic armour and compliant to applicable Building Code classification for this project.

.5 Connectors: anti short connectors.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Install cable in trenches in accordance with Section 33 71 73.02 - Underground Electrical Service.

.2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.3 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:
  .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
  .2 In underground ducts in accordance with Section 33 65 76 - Direct Buried Underground Cable Ducts.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable exposed, securely supported by straps.

3.5 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 26 05 00 - Common Work Results for Electrical.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

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

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.2 Insulated grounding conductors: green, copper conductors, size as indicated.

.3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
- .1 Grounding and bonding bushings.
- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Thermit welded type conductor connectors.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

.5 Soldered joints not permitted.

.6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.7 Install separate ground conductor to outdoor lighting standards.

.8 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.2 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting, cable trays.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests before energizing electrical system.

.3 Disconnect ground fault indicator during tests.

3.4 CLEANING

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

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 61 00 - Common Product Requirements.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition, Safety Standard for Electrical Installations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

PART 2 - PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Blank cover plates for boxes without wiring devices.

.4 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

2.3 CONDUIT BOXES

.1 Cast FS or FD boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.4 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.5 WEATHER-PROOF JUNCTION BOX

.1 Enclosure construction to: CSA C22.2 No. 94.

.2 Base and cover to be made from gray, fiberglass reinforced polyester.

.3 Enclosure to be fully gasketted and rated for outdoor application.

.4 Enclosure to be maintenance free and corrosion resistant.

.5 Enclosure to be complete with:
.1 Stainless steel hardware.
.2 Prepared knock-outs as required.

2.6 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 74 11 - Cleaning.

.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .3 CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.
- .4 CSA C22.2 No. 211.2-06(R2011), Rigid PVC (Unplasticized) Conduit.

1.3 WASTE MANAGEMENT AND DISPOSAL

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

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

PART 2 - PRODUCTS

2.1 CONDUITS

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.2 Rigid pvc conduit: to CSA C22.2 No. 211.2.

.3 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller.
- .1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.
.1 Set-screws are not acceptable.

2.4 FISH CORD

.1 Polypropylene.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.

.4 Use rigid pvc conduit underground.

.5 Use flexible metal conduit for connection to motors in dry areas connection to surface or recessed fluorescent fixtures.

.6 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.7 Use explosion proof flexible connection for connection to explosion proof motors.

.8 Minimum conduit size for lighting and power circuits: 21 mm.

.9 Bend conduit cold:
.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.10 Mechanically bend steel conduit over 19 mm diameter.

.11 Install fish cord in empty conduits.

.12 Remove and replace blocked conduit sections.
.1 Do not use liquids to clean out conduits.

.13 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Group conduits wherever possible on surface channels.

.4 Do not pass conduits through structural members except as indicated.

.5 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.5 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 11 - Cleaning.

.3 Section 01 78 00 - Closeout Submittals.

.4 Section 01 61 00 - Common Product Requirements

1.2 REFERENCES

.1 CSA International
  .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23nd Edition), Safety Standard for Electrical Installations.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for lighting controls system and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop and Wiring Drawings:
  .1 Submit shop drawings detailing all mechanical and electrical equipment, as supplied, including one-line diagrams, and physical dimensions of each item.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for lighting controls for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
  .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  .2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 COMPONENTS

.1 Components: to CSA C22.1.

.2 Designed for lighting control up to and including 600 V 20 amp.

.3 Quick change frames with pre-assembled relays, transformer rectification, multi-recessed control ports.

.4 Relay module.

.5 Low voltage switch.

.6 Station power module.

.7 Control processor module.

.8 Astronomical timeclock.

2.2 RACK ENCLOSURES

.1 Mechanical
- .1 The Rack Enclosure shall be a surface mounted, deadfront switchboard, constructed of 18-gauge formed steel panels with a hinged, lockable full-height door containing an integral electrostatic air filter.
  - .1 Filter shall be removable for easy cleaning.
  - .2 The enclosure shall support one control processor and one station power module plus accessories.
  - .3 The enclosure door shall have an opening to allow limited access to the control module face panel.
- .2 All rack components shall be properly treated and finished.
  - .1 Exterior surfaces shall be finished in fine textured, scratch-resistant, epoxy paint.
- .3 The fully digital rack enclosure shall be available with a minimum of six dimmer module spaces, one processor and a single station power supply.
- .4 A single low-noise fan shall be located at the top of each rack. The fan shall draw all intake air through the integral electrostatic air filter, over the surfaces of the module housing and out the top of the rack.
  - .1 The fan shall maintain the temperature of all components at proper operating levels with dimmers under full load, provided the ambient temperature of the dimmer room does not exceed 40°C/104°F.
  - .2 In the event of an over-temperature condition, only the affected dimmer module(s) shall shut down. A red indicator LED will flash and an error message shall appear on the Control Processor.
- .5 Rack Enclosures shall be designed to allow easy insertion and removal of dimmer and control modules without the use of tools.
  - .1 Supports shall be provided for precise alignment of modules into power and signal connector blocks.
  - .2 With modules removed, racks shall provide clear front access to all load, neutral and control wire terminations.
- .6 Racks enclosures shall be designed for use with auxiliary racks for Main Circuit Breaker, Main Lug, and cross bussing applications.

.2 Electrical:
- .1 Rack enclosures shall be 120 Volt.
- .2 Rack enclosures shall be completely pre-wired by the manufacturer. The contractor shall provide input feed, load, and control wiring.
- .3 Standard Short Circuit Current Ratings (SCCR) shall be minimum 22,000 at 100-277 Volt.

.4 All control wire connections shall be terminated via factory provided connectors.
.5 Rack enclosures shall support dimming for incandescent, LED fluorescent, neon, cold cathode, electronic low voltage and magnetic low voltage transformer load types.
.6 The rack enclosure shall support minimum 65,000 steps of dimming.
.7 The rack enclosure dimming engine shall support multiple dimmer curves including modified square law, linear, switched, fluorescent, pre-heat and electronic low voltage.
.8 The rack enclosure shall support voltage regulation including, minimum and maximum scale voltages with offsets.
.9 Rack enclosures shall be designed to support the following wire terminations as a minimum:
    .1 AC
    .2 24Vdc (2- 16AWG Wire)
    .3 RS232 Serial In/Out
    .4 Unshielded Twisted Pair (UTP) Category 5/5e Ethernet
    .5 Contact Closure In (14AWG to 26AWG Wire)
    .6 Contact Closure Out (14AWG to 26AWG Wire)
        .1 Contact Closure Out shall provide 1A @ 30Vdc
.10 All control wire connections shall be terminated via factory provided connectors.

.3 Thermal:
    .1 Ambient room temperature: 0-40°C / 32-104°F.
    .2 Ambient humidity: 10-90% non-condensing.

2.3 RELAY MODULES

.1 General:
    .1 The relay modules shall be designed for service in theatrical, architectural, and video application use with theatrical and architectural lighting.
    .2 Relay module configuration shall be dual channel, 100/140V, 20A, unless otherwise noted on the Electrical Drawings.
    .3 Relay modules shall be fully plug-in and factory wired. The modules shall consist of a heavy duty, die-cast aluminum chassis with integral face panel. No tools shall be required for module removal and insertion. All parts shall be properly treated, primed and finished in fine-texture, scratch resistant, gray epoxy powder coat. With the exception of the circuit breaker, the module shall contain no moving parts. Each module shall be labeled with the manufacturer's name, catalog number and rating. Modules constructed of molded plastic for structural support are not equivalent and are not acceptable. Relay modules shall be UL and cUL listed power control devices with a minimum AIC rating of 10,000A.
    .4 Modules shall have a fully magnetic circuit breaker for each channel. Relay modules shall be rated for a minimum of 100,000 full load activations.
    .5 Modules shall have Signal and Load LED indicators for each channel.

2.4 LOW VOLTAGE SWITCH KIT

.1 General:
    .1 The low voltage switch shall be a remote station that can play presets stored in a host product such as a dimmer pack, Relay panel or control module. The station shall consist of a dual function (program/play) push-button with an integral LED for each corresponding look.
    .2 Standard stations shall control 5 backup looks.

.2 Electrical:
    .1 Low voltage switch network wiring shall utilize low-voltage Class II unshielded twisted pair, and one #14 ESD drain wire (when not installed in grounded metal conduit).
    .2 The station shall operate on ± 21 Vdc provided by the control module via the network wiring.
    .3 Station wiring must be topology free. It may be point-to-point, bus, loop, home run or any combination of these.
    .4 Network insulation displacement connectors shall be provided with all stations.

.3 Station Addressing:
.1 Preset addressing for stations shall be via a 7- position dipswitch, and will be set by installers or factory personnel. Stations shall address only consecutive presets.

.4 Play Presets:
.1 Pressing a button shall play the corresponding preset. The station will send the command to play the look to all host products. If the look is a recorded look, the button's LED will stay lit. If the look is unrecorded, the LED will go off.
.2 The station shall monitor (at 30-second intervals) the status of presets. If any looks are active in the range of the station's numbered push-buttons, the station shall light the corresponding LED regardless of which device (console, host product, network PC or Button station) activated the look.
.3 If the button with the active look (LED lit) is pressed, the station shall send the command to return to normal operation, deactivate the preset and turn off the LED.
.4 Only one preset may be active at a time. Pressing a second button shall play the corresponding preset and fade out any preset previously active.

.5 Physical:
.1 Control station electronics shall mount directly behind the faceplate. A terminal block shall be supplied for contractor terminations. The entire assembly shall mount into a single gang back box. Back boxes for the flush mounted stations shall be industry standard back boxes. The manufacturer shall supply back boxes for surface mounted stations.
.2 Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment. All low voltage switch stations shall be available with white, signal white, ivory, gray or black faceplates and buttons.

2.5 DIMMER MODULES

.1 Electrical:
.1 Each dimmer module shall contain two single-pole circuit breakers, a solid-state switching module, associated toroidal filters, and power and control connectors.
.2 Modules shall not have any protruding pins subject to physical damage when the module is not installed.
.3 Modules shall be keyed so that dimmer modules of different capacity shall not be interchangeable.
.4 Circuit breakers shall be fully magnetic so the trip current is not affected by ambient temperature. Circuit breakers shall be rated for tungsten loads having an inrush rating of no less than 20 times normal current. Circuit breakers shall be rated for 100 percent switching duty applications. Dimmers that do not operate continuously at 100% load shall not be acceptable.

.2 SCR Assembly:
.1 Each dimmer module shall use a solid state module (SSM) consisting of two silicon-controlled rectifiers (SCRs) in an inverse parallel configuration, and all required gating circuitry on the high voltage side of an integral, opto-coupled control voltage isolator. Rectifiers, copper leads and a ceramic substrate shall be reflow soldered to an integral heat sink for maximum heat dissipation. The SSM shall also contain a control LED, a thermistor for temperature sensing, and silver-plated control and load contacts. The entire SSM shall be sealed in a plastic housing requiring only a screwdriver to replace. Dimmers employing triac power devices, pulse transformers, or other isolating devices not providing at least 2,500V RMS isolation, shall not be acceptable. Dimmer modules requiring disassembly, heat sink grease or additional tools for repair shall not be acceptable.
.2 All electronic components (current/voltage sensors and indicators) shall be contained in a single, field-replaceable housing. Modules requiring discrete wiring of electronic components shall not be acceptable.

.3 SCR power switching devices shall have the following minimum ratings:

Modular Size:	15 A	20 A	Half cycle:		
Single cycle:			12T	1,620	1,620
Peak surge			Tansient		
current	625 A	625 A	over voltage	600 V	600 V
			Die size (in)	0.257	0.257

.3 Filtering:
.1 Dimmer modules shall include toroidal filters to reduce the rate of current rise time resulting from switching the SCRs. The filter shall limit objectionable harmonics, reduce lamp filament sing and limit radio frequency interference on line and load conductors. Modules shall offer 350 or 500 uS. filter rise times. Rise time shall be measured at the worst case slew rate (about 50 percent) from 10 to 90 percent of the output wave form with the dimmer operating at full load.
.2 All dimmers shall maintain their published rise time and/or fall time regardless of duty cycle or rack temperatures. Dimmers that derate due to increased dimmer temperature caused by full load operation or high phase angles shall not be acceptable.

.4 Performance:
.1 Power efficiency for standard dimmers shall be at least 97 percent at full load with a no-load loss of 3V RMS. The dimmer shall accept hot patching of a cold incandescent load up to the full rated capacity of the dimmer.

.5 Physical:
.1 Dimmer modules shall be fully plug-in and factory wired. Dimmer modules shall consist of a heavy duty, die-cast aluminum chassis with integral face panel. No tools shall be required for module removal and insertion. All parts shall be properly treated, primed and finished in fine-texture, scratch resistant, gray epoxy powder coat. With the exception of the circuit breaker, the module shall contain no moving parts. Each module shall be labeled with the manufacturer's name, catalog number and rating. Modules constructed of molded plastic for structural support are not equivalent and are not acceptable. Dimmer modules shall be UL Recognized.

2.6 STATION POWER MODULES

.1 Mechanical:
.1 The Station Power Module (SPM) assembly shall be designed for use in Rack Enclosures.
.2 The SPM shall convert input power into low-voltage (Class II) power with data line to energize button, and timeclock devices for multi-scene lighting control.
.3 SPM module shall be contained in a plug-in assembly.
.1 The module shall be housed in a formed steel body and contain no discrete wire connections.
.1 No tools shall be required for module removal or insertion.
.4 The SPM shall be convection cooled.
.5 User Interface:
.1 The SPM shall utilize light emitting diodes (LED's) to indication function, status and fault.
.6 The SPM shall be secured behind the locking door.
.7 Wall-mounted, direct wire and 19" rack-mount, connectorized variants shall be available from the same manufacturer where required on the project.

.2 Electrical:
.1 The SPM shall require no discrete wiring connections; all wiring shall be terminated into the dimming enclosure, unless required by a variant.
.2 The SPM shall require line-voltage power supplied by the contractor, terminated inside the dimming enclosure.
.3 The SPM shall be hot-swap capable.
.4 The SPM, in conjunction with a matching Architectural Control Processor (ACP), shall support communications with remote devices, including button, and timeclock stations.

.1 The network shall utilize polarity-independent, low-voltage Class II twisted pair wiring. One #14 AWG drain wire will be required for system not using grounded metal conduit.

.5 The network shall be topology free. Network wiring may be bus, loop, home run, star or any combination of these.

.3 Functional:

.1 Capacity:

.1 Each SPM shall supply power for up to 16 button and timeclock stations.

.2 Operation:

.1 The SPM shall not require configuration or programming.

.2 The SPM shall automatically detect faults in the wiring, indicate the fault, including the fault polarity, and shut down the output power.

.1 The SPM shall automatically reset when the fault is clear, and can be manually reset by removing and re-inserting the module.

2.7 CONTROL PROCESSOR MODULE

.1 Mechanical:

.1 The Architectural Control Processor (ACP) assembly shall be designed for use in Rack Enclosures.

.2 The processor shall utilize microprocessor based, solid state technology to provide multi-scene lighting and building control.

.3 ACP module electronics shall be contained in a plug-in assembly.

.1 The module shall be housed in a formed steel body and contain no discrete wire connections.

.1 No tools shall be required for module removal or insertion.

.4 The ACP shall be convection cooled.

.5 User Interface

.1 The ACP shall utilize a backlit liquid crystal display capable of graphics and eight lines of text.

.1 The backlight shall have a user selectable time out, including no time out.

.2 The ACP shall provide a numeric keypad for data entry and navigation.

.3 The ACP shall provide a touch-sensitive control wheel for navigation.

.4 The ACP shall provide shortcut buttons to assist in navigation, selection, and data entry.

.2 Electrical:

.1 The ACP shall require no discrete wiring connections; all wiring shall be terminated into the dimming enclosure.

.2 The ACP shall be hot-swap capable.

.3 The ACP shall support E communications with remote devices, including button stations and timeclock stations

.1 The network shall utilize polarity-independent, low-voltage Class II twisted pair wiring. One #14 AWG drain wire will be required for system not using grounded metal conduit.

.2 The network shall be topology free. Network wiring may be bus, loop, home run, star or any combination of these.

.3 Functional:

.1 Capacity

.1 Shall support 48 channels of control

.2 The ACP shall support 64 presets using any combination of 48 channels

.2 System:

.1 System shall support local firmware upload from removable media (SD media)

.3 Configuration Data:

.1 Configuration data shall be locally stored in non-volatile memory

.2 Configuration Data may be loaded to and from removable media access provided on front panel (SD media)

.4 Local User Interface:

.1 Shall provide access to Processor status

.2 Shall provide access to Dimming enclosure setup and status

.3 Shall provide control functionality for Control Channels, Presets, and Sequence within the current configuration.
.4 Shall allow to perform firmware upgrades for connected Dimming enclosures
.5 Shall allow for transfer of configuration to and from Dimming enclosures using removable media (SD media)

.5 Access Controls:
.1 There shall be 2 user accounts - Administrator, and User with separate password protection
.2 Account and password settings shall be local to each Processor

.6 Operation:
.1 The ACP shall support control channel patch functions individually or for each of its 48 channels to any of 512 channels
.2 Configurable control signal-loss behavior including hold last look, wait and change to present or wait and change to off
.3 User programmable up, down and hold times as well as configurable sequence
.1 Times shall be configurable from 0 to 60 min, 59 sec
.2 Sequence shall include at least 1, up to 64 presets and use the timing of each independent preset.
.4 The ACP shall be capable of standalone operation and support host preset activation to and from other integrated products
.5 Shall support the following dimmer modes; normal, dimmer doubled, switched, 2/3 wire fluorescent, 4 wire fluorescent, DALI, Constant On, Off and Reverse Phase
.6 The ACP shall support multiple dimmer outputs including IES modified square law, linear, switched, fluorescent with adjustable cut-off, and adjustable pre-heat
.7 Standard rack feedback indications shall include
.1 Dimmer over-temperature
.2 Rack power status including under and over voltage
.8 Upon power cycle, the ACP shall return to its previous output state
.9 The ACP shall boot in less than 5 seconds
.10 Each Preset shall have a status that can be Activated or Deactivated

2.8 TIMECLOCK

.1 Mechanical:
.1 Astronomical Timeclock stations shall operate using six buttons, Up, Down, Back, Enter, Recall Preset and Hold.
.2 All stations shall be available with white, cream, ivory, gray or black faceplates.
.1 Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.
.3 All faceplates shall be designed for flush or surface mounting.
.4 Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
.5 Station electronics shall mount directly behind the faceplate. The entire assembly shall mount into a two gang back box.
.1 Back boxes for the flush mounted stations shall be industry standard back boxes.
.2 The manufacturer shall supply back boxes for surface mounted stations

.2 Electrical:
.1 Control station wiring shall be:
.1 Link power shall utilize low-voltage Class II unshielded twisted pair, and one #14 ES drain wire (when not installed in grounded metal conduit).
.2 Station wiring shall be topology free and polarity independent.
.3 It may be point-to-point, bus, loop, home run or any combination of these.
.4 Network insulation displacement connectors shall be provided with all stations.

.3 Functional:
.1 The Control System shall be designed to allow control of lighting and associated systems via manual and Astronomical timeclock controls.
.2 System shall allow the activation of presets, a sequence, and programming of timeclock events.

.1 The number of programmable presets shall be dependent on the limitations of the Host product
.1 32 presets shall be provided.

.3 System presets shall be programmable via Button stations and the control interface.
.1 Presets shall have a discrete fade time, programmable from zero to 60 minutes, 59 seconds.
.2 Presets shall be selectable via button stations or timeclock event.

.4 System sequence shall be programmable via the control interface
.1 Sequence steps shall be sequential starting with preset 1 and may include all presets in the system.
.2 Sequences shall be activated by button or timeclock event.

.5 System time events shall be programmable via the Timeclock facepanel.
.1 Timeclock events shall be assigned to system day types. Standard day types include: everyday, weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday.
.2 Timeclock events shall be activated based on sunrise, sunset, time of day or periodic event.
.3 System shall automatically compensate for regions using a fully configurable daylight saving time.
.4 Presets shall be assigned to events at the timeclock.

.6 The Timeclock shall support event override
.1 It shall be possible to override the timed event schedule form the facepanel of the timeclcok

.7 The timeclock shall support timed event hold
.1 IT shall be possible to hold a timed event from the facepanel of the processor

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install system and components in accordance with manufacturer's instructions.

.2 Install enclosures as shown on drawings.

.3 Install low voltage switches and low voltage cables as shown on drawings and in accordance with manufacturer's instructions and connect to control ports of controlled circuits.

.4 Install and connect relay, dimmer and station power modules in accordance with manufacturer's instructions. Install airflow module(s) as required to provide an operational system.

.5 Install central processor module within control panel.
.1 Connections within central control panel as instructed by control manufacturer.

.6 Install astronomical timeclock module in accordance with manufacturer's instructions. Set timeclock accordingly and provide instruction to NCC Representative on equipment operation.

3.2 FIELD QUALITY CONTROL

.1 On completion of installation, manufacturer representative shall be notified to carry out site inspection and report any inconsistencies to the NCC Representative. Corrections are to be implemented to comply with manufacturer's report.

3.3 CLEANING

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

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

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by network lighting controls installation.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 CSA International
- .1 CSA C22.2 No. 42-10 (R2015), General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CAN/CSA C22.2 No. 42.1-13, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wiring devices from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

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

PART 2 - PRODUCTS

2.1 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No. 42 with following features:
- .1 Brown urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.
.3 Break-off links for use as split receptacles.
.4 Eight back wired entrances, four side wiring screws.
.5 Triple wipe contacts and rivetted grounding contacts.
.6 Ground fault interrupter 5 mA, Class 'A' type where indicated.
.7 Specification grade.

.2 Other receptacles with ampacity and voltage as indicated.

.3 Receptacles of one manufacturer throughout project.

2.2 WEATHER RESISTANT RECEPTACLES

.1 All receptacles installed outdoors to be weather resistant grade with the following features.
.1 Auto-ground clip for positive ground.
.2 Zinc-plated steel mounting screws.
.3 Heavy-duty, brass strap for added strength and ground conductivity.
.4 UV-resistant nylon face.
.5 0.032 inch thick brass triple-wipe power contacts.
.6 Brown moulded housing.

.2 Receptacles of one manufacturer throughout project.

.3 Certified to CSA C22.2 No. 42.

2.3 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No. 42.1.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Stainless steel, vertically brushed, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

.4 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

2.4 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Receptacles:
.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
.2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results for Electrical or as indicated.
.3 Install GFI type receptacles as indicated.

.2 Cover plates:
.1 Install suitable common cover plates where wiring devices are grouped.
.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.2 CLEANING

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

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

3.3 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

.1 Ship fuses in original containers.

.2 Store fuses in original containers in moisture free location.

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

PART 2 - PRODUCTS

2.1 FUSES - GENERAL

.1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.

.2 Fuses: product of one manufacturer.

2.2 FUSE TYPES

.1 Class J fuses.
- .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
- .2 Type J2, fast acting.

.2 Class R -R fuses.
- .1 Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.
- .2 Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.
- .3 Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.1 Install rejection clips for Class R fuses.

.3 Ensure correct fuses fitted to assigned electrical circuit.

.4 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.

.5 Install spare fuses in fuse storage cabinet.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

1.2 REFERENCES

.1 CSA International
- .1 CSA C22.2 No. 5-13, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Certificates:
- .1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit 3 copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations.
  - .1 Production certificate of origin must be submitted to NCC Representative for approval.
- .2 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.
- .3 Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by NCC Representative. Unless complying with this requirement, NCC Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.
- .4 Production certificate of origin must contain:
  - .1 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.
  - .2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.
  - .3 Contractor's name and address and person responsible for project.
  - .4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store circuit breakers in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers, Circuit breakers, and ground-fault circuit-interrupters: to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
.1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.5 Circuit breakers to have minimum 10 kA symmetrical rms interrupting capacity rating.

2.2 THERMAL MAGNETIC BREAKERS DESIGN A

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 HIGH INTENSITY DISCHARGE CIRCUIT BREAKERS

.1 Design to CSA C22.2 No. 5.

.2 Breakers to be designed to handle high inductive loads, harmonic currents and cycling common to HID lighting systems.

.3 Breaker to be designed to hold in against high starting inrush currents.

.4 Circuit breaker to have minimum 10 kA symmetrical RMS interrupting capacity rating.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

.2 Review and confirm all spares within panel RH-0-02, RH-0-03, RH-0-04, RH-0-05 and RH-0-07. Provide updated panel schedules to Engineer prior to start of work.

3.2 CLEANING

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

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.3 Section 26 05 00 - Common Work Results for Electrical.

.4 Section 26 28 13.01 - Fuses - Low Voltage.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
- .1 CAN/CSA C22.2 No. 4-04 (2014), Enclosed Switches.
- .2 CSA C22.2 No. 39-13, Fuseholder Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES

.1 Fusible, disconnect switch in CSA Enclosure to CAN/CSA C22.2 No. 4 size as indicated.

.2 Provision for padlocking in off switch position by three locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuses: size as indicated, in accordance with Section 26 28 13.01 - Fuses - Low Voltage.

.5 Fuseholders: to CSA C22.2 No. 39 relocatable and suitable without adaptors, for type and size of fuse indicated.

.6 Quick-make, quick-break action.

.7 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 74 11 - Cleaning.

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Section 01 78 00 - Closeout Submittals.

.6 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 International Electrotechnical Commission (IEC)
  .1 IEC 947-4-1-2002, Part 4: Electromechanical contactors and motor-starters.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit operation and maintenance data for each type and style of motor starter for incorporation into maintenance manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Starters: to IEC 947-4 with AC4 utilization category.

2.2 MANUAL MOTOR STARTERS

.1 Single or three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
- .1 Switching mechanism, quick make and break.
- .2 One overload heater per phase, manual reset, trip indicating handle.

.2 Accessories:
- .1 Toggle switch: heavy duty oil tight labelled as indicated.
- .2 Indicating light: heavy duty oil tight type and colour as indicated.
- .3 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

.1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
- .1 Contactor solenoid operated, rapid action type.
- .2 Motor overload protective device in each phase, manually reset from outside enclosure.
- .3 Wiring and schematic diagram inside starter enclosure in visible location.
- .4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

.2 Combination type starters to include circuit breaker with operating lever on outside of enclosure to control circuit breaker, and provision for:
- .1 Locking in "OFF" position with up to 3 padlocks.
- .2 Independent locking of enclosure door.
- .3 Provision for preventing switching to "ON" position while enclosure door open.

.3 Accessories:
- .1 Selector switches: heavy duty oil tight labelled as indicated.
- .2 Indicating lights: heavy duty oil tight type and color as indicated.
- .3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.

2.4 ACCESSORIES

.1 Pushbutton: heavy duty, oil tight as required.

.2 Selector switches: heavy duty, oil tight as required.

.3 Indicating lights: heavy duty, oil tight, type and colour as indicated.

2.5 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.6 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Manual starter designation label, white plate, black letters, size 1, engraved as indicated.

.3 Magnetic starter designation label, white plate, black letters, size No. 3 engraved as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install starters and control devices in accordance with manufacturer's instructions.

.2 Install and wire starters and controls as indicated.

.3 Ensure correct fuses installed.

.4 Confirm motor nameplate and adjust overload device to suit.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and manufacturer's instructions.

.2 Operate switches and contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

3.3 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 61 00 - Common Product Requirements.

.4 Section 01 74 11 - Cleaning.

.5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.6 Section 26 05 21 - Wires and Cables (0-1000 V).

.7 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.8 Section 33 65 76 - Direct Buried Underground Cable Ducts.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.2 Underwriters' Laboratories of Canada (ULC).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by NCC Representative.
- .3 Photometric data to include: VCP Table where applicable.

.3 Provide sample fixtures. Include cost of mock-up in project price. Locate mock-up on site.
- .1 Install one sample LED Type 8 fixture as shown on drawings for NCC Representative approval.
- .2 Install chadelier fixture as shown on drawings. Install LED and halogen lamps for NCC Representative review. Install final lamp selection at the direction oF NCC Representative.

.4 Quality assurance submittals: provide following in accordance with Section 01 45 00 - Quality Control.

1.4 QUALITY ASSURANCE

.1 Provide mock-ups in accordance with Section 01 45 00 - Quality Control.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

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

.4 Divert unused metal materials from landfill to metal recycling facility.

.5 Disposal and recycling of fluorescent lamps as per local regulations.

.6 Disposal of old PCB filled ballasts.

PART 2 - PRODUCTS

2.1 LAMPS

.1 LED lamps to be:
- .1 PAR20 - 8W, medium base, wide flood, minimum 45,000 hours rated life to 70% output, minimum 470 lumens, 3000K, CRI at minimum 84, dimmable lamp.
- .2 PAR16 - 6W, medium base, narrow flood, minimum 50,000 hours rated life to 70% output, minimum 230 lumens, 3000K, CRI at minimum 80, dimmable lamp.

.2 Halogen lamps to be:
- .1 PAR20 - 50W, medium base, wide flood, minimum 3000 hours rated life, minimum 570 lumens.
- .2 PAR16 - 60W, medium base, narrow flood, minimum 3000 hours rated life, minimum 450 lumens.

.3 Ceramic metal halide lamps to be - clear, 150 Watt, G12 base, horizontal burn, 4100 K,9,000 hour lamp life, 36,000 initial lumens, CRI65, open or enclosed type to suit the luminaire; or as indicated.

2.2 BALLASTS

.1 Metal halide ballast:
- .1 Rating: 120 V, 60 Hz, for use with 1-150W metal halide lamp.
- .2 Totally encased and designed for 40 degrees Celsius ambient temperature.
- .3 Power factor: minimum 95% with 95% of rated lamp lumens.
- .4 Type: constant wattage autotransformer.
- .5 Input voltage range: plus or minus 10% of nominal.
- .6 Minimum starting temperature: minus 30 degrees Celsius at 90% line voltage.
- .7 Mounting: outdoor and integral with luminaire.
- .8 Current crest factor: 1.7 maximum current.

2.3 FINISHES

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

.2 Furnish light fixture with weatherproof housing when installed outdoors to minimum of NEMA 4.

2.4 OPTICAL CONTROL DEVICES

.1 As indicated in luminaire schedule.

2.5 LUMINAIRES

.1 As indicated in luminaire schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Provide adequate supports and mounting brackets as required for instllation.

3.2 WIRING

.1 Connect luminaires to lighting circuits:
  .1 Install wire and conduit in accordance with Section 26 05 21 - Wires and Cables (0-1000 V) and Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings respectively.
  .2 Provide buried conduits where required in accordance with Section 33 65 76 - Direct Buried Underground Cable Ducts.

3.3 LUMINAIRE ALIGNMENT

.1 Contractor to submit a schedule indicating the expected date of fixture alignment to the NCC Representative for review.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
  .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

- END OF SECTION -

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements

.3 Section 01 74 11 - Cleaning.

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 26 05 21 - Wires and Cables (0-1000 V).

.6 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

.1 CSA International
  .1 CSA C22.2 No. 141-15, Emergency Lighting Equipment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for emergency lighting and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for emergency lighting for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
  .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  .2 Store and protect emergency lighting from nicks, scratches, and blemishes.
  .3 Replace defective or damaged materials with new.

1.6 WARRANTY

.1 For batteries in this Section 26 52 00 - Emergency Lighting, 12 months warranty period is extended to 120 months.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Emergency lighting equipment: to CSA C22.2 No.141.

.2 Supply voltage: 120 V, AC.

.3 Output voltage: 12 V DC.

.4 Operating time: 30 minutes.

.5 Battery: sealed, maintenance free.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

.7 Solid state transfer circuit.

.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.9 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.

.10 Lamp heads: integral on unit, 345 degrees horizontal and 180 degrees vertical adjustment. Lamp type: quartz halogen, 12 W.

.11 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.12 Finish: White.

.13 Auxiliary equipment:
- .1 Ammeter.
- .2 Voltmeter.
- .3 Test switch.
- .4 Time delay relay.
- .5 Battery disconnect device.
- .6 AC input and DC output terminal blocks inside cabinet.
- .7 Bracket.
- .8 RFI suppressors.

2.2 WIRING OF REMOTE HEADS

.1 Conduit: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Conductors: in accordance with Section 26 05 21 - Wires and Cables (0-1000 V), sized in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install unit equipment and remote mounted fixtures.

.2 Direct heads.

.3 Connect exit lights to unit equipment.

3.2 CLEANING

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

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

3.3 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by emergency lighting installation.

- END OF SECTION -

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 20 00 Concrete Reinforcing

.2 Section 03 30 00 Cast-In Place Concrete

.3 Section 03 35 00 Concrete Finishing

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction.

.2 CAN/CSA O86-01, Engineering Design in Wood (Limit States Design).

.3 CSA O121 (R2003), Douglas Fir Plywood.

.4 CSA O151-04, Canadian Softwood Plywood.

.5 CSA O437 (R2006), Standards for OSB and Waferboard.

.6 CSA S269.1-1975 (R2003), Falsework for Construction Purposes.

.7 CAN/CSA S269.3 (R2003), Concrete Formwork.

.8 CAN/ULC S701-05 Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.2 Council of Forest Industries of British Columbia (COFI)

.1 COFI Exterior Plywood for Concrete Formwork.

.3 ACI

.1 ACI 302.1R.96 Guide for Concrete Floor and Slab Construction.

1.3 SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework in accordance with Division 1.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, water stops, dovetail anchor slots, and locations of temporary embedded parts. Show size of tie hole, plastic plug, and plug recess. Comply with CSA S269.1, for falsework drawings Comply with CAN/CSA-S269.3 for formwork drawings.

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Indicate sequence of erection and removal of formwork/falsework as directed by the NCC Representative.

.5 Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

.6 Assume full responsibility for complete design and engineering of formwork including shoring and bracing to resist loads due to wet concrete, forms, wind and other forces arising from use of equipment to place concrete.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1, Clause 9.

.2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

PART 2 PRODUCTS

1.5 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121 and CAN/CSA-O86.1.

.2 For concrete with special architectural features, use formwork materials to CAN/CSA-A23.1.

.1 New Sylvaform sealed overlaid plywood by MacMillan Bloedel Building Materials.

.2 Tubular column forms: round, spirally wound laminated fiber forms, internally treated with release material. Use seamless plastic liner for exposed columns.

.3 Form ties:

.1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 1” dia. in concrete surface.

.4 For Architectural concrete:

.1 Form Ties: Threaded internal disconnecting, spreader type, adjustable in length. Ties to have maximum break back of 1- ½” from concrete surface. Ensure ties incorporate removable tapered plastic spreader cones, with setback of 1- ½”. Ensure taper of spreader matches taper of tie hole plugs. Wire ties not permitted.

.2 Tie Hole Plugs: Plastic set back plugs, grey to match concrete, 1 – ½" setback, to fit tightly into tie holes. Include for tie hole plug quantity on basis of 30" each way plug spacing pattern.

.5 Form liner:

.1 Plywood: Douglas Fir to CSA O121 T and G.

.6 Form release agent: non-staining, chemically active release agent containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing set of film of concrete in contact with form.

.1 For temperatures less than 0°C: Formwork Release Agent: Eucoslip by Euclid Admixture Canada Inc., C.R.A. by Sika Canada Inc., CPD Chemical Form Release Agent by CPD Construction Products or Duogard by W.R. Meadows of Canada Ltd.. For formed concrete work in contact with soil, use material that does not alter sulphate resistant qualities of concrete.

.2 For temperatures greater than 0oC: Water Based Formwork Release Agent: Eucsolip VOX by Euclid Admixture Canada Inc. or Sealtight Duogard II by W.R. Meadows of Canada Ltd.

.7 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 0.03 to 0.04 in^2 at 40°C, flashpoint minimum 150°C, open cup.

.8 Falsework materials: to CSA-S269.1.

.9 Sealant: to Division 7.

.10 Waterstops: Extrusions of plasticized PVC low temperature compound to sizes and shapes indicated on drawings by W.R. Meadows of Canada Ltd., W.R. Grace and Co. of Canada Ltd., Coodco Ltd., CPD Construction Products or Sika Canada Inc.

.11 Dovetail Anchors and Slots: Minimum 24 ga overall thickness zinc coating Z275 galvanized steel dovetail anchor slots with fillers to prevent entry of concrete during placing and minimum 14 ga overall thickness. Zinc coating Z275 galvanized steel dovetail anchors. Anchors shall project to within 3/4" of masonry face.

.12 Mechanical Fasteners: Galvanized steel screw and washer with screw of length to secure insulation to formwork without penetrating concrete finish surface.

.13 Formwork Insulation: Extruded, expanded polystyrene, CAN/ULC-S701, Type 4, minimum RSI (R) value of 5.0 per 1", compressive strength 30 psi, thickness as indicated on Drawings.

PART 3 EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and column centres before proceeding with formwork and ensure dimensions agree with drawings. Verify the locations of all inserts, anchor bolts, cast-ins, etc. with structural, architectural, mechanical, electrical, and shop drawings prior to proceeding with formwork. Report any discrepancies to the NCC Representative immediately.

.1 Construct forms to produce plumb and level concrete and true to linear building lines. Maximum variations (not accumulative) as follows:

.2 Variation from plumb in concrete surfaces not to exceed 1/4" in 10' nor 3/8" in 20' or more.

.3 Variation from level or grade indicated on Drawings for tops of walls not to exceed 1/4" in 10' nor 3/8" in 20' in building length.

.4 Variation of linear building lines from established position in plan and related positions of walls not to exceed 1/4" in 10', 3/8" in 1 bay nor 1" in building length.

.5 Variation of concrete slabs and toppings from dead level or slopes as indicated on Drawings not to exceed 1/8" in 10'.

.2 Obtain the NCC Representative's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.

.5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.6 Do not place shores and mud sills on frozen ground.

.7 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.8 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.

.9 Align form joints and make watertight. Keep form joints to minimum.

.10 Use 1" chamfer strips on external corners and/or 1" fillets at interior corners, joints, unless specified otherwise.

.11 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.12 Construct forms for architectural concrete to achieve the following:

.1 Water-tight forms at corners, panel joints, recesses, arises and at construction joints.

.2 Accurate alignment of concrete surfaces.

.3 Surfaces without indentations other than those indicated.

.4 Sharp and straight corners (unless other wise indicated).

.13 Build in anchors, sleeves, ties, bolts, nailers, templates, shelf angles and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.14 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

.15 If slip forming and flying forms are used, submit details of equipment and procedures for NCC Representative's approval.

.16 Use full size contact form sheeting panels wherever possible. Install contact surfaces of formwork to produce neat and symmetrical joint patterns. Ensure joints are vertical or horizontal and, where possible, stagger to maintain structural continuity. Back vertical joints solidly and nail edges of abutting sheets to same stud. Likewise solidly back horizontal joints. Ensure adjacent form panels fit accurately, tight and flush. Use straightest available lumber.

.17 Align forms to ensure no visible defects appear on finished work.

.18 Locate wall form ties in accordance with reviewed shop drawings; align on a particular member both vertically and horizontally. Arrange reuse of form so tie holes are also reused. Tighten form ties, particularly at corners.

.19 Form slab soffits using full size panels where possible. Keep number of smaller size panels to minimum.

.20 Take particular care in forming corners and openings. Ensure formwork is tight and braced so no movement occurs.

.21 Use templates to secure and align anchor bolts in formwork prior to placement of the concrete. Report any interference with reinforcing or other inserts to the NCC Representative prior to the placement of the concrete. Concrete should not be placed until interference issues are resolved in writing by the NCC Representative.

.22 For walls, leave one side of form open for review of reinforcing steel. Close form only after the NCC Representative has reviewed bar placement.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete. Proposed removal times to be approved by the NCC Representative in writing prior to work.

.1 3 days for walls and sides of beams.

.2 28 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework, and when concrete has reached at least 75% of specified 28 day strength.

.3 3 days for footings and abutments.

.2 Remove formwork when concrete has reached 75 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 10'-0" apart.

.5 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

.6 Strip fibre forms off architectural concrete 2 Days after placing, using power operated saw. To strip form, set power saw blade slightly less than thickness of the form, make 2 vertical cuts and remove form. Then, using broad bladed tool, carefully pry form off with short strokes by pushing handle toward column. Exercise care so not to mar concrete surface. After stripping, replace form halves on column and wire in place to protect column during construction. Leave around columns until after scaffolding and other formwork have been removed at end of construction to ensure column protection.

.7 Be responsible for safety of structure, both before and after removal of forms until concrete has reached its specified 28 Day compressive strength.

.8 Take particular care when removing forms to ensure no damage occurs at corners, arises and the like.

.9 To help avoid colour variations in architectural concrete, ensure length of time between concrete placing and form removal is approximately same for each portion of work.

.10 In hot weather, wood forms remaining in place should not be considered adequate for curing but should be removed or loosened so concrete surfaces may be kept moist or coated with curing agent.

.11 In cold weather, defer removal of formwork or insulate formwork, to avoid thermal shock and consequent cracking of concrete surface.

.12 Install tie hole plugs immediately following removal of spreader cones. Install to a snug fit, maximum setback from concrete surface as specified.

.13 When concrete is dry, install temporary polyethylene rope in reglets to prevent contamination of same.

3.3 CONSTRUCTION JOINTS

.1 Form construction joints where required and where indicated. Construction joints shall conform to CSA A23.1, Clause 20. Construction joint locations to be approved by the NCC Representative in writing prior to performance of work.

.2 Form 2” x 4” beveled shear keys full length on construction joints, unless detailed otherwise.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 MEASUREMENT PROCEDURES

.1 Reinforcing steel will be measured in pounds of steel incorporated into work, computed from theoretical unit mass specified in CAN/CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by the NCC Representative.

.2 No measurement will be made under this section. Include costs in items of concrete work for which reinforcement is required.

1.3 REFERENCES

.1 American Concrete Institute (ACI)

.1 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 American National Standards Institute/American Concrete Institute (ANSI/ACI)

.1 ACI 315-99, Details and Detailing of Concrete Reinforcement.

.3 American Society for Testing and Materials (ASTM)

.1 ASTM A 775/A 775M- 07b, Specification for Epoxy-Coated Reinforcing Steel Bars.

.4 Canadian Standards Association (CSA)

.1 CSA A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction.

.2 CAN3 A23.3-00, Design of Concrete Structures for Buildings.

.3 CSA G30.3-M1983 (R1998), Cold Drawn Steel Wire for Concrete Reinforcement.

.4 CSA G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.

.5 CSA G30.14 M1983 (R1998), Deformed Steel Wire for Concrete Reinforcement.

.6 CSA G30.15-M1983 (R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

.7 CAN/CSA G30.18-M-92 R2002, Billet-Steel Bars for Concrete Reinforcement.

.8 CAN/CSA G40.21-04, Structural Quality Steels.

.9 CAN/CSA G164-M-92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.10 CSA W186 (R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.4 SHOP DRAWINGS

.1 Submit shop drawings including placing of reinforcement in accordance with Division 1.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by the NCC

Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.

.3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide type C tension lap splices unless otherwise indicated.

.4 Show walls and beams in full elevation and indicate bar size, spacing, laps, bends, etc.

.5 Show slab reinforcing full length on drawings.

.6 Detail placement of reinforcing where special conditions occur.

1.5 DELIVERY, STORAGE & HANDLING

.1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1, Clause 9.

.2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

.3 Handle, transport and install epoxy coated reinforcing steel bars carefully to avoid damage thereto. Conform to OPSS 1442, Clause 1442.07.03.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by the NCC Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.3 Deformed steel wire for concrete reinforcement: to CSA G30.14.

.4 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.

.5 Epoxy coating of non-prestressed reinforcement: to ASTM A 775/A 775M.

.6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1. To be adequate for strength and support of reinforcing construction required. Use chairs with plastic coated feet where slab and beam soffits will be exposed.

.7 Mechanical splices: subject to approval of the NCC Representative.

.8 Plain round bars: to CAN/CSA-G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, unless indicated otherwise.

.2 Obtain the NCC Representative's approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of the NCC Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Provide the NCC Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.

.2 Inform the NCC Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by the NCC Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcement in accordance with reviewed shop drawings and in accordance with CAN/CSA-A23.1. Support with chairs, bolsters, bar supports or spacers in as close spacing as possible to prevent displacement of reinforcement from intended bar position, before and during placing of concrete. Pieces of block, wood, and/or similar items, are not acceptable as chairs and spacers.

Maximum chair spacing: 10M - 24"
15M – 48"
20M – 64"
25M – 78"

.2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain the NCC Representative's review of reinforcing material and placement. Provide minimum 24 hours notice prior to concrete placement for review.

.4 Ensure cover to reinforcement is maintained during concrete pour.

.5 Protect epoxy coated portions of bars with covering during transportation and handling. Repair in accordance with EM-69.

.6 Lap wire mesh sections at least 6" and wire tighter securely; discontinue wire mesh at joints.

.7 Clean reinforcing before placing concrete.

.8 Ensure welded wire fabric is lifted to centre of slab (or where indicated) during concrete placing.

3.3 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated reinforcing steel with compatible finish to provide continuous coating.

3.4 FIELD QUALITY CONTROL

.1 Independent inspection and testing company may be appointed and paid for by the NCC to conduct mill tests – physical and chemical analysis of reinforcing steel supplied. Refer to Division 1.

.2 Cooperate with and assist inspection and testing company's personnel during inspection and tests.

.3 Remove defective materials and complete work which fails tests and replace as directed by the NCC Representative.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 03 35 00 - Concrete Finishing.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 109/C109M-07, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).

.2 ASTM C 260-06, Specification for Air-Entraining Admixtures for Concrete.

.3 ASTM C 309-07, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.4 ASTM C 332-07, Specification for Lightweight Aggregates for Insulating Concrete.

.5 ASTM C 494/C494M-08, Specification for Chemical Admixtures for Concrete.

.6 ASTM C 827-1827M-02, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.

.7 ASTM C 939-02, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

.8 ASTM D 412-06a, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

.9 ASTM D 624-00 (2007), Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.10 ASTM D 1751-04, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.11 ASTM D 1752-04a, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.2 CAN/CGSB 51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CGSB 81-GP-1M-10M-79, Flooring, Conductive and Spark Resistant.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA A5-93, Portland Cement.

.2 CSA A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction.

.3 CAN/CSA A23.2-00, Methods of Test for Concrete.

.4 CAN/CSA A23.5-M86 (R1992), Supplementary Cementing Materials.

.5 CAN/CSA A363-M88 (R1996), Cementitious Hydraulic Slag.

1.3 SAMPLES

.1 Submit samples in accordance with Division 1.

.2 At least 4 weeks prior to commencing work, inform NCC Representative of proposed source of aggregates and provide access for sampling.

1.4 CERTIFICATES

.1 Submit certificates in accordance with Division 1.

.2 Minimum 4 weeks prior to starting concrete work submit to the NCC Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.

.2 Blended hydraulic cement.

.3 Supplementary cementing materials.

.4 Grout.

.5 Admixtures.

.6 Aggregates.

.7 Water.

.8 Waterstops.

.9 Waterstop joints.

.10 Joint filler.

.11 Bonding agent

.12 Curing compound

.13 Column anchor bolts

.14 Sealant

.15 Specified admixtures

.3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.

.4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

.5 Anchor Bolt Setting Diagrams: Submit detailed drawings for anchor bolt setting.

.6 Records: Keep a written record of concrete pours, showing location, date, cubic yards or metres of concrete including signed trip ticket for each truck, ambient air temperature, and unusual occurrences during placement of each pour. Permit inspection of records by NCC Representative at any time. At completion of work, submit a summary of such data in 6 copies to the NCC Representative.

1.5 QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Division 1 for the NCC Representative's approval for following items:

.1 Falsework erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

.2 Qualifications: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1, Clause 9.

.2 Protect work of this Section from damage. Protect other work from damage resulting from this work Replace damaged work which cannot be satisfactorily repaired.

1.7 GENERAL

.1 Do not place concrete during or before rain. If rain occurs after placing and before initial set of concrete, cover with waterproof material until set. Embedded materials used in the slab for floor drains, pipes and other hardware shall be non-metallic; and a low copper aluminum alloy, as designated in CAN3-B79 or an equally corrosion resistant metal, coated on surfaces in contact with concrete to prevent galvanic corrosion with steel reinforcing or protected against corrosive effects of de-icing chemicals by an effective and durable coating.

.2 Do not use calcium chloride or other chemical in mix to reduce freezing point of concrete.

.3 When ready mixed (mixed in transit) concrete is used, complete discharge of concrete within period of 1 hour after mixing water has been added to dry material except when concrete materials are heated, in which case reduce this period to 30 minutes. When concrete is delivered at air temperature below 4 deg C (39 deg F), ensure temperature at work of not less than 16 deg C (61 deg F) or more than 32 deg C (90 deg F).

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Portland cement to CAN/CSA-A5-93 Type 10.

.2 Blended hydraulic cement: to CAN/CSA-A5A363-88(R1998).

.3 Supplementary cementing materials: to CAN/CSA-A23.5.

.4 Cementitious hydraulic slag: to CAN/CSA-A363.

.5 Water: to CAN/CSA-A23.1.

.6 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density fine

aggregates to CAN/CSA-A23.1.

.7 Air entraining admixture: to ASTM C 260.

.8 Chemical admixtures: to ASTM C 494. NCC Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.1 Admixtures may be added to concrete to provide following specific qualities as required or permitted in this Section shall meet the following criteria:

.1 Workability.

.2 Entrained air content.

.3 Controlled rate of handling.

.4 Compressive or flexural strength.

.2 Admixtures shall conform to ASTM C260 and ASTM C494M except they shall not, individually or in combination, increase shrinkage of concrete compared with a reference specimen of same mix but not contained admixture. Where used individually, following water reducing admixtures are acceptable.

.9 Concrete retarders: to ASTM C 494 water based, low VOC, solvent free. Do not allow moisture of any kind to come in contact with the retarder film.

.10 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.

.1 Compressive strength: 50 MPa at 28 days.

.2 Consistency:

.1 Fluid: to ASTM C 827. Time of efflux through flow cone (ASTM C 939), under 30s.

.2 Flowable: to ASTM C 827. Flow table, 5 drops in 3s, (ASTM C 109, applicable portion) 125 to 145%.

.3 Plastic: to ASTM C 827. Flow table, 5 drops in 3 s, (ASTM C 109, applicable portions) 100 to 125 %.

.4 Dry pack to manufacturer's requirements.

.11 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 35 MPa at 28 days.

.12 Curing compound: to CAN/CSA-A23.1 and at ASTM C309.

.13 Ribbed waterstops: extruded PVC of sizes indicated with shop welded corner and intersecting pieces.

.14 Labyrinth waterstops: extruded PVC of sizes indicated with prewelded corner and intersecting pieces.

.15 Premoulded joint fillers:

.1 Bituminous impregnated fiber board: to ASTM D 1751.

.2 Sponge rubber: to ASTM D 1752, Type I, flexible grade.

.3 Self-expanding standard cork: to ASTM D 1752, Type III.

.16 Weep hole tubes: plastic.

.17 Dampproofing below slab on grade:

.1 Reinforced: two 10 mil thick polyethylene films bonded each side of asphalt

treated creped kraft paper, reinforced with ½" x ½" fibreglass scrim.

.2 Membrane adhesive: as recommended by membrane manufacturer.

.3 Lap damp proof membrane minimum 6" at joints and seal. Carry up walls to top of slabs.

.4 Seal punctures in damp proof membrane before placing concrete. Use patching material at least 6" larger than puncture and seal.

.18 Dampproofing on Foundation Walls:

.1 Refer to Division 7.

.19 Bonding agent: Supply ST-433 by Sternson, Sika-Dur Hi-Mod by Sika Chemical or Bondlok by W.R. Meadows of Canada Ltd., SBR Latex by Euclid Chemical or Acrylic Adhesive by C C Chemicals Limited.

.20 Water: Conforming to CSA A23.1, Clause 4.

.21 Anchor Bolts: To meet specified requirements of ASTM A307, Section 1.3. Provide suitable nuts and washers to meet specified requirements of ASTM A563M, Table 11 (Hot dip galvanized to CSA G164-M).

.22 Wet Curing: Water conforming to CSA A23.1, Clause 4, clear and entirely free from any elements which might cause staining of concrete, and minimum 4 mil thick polyethylene film as specified herein.

2.2 MIXES

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, to give the quality for all concrete as indicated on drawings and plans.

.2 Ready-mixed concrete and concrete proportions shall be in accordance with CSA A23.1, Clause 12 and as follows:

.1 Minimum allowable compressive strength shall be 25 MPa at 28 Days of age, unless otherwise noted or shown.

.2 If blended normal Portland cement/cementitious hydraulic slag is used except for floor mixes, slag content shall not be more than 25% of total mass of cement. Total volume of cement in concrete floor mixes shall be 100% Normal Portland Cement.

.3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA-A23.1-M94, Clause 17.5.

.4 Use of calcium chloride not permitted.

.5 Do not change concrete mix without prior approval of NCC Representative. Should change in material source be proposed, new mix design to be approved by the NCC Representative.

PART 3 – EXECUTION

3.1 PREPARATION

.1 Obtain NCC Representative's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.

.1 Obtain the NCC Representative's review of reinforcing placement before placing

concrete. Provide 24 hrs. notice prior to placing of concrete. In slab construction, ensure that all bottom steel and at least 66% of top steel is in place and inspected before commencing concrete placement. For walls and columns leave one side of form open for review of reinforcing. Close furing only after the NCC Representative has reviewed bar placement.

.2 Pumping of concrete is permitted only after approval of equipment and mix in writing by the NCC Representative.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to placing of concrete obtain the NCC Representative's approval of proposed method for protection of concrete during placing and curing.

.5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.

.7 Do not place load upon new concrete until authorized by the NCC Representative.

.8 Confirm surfaces on which concrete is to be placed are free of frost, water and debris before placing concrete.

3.2 CONSTRUCTION JOINTS

.1 Where construction joints other than those indicated on Drawings are required, locate in consultation with the NCC Representative.

.2 Unless agreed otherwise for specific locations by the NCC Representative, provide shear keys in all construction joints. Normally, form keys from 2" x 4" material. Depth of keys shall total approximately 1/4 of the depth of member. In deep members, use 2 or more keys.

.3 Construction joints shall be straight and plumb unless otherwise agreed for specific conditions.

.4 Install PVC waterstops in horizontal and vertical construction joints in walls at or below grade, and at other locations where shown. Waterstops shall be continuous throughout length of joint.

.1 Install waterstops to provide continuous waterseal. Do not distort or pierce waterstop in such a way as to hamper performance. Do not displace reinforcement when installing. Tie waterstops in place.

.2 Use only straight heat sealed butt joints in field. Use factory welded corners and intersections, unless otherwise approved by the NCC Representative.

.5 Unless otherwise detailed on the Structural Drawings, reinforcement shall be continuous through construction joints.

.6 Maximum length of pour not to exceed 60 ft.

3.3 CONTROL JOINTS

.1 In walls, form grooves for control joints on both faces, as detailed. Unless otherwise noted, cut or stop alternate horizontal reinforcing bars at the joints. Sealant and sealant

backing - under Sealant Section in Division 7.

.2 In slab on grade floors, form or sawcut control joints as detailed. Where 'diamonds' or other isolation joints are shown to be constructed around columns or piers, place after the floor has been concreted and sawcuts have been made as specified under Section 03362.

.3 Use ½" thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within ½" of finished slab surface unless indicated otherwise.

3.4 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.

.2 Sleeves and inserts.

.1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by the NCC Representative in writing.

.2 Where approved by the NCC Representative in writing, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 4" x 4" not indicated, must be approved by the NCC Representative.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from the NCC Representative before placing of concrete.

.4 Check locations and sizes of sleeves and openings shown on drawings.

.5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts.

.1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

.2 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.3 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.4 Drainage holes and weep holes:

.1 Form weep holes and drainage holes in accordance with Section 03100 - Concrete Formwork. If wood forms are used, remove them after concrete has set.

.2 Install weep hole tubes and drains as indicated.

.5 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.6 Finishing.

.1 Finish concrete in accordance with CAN/CSA-A23.1 and Section 03362.

.2 Use procedures acceptable to the NCC Representative or those noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.

.3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

.7 Installation

.1 Preparation for placing concrete:

.2 Ensure that foundation excavations are free of frost or water before placing concrete. If a sump is required for pumping water from the excavation, excavate it outside the area of the foundation. Remove any wet or disturbed soil just prior to placing concrete.

.3 Before placing concrete, check that all forms are rigid and structurally safe, and that all reinforcing steel, formwork, sleeves, anchor bolts and other items are installed in accordance with the drawings and specifications. Ensure that all trades have checked the security and location of all components required in the concrete by those trades.

.4 Ensure that the electrical conduits have been properly set in the mid-height of the slab, beam, or other concrete. Avoid concentrations and crossing of conduit. Any such concentrations which are required shall be approved by the NCC Representative before concrete is placed. The Contractor shall co-ordinate the placing of reinforcement with the Electrical Subcontractor to ensure that both conduit and reinforcement are properly placed.

.5 Immediately prior to placing concrete slabs on granular base, moisten the base material to reduce absorption of moisture from the concrete.

3.5 SITE TOLERANCE

.1 Concrete tolerance in accordance with CAN/CSA-A23.1 straight edge method.

3.6 FIEL D QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by the NCC Representative in accordance with CAN/CSA-A23.1 and Division 1.

.2 NCC will pay for costs of tests as specified in Division 1.

.3 Contractor will take additional test cylinders during cold and hot weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.4 Concrete cylinder test. Three cylinders from each Day's pour for each 100 cu yd of concrete, or for each 40 cu yd of concrete poured in small amounts on successive Days.

.5 Air entrainment test and slump test made from same batch of concrete from which test cylinders are made.

.6 Tests will be made in accordance with CSA A23.2.

.7 Inspection Company's reports of tests will be forwarded to the NCC Representative and Contractor with an opinion or reason for any abnormalities noted thereon.

.8 Cooperate with and assist Inspection Company's personnel during inspection and tests.

.9 Remove defective materials and completed work which fails tests and replace as directed by the NCC Representative.

.10 Where work or materials fail to meet strength requirements as indicated by test results, pay costs of additional inspection and testing required for new replacement work or materials.

.11 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.

.12 Inspection or testing by the NCC Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

3.7 DEPOSITING

.1 Notify the NCC Representative at least 24 hours before each day's operation of placing concrete.

.2 Convey concrete from the mixer to the place of final deposit by methods which will prevent:

.1 The separation or loss of ingredients. Chutes, if used, shall be rounded in cross-section and have a minimum diameter of 8 times the maximum aggregate size.

.2 Do not displace rebar and/or mesh from their specified location.

.3 Do not deposit any concrete in the work which has partly hardened or which has been contaminated with foreign matter.

.4 Cast footings, beams and slabs their full design depth in 1 operation. In upstand beams, stepped footings and similar details cast the upper portion as soon as stiffening of the lower portion will permit. The consistency of the lower portion shall be of lower slump than generally specified for the class of work. Remove any free water or laitance from the lower portion before the subsequent layer of concrete is placed.

.5 Immediately before placing concrete in walls, cover the bottom of the form with a layer of stiff grout. Proportions of cement and sand in the grout shall be similar to that in the concrete being used in the wall.

.6 Place and consolidate concrete in floors (on grade) and screed to level ready for finishing under the concrete floor finish section.

.7 Do not exceed 1.5 m (5'-0") for the free vertical drop of the concrete unless special measures are taken to prevent segregation.

.8 Where pumps are to be used for placing concrete design the concrete mix accordingly. Maintain design slump at point of entry into pumps and add superplasticizer to take into account the slump lost during the pumping process.

.9 Unless otherwise agreed by the NCC Representative, consolidate concrete including slabs on grade in place by means of internal vibrators. Use the largest vibrator consistent with the type and location of concrete being placed. Vibrators shall be in accordance with CSA A23.1, table 14.

.10 When concrete is being placed in deep members (such as walls and footings) vibrators shall be inserted and withdrawn vertically, and shall not be used to flow concrete into final position. They shall be lowered through the full lift of concrete into the lift below, so as to ensure blending of the concrete in the two lifts.

.11 Apply vibrators systematically and at such spacing that the zones of influence over-lap. Do not over-vibrate.

.12 Keep 1 spare vibrator for every three vibrators in use, in case of breakdown.

.13 After completing concrete in walls or columns, allow at least two hours before placing slabs and beams supported thereon.

.14 Install continuous waterstops in location shown, fixed rigidly in forms prior to concreting. Waterstop splices to be heat welded in such a manner that the water stopping action will not be impaired.

.15 Architectural Exposed Concrete: Place concrete conforming to Clause 28 or CSA A23.1

.16 Floor slabs with Surface Hardener Finish: Cast with a maximum slump of 3" when being placed; with an air content not exceeding 3%. Add no admixture to concrete mix that will increase bleeding.

3.8 COLD WEATHER PROTECTION

.1 When the air temperature is below, or is likely to fall below 5 deg C (40 deg F) (as forecast by the local meteorological office) carry out all concrete work in accordance with the recommendations of CSA A23.1, Clause 21.2. Have all equipment prepared and operational before commencing to place concrete.

.2 When heated concrete is exposed to drying effects of wind, provide adequate windbreaks to protect the surface.

.3 Methods of heating shall be such as to prevent discharge of combustion products over, or drying of, surface of fresh concrete.

.4 Keep a permanent temperature record conforming to following requirements:

.1 Records to show date, time, outside temperature and maximum and minimum temperature at several points within any enclosure, before the placing of concrete in or above enclosure.

.2 Use maximum and minimum type thermometers for measuring temperature. If concrete is placed on forms heated from an enclosure below, place thermometers close to the underside of the forms. Temperature record to be kept available for the NCC Representative's inspection at any time.

.3 Temperature of air within enclosures shall not exceed 32 deg C (90 deg F). Maintain concrete temperatures at 21 deg C (70 deg F) for 5 days. Removal of concrete protection shall conform to CSA A23.1, clause 21.2.6.

.4 Do not place concrete on frozen ground, on ground which contains frozen materials, nor on or against any surface which is at a temperature of less than 10 deg C (50 deg F.).

3.9 HOT WEATHER PROTECTION

.1 Carry out hot weather concreting, unless otherwise specified, in accordance with CSA A23.1.

.2 Protect concrete from effect of hot or drying weather conditions. Protect forms and reinforcing from the direct rays of the sun, or cool by fogging and evaporation.

.3 Refer to curing article for special curing precautions in hot weather.

3.10 CURING

.1 Protect and cure concrete in such a manner as to prevent evaporation of moisture from the concrete and injury to the surface.

.2 When the air temperature may exceed 27 deg C (80 deg F) curing shall be by methods which keep the surface continually moist for at least 7 days after placing, commencing immediately the concrete has set sufficiently. Moisture shall be applied by fogging or by the application of wetted burlap, or by other acceptable methods which will not

damage the surface. A curing membrane is not acceptable under these conditions.

.3 When the temperature will not exceed 27 deg C (80 deg F) a curing membrane specified herein may be used. Membrane curing over slab shall be compatible with finish to be applied. For sidewalks, curbs and similar exterior concrete, use a membrane specified herein.

.4 Do not use a curing membrane on architectural exposed concrete or where a topping is to be applied.

.5 For vertical surfaces, forms shall be left in place for a minimum of seven curing days or alternatively forms may be stripped earlier, and the surfaces kept covered with wet burlap, subject to the NCC Representative's approval. Wood forms remaining in place shall be wetted down during periods of hot weather.

.6 Except as noted herein above, curing of finished concrete floors and concrete toppings under Concrete Floor Finishes Section.

3.11 NON SHRINK GROUT

.1 Grout between column and base plates and bearing surface of concrete piers and foundations and/or masonry walls. Use a premix non-shrink grout in accordance with the manufacturers directions, and with a minimum 28 day strength of 50 MPa. Base plates up to 15" square shall be dry-packed. Place a rigid form on 2 adjacent sides and pack grout against the form from the other sides.

.2 Where accessibility is difficult and for bases in excess of 15" square use a flowable grout. Install the grout with a positive hydraulic head and ensure that provision is made for escape of air from below the baseplate.

.3 In areas where the grout is exposed in the finished work, use a non-staining material.

.4 When grout is being placed at air temperatures below 4 deg C (40 deg F), ensure that concrete, grout and steel is preheated to 21 deg C (70 deg F) before grouting. Enclose grouted area (including nearest 5' length of all steel connecting to the base) and maintain at 10 deg C (50 deg F) for a minimum of 3 days. If required by the NCC Representative, submit a written proposal describing the heating methods to be adopted.

3.12 PATCHING

.1 Make good temporary openings left in concrete work for pipes, conduit, ducts, shoring and other such work, using mix or mortar of same proportions as surrounding work, reinforced with wire mesh as required, and finish to match surrounding work.

.2 Have enough expert cement finishers available to complete required patching on same day as forms are stripped.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00 Cast-In Place Concrete.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 25.20-95, Surface Sealer for Floors.

.2 Canadian Standards Association (CSA)

.1 CSA A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction.

1.3 PERFORMANCE REQUIREMENTS

.1 Product quality and quality of work in accordance with Division 6.

.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.4 PRODUCT DATA

.1 Submit product data in accordance with Division 1.

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Division 2. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.

.3 Include application instructions for concrete floor treatments

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Temporary lighting:

.1 Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.

.2 Electrical power:

.1 Provide sufficient electrical power to operate equipment normally used during construction.

.3 Work area:

.1 Make the work area water tight protected against rain and detrimental weather conditions.

.4 Temperature:

.1 Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.5 Moisture:

.1 Ensure concrete substrate is within moisture limits prescribed by finish manufacturer.

.6 Safety:

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.7 Ventilation:

PART 2 - PRODUCTS

2.1 CHEMICAL HARDENERS

.1 Type 1 - Sodium silicate.

.2 Water: potable.

2.2 SEALING COMPOUNDS

.1 Surface sealer: to CAN/CGSB-25.20, Type 2 - water based, clear.

.2 Surface sealers may not be manufactured or formulated with aromatic solvents formaldehyde halogenated solvents mercury lead cadmium hexavelant chromium and their compounds.

2.3 CURING COMPOUNDS

.1 Select low VOC, water-based, organic-solvent free curing compounds.

2.4 CONCRETE STAINS

.1 Select low VOC, water-based concrete stains.

2.5 MIXES

.1 Mixing, ratios and application in accordance with manufacturer's instructions.

PART 3 - GENERAL

3.1 FINISHING

.1 Formed Concrete Surfaces.

.2 After removal of fins, replace or treat honeycombing or defects in exposed concrete surfaces according to CSA A23.1, para. 24.2, Formed Surfaces. Refer honeycombed areas to the NCC Representative for designation as structural or non-structural, and repair according to CAN3 Specifications

.3 Bring the surfaces of all exposed interior and exterior concrete to a smooth rubbed finish not later than 5-6 hours after removal of forms and in accordance with the requirements of CSA A23.1.

.4 The producing of smooth surfaces by means of cement plaster will not be permitted unless otherwise specified or scheduled.

.5 Concrete Floors:

.1 Leave slabs reasonably level or sloped to drains, ready for finishing.

.2 Refer to Item 4.2 for finishing.

.3 Finish for exposed concrete shall match the approved prototype sample wall and is to have uniform colour and texture throughout.

.4 Concrete not exposed in the finished work e.g. exterior concrete below grade, concealed ceiling spaces and wall surfaces to be finished to CAN/CSA-A23.1-M00.

.5 Refer to CSA A23.1, Clause 24 for descriptions of above finishes.

PART 4 - EXECUTION

4.1 EXAMINATION

.1 Verify that all surfaces are ready to receive work and elevations are as indicated on drawings.

4.2 WORKMANSHIP

.1 Steel trowel concrete slabs to be left exposed or to receive resilient flooring or carpeting.

.2 Other concrete slabs to be screeded off to true lines and levels shown and left ready to receive finish. Depress slabs where required.

.3 Where floor drains occur, floors to be level around walls and have a minimum 5mm per metre uniform pitch to drains, unless indicated otherwise.

.4 Co-ordinate with equipment suppliers regarding additional requirements for tolerances on floor level finishes etc.

.5 Plain Floor Finish (unexposed)

.1 Roll or tamp concrete to force coarse aggregate into concrete mix, then screed.

.2 Float surface with wood or metal float or with power finishing machine and bring surface to true elevation.

.3 Steel trowel to smooth and even surface.

.4 Unless otherwise noted, follow with second steel trowelling to produce smooth burnished surface to within 6mm tolerance when measured in any direction using 10' straight edge. For floor areas to receive ceramic tile, produce fine broom finished surface to within 0.12" tolerance when measured in any direction using 10' straight edge. For floor areas to receive ceramic tiles that are 12"x24" in size, produce fine broom finished surface to within 0.06" in 24" tolerance when measured in any direction from the high points in the surface. Do not overtrowel.

.5 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.

.6 Apply curing compound in accordance with manufacturer's instructions. Do not use curing compound when slab is to receive bonded finish. Damp curing or other approved method shall then be employed.

.7 Sawcut crack-control joints in slabs on grade to CAN/CSA-A23.1-04 (maximum 24 hours after placement), or as noted on drawings. Seal with joint filler.

.8 After curing and when concrete is dry, seal control joints and joints at junction with vertical surfaces with sealing compound.

.6 Floor Finish (exposed)

.1 Finish concrete floors as per Paragraph 3.2, Clauses .1 to .5, and apply floor hardener, non-metallic aggregate at a rate of 1lb / ft2 to manufacturer's instructions.

.2 Apply approved curing/sealing compound to manufacturer's instructions.

.3 Sawcut crack-control joints in slabs on grade to CAN/CSA-A23.1-04 (maximum 24 hours after placement), or as noted on drawings. Seal with joint filler.

.4 After curing/sealing and when concrete is dry, seal control joints and joints at junction with vertical surfaces with sealing compound.

.5 Clean surfaces and apply second coat curing/sealing compound before handing building over to Owner.

.7 Saw cut Joints:

.1 Saw cut control joints and construction joints in slab where shown, in straight lines.

.2 Perform saw cutting 12 to 24 hours after concrete has been placed, depending on when saw can be run over concrete surface without leaving tread marks, when concrete can be sawn without dislodging aggregate and before uncontrolled shrinkage has occurred. Do not postpone sawing operations beyond these time limitations.

.3 Spray water on saw blade at all times during sawing. Grind edges of sawcuts to eliminate burrs; do not grind to bevel or chamfer joint edges.

.4 After sawing and grinding, clean joints with a jet of water, and blowout with compressed air. Broom clean residue caused by sawing operation.

.5 When cleaned joints are dry and prior to traffic being allowed over the area, install temporary polyethylene rope in such joints to prevent contamination of same.

4.3 APPLICATION

.1 Curing/Sealing:

.1 Liquid Compound Curing/Sealing: Apply compound after saw cutting operations have been completed, at a rate recommended by compound manufacturer. Clean concrete floor of laitance, tire marks, oil, grease, etc. to the satisfaction of the NCC Representative prior to applying sealing compound.

.2 Water Curing: Water cure slabs where so designated. Do not use curing/sealing compound. Water down entire area and cover with polyethylene sheets for a minimum of 7 Days. Sheet coverage to include exposed edges. Provide suitable weights to prevent blow-off or displacement of sheets. Remove cover after

minimum 7 consecutive Days. Allow to air dry until concrete has developed design strength.

.2 Anchor Bolt Protection:

.1 Adequately protect unburied portion of anchor bolts set in concrete, including nuts and washers from rusting, corrosion and damage by a heavy coating of specified coating material; wrap in a manner to exclude moisture.

.2 Clean surfaces to be protected to bare steel followed by the specified protection system.

.3 Sealants:

.1 Sealant At V-Joints: Prime, prepare substrate and apply sealant full joint depth in accordance with manufacturer's printed directions. Tool to a smooth semi-concave finish. Exclude joints in surfaces to receive waterproofing treatment.

.2 Sealant at Saw cut Joints/Reglets/Isolation Joints: Do not fill saw cut joints and isolation joints sooner than 30 days after concrete pours. Comply with curing and saw cutting requirements as specified herein. Execute joint sealing as specified herein during cool, dry ambient conditions when slab is in a contracted state to minimize future joint separation at sealant filled joints.

.1 Application:

.1 Remove temporary polyethylene rope from joints or reglets. Clean joints and blow clean with compressed air.

.2 Fill sawn joints in concrete slabs full depth with saw cut joint sealant in accordance with manufacturer's printed directions.

.3 Caulk over isolation joints and reglets with specified sealant per manufacturer's instructions.

.4 Comply with application and substrate temperature requirements. Mask floor to edge of joints and fill joint with sealant. After initial set, prime sealant surface and refill joints with sealant as required to produce slightly convex joint surface.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections
- .1 Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .2 Section 31 23 13 – Rough Grading
- .3 Section 32 11 23 – Aggregate Base Courses

1.2 References
- .1 Canadian Standards Association (CSA International)
  - .1 CSA A23.1/A23.2-[09], Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CSA A3000-[08], Cementitious Materials Compendium.
- .2 Department of Justice Canada
  - .1 Explosives Act, R.S.,c.E-15, s.1 (updated 2005)
- .3 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
  - .1 OPSS 1004-[05], Material Specification for Aggregates - Miscellaneous.
  - .2 OPSS 1010-[04], Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

1.3 Submittals
- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit to designated testing agency, 23 kg sample of backfill for fill material proposed for use, no later than 1 week before backfilling or filling work.
- .2 Quality Control: in accordance with Section 01 45 00 – Quality Control.
  - .1 Submit condition survey of existing conditions as described in 1.6 Existing Conditions article.
  - .2 Submit testing results as described in article PART 3 – Field Quality Control.

1.4 Quality Assurance/ Regulatory Requirements
- .1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial, Territorial and Municipal regulations whichever is more stringent.
- .2 Comply with Explosives Act of Canada.
- .3 Perform blasting in accordance with Provincial regulations: repair damage as directed by NCC Representative.
- .4 Do not blast within 3m of building and where damage would result. Do not hoe-hammer within 3 m of building and where damage would result
- .5 Obtain approval from NCC Representative of proposed blasting activities before scheduling work.

1.5 Waste Management and Disposal
- .1 Separate waste material for reuse and recycling in accordance with Section 01 74 19 – Waste Management.
- .2 Divert unused vegetation materials from landfill to local facility as directed by NCC Representative.

1.6 Existing Conditions
- .1 Examine Geotechnical Investigation Report – (File No. PG2731-LET.01R), February 7, 2013, prepared by Paterson Group.
- .2 Buried services:
  - .1 Before commencing work verify location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 If obsolete buried services are discovered, inform NCC Representative immediately. Proceed as directed. Pay for cost of removal.

PART 2 PRODUCTS

2.1 Materials

.1 Granular A, B Type II to OPSS 1010. Sand to OPSS 1004.

.2 Unshrinkable fill: proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4 MPa at 28 days.

.2 Maximum Portland cement content of 25 kg/m 3.

.3 Minimum strength of 0.07 MPa at 24 hours.

.4 Concrete aggregates: to CSA A23.1/A23.2.

.5 Cement: to CSA A3000, Type GU.

.6 Slump: 160 to 200 mm.

PART 3 EXECUTION

3.1 Temporary Erosion and Sediment Control

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

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

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

3.2 Preparation/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 NCC 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 buried services that are required to remain undisturbed.

3.3 Clearing and Grubbing

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

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

.3 Dispose of cleared and grubbed material off site daily to disposal areas acceptable to authority having jurisdiction.

3.4 Excavation

.1 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil. Stockpile topsoil on site for later use.

.2 Excavate as required to carry out work.
- .1 Do not disturb soil or rock below bearing surfaces.
- .2 Notify NCC Representative when excavations are complete.
- .3 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
- .4 Excavation taken below depths shown without NCC Representative's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.

.3 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground.
- .1 Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.

.4 Excavate for slabs and paving to subgrade levels.
- .1 In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.5 Backfilling

.1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by NCC Representative.

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

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

.4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as fill.
- .1 Fill excavated areas with selected subgrade material compacted as specified for fill.

.5 Placing:
- .1 Place backfill, fill and base course material in 150 mm lifts: add water as required to achieve specified density.

.6 Compaction: compact each layer of material to following densities for material to ASTM D698:
- .1 To underside of base courses: 98%.
- .2 Base courses: 100%.
- .3 Elsewhere: 90%.

.7 Under slabs and paving:
- .1 Use Granular B up to bottom of granular base courses.

.8 In trenches:
- .1 Up to 300 mm above pipe or conduit: sand placed by hand.
- .2 Over 300 mm above pipe or conduit: native material approved by NCC Representative.

.9 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

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

.11 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.6 Grading

.1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by NCC Representative.
- .1 Grade to be gradual between finished spot elevations shown on drawings.

3.7 Field Quality Control

.1 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by NCC Representative.

.2 Not later than 1 week before backfilling or filling, provide to designated testing agency, samples of backfill as described in PART 1 - Submittals.

.3 Do not begin backfilling or filling operations until material has been approved for use by NCC Representative.

.4 Not later than 48 hours before backfilling or filling with approved material, notify NCC Representative to allow compaction tests to be carried out by designated testing agency.

3.8 Shortage and Surplus

.1 Supply necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.

.2 Dispose of surplus material off site.

3.9 Cleaning

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

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

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Related Sections

.1 Section 01 74 19 - Waste Management.

.2 Section 01 33 00 - Submittal Procedures.

1.3 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 Geotechnical Investigation Reports

.1 Geotechnical Investigation Report –(File No. PG2731-LET.01R), February, 7, 2013, prepared by Paterson Group.

1.4 Samples

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

.2 Allow continual sampling by NCC Representative during production.

.3 Provide the NCC Representative with access to source and processed material for sampling.

.4 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.5 Waste Management and Disposal

.1 Divert unused granular materials from landfill to local facility as approved by NCC Representative.

PART 2 PRODUCTS

2.1 Materials

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed five times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Natural sand.

.2 Manufactured sand.

.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag and expanded shale.

2.2 Source Quality Control

.1 Inform NCC Representative of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.

.2 If, in opinion of the NCC Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Advise the NCC Representative 4 weeks in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 EXECUTION

3.1 Preparation

.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 Begin topsoil stripping of areas as directed by the NCC Representative after area has been cleared of brush, weeds, and grasses and removed from site.

.3 Strip topsoil to depths as directed by the NCC Representative. Avoid mixing topsoil with subsoil.

.4 Stockpile in locations as directed by the NCC Representative. Stockpile height not to exceed 2 m.

.5 Dispose of topsoil as directed by the NCC Representative.

.2 Aggregate source preparation

.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by the NCC Representative.

.2 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.3 Trim off and dress slopes of waste material piles and leave site in neat condition.

.3 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by the NCC Representative.

.3 Wash aggregates, if required, to meet specifications. Use only equipment approved by the NCC Representative.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

.4 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.5 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by the NCC Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet Project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the NCC Representative within 48 h of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Max 1.5 m for coarse aggregate and base course materials.

.2 Max 1.5 m for fine aggregate and sub-base materials.

.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 Cleaning

.1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.2 Leave any unused aggregates in neat compact stockpiles as directed by the NCC Representative.

.3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:
  .1 The work of this Section includes the provision of all labour, materials, equipment and services required to execute the rough grading, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 Related Sections

.1 Section 01 74 19 - Waste Management.

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

1.4 References

.1 ASTM International
  .1 ASTM D698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ;).

.2 Underwriters' Laboratories of Canada (ULC)

.3 Geotechnical Investigation Reports
  .1 Geotechnical Investigation Report –(File No. PG2731-LET.01R), February, 7, 2013, prepared by Paterson Group.

1.5 Action and Informational Submittals

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

.2 Sustainable Design Submittals:
  .1 Construction Waste Management:
    .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
    .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
    .3 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction.

1.6 Existing Conditions

.1 Known underground and surface utility lines and buried objects are as indicated on site plan.

.2 Refer to dewatering in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.3 Reinstate all disturbed areas to existing conditions or better.

PART 2 PRODUCTS

2.1 Materials

.1 Fill material: in accordance with of Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Excavated or graded material existing on site suitable to use as fill for grading work if approved by NCC Representative.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of NCC Representative.
- .2 Inform NCC Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from NCC Representative.

3.2 Grading

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Slope rough grade away from building 1:50 minimum or as directed by NCC Representative. Grade ditches to depth as indicated on Grading Plan.

.3 Prior to placing fill over existing ground, scarify surface to depth of 150 mm minimum before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.4 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:
- .1 85% under landscaped areas.
- .2 95% under paved and walk areas.

.5 Do not disturb soil within branch spread of trees or shrubs to remain.

.6 All topsoil, organic or deleterious material must be entirely removed from beneath the proposed paved areas.

.7 Granular bases should be compacted to at least 100% of the standard proctor maximum dry density value. Any additional granular fill used below the proposed pavement should be compacted to at least 98% of the standard proctor maximum dry density value.

.8 Grade and/or fill behind proposed curb and between buildings and curbs, where required to provide positive drainage.

.9 Minimum of 2% grade for all grass areas unless otherwise noted.

3.3 Testing

.1 Submit testing procedure, frequency of tests, to NCC Representative for approval.

3.4 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 10 00 - General Instructions.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 10 00 - General Instructions.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 Protection

.1 Protect existing fencing, trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by NCC Representative. If damaged, restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:
.1 The work of this Section includes the provision of all labour, materials, equipment and services required to execute excavating, trenching and backfilling, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 Related Sections

.1 Section 01 74 19 - Waste Management.

.2 Section 33 41 00 - Storm Utility Drains.

.3 Section 33 71 73.02 - Underground Electrical Service

.4 Section 33 11 16 - Site Water Utility Distribution Piping

1.4 References

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D422-63-2002, Standard Test Method for Particle-Size Analysis of Soils.
.4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ;) (600 kN-m/m ;).
.5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ;) (2,700 kN-m/m ;).
.6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)
.1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
.2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

.5 Ontario Provincial Standard Specifications
- .1 OPSS 1010, Material Specification for Aggregates – Base, Sub-base, select Sub-grade, and Backfill Material, Latest Edition.
- .2 OPSS 1004, Material Specification for Aggregates – Miscellaneous, Latest Edition.

.6 Geotechnical Investigation Reports
- .1 Geotechnical Investigation Report –(File No. PG2731-LET.01R), February 7, 2013, prepared by Paterson Group.

1.5 Definitions

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
- .1 Rock : solid material in excess of 1.00 m^3; and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Topsoil:
- .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.7 Unsuitable materials:
- .1 Weak, chemically unstable, and compressible materials.
- .2 Frost susceptible materials:
  - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.
  - .2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

  - .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.6 Submittals

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

.2 Quality Control: in accordance with Section 01 45 00 - Quality Control:
- .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
- .2 Submit for review by the NCC Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.
- .3 Submit to the NCC Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
- .4 Submit to the NCC Representative written notice when bottom of excavation is reached.
- .5 Submit to the NCC Representative testing and inspection results and report as described in PART 3 of this Section.

.3 Preconstruction Submittals:
- .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
- .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority, and location plan of relocated and abandoned services, as required.

.4 Samples:
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform the NCC Representative at least 4 weeks prior to beginning Work, of proposed source of fill and unshrinkable fill materials and provide access for sampling.
- .3 Submit 70 kg samples of type of fill and unshrinkable fill specified including representative samples of excavated material.
- .4 Ship samples prepaid to the NCC Representative, in tightly closed containers to prevent contamination and exposure to elements.

1.7 Quality Assurance

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Submit design and supporting data at least 2 weeks prior to beginning Work.

.3 Design and supporting data submitted to bear stamp and signature of qualified professional Engineer registered or licensed in Province of Ontario, Canada.

.4 Keep design and supporting data on site.

.5 Engage services of qualified professional Engineer who is registered or licensed in Province of Ontario, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.6 Do not use soil material until written report of soil test results are reviewed and approved by the NCC Representative.

.7 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

.8 Footings must bear on approved bearing surfaces.

.9 Design bearing pressures for footings (on stiff clay/till): SLS: 80 kPa ULS: 145 kPa

.10 Design bearing pressures for slabs (on stiff clay/till): SLS: 120 kPa ULS: 130 kPa

.11 Reinstate all disturbed areas to existing conditions or better.

1.8 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management.

.2 Divert excess aggregate materials from landfill to local quarry or recycling facility for reuse as directed by the NCC Representative.

1.9 Existing Conditions

.1 Buried services:
- .1 Before commencing work verify and establish location of buried services on and adjacent to 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 footings: cap cut-offs.
- .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .5 Prior to beginning excavation Work, establish location and state of use of buried utilities and structures.
- .6 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods.
- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered (as indicated).
- .8 Where utility lines or structures exist in area of excavation, obtain direction of the NCC Representative before removing or re-routing. Costs for such Work to be paid by the NCC Representative.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:
- .1 Conduct, with the NCC Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
- .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by the NCC Representative.
- .3 Where required for excavation, cut roots or branches as directed by the NCC Representative.

.3 Prior to excavation, verify location of existing services and take all necessary measures to maintain services where required. Notify the NCC Representative if any services not shown on plan or otherwise expected are encountered. DO not proceed further until directed.

PART 2 PRODUCTS

2.1 Materials

.1 General: Except where otherwise specified, all granular materials shall be virgin, free from recycled asphaltic concrete or Portland cement concrete materials.
- .1 OPSS Granular "A" to OPSS 1010.
- .2 OPSS Granular "B", Type I to OPSS 1010.
- .3 OPSS Granular "B", Type II to OPSS 1010.
- .4 OPSS Granular "O" to OPSS 1010.
- .5 OPSS Select Sub-grade Material (SSM) to OPSS 1010.

.2 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.
- .3 Table:

Sieve Designation	% Passing	
	Type 1	Type 2
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

.3 19 mm Clear crushed stone: clean, hard crushed stone, free from shale, clay, friable materials, organic matter and other deleterious substances when tested to ASTM C136 and ASTM C117 and conforming to the following gradation:

ASTM Sieve Designation	% Passing
19 mm	100
9.5 mm	0

.4 50 mm Clear crushed stone: clean, hard crushed stone, free from shale, clay, friable materials, organic matter and other deleterious substances when tested to ASTM C136 and ASTM C117 and conforming to the following gradation:

ASTM Sieve Designation	% Passing
63 mm	100
53 mm	90-100
19 mm	0-15

.5 Sand (Granular "B", Type I, modified): clean, hard, durable sand, free from shale, clay, friable materials, organic matter and other deleterious substances when tested to ASTM C136 and ASTM C117.

ASTM Sieve Designation	% Passing
4.75 mm	100
1.18 mm	10 100
0.425 mm	5 30

0.075 mm	0	10

.6 Type 3 fill: selected material from excavation or other sources, approved by the NCC Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.7 Unshrinkable fill: proportioned and mixed to provide:
- .1 Maximum compressive strength of 0.4 MPa at 28 days.
- .2 Maximum cement content of 25 kg/m ; with 40 % by volume fly ash replacement: to CSA-A3001, Type GU.
- .3 Minimum strength of 0.07 MPa at 24 h.
- .4 Concrete aggregates: to CSA-A23.1/A23.2.
- .5 Cement: Type GU.
- .6 Slump: 160 to 200 mm.

.8 Shearmat: honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.

PART 3 EXECUTION

3.1 Temporary Erosion and Sedimentation Control

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings or requirements of authorities having jurisdiction, whichever is more stringent.

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

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

3.2 Site Preparation

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

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

3.3 Preparation/Protection

.1 Protect existing features in accordance with local regulations.

.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 NCC Representative 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 buried services that are required to remain undisturbed.

.6 Care must be taken to avoid undermining existing building foundations or underground services.

.7 Protect sub-grade from freezing and frost action at all times during construction.

3.4 Stripping Of Topsoil

.1 Begin topsoil stripping of areas as indicated by the NCC Representative after area has been cleared of brush, weeds and grasses and removed from site.

.2 Strip topsoil to depths as directed by the NCC Representative.
.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by the NCC Representative.
.1 Stockpile height not to exceed 2 m and should be protected from erosion.

.4 Dispose of unused topsoil as directed by the NCC Representative off site.

.5 All topsoil, organic or deleterious material must be entirely removed from beneath the proposed paved areas.

3.5 Stockpiling

.1 Stockpile fill materials in areas designated by the NCC Representative.
.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 Cofferdams, Shoring, Bracing and Underpinning

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29 - Health and Safety Requirements and Health and Safety Act for the Province of Ontario.
.1 Where conditions are unstable, the NCC Representative to verify and advise methods.

.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.3 Construct temporary Works to depths, heights and locations as directed by the NCC Representative.

.4 During backfill operation:
.1 Unless otherwise indicated or directed by the NCC Representative, remove sheeting and shoring from excavations.
.2 Do not remove bracing until backfilling has reached respective levels of such bracing.
.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:
.1 Remove cofferdams, shoring and bracing.
.2 Remove excess materials from site and restore watercourses as indicated and as directed by the NCC Representative.

3.7 Dewatering and Heave Prevention

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

.2 Provide for the NCC Representative's review and approval, details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

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

.5 Dispose of water to approved collection or runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.
.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.8 Excavation

.1 Advise the NCC Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions as indicated.

.3 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.

.4 Excavation must not interfere with bearing capacity of adjacent foundations.

.5 Do not disturb soil within branch spread of trees or shrubs that are to remain.
.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.6 For trench excavation, unless otherwise authorized by the NCC Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by the NCC Representative.

.8 Restrict vehicle operations directly adjacent to open trenches.

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

.10 Do not obstruct flow of surface drainage or natural watercourses.

.11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.12 Notify the NCC Representative when bottom of excavation is reached.

.13 Obtain the NCC Representative approval of completed excavation.

.14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by the NCC Representative.

.15 Correct unauthorized over-excavation as follows:
- .1 Fill under bearing surfaces and footings with concrete specified for footings, fill concrete. Type 2 fill compacted to not less than 100 % of corrected Standard Proctor maximum dry density.
- .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

.16 Hand trim, make firm and remove loose material and debris from excavations.
- .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
- .2 Clean out rock seams and fill with concrete mortar or grout to approval of the NCC Representative.

.17 Remove from site all excess excavated material, organic material and debris unless otherwise instructed by the NCC Representative. Excavate and remove from site any contaminated material. All contaminated material shall be disposed of at a licensed landfill facility.

3.9 Fill Types and Compaction

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698 and ASTM D1557.
- .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95 % of corrected maximum dry density.
- .2 Within building area: use Type 2 to underside of base course for floor slabs. Compact to 100 % of corrected maximum dry density.
- .3 Under concrete slabs: provide 150 mm compacted thickness base course of Type 1 fill (topped with shearmat filler as indicated) to underside of slab. Compact base course to 100 %.
- .4 Retaining walls: use Type 2 fill (to subgrade level) on high side for minimum 500 mm from wall and compact to 95 %. For remaining portion, use Type 3 fill compacted to 95 %.
- .5 Place unshrinkable fill in areas as indicated.

3.10 Bedding and Surround of Underground Services

.1 Place and compact granular material for bedding and surround of underground services as indicated and as specified in Section 33 41 00 - Storm Utility Drainage Piping, and Section 33 11 16 - Site Water Utility Distribution Piping.

.2 Place bedding and surround material in unfrozen condition.

3.11 Backfilling

.1 Do not proceed with backfilling operations until completion of following:
- .1 The NCC Representative has inspected and approved installations.
- .2 The NCC Representative has inspected and approved of construction below finish grade.
- .3 Inspection, testing, approval, and recording location of underground utilities.
- .4 Removal of concrete formwork.
- .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 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 of concrete.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading.
- .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
  - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from the NCC Representative (or):
  - .2 If approved by the NCC Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by the NCC Representative.

.6 Place unshrinkable recycled fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

.8 Install drainage system in backfill as indicated or as directed by the NCC Representative.

.9 Backfill to within 200mm of underside of slab with granular ‘B’ type II in layers up to 12” thick, compacted to minimum 100% SPMDD.

.10 Final 200mm under slab to be granular ‘A’ compacted to minimum 100% SPMDD.

.11 Re-use of excavated granular material is subject to approval of NCC Representative.

3.12 Restoration

.1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 19 - Waste Management, trim slopes, and correct defects as directed by the NCC Representative.

.2 Replace topsoil as directed by the NCC Representative.

.3 Reinstate lawns to elevation which existed before excavation.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.5 Clean and reinstate areas affected by Work as directed by the NCC Representative.

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

.8 Refer to landscape plan for planting and other landscape feature details.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections
- .1 Section 31 00 00 – Earthwork Short Form
- .2 Section 32 11 23 – Aggregate Base Courses
- .3 Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .4 Section 31 23 16 – Rock Removal
- .5 Section 32 01 90.33 – Tree and Shrub Preservation

1.2 Protection
- .1 Protect existing trees, landscaping, pavement, surface or underground utility lines which are to remain as directed by the NCC Representative. If damaged, restore to original or better condition unless directed otherwise.

PART 2 – PRODUCTS

2.1 Materials
- .1 Fill material Type 2 (Granular 'B') in accordance with of Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Material existing on site may be suitable to use as fill for grading work or for shrubbery beds if approved by NCC Representative.

PART 3 – GRADING

3.1 Grading
- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades:
  - .1 135 mm for areas to be sodded.
  - .2 500 mm for planting beds.
  - .3 640 mm for asphalt driveway.
  - .4 1475 mm for heated granite walkways.
  - .5 875 mm for unheated granite walkways.
- .3 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .4 Compact filled and disturbed areas to corrected maximum dry density to ASTM D 698, as follows:
  - .1 85% under landscaped areas.
  - .2 95 % under paved and walk areas.
- .5 Do not disturb soil within branch spread of trees or shrubs to remain.

3.2 Testing
- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC. Costs of tests will be paid by the National Capital Commission.

3.3 Surplus Material
- .1 Remove surplus material and material unsuitable for fill, grading or landscaping off site.

END OF SECTION

PART 1 - GENERAL

1.1 References
- .1 Definitions:
  - .1 Rock: any solid material in excess of 0.25 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock. PPV: peak particle velocity.

1.2 Action and Informational Submittals
- .1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submittals: submit for approval, written proposal of operations for removal of rock by NCC Representative. Indicate proposed method of carrying out work, protection measures for items such as flying rock, vibration, dust and noise control. Include details on protective measures, and other pertinent details.
- .3 Sustainable Standards Certification:
  - .1 Construction Waste Management: submit copy of Waste Management Plan for project highlighting recycling and salvage requirements. Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

1.3 Quality Assurance
- .1 Vibration Control:
  - .1 Reduce ground vibrations to avoid damage to structures or remaining rock mass.

PART 2 - EXECUTION

2.1 Rock Removal
- .1 Perform excavation in accordance Section 31 23 33.01 Excavating, Trenching and Backfilling.
- .2 Remove rock to alignments, profiles, and cross sections as indicated.
- .3 Explosive blasting is not permitted.
- .4 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.
- .5 Excavate rock to horizontal surfaces with slope not to exceed 1:1
- .6 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.
- .7 Remove boulders and fragments which may slide or roll into excavated areas.
- .8 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

2.2 Cleaning
- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Rock Disposal:
  - .1 Dispose of surplus removed rock off site
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management.

2.3 Protection
- .1 Prevent damage to surroundings and injury to persons. Erect protective fencing and display signs when rock removal to take place.

END OF SECTION

PART 1 – GENERAL

1.1 Related Work
- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling
- .2 Section 32 22 76 - Precast Concrete L Wall
- .3 Section 32 94 10 - Rockwork
- .4 Section 32 91 21 - Topsoil and Finish Grading

1.2 References
- .1 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1860-March 1998, Material Specification for Geotextiles.

1.3 Samples
- .1 Submit to NCC Representative samples of material at least 2 weeks prior to commencing work.

PART 2 – PRODUCTS

1.1 Material
- .1 Geotextile -Standard, Non-woven Filter Fabric: Thrace-Linq by Geosynthetic Systems or approved equal.

PART 3 - EXECUTION

3.1 Installation
- .1 Install in accordance with manufacturer's instructions and contract documents.
- .2 Place geotextile material by unrolling onto graded surface in orientation, manner and locations as directed by Representative and retain in position with appropriate staples or fill for the required location.
- .3 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .4 Overlap each successive strip of geotextile 300 mm over previously laid strip.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 4 hours of placement.
- .7 Install Geotextile in such a manner that it does not protrude visibly from between materials or at top or bottom of slope.
- .8 Replace damaged or deteriorated geotextile to approval of Representative.

3.2 Protection
- .1 No vehicles permitted directly on geotextile.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for fertilizing and preserving root systems of plants affected by changing grades or excavation.

.2 Materials and installation of ground protection and other measures as deemed necessary to protect existing trees according to contract drawings and conditions outlined in this section.

1.2 Related Sections

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 56 00 – Temporary Barriers and Enclosures

.3 Section 01 74 19 – Waste Management

1.3 References

.1 Canadian Standards Association (CSA International)

.1 CSA G30.5-M1983 Welded Steel Wire Fabric for Concrete Reinforcement.

.2 Department of Justice Canada

.1 Canadian Environmental Protection Act (CEPA), 1999, c.33.

.2 Fertilizers Act (R.S. 1985, c. F-10).

.3 Fertilizers Regulations (C.R.C., c. 666).

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

.3 Health Canada - Pest Management Regulatory Agency (PMRA)

.1 National Standard for Pesticide Education, Training and Certification in Canada 1995.

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

.1 Material Safety Data Sheets (MSDS).

1.4 Submittals

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

.2 Submit monthly written reports on maintenance during warranty period to the NCC Representative identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

1.5 Delivery, Storage and Handling

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management.

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

.3 Dispose of unused fertilizer material at official hazardous material collections site approved by the NCC Representative.

.4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, regional and municipal regulations.

.5 Do not dispose of unused fertilizer material into sewer system, into streams, lakes, onto ground in any other location where they will pose health or environmental hazard.

.6 Ensure emptied containers are sealed and stored safely.

1.6 Scheduling

.1 Obtain approval from the NCC Representative of schedule indicating beginning of Work.

1.7 Maintenance during Warranty Period

.1 From time of acceptance by the NCC Representative to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 Apply fertilizer in early spring at manufacturer's suggested rate.

.3 Remove dead, broken or hazardous branches from plant material. Seek approval from NCC Representative prior to removing any branches. Pruning may only be carried out by a certified arborist.

.4 During periods of extended drought, wind or grading, trunks, limbs and foliage should be sprayed with water to remove accumulated construction dust.

.5 Maintain tree protection fencing in good repair.

.6 Maintain ground protection in good repair.

PART 2 - PRODUCTS

2.1 Materials

.1 Fertilizer:

.1 To Canada Fertilizer Act and Fertilizers Regulations.

.2 Complete, commercial, slow release with 35 % of nitrogen content in water-insoluble form.

.2 Anti-desiccant: commercial, wax-like emulsion.

.3 Water: potable - free from impurities that inhibit growth.

2.2 Tree Protection Fencing

.1 The modular construction fencing shall act as the tree protection fencing. Refer to Section 01 56 00 – Temporary Barriers and Enclosures.

2.3 Ground Protection

.1 Mulch: 2” unpainted, untreated wood chip or bark mulch.

.2 Granular A.

.3 Steel plates.

PART 3 - EXECUTION

3.1 Identification and Protection

.1 Do construction occupational health and safety in accordance with Section 01 35 30 – Health and Safety.

.2 The trees on this site are ceremonial trees and are designated cultural assets of great importance. They are considered irreplaceable.

.3 Extreme care must be taken to protect existing trees (including crown, trunk and root system) from damage, compaction and contamination during all stages of work. The roots of a tree can extend from the trunk to approximately 2-3 times the distance of the dripline.

.4 No material, construction equipment, or vehicles are to be stored in the tree protection zone (TPZ) or within the critical root zone (drip line) of trees at any time.

.5 No movement of vehicles, equipment or pedestrian in the TPZ will be permitted.

.6 The use of tree trunks as a backstop, winch support, anchorage, as a temporary power pole, signpost or other similar function is prohibited.

.7 Any disturbed vegetation or landscaping will be repaired or replaced without delay to the satisfaction of the NCC Representative.

3.2 Tree Protection Fencing

.1 Supply and erect solid barriers to protect existing trees in accordance with the drawings and to the approval of the NCC Representative.

.2 Tree protection fencing must be installed before construction begins and equipment arrives on site and maintained until the project is completed.

.3 Removal of fences, even temporarily to allow deliveries or equipment access is not allowed unless approved by the NCC Representative and ground protection is installed.

3.3 Ground Protection within the Critical Root Zone

.1 Ground protection must be installed before construction begins and equipment arrives on site and maintained until the project is completed.

.2 In areas where the critical root zone cannot be fenced and is within the limits of work, wood chip or bark mulch must be installed to a minimum depth of 6", followed by a layer of Granular A with ¾" plywood sheets laid on top. Steel plates can also be used in place of plywood. Leave the tree trunks clear of mulch. Install where indicated in the drawings and as directed by the NCC Representative to protect the sensitive root zone.

.3 Asphalt removal from within the critical root zone must be supervised by a certified arborist. Once removed, the granular base shall be protected from repeated compaction from vehicular circulation by the placement of steel plates.

3.4 Excavation within the Critical Root Zone

.1 Limits of excavation to be approved by the NCC Representative prior to commencing work.

.2 Hand digging, hydraulic, or pneumatic excavations are permitted methods for excavation within the critical root zone.

.3 Do not cut or damage roots greater than 25mm (1") diameter. When larger roots are encountered, consult a certified arborist before proceeding. If there are no roots greater than 25mm diameter, leave at least two (2) of the largest roots per meter of trench. Retain as many roots as possible.

.4 Prune roots that must be removed using sharp, clean tools such as secateurs or a landscape handsaw. Make a clean cut and leave as small a wound as possible. All root pruning to be supervised by a certified arborist.

.5 If any roots are exposed during construction, they should be immediately reburied with soil or wrapped in peat moss and burlap and kept moist until they can be buried permanently. Avoid exposing roots during hot, dry weather.

.6 Directional micro-tunneling and boring may be permitted within the limits of the critical root zone subject to the approval of the NCC Representative.

.7 Open face cuts that are consistent with an approved plan and that require root pruning, require the services of a certified arborist. An exploratory dig, either by hand or using a low water pressure hydro vacuum, or air spade method, must be completed prior to commencing with open face cuts.

3.5 Lowering Grade Around Existing Tree

.1 Begin Work in accordance with schedule approved by the NCC Representative.

.2 Cut slope not less than 500 mm from tree trunk to new grade level.

.3 Excavate to depths as indicated. Protect from damage root zone which is to remain.

.4 When severing roots at excavation level, cut roots with sharp tools.

.5 Cultivate excavated surface manually to 15 mm depth.
.6 Prepare homogeneous soil mixture consisting by volume of:
  .1 60 % excavated soil cleaned of roots, plant matter, stones, debris.
  .2 25 % coarse, clean sterile sand.
  .3 15 % organic matter.
  .4 Grade 2:12:8 fertilizer at rate of 1.5 kg/m³.
.7 Place soil mixture over area of excavation to finished grade level. Compact to 85 % Standard Proctor Density.
.8 Water entire root zone to optimum soil moisture level.

3.6 Watering
.1 Ensure that the ongoing maintenance and irrigation of the site vegetation is performed by a qualified contractor, while the construction hoarding is in place.
.2 During the construction period, water existing trees within protected areas by applying water to surface, soaking area 1.5 times the diameter of the dripline of each tree.
.3 Watering schedule to be approved by the NCC Representative.

3.7 Damage to Trees
.1 Any damage or injury to trees shall be reported as soon as possible to the NCC Representative.
.2 A substantial fine, as determined by the NCC Representative, may be enforced for any damage to the trees including unauthorized pruning.

3.8 Pruning
.1 If pruning is required, consult an arborist and seek approval from the NCC Representative.
.2 Prune in accordance with Section 32 93 45 - Tree Pruning.
.3 Prune crown to compensate for root loss while maintaining general form and character of plant.

3.9 Anti-Desiccant
.1 Apply anti-desiccant to foliage where applicable and as directed by the NCC Representative.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:
.1 The work of this Section includes the provision of all labour, materials, equipment and services required to install the granular sub-base, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 Related Sections

.1 Section 01 74 19 - Waste Management.

.2 Section 31 05 16 - Aggregate Materials.

1.4 References

.1 American Society for Testing and Materials (ASTM)
.1 ASTM C117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
.2 ASTM C131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
.3 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.4 ASTM D422-63(1998), Standard Test Method for Particle-Size Analysis of Soils.
.5 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).
.6 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).
.7 ASTM D1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
.8 ASTM D4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Ontario Provincial Standard Specifications
.1 OPSS 1010, Material Specification for Aggregates – Base, Sub-base, select Sub-grade, and Backfill Material, Latest Edition.

.4 Geotechnical Investigation Reports
.1 Geotechnical Investigation Report –(File No. PG2731-LET.01R), February 7, 2013, prepared by Paterson Group.

1.5 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management.

.2 Divert unused granular material from landfill to local quarry or facility as approved by the NCC Representative.

PART 2 PRODUCTS

2.1 Materials

.1 Granular "B" Type II to meet the requirements of and OPSS 1010, Latest Edition.

.2 Granular sub-base material: in accordance with the following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.

.3 Table

Sieve Designation	% Passing			
100 mm	-	-	-	-
75 mm	100	100	100	-
50 mm	-	-	-	100
37.5 mm	-	-	-	-
25 mm	55-100	-	-	60-100
19 mm	-	-	-	-
12.5 mm	-	-	-	38-70
9.5 mm	-	-	-	-
4.75 mm	25-100	25-8]	-	22-55
2.00 mm	15-80	-	-	13-42
0.425 mm	4-50	5-30	0-30	5-28
0.180 mm	-	-	-	-
0.075 mm	0-8	0-10	0-8	2-10

.4 Other Properties as follows:

.1 Liquid Limit: to ASTM D4318, Maximum 25.

.2 Plasticity Index: to ASTM D4318, Maximum 6.

.3 Los Angeles degradation: to ASTM C131. Max% Loss by mass: 40 to 50.

.4 Particles smaller than 0.02 mm: to ASTM D422, Maximum 3%.

.5 Soaked CBR: to ASTM D1883, Min 40 when compacted to 100% of ASTM D1557.

PART 3 EXECUTION

3.1 Placing

.1 Place granular sub-base after subgrade is inspected and approved by the NCC Representative.

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow or ice.

.5 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. The NCC Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 Compaction

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Compact to density of not less than 100% standard proctor maximum dry density.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.4 Apply water as necessary during compaction to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the NCC Representative.

.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 Proof Rolling

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.

.2 Obtain approval from the NCC Representative to use non standard proof rolling equipment.

.3 Proof roll at level in sub-base as indicated. If non standard proof rolling equipment is approved, the NCC Representative to determine level of proof rolling.

.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.5 Where proof rolling reveals areas of defective subgrade:
- .1 Remove sub-base and subgrade material to depth and extent as directed by the NCC Representative.
- .2 Backfill excavated subgrade with sub-base material and compact in accordance with this section.
- .3 Replace sub-base material and compact.

.6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.4 Site Tolerances

.1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.5 Protection

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by the NCC Representative.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:
.1 The work of this Section includes the provision of all labour, materials, equipment and services required to install the aggregate base courses, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 Related Sections

.1 Section 01 74 19 - Waste Management.

.2 Section 31 05 16 - Aggregate Materials.

.3 Section 32 11 16.01 - Granular Sub-base.

1.4 References

.1 American Society for Testing and Materials (ASTM)
.1 ASTM C117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
.2 ASTM C131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
.3 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.4 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).
.5 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).
.6 ASTM D1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
.7 ASTM D4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Ontario Provincial Standard Specifications.
.1 OPSS 1010, Material Specification for Aggregates – Base, Sub-base, Select Sub-grade, and Backfill Material, Latest Edition.

.4 Geotechnical Investigation Reports
.1 Geotechnical Investigation Report – (File No. PG2731-LET.01R), February, 7, 2013, prepared by Paterson Group.

1.5 Delivery, Storage, and Handling

.1 Deliver and stockpile aggregates in accordance with the NCC Representative's instructions. Stockpile minimum 50% of total aggregate required prior to beginning operation.

.2 Store cement in weather-tight bins or silos that provide protection from dampness and easy access for inspection and identification of each shipment.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management.

.2 Divert unused granular material from landfill to local quarry or facility as approved by the NCC Representative.

PART 2 PRODUCTS

2.1 Materials

.1 Granular base shall be designated as Granular "A" and shall be composed of 100% crushed rock meeting the requirements of OPSS 1010, Latest Edition.

.2 Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and the following requirements:

.1 Crushed stone or gravel.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.

.1 Gradation Method # 1 to:

Sieve Designation	% Passing (1)	(2)	(3)
100 mm	-	-	-
75 mm	-	-	-
50 mm	100	-	-
37.5 mm	70-100	-	-
25 mm	-	100	-
19 mm	50-75	-	100
12.5 mm	-	65-100	70-100
9.5 mm	40-65	-	-
4.75 mm	30-50	35-60	40-70
2.00 mm	-	22-45	23-50
0.425 mm	10-30	10-25	7-25
0.180 mm	-	-	-
0.075 mm	3-8	3-8	3-8

.2 Material to level surface depressions to meet gradation (2) limits in accordance with Method #1.

.3 Liquid limit: to ASTM D4318, maximum 25

.4 Plasticity index: to ASTM D4318, maximum 6

.5 Los Angeles degradation: to ASTM C131. Max. % loss by weight: 45

.6 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C136.

Passing		Retained on
50 mm	to	25 mm
25 mm	to	19.0 mm
19.0 mm	to	4.75 mm

.7 Soaked CBR: to ASTM D1883, min 80 to 100, when compacted to 100% of ASTM D1557.

PART 3 EXECUTION

3.1 Sequence of Operation

.1 Place granular base after sub-base surface is inspected and approved by the NCC Representative.

.2 Placing
- .1 Construct granular base to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Begin spreading base material on crown line or on high side of one-way slope.
- .4 Place material only on clean unfrozen surface, free from snow and ice.
- .5 Place material using methods which do not lead to segregation or degradation of aggregate.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. The NCC Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment
- .1 Compaction equipment to be capable of obtaining required material densities.

.4 Compacting
- .1 Compact to density not less than 100% Standard Proctor maximum dry density.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density.
- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the NCC Representative.
- .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.5 Proof rolling
- .1 For proof rolling use standard roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.
- .2 Obtain approval from the NCC Representative to use non standard proof rolling equipment.
- .3 Proof roll at level in granular base as indicated. If use of non standard proof rolling equipment is approved, the NCC Representative to determine level of proof rolling.
- .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
- .5 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by the NCC Representative.
.2 Backfill excavated subgrade with sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-Base.
.3 Replace sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-base.
.4 Replace base material and compact in accordance with this Section.

.6 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by the NCC Representative and replace with new materials in accordance with Section 32 11 16.01 - Granular Sub-base and this section at no extra cost.

3.2 Site Tolerances

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 Protection

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by the NCC Representative.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:

.1 The work of this Section includes the provision of all labour, materials, equipment and services required to install the asphalt paving, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 Related Sections

.1 Section 01 10 00 – General Instructions.

.2 Section 01 74 19 – Waste Management.

.3 Section 32 11 16.01 – Granular Sub-base.

.4 Section 32 11 23 – Aggregate Base Courses.

1.4 References

.1 American Association of State Highway and Transportation Officials (AASHTO)
- .1 AASHTO M320-02, Standard Specification for Performance Graded Asphalt Binder.
- .2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
- .3 AASHTO T245-97(2001), Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

.2 Asphalt Institute (AI)
- .1 AI MS2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.3 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 0.075mm (No.200) 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 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 C207-91(1997), Standard Specification for Hydrated Lime for Masonry Purposes.
.9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
.10 ASTM D2419-02, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
.11 ASTM D3203-94(2000), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
.12 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.4 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-16.3-M90, Asphalt Cements for Road Purposes.

.5 Ontario Provincial Standard Specifications (OPSS):
.1 OPSS 310, Construction Specification for Hot Mix Asphalt.
.2 OPSS 1010, Material Specification for Aggregates - Base, Sub-base, Select Sub-grade and Backfill Material.
.3 OPSS 1103, Material Specification for Emulsified Asphalt.
.4 OPSS 1150, Material Specification for Hot Mix Asphalt.

.6 Geotechnical Investigation Reports

.1 Geotechnical Investigation Report – (File No. PG2731-LET.01R), February, 7, 2013, prepared by Paterson Group.

1.5 Product Data

.1 Submittals in accordance with Section 01 10 00 – General Instructions.

.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least 4 weeks prior to beginning Work.

.3 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.

.4 Submit manufacturer's test data and certification that hydrated lime meets requirements of this Section.

.5 Submit asphalt concrete mix design and trial mix test results to the NCC Representative for approval at least 4 weeks prior to beginning Work.

1.6 Samples

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

.2 Inform the NCC Representative of proposed source of aggregates and provide access for sampling at least 4 weeks prior to beginning Work.

1.7 Delivery, Storage and Handling

.1 Deliver and stockpile aggregates in accordance with the NCC Representative's instruction. Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.

.2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.3 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.

.4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

.5 Submit to the NCC Representative copies of freight and waybills for asphalt cement as shipments are received. The NCC Representative reserves the right to check weights as material is received.

.6 Stockpile crushed RAP separately.

.7 Protect stockpiles of crushed RAP from rain to approval of the NCC Representative.

1.8 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused aggregate materials from landfill to quarry or facility for reuse as approved by the NCC Representative.

.5 Divert unused asphalt from landfill to facility capable of recycling materials.

.6 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 PRODUCTS

2.1 Materials

.1 All designations used herein conform to Ontario Provincial Standard specifications (OPSS 1150 – Latest Edition).

.2 Asphalt paving primer: OPSS No. 1102 and 1103.

.3 Aggregate for asphalt: OPSS No. 1003.

.4 Asphalt: OPSS No. 1101 – performance graded (PG 58-34).

.5 Mineral filler: OPSS No. 1003.

.6 Asphalt cement: to CAN/CGSB-16.3.

.7 Performance graded asphalt cement: to AASHTO M320, grade PG58-28 when tested to AASHTO R29.

.8 Reclaimed asphalt pavement:
.1 Crushed and screened so that 100% of RAP material passes 50 mm screen before mixing.

.9 Aggregates: in accordance with the following requirements:
.1 Crushed stone or gravel.
.2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.
.3 Table:

Sieve Designation	% Passing		
	Lower Course	Surface Course	Sheet Asphalt
200 mm	-	-	-
75 mm	-	-	-
50 mm	-	-	-
38.1 mm	-	-	-
25 mm	100	-	-
19 mm	-	-	-
12.5 mm	70-85	100	-
9.5 mm	-	-	100
4.75 mm	40-65	55-75	85-100
2.00 mm	30-50	35-55	80-95
0.425 mm	15-30	15-30	40-70
0.180 mm	5-20	5-20	10-35
0.075 mm	3-8	3-8	4-14

.4 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.
.5 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.
.6 Separate stockpiles for coarse and fine aggregates not required for sheet asphalt.
.7 Do not use aggregates having known polishing characteristics in mixes for surface courses.
.8 Sand equivalent: ASTM D2419 Min: 50.
.9 Magnesium Sulphate soundness: to ASTM C88. Max% loss by mass:
.1 Coarse aggregate surface course: 12 %.
.2 Coarse aggregate lower course: 12 %.
.3 Fine aggregate, surface course: 16 %.
.4 Fine aggregate, lower course: 16 %.
.10 Los Angeles degradation: Grading B, to ASTM C131. Max % loss by mass:
.1 Coarse aggregate, surface course: 25.
.2 Coarse aggregate, lower course: 35 %.
.11 Absorption: to ASTM C127. Max % by mass:
.1 Coarse aggregate, surface course: 1.75 %.
.2 Coarse aggregate, lower course: 2.00 %.
.12 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:
.1 Coarse aggregate, surface course: 1.5.

.2 Coarse aggregate, lower course: 2.0.

.13 Lightweight particles: to ASTM C123. Max % by mass less than 1.95 relative density:
- .1 Surface course: 1.5 %.
- .2 Lower course: 3.0 %.

.14 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5): Max% by mass:
- .1 Coarse aggregate, surface course: 15%.
- .2 Coarse aggregate, lower course: 15 %..

.15 Crushed fragments: at least 60 % of particles by mass within each of following sieve designation ranges, to have at least 1 freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.

Passing		Retained on
25 mm	to	12.5 mm
12.5 mm	to	mm

.16 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.10 Mineral filler:
- .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 to improve mix properties.
- .3 Mineral filler to be dry and free flowing when added to aggregate.

.11 Anti-stripping agent: hydrated lime to ASTM C207 type N. Add lime at rate of approximately 2-3% of dry weight of aggregate.

.12 Water: to approval of the NCC Representative.

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 (minimum of three per paver) of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:
- .1 Minimum drum diameter: 1200 mm.
- .2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.

.4 Haul trucks: 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.
- .4 Use only trucks which can be weighed in single operation on scales supplied.

.5 Hand tools:
- .1 Lutes or rakes with covered teeth for spreading and finishing operations.
- .2 Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm^2 for compacting material along curbs, gutters and other structures

inaccessible to roller. Mechanical compaction equipment, when approved by the NCC Representative, may be used instead of tamping irons.

.3 Straight edges, 4.5 m in length, to test finished surface.

.6 Sandblaster: sufficient to match existing asphalt surface finish.

.7 Plant testing facility: provide laboratory space at plant site for exclusive use of the NCC Representative, for performing tests, keeping records and making reports.

2.3 Mix Design

.1 Mix design for Superpave 12.5 and Superpave 19.0 to be approved by the NCC Representative, in accordance with Division 01.

.2 Mix design to be developed by testing laboratory approved by the NCC Representative.

.3 Mix to contain maximum 50% by mass of RAP. The NCC Representative may approve higher proportion of RAP if Contractor demonstrates ability to produce mix meeting requirements of specification.

.4 N/A

.5 Design of mix: by Marshall method to requirements below.

.1 Compaction blows on each face of test specimens: 50 to 75.

.2 Mix physical requirements:

Property	Airfield Pavements	Roads	Sheet Asphalt
Marshall Stability at 60 C kN min	7.0	5.5 surface course/4.5 lower course	3.0
Flow Value mm	2-4	2-4	2-5
Air Voids in Mixture, %	3-5	3-5 surface course/2-6 lower course	3-5
Voids in Mineral Aggregate, % min	15 surface course/13 lower course	15 surface course/13 lower course	16
Index of Retained Stability % minimum	75	75	75

.3 Measure physical requirements as follows:

.1 Marshall load and flow value: to AASHTO T245.

.2 Air voids: to ASTM D3203.

.3 Voids in mineral aggregates: to AI MS2, chapter 4.

.4 Index of Retained Stability: measure.

.4 Do not change job-mix without prior approval of the NCC Representative. When change in material source proposed, new job-mix formula to be approved by the NCC Representative.

.5 Return plant dust collected during processing to mix in quantities acceptable to the NCC Representative.

PART 3 EXECUTION

3.1 Reference Standard

.1 All work shall be undertaken in accordance with applicable clauses of Ontario Provincial Standard Specification for Hot Mix, Hot Laid Asphalt Concrete (OPSS No. 310 - Latest Edition).

3.2 Plant and Mixing Requirements

.1 Batch and continuous mixing plants:
- .1 To ASTM D995.
- .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.
- .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
- .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
- .5 Before mixing, dry aggregates to moisture content not greater than 1 % by mass or to lesser moisture content if required to meet mix design requirements. (Heat to temperature required to meet mixing temperature as directed by the NCC Representative after combining with RAP).
- .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
- .7 Store hot screened aggregates in manner to minimize segregation and temperature loss.
- .8 Heat asphalt cement and aggregate to mixing temperature directed by the NCC Representative. Do not heat asphalt cement above 160 degrees C (maximum temperature indicated on temperature-viscosity chart).
- .9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, the NCC Representative to approve temperature of completed mix at plant and at paver after considering hauling and placing conditions.
- .10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.
- .11 Mixing time:
  - .1 In batch plants, both dry and wet mixing times as directed by the NCC Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.
  - .2 In continuous mixing plants, mixing time as directed by the NCC Representative but not less than 45s.
  - .3 Do not alter mixing time unless directed by the NCC Representative.
- .12 Where RAP is to be incorporated into mix:
  - .1 Feed from separate cold feed bin specially designed to minimize consolidation of material. Provide 50 mm scalping screen on cold feed to remove oversized pieces of RAP.
  - .2 Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti rollback device to prevent material from sliding backward on feed belt.
  - .3 Combine RAP and new aggregates in proportions as directed by the NCC Representative. Dry mix thoroughly, until uniform temperature within plus or minus 5 degrees C of mix temperature, as directed by the NCC Representative, is achieved prior to adding new asphalt cement. Do not add new asphalt cement where temperature of dried mix material is above 160 degrees C.

.2 Dryer drum mixing plant:
- .1 To ASTM D995.
- .2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
- .3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.
- .4 Where RAP is to be incorporated into mix, dryer drum mixer is to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180 degrees C.
- .5 Feed RAP from separate cold feed bin designed to minimize reconsolidation of material.
- .6 Meter total flow of aggregate (and RAP) by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate, RAP and asphalt entering mixer remain constant.
- .7 Provide for easy calibration of weighing systems for aggregates (and RAP) without having material enter mixer.
- .8 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2 %.
- .9 Make provision for conveniently sampling full flow of materials from cold feed.
- .10 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate (and RAP) from cold feed prior to entering drum.
- .11 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .12 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each week.
- .13 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 2 %.

.3 Temporary storage of hot mix:
- .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
- .2 Do not store asphalt mix in storage bins in excess of 3 hour.

.4 While producing asphalt mix for this Project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.

.5 Mixing tolerances:
- .1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve and larger	
2.00 mm sieve	
0.425 mm sieve	
0.180 mm sieve	
0.075 mm sieve	2.0

- .2 Permissible variation of asphalt cement from job mix: 0.25%.

.3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

.6 Addition of anti-stripping agent:
- .1 Plant to be equipped with pug mill to thoroughly mix aggregates and lime prior to entering the plant.
- .2 Plant to be equipped with suitable conveyor systems capable of supplying aggregates and lime at constant rate.
- .3 Plant and equipment used for addition of lime to be equipped with covers to control loss of lime.
- .4 Plant to be equipped to control rate of lime incorporation to within 1/4%.
- .5 Add water to aggregate prior to entering pug mill.
- .6 Add water to lime sufficiently in advance to permit time to slake prior to entering pug mill.

3.3 Approval to Lay Asphalt

.1 Notify the NCC Representative at least 24 hours before any paving operation is to proceed, and obtain approval.

.2 Minimum air temperature when laying asphalt; 5°C and rising.

3.4 Preparation

.1 Reshape granular roadbed and asphalt pavement.

.2 Grade base in accordance with Section 32 11 23 – Aggregate Base Courses.

.3 Apply prime coat and tack coat prior to paving.

.4 Prior to laying mix, clean surfaces of loose and foreign material.

.5 Saw cut and key grind asphalt at all road cuts and asphalt tie in points.

3.5 Transportation of Mix

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.

.3 Schedule delivery of material for placing in daylight, unless the NCC Representative approves artificial light.

.4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.

.5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by the NCC Representative, but not less than 135 degrees C.

3.6 Test Strip

.1 Construct and test test strip to approval of the NCC Representative.

.2 N/A

.3 During construction of test strip, the NCC Representative will establish optimum rolling pattern by taking nuclear densimeter readings and observations to:
- .1 Determine sequence and number of passes.
- .2 Determine correct operating characteristics of vibratory rollers.
- .3 Determine maximum density of asphalt mix.
- .4 Ensure surface finish matches existing.
- .5 Establish actual density achieved by coring in order to determine if additional or other rolling equipment is required to achieve density of not less than 98 % of density obtained with Marshall specimens prepared from samples of mix being used.

3.7 Placing

.1 Obtain the NCC Representative approval of base, existing surface, tack coat and prime coat prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines indicated on drawings or as directed by the NCC Representative.

.3 Placing conditions:
- .1 Place asphalt mixtures only when air temperature is above 5 degrees C.
- .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
- .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.4 Place asphalt concrete in compacted lifts of thickness as indicated.
- .1 Levelling courses to thicknesses required but not exceeding 50 mm.
- .2 Lower course in layers of 100 mm each.
- .3 Surface course in layers of maximum 60 mm each.

.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.

.6 Place individual strips no longer than 500 m.

.7 Spread and strike off mixture with self propelled mechanical finisher.
- .1 Construct longitudinal joints and edges true to line markings. The NCC Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
- .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
- .3 Maintain constant head of mix in auger chamber of paver during placing.
- .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
- .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
- .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
- .7 Do not throw surplus material on freshly screeded surfaces.

.8 When hand spreading is used:
- .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
- .2 Distribute material uniformly. Do not broadcast material.
- .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
- .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
- .5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

.9 Provide a sandblast finish to expose aggregates.

3.8 Compacting

.1 Roll asphalt continuously using established rolling pattern for test strip and to density of not less than 100 % of maximum density determined for test strip.

.2 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by the NCC Representative.

.3 Roll asphalt continuously to density not less than 98 % of blow Marshall density to AASHTO T245.

.4 General:
- .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
- .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
- .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
- .4 Use static compaction for levelling coarse less than 25 mm thick.
- .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
- .6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
- .7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
- .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
- .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
- .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
- .11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.

.12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.5 Breakdown rolling:
- .1 Begin breakdown rolling with static steel wheeled roller or vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
- .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
- .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by the NCC Representative.
- .4 Use only experienced roller operators.

.6 Intermediate rolling:
- .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
- .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.7 Finish rolling:
- .1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by the NCC Representative.
- .2 Conduct rolling operations in close sequence.

.8 Dust entire area of sheet asphalt pavements (with hydrated lime) immediately after rolling to eliminate tendency to pick-up under traffic.

3.9 Joints

.1 General:
- .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
- .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
- .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:
- .1 Offset transverse joint in succeeding lifts by at least 600 mm.
- .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
- .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

.3 Longitudinal joints:
- .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
- .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
  - .1 For airfield runway paving, avoid cold joint construction in mid 30 m of runway.

.2 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.

.3 Overlap previously laid strip with spreader by 25 to 50 mm.

.4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

.5 Roll longitudinal joints directly behind paving operation.

.6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

.4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Location of feather joints as indicated.

.5 Construct butt joints as indicated.

3.10 Saw Cutting

.1 Saw cut existing asphalt where new pavement ties into existing.

3.11 Adjustment of Ironworks

.1 Make final adjustments of all ironworks prior to final lift of paving.

.2 Construct asphalt collar around all ironworks.

3.12 Finish Tolerances

.1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.

.2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.13 Defective Work

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.

.2 Repair areas showing checking, rippling, or segregation.

.3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

.4 Reinstate all existing areas to existing conditions or better.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE OF WORK

.1 Work under this section includes labour, material and equipment required for the implementation of various granite elements:

- .1 Granite edge stones;
- .2 Granite Pavers;
- .3 Granite stairs and granite fountain pavers
- .4 Custom granite elements

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures
.2 Section 01 74 19 – Waste Management
.3 Section 03 30 00 – Cast In-Place Concrete
.4 Section 04 05 12 – Masonry Mortar and Grout
.5 Section 32 11 16.01 – Granular Sub-Base
.6 Section 32 11 23 – Aggregate Base Courses
.7 Section 31 32 19.1 – Geotextiles

1.3 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)

- .1 ANSI/CTI A108.1-[1999], Specification for the Installation of Ceramic Tile.
- .2 ANSI A108.1-[1999], Installation of Ceramic Tile.

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

- .1 ASTM C 136-[01], Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2 ASTM C 207-[91(1997)], Specification for Hydrated Lime for Masonry Purposes.

.3 Office des normes générales du Canada (CGSB)

- .1 CAN/CGSB-8.1-[M88], Tamis de contrôle en fil métallique tressé, métriques.
- .2 CAN/CSA-A164 série F04 : Normes sur les éléments de maçonnerie en béton.

.4 CGSB 71-GP-29M-[79], Adhésif élastomère pour l'installation des carreaux de carrière.

.5 CGSB 71-GP-30M-[79], Systèmes adhésifs époxydiques et de mortier modifié pour l'installation de carreaux de carrière.

.6 Association canadienne de normalisation (CSA International)

- .1 CAN/CSA-A3000-[F98], Compendium de matériaux cimentaires (contient A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).

.7 BNQ 2520-110 Granite curbs.

.8 All work to be completed in accordance to best practices

1.4 TESTING AND CERTIFICATIONS

.1 Test reports and certificates to be submitted, certifying that products and materials meet physical requirements and performance criteria.

1.5 TRANSPORT, STORAGE AND HANDLING

.1 Deliver, store and handle all material in order to prevent any damage.

.2 Deliver material on site just before implementation.

.3 Deliver material in their packaging with intact seal and manufacturer's label.

.4 Store material in their packaging, in a dry place, protected from vandalism and away from heavy traffic.

.5 Store cardboard standing.

.6 Handle mortar and grout resin carefully and respect safety instructions on the packaging labels and Safety Data Sheets of the product.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to section 01 74 19- Management and Disposal of Excess Material.

.2 All packaging and materials to be removed from site and disposed of at an appropriate recycling facility.

.3 Send all unused adhesives and unused sealants to an authorized site that collects dangerous waste, to be approved by the NCC Representative.

.4 It is forbidden to dump unused adhesives and sealing products in sewers, in any water courses, , on the ground or at any other place where it may present a risk to health or the environment.

.5 Send all broken pieces to an approved site.

.6 Fold, flatten and bind all cardboard and metal strapping. Dispose of at appropriate recycling location.

.7 Packing spacers, wooden pallets and all other loose packing materials to be disposed of at appropriate recycling location.

.8 Remove all waste material and recyclable material from site at the end of each working day.

1.7 IMPLEMENTATION CONDITIONS

.1 According to Manufacturer's specifications, always maintain proper temperature for the mortar, caulking and grout 72 hours before commencement of work and until work is completed.

.2 Do not install any materials covered in frost, ice or if the material itself is frozen.

.3 Contractor to take all necessary precautions to protect work against frost using heated shelters on top of granite area or other approved method. No stone work shall be installed if the temperature is below 5°C and or if the materials are below 7°C.

.4 If work is done is hot weather, contractor to cover work with wet tarp, which will not stain, to prevent work from drying too quickly

.5 Contractor to follow manufacturer's specification in regards to climatic conditions during polymeric sand installation.

PART 2 PRODUCTS

2.1 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples for all work described in this section and in the drawings package as per section 01 33 00. Contractor to use the same wording as specified on the plan when preparing shop drawings for granite elements.

.2 Before commencing any work, NCC Representative must approve all granite samples showing every finish within ten (10) days of contract award

.3 Submit following product test data:
.1 Sieve analysis for gradation of bedding and joint material
.2 Granite paver test data

.4 Submit following shop drawings indicating dimensions, finish, layout, pattern and relationship of paving joints to fixtures and project formed details as well as method of installation.
.1 Granite unit pavers;
.2 Granite borders;
.3 Granite stairs;
.4 Granite fountain pavers;
.5 Granite paver for bronze diais;
.6 Granite paver for flagpole foundation;
.7 Granite veneer stones for access hatch.

.5 Submit full size samples of the granite unit pavers showing the three (3) specified finishes. The source and finish of each sample must be clearly identified. Samples must represent all color and texture variations that may occur in the stone.

.6 Supplied stones (after approval of samples) must have the same colors and textures as the approved samples.

.7 Approval of samples shall occur during daylight hours at a distance of 3 meters away.

.8 Stone must not present any imperfection other than a light color variation visible at 6m away from surface.

.9 Submit samples and an electronic copy of product data for:
.1 Sand for joints;
.2 Sand for leveling bed;
.3 Leveling shims;
.4 Lean concrete;
.5 Joint sealant.

2.2 GRANITE CHARACTERISTICS

.1 The granite elements in the current project are of one different type of granite: Mystique Brown or approved equal. There is three (3) types finished. Every color and finishes must be homogenous and have the same characteristic.

.1 Aspect: free of cracks, chips or scratches.

.2 All granite must be free of veins or other defects that may affect its appearance, its resistance or its continuity.

.3 The physical and mechanical characteristics of granite must be as follows:

Characteristics	Technical Requirements	Test mode
Resistant to compression in dry conditions, perpendicular to stone structure	Min. 140 MPa	ASTM C 170
Rupture module in dry conditions, perpendicular to stone structure	Min. 10,5 MPa	ASTM C 99
Absorption	Max. 0,4 %	ASTM C 97
Density	Min. 2550 kg/m^3	ASTM C 97
Abrasion resistance	Min. 10	ASTM C 241

2.3 PIECES OF GRANITE

.1 All granite must be provided by an approved supplier. Substitution must be approved by NCC Representative.

.2 Granite pavers must be cut to respect dimensional tolerance of:

.1 ±0,5mm in thickness; and

.2 ±0.5 mm in length and width

.3 Granite edge must be cut to respect dimensional tolerance of:

.1 ± 0.5 mm in height and ± 0.5 mm in thickness, measured at the top edge and

.2 ± 0.5 mm when the length is specified in the contract documents.

.4 The stone should not contain veins of more than 1 mm width. Natural stone must have a shine. Pavers and curbs of same colors must come from the same extraction site.

.5 The geological vein width tolerance is 3 mm. No cracks empty or filled with limestone material will be accepted. For the dimensional tolerances of the pieces, refer to point 2.6 of the present section.

.6 Granite Materials and Finishes:

.1 All granite used in this project is Mystic Brown or approved equal

.2 All edges eased with 1mm bevel unless noted otherwise.

.3 This project specifies three (3) granite finishes:

.1 Bush-hammered

.2 Thermal

.3 Gem 8

.4 Widths, lengths and thicknesses of pavers vary, contractor to refer to plan, details and sheet.

2.4 ACCESSORIES

.1 Leveling shim for curbs: cement bricks to standards CSA A165.2, type I-35 or granite block.

2.5 MORTAR

.1 Refer to section 04 05 12 – Masonry mortar and Grout

2.6 GRANULAR BASE

.1 Refer to Sections 32 11 26.01 - Granular Sub-Base and 32 11 23 - Aggregate Base Courses.

2.7 MATERIALS FOR PAVING BED

.1 Manufactured sand for bedding: hard, durable, crushed stone particles, conforming to gradation of concrete sand as specified in CSA-A231.1-14/ A231.2-14. Sand: granitic origin, free from clay lumps, cementation, organic material, frozen material and other deleterious materials. Do not use limestone screenings or stone dust. Do not use jointing sand in place of bedding sand.

.2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1. 0% to pass 0.075 mm sieve.

Table 2.3.1 Grain size

Sieve Designation (mm)	% Passing
10	100
5	95-100
2.5	80-100
1.25	50-90
0.630	25-60
0.315	10-35
0.160	2-10

Table 2.3.2 Complementary characteristic.

Characteristic	Prescription	Test mode

Micro-Duval	Max 35%	LC21-101
Flow Rate	Min 80	LC21-075
Absorption	Max 1.0%	LC21-065
Brittleness	Max 40%	LC21-080

2.7 STABILIZE SAND FOR JOINTS

.2 Sand in bags with a polymeric binder that has already been added in the bag. Manufacturer must be approved by NCC Representative.

.1 Use: Granite pavers on granular material for bed

.2 Product: Techniseal HP2 Polymeric Sand or approved equivalent. Colour to be approved by NCC Representative.

PART 3 EXECUTION

3.1 WORK

.1 Contractor shall perform all work required in the present section and as described on the plans. Contractor to supply all material, tools, labour to execute the following work, without limitation

.2 Prevent damage to buildings, landscaping, curbs, sidewalks, trees, fences, roads and adjacent property. Make good any damage.

.3 Provide access to building via the Princess Anne entrance at all times. Coordinate paving schedule to minimize interference with normal use of the premises.

3.2 REQUIREMENTS PARTICULAR TO WOK :

.1 Notice to contractor:

.1 The contractor shall read the specifications as a whole to realize all the different types of work regarding different trades. Contractor must plan and execute to his own cost all work, which, although not described in the specification, are nevertheless required or necessary to complete the works.

.2 His work must fit perfectly with other trades and crafts to form a perfect execution. The execution must be made in the required way and in a timely manner in order not to delay the work.

.3 Any errors, omission and imperfections in the work of any other trades must not serve as an excuse or pretext for errors, omission or imperfection in contractor's work.

.2 Screening:

.1 The contractor shall verify that the surfaces and conditions of work already completed are in condition to receive the works described in this section. Any anomaly or inconsistence shall be reported to the NCC Representative immediately and must be corrected before doing any additional work. Check all measures and templates on site before doing any work

.3 Survey:

.1 Contractor must provide the services of a qualified Land Survey team that must be permanently on site to validate every step of the project implementation. The verification instruments (Total stations) are to insure a constant accuracy in the implementation of all granite pieces and all components of the project.

.4 Layout plan:

.1 Contractor must submit a detailed layout plan showing all the granite pavers and granite curb work. Layout plan must indicate type of pavers and curbs and method of installation. Layout plan will be done using AutoCAD software, according to the coordinate system SCOPQ starting with the base plan supplied by the NCC Representative. Granite supplier shall deposit pavers on wood pallets in accordance to the layout plan.

.2 Contractor must specify to supplier that the product ordered must meet all specifications regarding the implementation of the granite pavers on bed and on concrete slab and granite curb on granular, on levelling shim and on lean concrete. Delivery slips should identify the project.

.5 Instructions to Granite Supplier

.1 Direct the granite supplier to deposit the granite elements on wooden pallets in sequenced order for transport in accordance with the approved layout plan for that element.

.2 Inform the granite supplier of all specifications regarding the installation of the various granite elements.

.3 Delivery slips must identify the project.

.6 Site mock-up

.1 Contractor to install a 2m x 4m mock up prior to paving. This mock-up must include a 2m section of granite borders, and granite pavers. This mock-up will be used to determine joints width, alignment and patterns. This mock-up will be executed with all concerned parties on site and once approved, will be the standard for judging the compliance of work and may be incorporated into the project.

.7 Quality insurance of labour.

.1 The contractor must ensure that the team in charge of cutting, measuring and installing the granite pieces are experienced and follow best practices

3.3 SUBGRADE

.1 Ensure the subgrade preparation conforms to levels and compaction required for the installation of the granular sub-base.

3.4 GEOTEXTILE

.1 Install where indicated.

3.5 GRANULAR BASE

.1 Refer to Sections 32 11 16.01 - Granular Sub-Base and 32 11 23 - Aggregate Base Courses.

3.6 SAND LEVELING COURSE

.1 Maximum thickness after compaction: 25mm.

.2 Do not use bedding sand to compensate for depressions that exceed specified tolerances in surface of base. Do not use joint sand for bedding sand.

.3 Spread bedding sand on concrete slab without compaction. Level surface according to the required profile and maintain the sand loose until the pavers are placed.
.4 Any area compacted in any way whatsoever, including by rain, must be scarified, loosened and restored to its original state.
.5 No vehicular circulation is permitted on the bed after it is leveled.

3.7 MORTAR

.1 Refer to Section 04 05 12 – Masonry Mortar and Grout.
.2 Mortar is used to set the permanent pavers within the fountain area, and to install the granite paver for the flagpole foundation.
.3 Use mortar to compensate for depressions that exceed specified tolerances in surface of base.
.4 Maintain proper temperature for the mortar and grout. Install as per manufacturer's instructions.

3.8 STABILIZED JOINTING SAND

.1 Use where indicated in the plans. Install as per manufacturer's instructions.

3.9 GRANITE PAVERS AND BANDING

.1 Ensure bedding sand and granular base are not saturated prior to placement of granite unit pavers.
.2 Install paving true to grade on the bedding sand, in location, layout and pattern as indicated. Place them manually or mechanically without compressing the loose bed underneath.
.3 Confirm the starting out point on site with the NCC Representative prior to laying the pavers.
.4 Verify continuity of curves and ensure that rows are parallel at least every two (2) meters. Realign as necessary.
.5 Where required, cut pavers accurately without damaging edges. Use a water table saw. Do not cut near or beside a recently paved area. Ensure a sufficient water supply is used at all times to reduce dust. Do not cut within 25mm of the edge of a paver. Do not cut more than three factory edges of any given paver. Ensure paver layout does not allow for 'sliver cuts'.
.6 For vehicular areas, use cut pieces no smaller than one-third of a whole paver. In the event this is unavoidable, do not proceed without approval from the NCC Representative. Replace damaged or defective items before filling joints.
.7 Pavers shall have 3mm wide joints. Fountain pavers shall have 6mm wide joints. Alignment tolerances for joint lines compared with the contract documents is ± 2mm.
.8 Fill joints between pavers by sweeping in sand. Ensure all excess has been swept clean prior to compaction. Any pebbles susceptible of breaking the edges of granite elements during compaction must be removed from the joints.
.9 Pass mechanical plate vibrator over unit paving to achieve compaction of sand in joints. Use minimum 22 kN force mechanical plate vibrator and minimum 19mm thick plywood or neoprene pad under plate compactor and over granite. The plate tamper must never be in direct contact with the natural stone elements.
.10 Make three (3) passes in different directions. Ensure joints are full at completion of compaction. Do not compact unit paving within 1m of unrestrained edges or from a non-filled joint edge.
.11 Compact and level granite until units are true to grade and free of movement. Ensure final elevation of pavers takes into account the mechanical compaction of the completed pavers.
.12 Any paver damaged as a result of compaction must be replaced immediately.
.13 At completion of each work day, ensure all work beyond 1 m of laying face is left fully compacted with sand filled joints. A water proof non-staining tarp must be installed on any areas where joints have not been completely filled and compacted.
.14 Tolerance for paving surfaces lengthwise and crosswise in relation to prescribed grade is ±3mm as measured with a 3m straight edge placed diagonally at 45° from joint orientation. Verification will be done every 10m² of surface. Grading will be considered acceptable when

this tolerance is respected for 95% of control points and no difference is greater than 10mm. Levels between adjacent elements are not to exceed 2mm.

.15 Sweep surface clean and check final elevations for conformance to drawings.

.16 Protect granite from latex mortar with adhesive tape.

3.11 GRANITE BORDERS

.1 Install borders true to grade, in location, layout and pattern as indicated in the plans.

.2 For deep borders, prepare granular foundation and place leveling shims on foundation according to plans. At least two (2) shims are required per straight border section. Install an extra shim in center to stabilize the curved borders.

.4 Place border on shim respecting layout, grading and alignment on plan. Align border sections.

.5 Adjust border if required by using additional non-metallic, rot-proof shims approved by the NCC Representative.

.6 A maximum discrepancy of +/- 5mm is allowed for layout, levels and alignments. The difference in elevation between curbs must not exceed 5mm.

.7 Fill space under borders and part way up each side using lean concrete to create a solid shoulder on both sides. Shoulder slope to be equal to the angle of set concrete.

.8 No compaction, other concrete work or paving is to take place adjacent to fresh lean concrete within 48 hours of installation or the time required to obtain a compression resistance of 15 MPA.

3.12 GRANITE STAIRS

.1 Install stairs true to grade, in location, layout and pattern as indicated in the plans.

.2 Install on 25mm non-metallic, rot-proof shims approved by the NCC Representative. Maintain air space below. Stairs shall be cored and secured in place with epoxy and stainless steel dowels.

.3 A maximum discrepancy of +/- 5mm is allowed for layout, levels and alignments. The difference in elevation between stairs must not exceed 5mm.

.4 Caulk joints between stairs with water resistant sealant. Product and colour to the approval of NCC Representative.

3.13 GRANITE FOUNTAIN PAVERS

.1 Install pavers true to grade, in location, layout and pattern as indicated in the plans.

.2 Install permanent pavers on 25mm thick epoxy based mortar bed.

.3 A maximum discrepancy of +/- 5mm is allowed for layout, levels and alignments. The difference in elevation between pavers and abutting material must not exceed 5mm.

.4 Caulk joints between permanent pavers with water resistant sealant. Product and colour to the approval of NCC Representative.

3.14 QUALITY CONTROL

.1 The NCC Representative reserves the right to ask for samples or other items from fabricators or on site to verify conformity between contract documents and supplier submitted information on material or other elements. In case of non-compliance, the NCC Representative may refuse in part or in total the material.

.2 Provide all necessary assistance to the NCC Representative to obtain and handle samples.

.3 Material: Material will be refused if any physical characteristic does not comply with the specification. Remove and immediately replaced it with a complying material.

.4 Element implementation: Immediately correct defects in the work if implementation does not comply with the specifications. In the case of non-compliance, the NCC Representative reserves the right to stop the work and impose corrective measures.

3.16 CLEANING

.1 Once work is complete, sweep all surfaces clean. Wash granite according to manufacturer's instructions. Use soft fibre brushes.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes
- .1 Section 01 74 19 - Waste Management
- .2 Section 32 11 23 - Aggregate Base Courses
- .3 Section 31 23 13 - Site Grading
- .4 Section 31 23 33.01 - Excavating, Trenching and Backfilling

1.2 Measurement Procedures
- .1 Granular base and stone dust will be measured on a unit price basis.

1.3 References
- .1 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.

1.4 Protection
- .1 Prevent damage to previously constructed works including unit paving, sidewalks, asphalt paving, and curbs. Make good any damage.

1.5 Samples
- .1 Submit sample of crushed granite.
- .2 Submit product data for stabilizing compound.

PART 2 - PRODUCTS

2.1 Use
- .1 The rock dust, when treated with a stabilizing compound, can be used as a finished base for walking or service path, public areas, parking lots, bicycle paths, school yards, and other similar projects.

2.2 Materials
- .1 Granular base: Granular A to conform with OPSS 1010.
- .2 Stonedust
  - .1 100mm, pitch finished surfacing to drain.
  - .2 Grading to be between 0/4 and 0/10, fine particles (<80um) between 15% and 20% as per recommendations of the stabilizing compound manufacturer.
  - .4 Stonedust to be made from crushed granite and will be a mixture of 3 sizes: ¼- ¾ " as supplied by Nesbitt Quarry, Braeside, ON and approved by the NCC Representative.
- .3 Stabilizing Compound
  - .1 Binder that agglomerates aggregates, forming stable and very resistant surfaces even on unlevel ground. Will not modify the appearance of the materials used in the project. Odourless, colourless, non-toxic organic powder.
  - .2 Product: Stabilizer®, manufactured and distributed by Stabilizer, Inc. 33 S 28th St⊲Phoenix, AZ 85034⊲USA, Tel: 800.336.2468 Web: www.stabilizersolutions.com

2.3 Stabilized Mix
- .1 Proportions
  - .1 Composed of 5.5kg to 7kg of organic binder per metric ton of stonedust as per manufacturer's instructions.

.2 Mixture must be prepared by an accredited supplier using a mixer suitable for that purpose.
.3 If the desired product is not available from an accredited supplier, the Contractor shall submit an alternative to the NCC Representative for approval of colour and/or grading. Sample to indicate the origin of the material, grading curve and recommended proportions.

.2 Aggregate
.1 Grading curve and physical requirements to meet manufacturer specifications.

.3 Preparation
.1 The mixture must be prepared according to manufacturer specifications.
.2 An exhaustive mixing is essential to obtain homogeneity. Mixing in a pail, wheel barrel, or any other manual machinery will not be sufficient.
.3 A manufacturer representative must be advised and present when the mixture is being prepared.

PART 3 - EXECUTION

3.1 Subgrade
.1 Ensure that the area of stonedust pathway is free of debris, vegetation, and topsoil. Remove any loose soil. Excavate to depth as indicated in drawings.

3.2 Granular Base
.1 Granular base material minimum thickness: 200mm
.2 Spread and compact granular base material in uniform layers not exceeding100 mm compacted thickness.
.3 To make a 'Stabilizer' coating, the base must be water permeable.
.4 Compact to a density as indicated on drawings.
.5 Provide adequate leveling to receive finish coat of stonedust and adjustment to meet adjacent surfacing.

3.3 Drainage
.1 Provide positive drainage as indicated.

3.4 Stonedust Topping
.1 Place stonedust topping to compacted thickness of 100mm, 95% Standard Proctor dry density. Topping to be applied in one application and maintain humidity level.
.2 Saturate the subgrade with water before applying stonedust topping.

3.5 Watering
.1 Minimum temperature to lay down stonedust topping is 5 degrees Celcius. 90-160 Litres of water is required to activate the binder per metric ton of stonedust.
.2 Stonedust must be saturated as the water will settle the final coat and activate the organic binder 'Stabilizer' in the stonedust.

3.6 Field Quality Control
.1 Inspection and testing of crushed stone paving to be carried out by designated testing laboratory.
.2 Costs of tests will be paid by Contractor.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 This Section specifies requirements for the precast concrete L wall for the trench drain structure indicated, and the installation instructions as required for complete, high quality and long lasting walls.

1.2 Quality Assurance

.1 Engage an experienced Installer who has experience with architectural precast concrete screening wall or noise barrier projects with similar material and of similar scope to that indicated for this project with a successful construction record of in-service performance. Installer must submit names, location, and phone number of three references as well as description of the project successfully completed for each reference.

.2 Installer shall be registered and/or licensed and approved by authorities having jurisdiction.

.3 Single Source Responsibility:

1. Obtain concrete materials manufactured in Canada from a single source duly licensed or authorized to manufacture or distribution precast L wall panels.

.4 Manufacturer Qualification: Engage a firm experienced in producing precast concrete L wall units in accordance with those indicated and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

.5 Manufacturer shall be registered and approved by authorities having jurisdiction.

1.3 Submittals

.1 Submit the following according to the Conditions of Section 01 33 00 Submittal – Procedures:

1. Product Data: Furnish manufacturer's literature for each architectural precast concrete screening wall or noise barrier.
2. Color Chart: Show full range of available base and accent colors
3. Shop Drawings: Provide working drawings indicating all information necessary for precast L wall. Drawings shall illustrate the shape and dimension of precast components; the size, quantity and details of the reinforcing steel; the quantity, type, size and details of connection and lifting hardware. Drawings shall accommodate grade changes and slopes indicated and shall bear the seal of a registered professional engineer.

PART 2 - PRODUCTS

2.1 Manufacturers

.1 Precast wall manufactured by Central Precast Inc. or approved equal. 25 Bongard Ave, Ottawa, ON, K2E 6V2. Phone: (613) 224-9510. Representative: Todd Vine. Email: tvine@centralprecast.com or approved equivalent.

2.2 Materials

.1 Wall System

1. 840mm high
2. Panels shall have a smooth, sandblasted finish on both sides.
3. Panels shall be monolithic.
4. Panels, shall be constructed from normal weight concrete, having sand and gravel or crushed stone aggregates mixed with ASTM-C150, Type I or Type III Portland Cement and shall have a minimum compression strength of 4,000 psi @ 28 days.

.5 Panel Reinforcing: As per manufacturers recommendations.
.6 Panel Connection: As indicated and provided by Central Precast or approved equal.
.7 Loading: Wind loading and surcharge loads, will be applied to the panels, and components per local building code requirements.

.2 Component Dimensions
.1 Panels shall have a typical dimension of 1200mm long by 840mm tall by 125mm thick as indicated.
.2 Panel/Panel connection shall be tongue and groove construction.
.3 Panel Reinforcing: As per manufacturers recommendations.
.4 Reinforcing Materials:
1. All reinforcing steel shall be deformed type bars or welded wire mesh. All deformed type bars shall conform to ASTM – A615, Grade 60, placed as show on approved drawings. All welded wire mesh shall conform to ASTM – A185, Grade 60, placed as shown on approved drawings (if required).
2. All ties and stirrups shall conform to the requirements of ASTM – A615, Grade 60.

PART 3 - EXECUTION

3.1 Installation
.1 Installation shall be as per manufacturer's recommendations.
.2 Utility Lines. Contact local "Utility Locator" to have all underground power lines marked BEFORE installation begins.
.3 Panels should be plumb and level. Plastic or other nonorganic shims may be used where necessary to ensure that each panel and post is square and level.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections
- .1 Section 01 74 19 - Waste Management
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling
- .3 Section 31 23 13 - Site Grading
- .4 Section 32 92 23 - Sodding

1.2 Quality Assurance
- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties for all topsoil and planting soil mixes.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

PART 2 - PRODUCTS

2.1 Imported Topsoil
- .1 Topsoil for sodded and seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
  - .1 Soil texture Sandy Loam, based on The Canadian System of Soil Classification, to consist of 50 % sand, 30 % silt, 10 % clay and contain 10 % organic matter by weight.
  - .2 Contain no toxic elements or growth inhibiting materials.
  - .3 Finished surface free from:
    - .1 Debris and stones over 50 mm diameter.
    - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
  - .4 Consistence: friable when moist.

2.2 Imported Planting Soil
- .1 Planting bed soil: The soil used in all planting beds shall be a manufactured planting soil. Contractor shall submit to the NCC Representative, 2 samples of the proposed material and testing results for review and acceptance.
  - .1 Soil texture to consist of 30% Peat Moss, 30% Compost and 40% Topsoil.
  - .2 Soil to contain no toxic elements or growth inhibiting materials.
  - .3 Finished surface to be free from:
    - .1 Debris and stones over 50 mm diameter.
    - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
  - .4 Consistence: friable when moist.

2.3 Soil Amendments
- .1 Fertilizer:
  - .1 Fertility: major soil nutrients present in following amounts:
  - .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
  - .3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
  - .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
  - .5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

.6 Ph value: 6.5 to 8.0

.2 Peatmoss:
- .1 Derived from partially decomposed species of Sphagnum Mosses.
- .2 Elastic and homogeneous, brown in colour.
- .3 Free of wood and deleterious material which could prohibit growth.
- .4 Shredded particle minimum size: 5 mm.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Compost: A mixture of soil and decomposing organic matter used as a fertilizer, mulch, or soil conditioner. Compost is processed organic matter containing 40% or more organic matter as determined by the Walkley-Black or LOI test. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminates. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category (A) (B) produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

.5 Limestone:
- .1 Ground agricultural limestone.
- .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.6 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

2.4 Riverstone

.1 Riverstone: Size 7-25mm ø. Finish: smooth washed granite stone. Colour: variable. Free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
- .1 Provide sample to the NCC Representative for approval.

Riverstone Size	Percent (%)
¼ in – ½ in (7-12 mm)	70
½ in – 1 in (12-25 mm)	30

2.5 Source Quality Control

.1 Advise NCC Representative of sources of topsoil and manufactured topsoil to be utilized with sufficient lead-time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

.3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

.4 Testing of topsoil will be carried out by testing laboratory designated by NCC Representative Soil sampling, testing and analysis to be in accordance with Provincial standards. Owner will pay for cost of tests as specified in Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

PART 3 - EXECUTION

3.1 Preparation of Existing Grade

.1 Verify that grades are correct. If discrepancies occur, notify NCC Representative and do not commence work until instructed by NCC Representative

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 Placing and Spreading of Topsoil/Planting Soil

.1 Place topsoil after NCC Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 For sodded areas keep topsoil 15 mm below finished grade.

.4 Spread topsoil to following minimum depths after settlement.

.1 135 mm for sodded areas.

.2 300 mm for perennial areas.

.3 500 mm minimum for shrub beds.

.4 1000 mm minimum for tree planting beds.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.4 Finish Grading

.1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by NCC Representative. Leave surfaces smooth, uniform and firm against deep foot printing.

3.5 Riverstone

.1 Install geotextile prior to placing riverstone mulch.

3.6 Acceptance

.1 NCC Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.7 Surplus Material

.1 Dispose of materials except topsoil not required off site.

3.8 Cleaning

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

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections
- .1 Section 32 91 21 - Topsoil and Finish Grading
- .2 Section 01 74 19 - Waste Management

1.2 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.

1.3 Scheduling
- .1 Schedule sod laying to coincide with preparation of soil surface.
- .2 Schedule sod installation when frost is not present in ground.

1.4 Warranty
- .1 The Contractor hereby warrants that all sod installed will remain free of defects in accordance with NCC Representative approval, in following spring one year after start of growing season providing adequate maintenance has been provided.
- .2 End-of-warranty inspection will be conducted by NCC Representative

PART 2 - PRODUCTS

2.1 Sod Supplier
- .1 Manderlay (Head Office) 21 Concourse Gate, Ottawa, Ontario, K2E 7S4 or approved equivalent.
  Contact: Sean Moher, Manderlay (613) 225-7500 x 229
  - .1 Sod Blend:
    29.67% Ridgeline Kentucky Bluegrass
    29.57% Monte Carlo Kentucky Bluegrass
    28.91% Mallard Kentucky Bluegrass
    9.88% Diva Kentucky Bluegrass
    1.97% Inert Matter (0% Weed Seed)
- .2 Substitutions will be considered.

2.1 Materials
- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
  - .1 Turf Grass Nursery Sod types:
    - .1 Number One Kentucky Bluegrass-Fescue –Clover Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars with 5% White Dutch Clover.
  - .2 Turf Grass Nursery Sod quality:
    - .1 Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.
    - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
    - .3 Mowing height limit: 35 to 65 mm.
    - .4 Soil portion of sod: 6 to 15 mm in thickness

.2 Water:
.1 As supplied by at site.

.5 Fertilizer:
.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
.2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.2 Source Quality Control
.1 Obtain approval from NCC Representative of sod at source.
.2 When proposed source of sod is approved, use no other source without written authorization from NCC Representative.

PART 3 - EXECUTION

3.1 Preparation
.1 Verify that grades are correct and prepared in accordance with Section 32 91 21 - Topsoil Placement and Grading If discrepancies occur, notify NCC Representative and do not commence work until instructed by NCC Representative
.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
.3 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod and plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.
.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in location as directed by NCC Representative.

3.2 Sod Placement
.1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
.3 Roll sod as directed by NCC Representative Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.3 Fertilizing Program
.1 Fertilize during establishment periods to following program:

Date	Rate	Ratio
Two weeks after sodding	0.5 kg/ 100m2	2:1:1
Fall	0.5 kg/ 100m2	2:1:1
Spring	0.5 kg/ 100m2	2:1:1

3.4 Maintenance During Establishment Period
.1 Perform following operations from time of installation until acceptance.
.2 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
.3 Cut grass to 60 mm when or prior to it reaching height of 90 mm. Remove clippings that will smother grassed areas as directed by NCC Representative
.4 Maintain sodded areas 95% weed free.

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

3.5 Acceptance

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

.1 Sodded areas are properly established.

.2 Sod is free of bare and dead spots.

.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 60 mm.

.4 Sodded areas have been cut minimum 2 times after contract substantial completion prior to acceptance. Mowing must be completed at minimum bi-weekly until acceptance.

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

3.6 Maintenance During Warranty Period

.1 Repair and re-sod dead or bare spots to satisfaction of the NCC Representative for areas that have failed to establish or been damaged due to construction activity.

3.7 Cleaning

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

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:

.1 The work of this Section includes the provision of all labour, materials, equipment and services required to install structures, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 Related Sections

.1 Section 01 10 00 – General Instructions

.2 Section 01 33 00 - Submittal Procedures

.3 Section 01 45 00 – Quality Control

.4 Section 01 74 19 –Waste Management

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

.6 Section 03 20 00 – Concrete Reinforcing.

.7 Section 03 30 00 - Cast-in-Place Concrete.

1.4 References

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

.1 ASTM A48/A48M-00, Standard Specification for Gray Iron Castings.

.2 ASTM C117-04, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM C139-05, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.

.5 ASTM C478M-06, Standard Specification for Precast Reinforced Concrete Manhole Sections Metric.

.6 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3(600 kN-m/m^3)).

.2 Canadian General Standards Board (CGSB)

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

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

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-A3000-03(R2005), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
.2 CSA-A3002-03, Masonry and Mortar Cement.
.3 CAN/CSA-A165 Series-04, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
.4 CAN/CSA-G30.18-M92(R2002), Billet Steel Bars for Concrete Reinforcement.
.5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 Gouvernement du Québec, Ministère des Transports
.1 Cahier des charges et devis généraux (CCDG)-2003.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.6 Ontario Provincial Standard Specifications (OPSS)
.1 OPSS 407-November 2004, Construction Specification For Maintenance Hole, Catch Basin, Ditch Inlet And Valve Chamber Installation.

1.5 Submittals

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

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work. Include manufacturer's drawings, information and shop drawings where pertinent.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and.

1.6 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management.

PART 2 PRODUCTS

2.1 Materials

.1 Cast-in-place concrete:
.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Concrete mix design to produce 21 MPa minimum compressive strength at 28 days and containing 25 mm maximum size coarse aggregate, with water/cement ratio to CAN/CSA-A23.1, exposure and slump at time and point of deposit.
.1 Air entrainment to CAN/CSA-A23.1.
.3 Concrete reinforcement: in accordance with Section 03 20 00 - Concrete Reinforcing.

.2 Precast manhole units: to ASTM C478M, circular or oval.
.1 Top sections eccentric cone or flat slab top type with opening offset for vertical ladder installation.
.2 Monolithic bases to be approved by NCC Representative and set on concrete slabs cast in place.

.3 Precast catch basin sections: to ASTM C139 ASTM C478M.

.4 Joints: made watertight using rubber rings, bituminous compound, epoxy resin cement or cement mortar.

.5 Mortar:
.1 Masonry Cement: to CAN/CSA-A3002.

.6 Ladder rungs: hollow circular aluminum to OPSD 405.010.
.1 Rungs to be safety pattern (drop step type).

.7 Adjusting rings: to ASTM C478M.

.8 Concrete Brick: to CAN3-A165 Series.

.9 Drop manhole pipe: same as sewer pipe.

.10 Galvanized iron sheet: approximately 2 mm thick.

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

.12 Frames, gratings, covers to dimensions as indicated and following requirements:
.1 Metal gratings and covers to bear evenly on frames.
.1 Frame with grating or cover to constitute one unit.
.2 Assemble and mark unit components before shipment.
.2 Gray iron castings: to ASTM A48/A48M, strength class30B.
.3 Castings: coated with two applications of asphalt varnish, sand blasted or cleaned and ground to eliminate surface imperfections.
.4 Catch basin frames and covers: to OPSS 407.
.5 Manhole frames and covers: to CCDG.
.6 Catch basin frames and covers: to CCDG.
.7 Manhole frames and covers: heavy duty municipal type for road service; light duty for landscape service.
.1 Cover cast without perforations and complete with two 25 mm square lifting holes.
.8 Size: 762 mm clear diameter.

.13 Granular bedding and backfill: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
.1 Crushed screed stone, gravel, sand.
.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.3 Table:

Sieve Designation	% Passing Stone/Gravel	Gravel/Sand
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	65-90	100
9.5 mm	-	-
4.75 mm	35-55	50-100
2.00 mm	-	30-90
0.425 mm	10-25	10-50
0.180 mm	-	-
0.075 mm	0-8	0-10

.4 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.14 Unshrinkable fill: in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Excavation and Backfill

.1 Excavate and backfill in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling and as indicated.

.2 Obtain approval of NCC Representative before installing outfall structures, manholes or catch basins.

3.3 Concrete Work

.1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Place concrete reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 Position metal inserts in accordance with dimensions and details as indicated.

3.4 Installation

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

.2 Complete units as pipe laying progresses.
  .1 Maximum of three units behind point of pipe laying will be allowed.

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

.4 Cast bottom slabs directly on undisturbed ground.

.5 Set precast concrete base on 150 mm minimum of granular bedding compacted to 100% corrected maximum dry density.

.6 Precast units:
  .1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base.
  .2 Make each successive joint watertight with NCC Representative's approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination of these materials.
  .3 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
  .4 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.7 For sewers:
  .1 Place stub outlets and bulkheads at elevations and in positions indicated.
  .2 Bench to provide smooth U-shaped channel.
    .1 Side height of channel to be 0.75 times full diameter of sewer.
    .2 Slope adjacent floor at 1 in 20.
    .3 Curve channels smoothly.
    .4 Slope invert to establish sewer grade.

.8 Compact granular backfill to 95% corrected maximum dry density.

.9 Place unshrinkable backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.10 Installing units in existing systems:
  .1 Where new unit is installed in existing run of pipe, ensure full support of existing pipe during installation, and carefully remove that portion of existing pipe to dimensions required and install new unit as specified.
  .2 Make joints watertight between new unit and existing pipe.
  .3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready for operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.

.11 Set frame and cover to required elevation on no more than four courses of brick.
  .1 Make brick joints and join brick to frame with cement mortar.
  .2 Parge and make smooth and watertight.

.12 Place frame and cover on top section to elevation as indicated.
  .1 If adjustment required use concrete ring.

.13 Clean units of debris and foreign materials.
  .1 Remove fins and sharp projections.
  .2 Prevent debris from entering system.

.14 Install safety platforms in manholes having depth of 5 m or greater, as indicated.

3.5 Adjusting Tops of Existing Units

.1 Remove existing gratings, frames and I beams and store for re-use at locations designated by NCC Representative.

.2 Sectional units:
- .1 Raise or lower straight walled sectional units by adding or removing precast sections as required.
- .2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation, then replace cone section.
  - .1 When amount of raise is less than 600 mm use standard manhole brick, moduloc or grade rings.

.3 Monolithic units:
- .1 Raise monolithic units by roughening existing top to ensure proper bond and extend to required elevation with mortared brick course for 150 mm or less alteration cast-in-place concrete.
- .2 Lower monolithic units with straight wall by removing concrete to elevation indicated for rebuilding.
- .3 When monolithic units with tapered upper section are lowered more than 150 mm, remove concrete for entire depth of taper plus as much straight wall as necessary, then rebuild upper section to required elevation with cast-in-place concrete.
- .4 Install additional manhole ladder rungs in adjusted portion of units as required.
- .5 Re-use existing gratings, frames and I beams.
- .6 Re-set gratings and frames to required elevation on not more than 4 courses of brick.
  - .1 Make brick joints and join brick to frame with cement mortar, parge and trowel smooth.
  - .2 Re-set gratings and frames to required elevation on full bed of cement mortar, parge and trowel smooth.

3.6 Sealing Over Existing Units

.1 Cut galvanized iron sheet to extend 50 mm beyond opening of existing manhole or catch basin grating.
- .1 Center iron sheet over existing grating and spot or stitch weld to grating.

.2 Fill with cast-in-place concrete or material approved by NCC Representative.

3.7 Field Quality Control

.1 Leakage Test:

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

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

.4 If permissible leakage is exceeded, correct defects.

.5 Repeat until approved by NCC Representative.

.6 NCC Representative will issue Test Certificate for each manhole passing test.

3.8 Cleaning

.1 Proceed in accordance with Section 01 10 00 - General Instructions.

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

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:

.1 The work of this Section includes the provision of all labour, materials, equipment and services required to install the storm sewers and sub-drains, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 Related Sections

.1 Section 01 10 00 – General Instructions.

.2 Section 01 33 00 – Submittal Procedures.

.3 Section 01 74 19 – Waste Management.

.4 Section 03 30 00 – Cast-in-Place Concrete.

.5 Section 31 05 16 – Aggregate Materials.

.6 Section 31 23 33.0 – Excavating, Trenching and Backfilling.

1.4 References

.1 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 405 – Pipe Subdrains.
.2 OPSS 410.07.16 Field Testing.
.3 OPSS 1840 – Polyethylene Pipe Products.
.4 OPSS 1860 – Geotextiles.

.2 American Society for Testing and Materials International, (ASTM)

.1 ASTM C12-02, Standard Practice for Installing Vitrified Clay Pipe Lines.
.2 ASTM C14M-99, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
.3 ASTM C76M-02, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
.4 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
.5 ASTM C136-01, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
.6 ASTM C425-02, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
.7 ASTM C428-97(2002), Standard Specification for Asbestos-Cement Nonpressure Sewer Pipe.
.8 ASTM C443M-02, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
.9 ASTM C506M-02, Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.

.10 ASTM C507M-02, Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe (Metric).
.11 ASTM C663-98, Standard Specification for Asbestos-Cement Storm Drain Pipe.
.12 ASTM C700-02, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
.13 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3(600 kN-m/m^3)).
.14 ASTM D1056-00, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
.15 ASTM D1869-95(2000), Standard Specification for Rubber Rings for Asbestos-Cement Pipe.
.16 ASTM D2680-01, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
.17 ASTM D3034-00, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
.18 ASTM F405-97, Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.
.19 ASTM F667-97, Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.
.20 ASTM F794-01, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

.3 Bureau de normalisation du Québec (BNQ)
.1 BNQ-3624-115-2000, Polyethylene (PE) Pipe and Fittings - Flexible Corrugated Pipes and Drainage - Characteristics and Test Methods

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-M89, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
.3 CAN/CGSB-34.9-94, Asbestos-Cement Sewer Pipe.

.5 Canadian Standards Association (CSA International)
.1 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-A5-98, Portland Cement.
.2 CAN/CSA-A257 Series-M92(R1998), Standards for Concrete Pipe.
.3 CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
.1 CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
.2 CSA B182.4-02, Profile PVC Sewer Pipe and Fittings.
.3 CSA B182.11-02, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.
.4 CSA-G401-01, Corrugated Steel Pipe Products.

.6 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.7 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA)

.8 Geotechnical Investigation Reports
.1 Geotechnical Investigation Report – (File No. PG2731-LET.01R), February 7, 2013, prepared by Paterson Group.

1.5 Definitions

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

1.6 Submittals

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Shop drawings to 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 NCC Representative at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.

.5 Submit to the NCC Representative for testing, at least 2 weeks prior to beginning Work, samples of materials proposed for use.

.6 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.

.7 Certification to be marked on pipe.

.8 Submit to the NCC Representative 1 copy of manufacturer's installation instructions.

1.7 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material (in appropriate on-site bins) for recycling in accordance with Waste Management Plan.

.4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan.

.5 Divert unused metal materials from landfill to metal recycling facility for disposal approved by the NCC Representative.

.6 Divert unused concrete materials from landfill to local quarry or facility as approved by the NCC Representative.

.7 Divert unused aggregate materials from landfill to quarry or facility for reuse as approved by the NCC Representative.

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

.9 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.10 Dispose of unused asbestos cement pipe in accordance with regulations governing the disposal of hazardous materials.

.11 Fold up metal banding, flatten and place in designated area for recycling.

1.8 Scheduling

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

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

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

PART 2 PRODUCTS

2.1 Concrete Pipe

.1 Non-reinforced circular concrete pipe and fittings: to CAN/CSA-A257, ASTM C14M, designed for flexible rubber gasket joints to ASTM C443M CAN/CSA-A257.

.2 Reinforced circular concrete pipe and fittings: to CAN/CSA-A257, ASTM C76M, strength classification as indicated, designed for flexible rubber gasket joints to ASTM C443M CAN/CSA-A257.

.3 Reinforced concrete arch pipe: to ASTM C506M.

.4 Reinforced concrete elliptical pipe: to ASTM C507M.

.5 Lifting holes:
.1 Pipe 900 mm and less diameter: no lift holes.
.2 Pipe greater than 900 mm diameter: lift holes not to exceed two in piece of pipe.
.3 Provide pre-fabricated plugs to effectively seal lift holes after installation of pipe.

2.2 Plastic Pipe

.1 Type PSM Poly Vinyl Chloride (PVC): to ASTM D3034 and CSA-B182.2.
.1 Standard Dimensional Ratio (SDR): 35.
.2 Locked-in gasket and integral bell system.
.3 Nominal lengths: 4 and 6 m.

.2 Large diameter, ribbed PVC sewer pipe and fittings: to CSA B182.4 and ASTM F794.

.3 Corrugated polyethylene pipe: high density to ASTM F667, ASTM F405 and BNQ-3624-115.

.4 Acrylonitrile - Butadiene - Styrene (ABS): to ASTM D2680 and CAN/CSA-B182.1.

.5 Perforated plastic pipe and fittings: to CAN/CSA-B182.1.

.6 Perforated plastic pipe and fittings: to OPSS 1840. Nominal pipe sizes 150 mm. Piping shall be pre-wrapped by the manufacturer with a geotextile.
.1 Geotextile filter: In accordance with OPSS 1860.

.7 Polyethylene pipes: to CAN/CSA-B137. Acceptable material:
.1 Type: 3408
.2 Series: DR21
.3 Joints: to ANSI/AWWA C207, thermal butt fusion with steel backing flanges.

2.3 Pipe Bedding and Surround Material

.1 Granular material in accordance with Section 31 05 16 – Aggregate Materials and the following requirements:
- .1 Crushed or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.

.2 Table:

Sieve Designation (mm)	% Passing	
	Stone/Gravel	Gravel/Sand
200	-	-
75	-	-
50	-	-
38.1	-	-
25	100	-
19	-	-
12.5	65-90	100
9.5	-	-
4.75	35-55	50-100
2.00		30-90
0.425	10-25	10-50
0.180	-	-
0.075	0-8	0-10

.3 Concrete mixes and materials for bedding, cradles, encasement, supports: in accordance with Section 03 30 00 – Cast-in-Place Concrete.

2.4 Backfill Material

.1 As indicated.

.2 Backfill material: Type 3 to Section 31 23 33.01 – Excavating Trenching and Backfilling.

.3 Unshrinkable fill: in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.

.4 Native material approved by the NCC Representative. Clean excavated or imported soil, free of organic materials, approved by the NCC Representative.

2.5 Joint Mortar

.1 Portland cement: to CAN/CSA-A5, normal type 10.

.2 Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

2.6 Insulation

.1 Expanded polystyrene: to CAN/CGSB-51.20, Type 4, with 275 kPa compressive strength to ASTM D 1621, ship lapped edges, thickness as indicated.

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 NCC Representative.

.2 Obtain the NCC Representative's approval of pipes and fittings prior to installation.

3.2 Trenching

.1 Do trenching Work in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.

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

.3 Trench alignment and depth to approval of the NCC Representative prior to placing bedding material and pipe.

.4 Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by the NCC Representative.

3.3 Concrete Bedding and Encasement

.1 Do concrete Work in accordance with Section 03 30 00 – Cast-in-Place Concrete. Place concrete to details as directed by the NCC Representative.

.2 Position pipe on concrete blocks to facilitate placing of concrete.
.1 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

.3 Do not backfill over concrete within 24 h after placing.

3.4 Granular Bedding

.1 Place bedding in unfrozen condition.

.2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 95 % maximum density to ASTM D698.

.6 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted common backfill.

3.5 Installation

.1 Lay and join pipes to: ASTM C12.

.2 Lay and join pipe in accordance with manufacturer's recommendations and to approval of the NCC Representative.

.3 Handle pipe using methods approved by the NCC Representative.

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

.4 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

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

.6 Lay corrugated steel pipe:
.1 With outside circumferential laps facing upgrade and longitudinal laps or seams at side or quarter points.
.2 With longitudinal centre line of paved invert coinciding with flow line.

.7 Do not exceed maximum joint deflection recommended by pipe manufacturer.

.8 Do not allow water to flow through pipes during construction except as may be permitted by the NCC Representative.

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

.10 Install plastic pipe and fittings in accordance with CSA B182.11.

.11 Joints:
.1 Plastic pipe:
.1 Install gaskets as recommended by manufacturer.
.2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
.3 Align pipes before joining.
.4 Maintain pipe joints free from mud, silt, gravel and 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.

.12 When any stoppage of Work occurs, restrain pipes as directed by the NCC Representative, to prevent "creep" during down time.

.13 Plug lifting holes with the NCC Representative approved prefabricated plugs, set in shrinkage compensating grout.

.14 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.15 Make watertight connections to manholes and catch basins.
.1 Use shrinkage compensating grout when suitable gaskets are not available.

.16 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
.1 Joint to be structurally sound and watertight.

.17 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

.18 Insulate all pipes that have less that 1.5m cover with 50mmx1200mm HI-40 insulation. Provide 150mm clearance between pipe and insulation.

.19 Pipe bedding, cover and backfill are to be compacted to at least 95% of the standard proctor maximum dry density. The use of clear crushed stone as a bedding layer shall not be permitted.

.20 Flexible connections are required for connecting pipes to manholes (for example KOR-N-SEAL, PSX: Positive Seal and Duralseal). The concrete cradle for the pipe can be eliminated.

.21 Full port backwater valves are required on the storm services/foundation drains for all buildings.

.22 Protect sub-drains against flotation during installation. Do not lay pipe in water or on wet bed.

.23 Ensure foundation wall and dampproofing, waterproofing, rigid insulation, etc. have been installed and approved by NCC Representative before placing bedding material.

3.6 Pipe Surround

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after the NCC Representative has inspected pipe joints, surround and cover pipes as indicated.
.1 Leave joints and fittings exposed until field testing is completed.

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

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

.5 Compact each layer from pipe invert to mid height of pipe to at least 95 % maximum density to ASTM D698.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 95 % maximum density to ASTM D698.

.7 When field test results are acceptable to the NCC Representative, place surround material at pipe joints.

.8 All existing storm services to be capped at the construction boundary line.

3.7 Backfill

.1 Place backfill material in unfrozen condition in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.

.2 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

.3 Under paving and walks, compact backfill to at least 95 % maximum density to ASTM D698. In other areas, compact backfill to at least 90 % maximum density to ASTM D698.

.4 Place unshrinkable backfill in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.

3.8 Undercrossing

.1 Excavate working pit to dimensions indicated, outside right-of-way to be crossed.

.2 Excavate working pit to minimum of 0.5 m below lowest invert of encasing pipe.

.3 Dewater excavation.

.4 Dewater area of undercrossing.

.5 Install heavy timber backstop.

.6 Place encasing pipe to exact line and grade as indicated.

.7 Install encasing pipe by jacking, boring or tunnelling.

.8 Ensure encasing pipe is not in tension.

.9 Use mechanical or welded type joints for encasing pipe.

.10 Place concrete grout levelling pad in encasing pipe. Carefully control level of grout during placing.

.11 Provide shop drawings showing proposed method of installation for storm sewer pipe.

.12 Insert storm sewer pipe into encasement pipe, in end with largest opening after placement of levelling pad.

.13 Use approved blocking method to guide storm sewer pipe in true alignment.

.14 Clearance between blocks and encasement pipe: maximum 12 mm when storm sewer pipe is in position.

.15 Join storm sewer pipe one length at time outside encasement pipe. Push or Pull storm sewer pipe into position. Couplings of storm sewer pipe: not to rest on levelling pad when carrier pipe is in position.

.16 Place 20 MPa concrete cradle around storm sewer pipe after it is positioned. Cradle to be minimum of 225 mm and maximum of 300 mm above levelling pad.

.17 Pressure grout remaining void with grout consisting of one part Portland cement and two parts clean washed sand with only sufficient amount of water added to allow placement.
.1 Do not install pressure grout until storm sewer pipe is secure against flotation.
.2 Do not use additives.

.18 Do field testing before placing concrete cradle and grouting.

3.9 Field Testing

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

.2 When directed by the NCC Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Television and photographic inspections:
- .1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means.
- .2 Provide means of access to permit the NCC Representative to do inspections.

.5 Repair visible leaks regardless of test results.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections
- .1 Section 31 32 21 - Geotextiles.
- .2 Section 31 23 10 - Excavating Trenching and Backfilling.

1.2 Waste Management and Disposal
- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

PART 2 - PRODUCTS

2.1 Materials
- .1 Bedding and backfill material: clear washed gravel or crushed stone; hard, durable particles, graded evenly in size from 9 to 13 mm.
- .2 Perforated plastic pipe and fittings: Nominal pipe size of150 mm in a nylon sock.

PART 3 - EXECUTION

3.1 Trenching
- .1 Do excavating, trenching and backfilling in accordance with Section 312310- Excavating Trenching and Backfilling.
- .2 Ensure trench bottom is undisturbed subgrade.
- .3 Do not place bedding material prior to approval of trench by the NCC Representative.

3.2 Bedding
- .1 Place 150 mm layer of bedding material to full trench width and pack tightly.

3.3 Installation of Pipe Subdrains
- .1 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with bed throughout full length.
- .2 Commence laying at outlet and proceed in upstream direction.
- .3 Make joints tight in accordance with manufacturer's instructions.
- .4 Do not allow water to flow through pipes during construction except as approved by the NCC Representative.
- .5 Make watertight connections to drains and manholes where indicated or as directed by the NCC Representative.
- .6 Plug open upstream ends of pipes.
- .7 Surround and cover non-perforated drainage pipe with granular backfill material in uniform tightly packed 150 mm layers.
- .8 Protect sub-drains against flotation during installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 61 00 - Common Product Requirements

.4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  .1 Certificates: signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

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

PART 2 - PRODUCTS

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC duct: Type DB2/ES2, with moulded fittings, for direct burial expanded flange ends..

.2 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make a complete installation.

.3 Rigid PVC 90 degrees, 45 degrees bends as required.

2.2 CABLE PULLING EQUIPMENT

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.3 WARNING TAPE

.1 Standard 4-mil polyethylene yellow with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW". Ensure width covers width of ducts below.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install duct in accordance with manufacturer's instructions and at elevations as indicated.

.2 Clean inside of ducts before laying.

.3 Install plastic duct spacers and ensure full, even support every 1.5 m and smooth transition throughout duct length.

.4 Slope ducts with 1 to 400minimum slope.

.5 Install plugs and cap both ends of ducts to prevent entrance of foreign materials during and after construction.

.6 Pull through each duct mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign material.
.1 Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 Install a pull rope continuous throughout each duct run with 3 m spare rope at each end.

.8 Place continuous strip of warning tape 300 mm above duct before backfilling trenches.

.9 Notify the NCC Representative for field review upon completion of direct buried ducts and obtain acceptance prior to backfill.

- END OF SECTION -

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to clean stone foundation wall surfaces using a medium pressure water wash, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Alternates:

.1 Obtain, in writing from NCC Representative authorization for changes of cleaning method, cleaning medium, tools, pressure, and flow rates.

.2 Chemical cleaning agents shall not be used without the prior written approval of the NCC Representative.

.3 Related Sections:

.1 Section 04 03 07 - Masonry Repointing and Repair.

1.3 References

.1 Canadian Environmental Assessment Act (CEAA) 1995

.2 Mine Safety and Health Administration/National Institute for Occupational Safety and Health (MSHA/NIOSH) Standards

1.4 Submittals

.1 General:

.1 Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 No full scale cleaning will be permitted until the required methodology description has been submitted and agreed in writing by the NCC Representative.

.2 Equipment: Demonstrate machinery, tools and nozzles.

.3 Quality Assurance:

.1 Submit three copies of test results describing cleaning method, compressor equipment, water pressure at compressor, tools, and nozzle size and distance from masonry surface used for cleaning of each test patch.

.2 Proceed with cleaning only upon written approval by NCC Representative concerning tested cleaning methods.

.4 Submit two copies of WHMIS MSDS Material Safety Data Sheets in accordance with Section 01 35 29 - Health and Safety Requirements for each product.

1.5 Hazardous Material Disposal

.1 Divert unused cleaning agents from landfill to official hazardous material collections site approved by NCC Representative.

.2 Do not dispose of unused cleaning agents into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

1.6 Environmental Requirements

.1 Climatic conditions must be considered. Water cleaning shall not be carried out during

freezing conditions, because of risk of frost damage. Generally, one month will be needed between completion of work and first freeze up date.

.2 No masonry cleaning shall be performed when winds are sufficiently strong to spread cleaning material or rinsed materials to adjacent unprotected areas. Work must be postponed by agreement with NCC Representative.

.3 Do not use chemical cleaners without the prior written approval of the NCC Representative.

.1 Do not use chemical cleaners when temperature is below 10°C.

.2 If chemical cleaners are approved for use, take all necessary precautions to protect adjacent construction and surrounding landscaping and planting.

.4 Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous material; and regarding labelling and the provision of Material Safety Data Sheets.

.5 Provide shading to wall to avoid cleaning in full, hot sunlight.

1.7 Existing Conditions

.1 Report to NCC Representative conditions of deteriorated masonry or pointing found during cleaning.

.2 Record existing conditions, using photographs, before and after cleaning. Advise NCC Representative of potential cleaning problems.

.3 Do not clean areas of deteriorated masonry without prior written approval of NCC Representative.

1.8 Mock-ups

.1 Conduct tests on building to determine effectiveness of low pressure wash cleaning methods.

.2 Conduct tests to determine effectiveness of 500 kPa water pressures, 1 minute time periods, low flow rates and 10°C water temperatures, types of nozzles, spraying distances from wall surface.

.3 Test brushing and spraying as alternative to pressure washing. Use successful tests.

.4 When the use of chemical cleaning agents is approved by the NCC Representative, the masonry to be cleaned must be saturated with water throughout the application of the chemicals to prevent infiltration.

.5 Test for the elimination of vegetation growth in masonry cracks, using ammonium sulpha mate and glyphosate. Apply as a spot treatment with a hand or backpack sprayer. Take care to minimize runoff, especially near water.

.6 Locate test patches in inconspicuous places directed by NCC Representative.

.7 Test patches to be 2m square.

.8 Notify NCC Representative 72 hours before commencing cleaning of each test patch. Do not start without approval of NCC Representative.

.9 Determine effect of cleaning operations on surrounding historic material and plants.

.10 Stop work when cleaning has detrimental effect on surrounding material and plants.

.11 Proceed after written instructions are received from NCC Representative.

.12 Protect masonry openings from water/chemical infiltration during cleaning.

.13 Collect, neutralize and dispose of water and chemicals in accordance with contract requirements, applicable regulations and Canadian Environmental Assessment Act, (CEAA).

PART 2 PRODUCTS

2.1 Materials

.1 Use clean potable water free from contaminants. Treat water which has high metal content before use in cleaning.

.2 Use air free from oil or other contaminants.

.3 Use masking material, polyethylene strippable masking to approval of NCC Representative.

.4 Use ammonium sulpha mate glyphosate where there is vegetation growth in masonry cracks.

2.2 Tools and Equipment

.1 Use only brushes with natural or soft plastic bristles.

.2 Use only scrapers of wood or plastic.

.3 Use water pumps fitted with accurate pressure regulators and gauges capable of being pre-set and locked at maximum specified levels.

.1 Water pumps to have rating of 400 to 3000 kPa.

.4 Use air compressors equipped with on-line oil filters to avoid spraying oil onto masonry.

.5 Use gun equipped with pressure gauge at nozzle end.

.6 Use plastic or non-ferrous metal piping and fittings.

.7 Use nozzles that give nebulized droplet spray, nozzles with 12 mm opening.

PART 3 EXECUTION

3.1 Preparation

.1 Place safety devices and signs near work areas as indicated and directed.

.2 Seal or repair openings and joints where there is potential risk of water/chemical infiltration.

.3 Cover surfaces not to be cleaned.

.4 First, dry brush or scrape accumulations from walls, ledges and cornices.

3.2 Protection

.1 Mask or seal vents, windows, and other openings, to prevent water entry.

.2 Mask wood, glass, and metal adjacent to masonry.

.3 Protect plants, gardens, shrubs from excessive watering and chemicals.

.4 Hang sheeting material from scaffolding to enclose water spray.

.5 Ensure workers wear eye, head, and face protection, and protective gloves, coveralls, boots and filter mask to MSHA/NIOSH standard.

.6 Protect finished Work from damage until take-over.

.7 Protect adjacent Work from spread of dust and dirt beyond work areas.

.8 Protect operatives and other site personnel from hazards.

3.3 Execution of Cleaning

.1 Moderate Pressure Water Cleaning:

.1 Pre wet masonry surface when necessary. Work from bottom of wall upwards.

.2 Remove dirt with moderate high pressure 400 - 1400 kPa wash down at flow rate of 0.25 L/s. Compressed air not to exceed 1400 kPa at compressor.

.3 Use 25 mm nozzle and lower pressure on cut stone, tooled stone and carved work.

.4 Avoid prolonged wetting and excessive water penetration.

.5 Use previously tested chemical cleaners only approved by NCC Representative. Follow manufacturer's recommended dwell time.

.6 Use previously tested heated water approved by NCC Representative.

.7 Do not exceed maximum pressure at nozzle or have nozzle closer to masonry than approved by NCC Representative at tests.

.2 Soften and loosen heavy deposits with prolonged water spray, then brush. Remove thick encrustations with wooden or plastic scrapers.

.3 Eliminate vegetation growth in masonry cracks, using ammonium sulpha mate and glyphosate where invading vegetation is causing actual damage to construction. Apply in accordance with approved test. Take care to minimize runoff, especially near water.

.4 Use chemical cleaners for stain and soil removal only with the written approval of the NCC Representative and only in conjunction with appropriate protective measures.

3.4 Clean-up

.1 Rinse off masonry to satisfaction of NCC Representative until no indications of chemicals are present.

.2 Rinse from bottom to top and from top to bottom.

.3 Clean-up work area as work progresses. At end of each work day remove debris and waste from site.

.4 Upon completion, clean and restore areas used for work to condition at least equal to that previously existing.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:

.1 The work of this Section includes the provision of all labour, materials, equipment and services required to re-install loose masonry work, replace deteriorated masonry units, and repoint existing and newly reinstalled masonry work, as indicated on the drawings, as specified herein and as required for a complete project.

.2 The work includes, but is not limited to:

.1 Reinstallation of existing stone units which are removed for repair or because they are loose.

.2 Replacement of irreparable deteriorated stone units.

.3 Raking and repointing existing exterior stone masonry joints.

.2 Related Sections:

.1 Section 04 03 06 - Masonry Cleaning

1.3 References

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

.1 ASTM C207-06, Standard Specification for Hydrated Lime for Masonry Purposes.

.2 Canadian Standards Association (CSA):

.1 CSA-A3000-03, Cementitious Materials Compendium.

.2 CSA-A179-04, Mortar and Grout for Unit Masonry.

.3 CSA-A371-04, Masonry Construction for Buildings.

1.4 Definitions

.1 Repointing: filling and finishing of masonry joints from which defective mortar has been fully raked out or omitted.

.2 Tooling: finishing masonry joints to provide final contour.

1.5 Qualifications

.1 The work of this Section shall be executed by a contractor which specializes in masonry restoration work of this nature, using similar masonry repair techniques, with a minimum ten-year record of successful performance and having successfully completed at least one similar project.

.2 Employ only skilled tradesmen who are experienced in this work.

.3 Provide evidence of previously completed projects of a similar nature at the time of Tender. Tenders with unqualified masons will be subject to rejection.

.4 Provide a competent trade foreman with at least 15 years' experience, well-skilled and experienced in the specialized type of work required, for continuous supervision.

1.6 Pre-installation meeting

.1 Prior to commencement of the work, all tradespersons shall meet with the NCC Representative to review existing conditions and project requirements and to determine the locations of mock-ups.

1.7 Submittals

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Samples:

.1 Submit samples of each type and colour of stone proposed for use. Include sufficient sample units to indicate the full extent of colour variation for each type and colour of stone.

.2 Submit a sample of each type of mortar and of each colour proposed for use. Samples shall be submitted in "U" shaped, transparent plastic extrusions, 12 mm x 12 mm x 100 mm of length. Identify each type of mortar as well as the colouring agents contained in each extrusion.

.3 Product Data:

.1 Submit manufacturers' complete technical literature for all products.

.2 Submit details of all tools, machinery and equipment required to complete the work. Remove rejected items from the site.

.3 Submit a technical product data sheet for each mortar mixture with the related standards and mortar properties, including compressive strength, water retention and air content. Include test certificates required for verification of mortar mixture properties.

1.8 Field Samples and Mock-Ups

.1 Construct mock-ups of representative samples of the repointing and repair work, for the approval of the NCC Representative.

.2 Construct mock-ups to demonstrate procedures for the following (provide 2 sq.m. each for the following work):

.1 Sample of the incorporation of new stone units into the work.

.2 Sample of the reinstallation of existing stone units which have been removed for repair or because they are loose.

.3 Racking out of joints

.4 Backpointing of joints

.5 Finish pointing of joints

.6 Protection and curing of mortar work.

.3 Locate mock-ups where directed by the NCC Representative.

.4 Allow 72 hours for inspection of mock-ups before proceeding with the work.

.5 Should the initial mock-ups not be acceptable, samples shall be repeated until satisfactory, at no additional cost to the Contract.

.6 The reviewed and accepted mock-ups will be the standard of acceptance for the method and quality of work performed throughout the project.

.7 The reviewed and accepted mock-ups may remain as part of the finished work.

1.9 Product Delivery, Storage and Handling

.1 Keep materials dry until use, except where wetting of stone is specified.

.2 Store under waterproof cover in containers or on non-staining pallets or plank platforms held off ground by means of plank or timber skids.

1.10 Protection / Site Conditions

.1 For all masonry works, maintain at all times an ambient temperature of 12°C minimum and 25°C maximum and relative humidity above 60%:

.1 When ambient temperature is above 25°C, work shall stop and/or workspace shall be protected from direct sun and be ventilated to maintain the ambient temperature below 25 °C and a relative humidity of 60% at the wall surface.

.2 Protect from direct sunlight and from winds above 25 km/h.

.3 When ambient temperature is below 12 °C, workspace shall be protected with an air tight heated enclosure. The Contractor shall ensure that the heat is distributed evenly through the work space to avoid a temperature difference between the top and bottom of the wall and/or the ends of the work surface. Maintain at all times a relative humidity above 60%.

.4 Store mortar components intended for immediate use in heated enclosures, and let these materials reach a temperature of at least 12 °C before using them.

.5 To perform masonry work - surface temperature shall be not less than 10°C and no more than 25°C

.6 Heat and maintain the water at a temperature of at least 12 °C and at the most 20 °C.

.7 At time of use, mortar temperature should be at least 12 °C and maximum 25 °C.

.8 Relative humidity during 7 days moist cure should be no less than 80%.

.2 Install thermometers and relative humidity data loggers at every 5 meters of distance from one to the other along the foundation walls in exterior conditions.

.1 Data loggers should record temperatures and relative humidity information every hour even during night time (24 hours per day and 7 days a week for the duration of the masonry works).

.2 The contractor must transmit all data of all thermometers and data loggers on a weekly basis in Excel format to NCC Representative. All readings under 12 °C and over 25°C must be highlighted in the Excel file.

.3 Obtain approvals from NCC Representative for methods of protection and fabrication of enclosures.

.4 No masonry work will be permitted outside these parameters.

.5 Do not remove heat enclosures where masonry is not thoroughly dried out. Request and obtain the NCC Representative's permission before removing the heat or the enclosure.

1.11 Moist cure and protection

.1 Newly laid mortar shall be protected from exposure to rain, wind, and full sunlight during initial set and:

.1 Curing conditions for the backpointing or bedding mortars: maintain for a period of 7 days, 80% humidity at the face of the wall.

.2 Curing conditions for the finish pointing mortars: maintain for a period of 7 days, 80% humidity at the face of the wall.

.2 Keep masonry protected using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind-driven rain, until masonry work is completed and protected by flashings or other permanent construction or until masonry work has cured during seven days.

.3 Protect new masonry and mortar work from frost, marking and other damage for 21 days after the 7 days moist cure is done.

.4 Protect completed work from mortar droppings. Use non-staining coverings.

1.12 Access

.1 Provide access to all surfaces forming part of this contract to enable safe and proper inspection and supervision of the work to be carried out.

PART 2 PRODUCTS

2.1 Manufacturers

.1 Requests for acceptance of alternative products will be considered in accordance with provisions of Section 01 00 00 "General Instructions". Acceptance of alternative products is subject to the approval of the NCC Representative.

.2 For approval of alternative products, thorough laboratory testing shall be conducted by an independent testing laboratory acceptable to the NCC Representative, to establish equivalent performance levels. The cost of laboratory testing shall be paid by the Contractor.

.3 Use the same manufacturer’s brands and suppliers for the sources of mortar materials for entire project.

2.2 Mortar Materials

.1 Portland cement Type GU, in accordance with CSA-A3000.

.2 Hydrated lime Type "SA", in accordance with ASTM C207.

.3 Sand: Sharp grain aggregates, grading in accordance with CSA A179.

.4 Water: potable, lean, exempt of ice, oils, acids, alkalis, organic matter, sediments, or any other harmful matter.

.5 Colouring pigments: Pigments constituted of ground coloured natural aggregates or metallic oxide pigments. The ratio of colouring agent to Portland cement shall not exceed 8%.

2.3 Masonry Mortar

.1 Premixed mortar: Cementitious materials, sand and colouring agents shall be factory pre-mixed and then mixed with water on site in order to obtain for each type of mortar the characteristics described in the manufacturer's technical product data sheet.

.2 Mortar mix shall be type N, 1:1:6 cement/lime/sand, in accordance with property specifications of CSA-A179. Colour to match adjacent existing mortar to the approval of the NCC Representative.

.3 Only factory-premixed mortars which include the sand and colour tint are acceptable.

.1 Acceptable material: Betomix Plus, Type N, prepared by Daubois Inc. or approved equivalent.

2.4 Stone

.1 Wherever they are in acceptable condition or satisfactorily repairable, maintain existing stone units, clean and free of all mortar to the approval of the NCC Representative. Wherever feasible, leave existing stone units in place.

PART 3 EXECUTION

3.1 Damage

.1 Take care to prevent damage to masonry units resulting from cutting out and joint-raking operations.

.2 Damage includes nicks and gouges from saw blades and chipped or scratched surfaces from chisels, resulting from improper workmanship.

.3 All damaged units shall be repaired to the satisfaction of the NCC Representative or replaced.

3.2 Inspection

.1 Provide access, permit inspection, correct any defects and obtain approval of all raked joints prior to commencing pointing.

3.3 Workmanship

.1 Perform work in accordance with CSA-A371.

.2 Use manual raking tool to remove deteriorated mortar.

.3 Tool and compact using jointing tool to force mortar into joint.

.4 Use suitable approved jointing tool to form compacted tooled joints to match existing joints, except where specified otherwise.

.5 Select stone units to provide as good a colour match with adjacent existing masonry work as possible.

3.4 Mixing Mortar

.1 Mixing shall be executed with a clean electric drum-paddle horizontal shaft mortar mixer. Mixer to be free of dried mortar, rust traces and other contaminants. Do not use salt or antifreezes to thaw the equipment. Mortar shall be mixed manually only if there is no other potential alternative and if the NCC Representative has given prior written approval.

.2 Prepare mortar according to the instructions of the pre-mixed materials supplier concerning water /cementitious materials proportioning and sequencing of introduction in the mixture.

.3 Mixing time as per manufacturer's information.

.4 Mortar Colour:

.1 Provide samples as described in Part 1 of this Section.

.2 The pointing mortar is to match the colour of the original bedding material: a light to medium buff and shall be factory-tinted, prior to delivery on site.

3.5 Mortar Laying Delay

.1 Mortar shall be permanently laid in place within $2^{1}/_{2}$ hours after mixing for ambient temperatures below 25°C and within $1^{1}/_{2}$ hours after mixing for ambient temperatures above 25°C. Beyond these time limits, mortar shall be discarded.

.2 Do not temper mortars. It is strictly forbidden to add water to the mortar after original mixing.

3.6 Mortar Colour Uniformity

.1 In order to ensure the finished product's colour uniformity, the Contractor shall:

.1 Match the colour of the existing mortar.

.2 Use water originating from the same source and use the same brand of binders and colouring agents.

.3 Avoid adding water on site in order to modify mortar's workability or for tempering.

.4 Always execute joint tooling within the same delay after the laying of mortar.

.5 Clean mixer thoroughly if it was recently used for a different mixture (white cement or sand, colouring agents, etc.).

3.7 Mortar Removal for Repointing

.1 Remove defective mortar where indicated on the drawings and confirmed on site by the NCC Representative.

.1 Where mortar is found to be defective beyond specified raking depths, continue racking until sound mortar is encountered.

.2 If masonry unseats or bond is broken, remove unit and reset.

.2 Tools and Technique:

.1 Tools for cutting out shall be no wider than 50% of the joint width.

.2 Cutting out of mortar shall be carried out by one of the following techniques:

.1 Cut out mortar with hammer and chisels with dust channels, cutting away from the arises to prevent spalling of the masonry.

.2 Hacksaw blades or similar tools are to be used where fine joints are encountered.

.3 Clean joints to 150mm and not less than 20mm, removing all mortar on the masonry surfaces, to a square surface of existing mortar at back of joint.

.4 Flush open joints and voids; clean with low pressure water and if not free draining, blow clean with compressed air.

.5 Leave no standing water immediately prior to repointing.

.6 Clear out all loose particles with compressed air and leave ready for inspection.

.3 Damage:

.1 Take care to prevent damage to masonry units resulting from cutting out operation.

.2 Damage includes chipped or scratched surfaces from chisels, resulting from improper workmanship.

.3 All damaged units shall be replaced to the satisfaction and at no charge for NCC Representative.

.4 Inspection: Provide access, permit inspection, correct any defects and obtain approval of all raked joint prior to commencing pointing.

3.8 Pointing of Joints

.1 Obtain the NCC Representative's written approval to commence pointing operation.

.2 Pointing:

.1 Where voiding or unsound mortar exists beyond 150mm deep consolidate with mortar to within 100mm of face.

.2 Allow consolidation to set up before doing the finish pointing.

.3 Immediately prior to pointing, thoroughly wet joints in order to control absorption.

.4 Allow water to soak into masonry and mortar, leaving no standing water but remaining wet.

.5 Fill all joints full with pointing mortar, compact joints firmly to ensure positive adhesion to all inner surfaces, leaving mortar 10mm recessed from stone arises.

.3 Thoroughly compact mortar into joint.

.1 Finish joint recess of about 1mm behind the arises of stone.

.2 Do not project mortar past the arises or feather the work. Joint profile to match existing joints.

.3 Keep work clean, remove all droppings and clean faces of masonry units as work proceeds, and again at the end of each day.

.4 Protection and Completion:

.1 Protect newly laid mortar from frost, rainfall or rapid drying by wind or sun exposure for 3 weeks.

.2 Provide burlap enclosure and misting for damp cure of 7 days to prevent shrinkage and to control curing of mortar.

3.9 Protection

.1 Protect masonry and adjacent work against scratches and any other damage. Protect finished work against mortar spattering's. Use non-staining coverings.

3.10 Progressive Cleaning of New Masonry Work

.1 Clean surfaces of mortar droppings, stains and other blemishes resulting from work of this contract as work progresses. Remove excess mortar with a wood pallet. Once mortar has hardened sufficiently:

.1 Starting from the bottom, dampen surface with clear water.

.2 Starting from the top, scrub with water and a non-metallic stiff bristle brush.

.3 Rinse thoroughly with clear water as the work progresses.

.4 Never use acid even if diluted.

.2 Do further cleaning after mortar has set and cured, often 14 days is sufficient. Use stiff, natural bristle brushes and plain water only.

.3 Cleaning of existing masonry surfaces is specified in Section 04 03 06 "Masonry Cleaning".

3.11 Final Clean-Up

.1 Upon completion of the work of this Section remove from the premises all surplus material, dirt and debris caused by the work. and leave the installation clean.

.2 Clean any drippage and spills of surplus mortar from adjacent surfaces and make good any damage caused by the work of this Section.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included:

.1 The work of this Section includes the provision of all labour, materials, equipment and services required to replace selected stone masonry units, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:

.1 Section 04 03 06 - Masonry Cleaning.

.2 Section 04 03 07 - Masonry Repointing and Repair.

1.3 Submittals

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

.2 Submit two copies of WHMIS MSDS Material Safety Data Sheets in accordance with Section 01 35 29 - Health and Safety Requirements for materials used for the work of this Section. Indicate VOC content.

.3 Provide samples of replacement stones (2 of each color).

1.4 Stone Quality Control

.1 The NCC Representative shall inspect the stone blocks and stone units at the following stages:

.1 Prior to Installation: The rubble or cut stone units shall be approved by the NCC Representative before installation in the building.

1.5 Mortar Testing

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

.2 Test results to show that properties are appropriate to particular mortar mix.

.3 Test reports required prior to commencement of work:

.1 Sieve analysis of proposed sand.

.2 Bulking analysis of proposed sand in condition as delivered to site and after any change in environmental conditions.

.3 Air content of mortar mix in plastic state.

.4 Vicat cone penetration of mortar mix.

.5 Compressive Strength of mortar at 7 and 28 days, a minimum of 35 days prior to commencing work, or as directed by NCC Representative.

.4 Test reports required following commencement of work:

.1 Bulking analysis of sand upon delivery and following any change in environmental conditions, or upon request by NCC Representative.

.2 Air content of mortar mix on a weekly basis at discretion of NCC Representative.

.3 Vicat cone penetration measurements on each mortar batch for first three days, followed by daily tests at discretion of NCC Representative.

.4 Compressive strength of mortar at 7 and 28 days, at discretion of NCC Representative.

1.6 Delivery, Storage and Handling

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to job site in dry condition and in purpose made containers, packed to avoid chipping, damage or soiling, and protected from frost.

.3 Label each container to clearly indicate contents and location on building.

.4 Mark each stone quarry bed or direction of bedding and location of stone on building referenced to submittals. Use concealed permanent markings.

.5 Handling:

.1 Avoid excessive handling; protect against chipping damage, soiling or staining.

.2 Repairing stone damaged during handling is not permitted. Replace damaged stones.

.3 Do not use Lewis pins to move stones. Lift stones only by straps or chains with edges protected.

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 New Stone

.1 St-Marc des Carrières Limestone:

.1 Select pieces as follows:

.1 Free of seams, cracks or other imperfections impairing structural integrity.

.2 Free of excessive mottling or piebald markings, clay spots, coal streaks, iron banding, or foreign substance impairing appearance.

.3 Where exposed to sight, maintain continuity of colour and texture of existing units to be replaced or to match adjacent units, as applicable.

.2 Property Standards:

.1	Density, min. kg/m^3	2160
.2	Absorption by weight, max. %	7.50
.3	Compressive strength, min. MPa	28
.4	Modulus of rupture, min. MPa	3.45
.5	Abrasion resistance, min. hardness	10

.3 Fabrication:

.1 Cut stone to shape and dimensions obtained from measurements and profiles taken from existing stone.

.2 Cut stone to lay on its natural quarry bed.

.3 Dress beds and joints same thickness as existing and at right angles to face.

.4 Where exposed to sight:

.1 Hand tool finish stone to final size and profile. Match appearance and profile of existing stone. Machine split stones are not acceptable.

.2 Match finishes variations to existing stone and to approval of NCC Representative.

.5 Cut stone pieces to within tolerances exhibited by similar existing stones.

.6 Cut, dress, rub stones to accommodate existing materials and work of other

.7 Retain and store stone off-cuts for re-use as wall core material.

.8 Dress backs of stone to match original shape and keying into the core of wall.

.2 Mortar: Refer to Section 04 03 07 - Masonry Repointing and Repair.

PART 3 EXECUTION

3.1 Preparation

.1 Prevent absorption of ground water and exposure to rain. Rest stones in their natural bedding.

.2 Handling:

.1 Move and lift stone units using means to prevent damage.

.2 Submit stone units dropped or impacted to NCC Representative for inspection and approval.

.3 Do not make holes or indentations for Lewises or dogs on face or top side of stone.

.4 Fill holes after moving and lifting.

.3 Indicate bedding planes of stone units. Duplicate bedding marks on usable pieces of cut stone.

.4 Place safety devices and signs near work area, as directed.

.5 Install shoring and supports as required.

3.2 Cutting/Sizing of Stone

.1 Use calipers, squares and levels to measure hole for new stone.

.2 Site trim by cut-sizing new stone with joint widths not more than:

.1 Rock-face stone: 6 mm or as existing on building.

3.3 Moving Stones

.1 Use approved methods to move stones horizontally and to lift stones to working level.

.2 Move, handle and set stones without causing damage.

3.4 Resetting Misaligned Stones

.1 Where indicated, re-set misaligned stone.

.2 Remove stone units as necessary.

.3 Re-set stones true to line.

.4 Remove supports.

3.5 Re-Laying of Stone

.1 Prepare wall to receive stone.

.2 Obtain NCC Representative's approval of cleaning of core before commencing inserting stone.

.3 Mortar fill deep voids of cores to within 50mm of back of stone in maximum 50mm lifts. Build

up thicknesses with stone pieces set in mortar to replace original bonding pattern of core to facework.

.4 Clean stone by washing with water and natural fibre brush before laying.

.5 Thoroughly dampen surfaces of core and apply mortar.

.6 Set stones plumb, true and level in full bed of mortar and with vertical joints filled full except where otherwise specified. Set stones in same orientation as removed stones with even joint widths.

.7 Lay heavy stones and projecting stones after mortar in courses below has hardened sufficiently to support weight.

.8 Set large stones on water soaked softwood wedges to support stone in proper alignment until mortar has set. Remove wedges when dry, do not break off.

.9 Remove mortar dropping from face of stone before mortar is set. Sponge stone free of mortar along joints as work progresses.

3.6 Finish Pointing

.1 Rake back mortar joints and leave ready for finish pointing as specified in Section 04 03 07 - Masonry Repointing and Repair.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes
- .1 Provide labour, materials, services and equipment necessary to complete the work of this Section, including: Mortar and grout for granite stairs surrounding fountain.

1.2 Related Sections
- .1 32 11 16.01 - Granular Sub-Base
- .2 32 11 23 - Granular Base Courses
- .3 32 14 10 - Granite Paving, Curbs and Stairs

1.3 References
- .1 Canadian Standards Association (CSA)
  - .1 CSA A179-94 (R1999) 'Mortar and Grout for Unit Masonry'.
- .2 American Society for Testing and Materials (ASTM International)
  - .1 ASTM C144-11, Standard Specification for Aggregate for Masonry Mortar.
  - .2 ASTM C207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.

1.4 Definitions
- .1 Type 'M' mortar is recommended for use in masonry in contact with earth such as foundations, retaining walls, paving, sewers and manholes, and in reinforced masonry.
- .2 Type 'S' mortar is a contractor grade mortar mix designed to lay brick, set block, patching, tuck point and stone work.

1.5 Samples
- .1 Submit two samples of mortar and coloured mortar of each type used in masonry work.

PART 2 - PRODUCTS

2.1 Materials
- .1 Mortar and Grout: conforming to specifications of CSA A179-94.
- .2 Aggregate: passing 1.18 mm sieve where 6 mm thick joints are indicated.
- .3 Colour: ground coloured natural aggregates or metallic oxide pigments to match grey/black range of stone.
- .4 Latex Additive: by Laticrete or Mapei, subject to approval of Engineer.

2.2 Material Source
- .1 Use same brands of materials and source of aggregate for entire project.

2.3 Mortar Types
- .1 Mortar for exterior masonry above grade: Type 'S' Masonry Mortar Mix.
  - .1 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: Type 'M'.
  - .2 Following applies regardless of mortar types and uses specified above:
    - .1 Mortar for Stonework: Type 'N'.
    - .2 Mortar for Pointing: Type 'S'.

2.4 Coloured Mortar

.1 Coloured mortar: use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample.

2.5 Non-Staining Mortar

.1 For non-staining mortar use non-staining masonry cement for cementitious portion of specified mortar type.

2.6 Grout

.1 Grout: to CSA A179-9 (R 1999).

PART 3 - EXECUTION

3.1 Mixing

.1 Carry out masonry mortar and grout work in accordance with CSA A179-9 (R1999) except where specified otherwise.

.2 Colour and Admixtures: mix grout to semi-fluid consistency.

.3 Coloured Mortars: incorporate colour and admixtures into mixes in accordance with manufacturer's instructions. Use clean mixer for coloured mortar.

.4 Pointing Mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball.

.5 Allow to stand for not less than 1 hour and no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

3.2 Mortar Schedule

.1 Use coloured mortar for joints in granite stone work. Colours to be chosen are to match stone as closely as possible, making joints as invisible as possible.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International

.1 ASTM A123/A123M-[09], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21-[98], General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164-[M92(R1998)], Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16.1-[01], Limit States Design of Steel Structures.

.4 CSA W59-[1989(R2001)],Welded Steel Construction (Metal Arc Welding).

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet for NCC Representative's records.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets to NCC Representative for all products to be used. Indicate VOC's:

.1 For finishes, coatings, primers and paints.

.2 Shop Drawings:

.1 Submit shop drawings of the steel bracket and fixed ladder, stamped by a professional engineer licensed in the province of Ontario for review and approval by the NCC Representative prior to fabrication and installation.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 QUALITY ASSURANCE

.1 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.3 Perform welding to CSA W59.

1.4 DELIVERY,STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading: Deliver, store, handle and protect materials with care.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350W.

.2 Welding materials: to CSA W59.

.3 Welding electrodes: to CSA W48 Series.

.4 Bolts and anchor bolts: to ASTM A 307.

.5 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured. Refer to the provided structural drawings for all member sizes and locations.

.2 Where possible, fit and shop assemble work, ready for erection.

.3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.4 ISOLATION COATING

.1 Isolate stainless steel from galvanized steel by means of bituminous paint.

2.5 SHOP PAINTING

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.3 Clean surfaces to be field welded; do not paint.

2.6 ACCESS LADDERS

.1 Stringers: 51 x 51 x 4.8 mm thick, steel HSS.

.2 Steel Rungs: 19 mm diameter at 300 mm on centre.

.3 Brackets: sizes and shapes as indicated, weld to stringers at top and bottom, complete with fixing anchors.

.4 Galvanize finish for exterior.

.5 Galvanize exterior ladders after fabrication.

2.7 WT FRAMES

.1 Fabricate frames from steel, sizes of member as indicated.

.2 Weld together to form continuous frame sizes as indicated.

.3 Finish: galvanized.

PART 3 - EXECUTION

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections as indicated on the structural drawings. If required, seek guidance and clarification in writing from the NCC Representative prior to proceeding with the work.

.3 Provide suitable means of anchorage by using the specified anchors and connection types as indicated on the structural drawings with the required minimum loading values

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection with the specified finishes, including primer and paint.

.8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 ACCESS LADDERS

.1 Install access ladders in locations as indicated.

.2 Erect ladders 152mm clear of wall on bracket supports.

3.3 WT FRAMES

.1 Install steel frames on pre-cast concrete retaining walls as indicated.

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

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

END OF SECTION

PART 1 GENERAL

1.1 Section Content

.1 Preparation of substrates
.2 Hot-applied rubberized asphalt membrane
.3 Polyester fabric reinforcing
.4 Elastomeric sheet reinforcing
.5 Protection sheet
.6 Drainage boards
.7 Plastic cement

1.2 Summary of Work

.1 Work Included:
  .1 The work of this Section includes the provision of all labour, materials, equipment and services required to replace selected stone masonry units, as indicated on the drawings, as specified herein and as required for a complete project.
.2 Related Sections:
  .1 Section 04 03 06 - Masonry Cleaning.
  .2 Section 04 03 07 - Masonry Repointing and Repair.
  .3 Section 07 24 00 – Exterior Insulation and Finish Systems
  .4 Section 09 24 33 – Portland Cement Parging

1.3 References

.1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Used, for Asphalt Roofing, Dampproofing and Waterproofing.
.2 CAN/CGSB-37.50-M89, Hot-Applied, Rubberized Asphalt for Roofing and Waterproofing.
.3 CAN/CGSB-37.51-M90, Application of Hot-Applied, Rubberized Asphalt for Roofing and Waterproofing.
.4 CGSB-37-GP-52-M84, Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.
.5 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe covering.
.6 CSA/A231.2-06 (R2010) - Precast Concrete Paving Slabs/Precast Concrete Pavers.

1.4 System Description

.1 Furnish and install a completed waterproofing assembly including surface conditioner, a monolithic, rubberized asphalt membrane, protection course, flashings, extruded polystyrene insulation and drainage panel.

1.5 Submittals

.1 Product Data: submit product data for primer, membrane, reinforcing fabric, elastomeric reinforcing sheet, thermal insulation.
.2 Indicate special procedures required to join rubberized membrane to wall to ensure the integrity of the building envelope's waterproofing.
.3 In order to ensure total compatibility, all products prescribed in this section must be supplied by one membrane manufacturer.

1.6 Quality Assurance

.1 Membranes manufacturer must has been producing hot-applied rubberized asphalt roofing membrane for at least fifteen (15) years.

.2 Waterproofing contractor must be approved by membrane manufacturer; submit documentation acceptable to NCC Representative that membrane applicator is a certified installer and that he has uninterrupted experience in the field for the last five (5) years.

.4 Lists of at least three (3) projects, satisfactorily completed within the past five (5) years, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific membrane system proposed for use by applicator.

.5 Membrane Manufacturer shall have available an in-house technical staff to assist the contractor, when necessary, in application of the products and final inspection of the system.

1.7 Pre-Installation Meeting

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section.

.2 Ensure representatives from inspection agencies, manufacturer, applicator and entities directly involved in the Work of this Section are present.

.3 Review installation conditions, procedures and coordination with other trades. Use manufacturer's requirements for approval of membrane substrate.

1.8 Storage and Handling

.1 Deliver materials in original unopened containers of packaging clearly labeled with manufacturer's name, brand name, instruction for use, all identifying numbers, and U.L. labels.

.2 Materials shall be stored in a neat, safe manner, not to exceed the allowable structural capacity of the storage area.

.3 Store products in weather protected environment, clear of ground and moisture.

.4 Store rolls in upright position.

.5 Remove only in quantities required for same day use.

.6 Store insulation away from sunlight and any deleterious substance.

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

1.9 Project Conditions

.1 Do not apply rubberized asphalt roofing when air temperature and substrate temperature are below –18°C.

.2 Ensure substrate is dry, free of ice and snow. Use only dry materials, installed only when atmospheric conditions will not cause moisture ingress into the roofing plies.

.3 Preparation and application of membrane shall be conducted in well ventilated areas.

.4 Over its service life, do not expose membrane or accessories to a constant temperature in excess of 82°C (i.e., hot pipes and vents or direct steam venting, etc.).

.5 Primers contain petroleum distillates and are extremely flammable. Do not breathe vapours or use near an open fire. Do not use in confined areas without adequate ventilation. Consult container or packaging labels and Material Safety Data Sheets (MSDS) for specific safety information.

.6 Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the waterproofing membrane. Any exposure to foreign materials or

chemical discharges shall be presented to membrane manufacturer or evaluation to determine any impact on the waterproof membrane assembly performance.

.7 General contractor shall assure that adequate protection is provided after installation so other trades do not damage membrane and plantings.

1.10 Construction schedule

.1 Submit a work schedule in accordance with requirements of Section 01 32 16.06.

.2 Coordinate work with Related Sections for the installation of materials and the performance of work required prior to membrane application in certain parts of the building.

1.11 Warranty

.1 Material only Warranty, excluding labour ten 10 years.

.2 Accredited Contractor Warranty Program

.1 Total System Warranty; covers components of the waterproofing assembly

A. Fabric Reinforced Assembly; duration: 10 years.

PART 2 PRODUCTS

2.1 Surface Conditioner

.1 Product: QUICK-SET manufactured Hydrotech Membrane Corporation. Or equivalent approved.

2.2 Rubberized Asphalt

.1 Hot-applied rubberized asphalt: to CAN/CGSB-37.50.

.1 Product: 6125® Monolithic Membrane by Hydrotech Membrane Corporation. Or equivalent approved.

2.3 Fabric Reinforcing

.1 Spunbonded polyester reinforcing fabric for hot-applied rubberized asphalt membrane.

1 Product: Flex-Flash® F 2014, manufactured by Hydrotech Membrane Corporation. Or equivalent approved.

2.4 Elastomeric Reinforcing

.1 Polyethylene separation sheet.

.1 Product: Polyethylene 0.12 mm thick.

2.5 Drainage panels

.1 Consisting of 2 layers of high-strength drainage panel of polypropylene core with factory laminated geotextile: Hydrodrain® 400. Or equivalent approved.

.1 Thickness of 16mm
.2 Compressive strength 73236,4 Kg/m²
.3 Water flow rate: 5907L/min/m²
.4 Grab Tensile: 401 N
.5 Grab Elongation: 50%
.6 Puncture Resistance: 1113 N.

PART 3 EXECUTION

3.1 Protective measures

.1 Cover walls and adjacent work
.2 Use warning signs and barriers. Maintain in good order until completion of work.
.3 Clean off all drips and smears of bituminous material.
.4 At end of each day's work or when stoppage occurs due to inclement weather provide protection for completed work and materials out of storage.
.5 Waterproof and ballast all edges.
.6 Make sure that mortar has cured for at least 14 days prior to membrane work.

3.2 Preparation General

.1 Prior to any waterproofing work, clean surface of any contaminant that could damage adhesion of membrane materials; remove all traces of curing products, dust, paint, frost, form release agents and loose particles.
.2 Heat the membrane in a double jacketed, oil bath melter with a maximum flash point of 315°C, or an air jacketed melter. All melters shall be equipped with thermometers and direct drive mechanical agitation. It is forbidden to heat the bitumen in a direct heat melter. Heat membrane until membrane can be drawn-free flowing at a temperature range between 180°C and 190°C, and not exceeding this maximum temperature.
.3 Crack and construction joint reinforcing (1.5 mm to 6 mm wide): apply a 300 mm wide, 3 mm thick coat of hot rubberized asphalt membrane and a strip of 150 mm wide uncured neoprene flashing sheet centred on crack or joint and embedded into the membrane; overlap joints in sheet flashing a minimum of 150 mm and seal laps with hot rubberized asphalt membrane. Avoid any wrinkles or fish mouths. If required, an edge restraint fastening bar shall be used to maintain the elastomeric sheet in its vertical position.
.4 Apply a second 3 mm thick coat of bitumen on the reinforcing sheet to ensure it is perfectly embedded into the membrane.
.5 Metal flashings for mechanical vents and pipes: Install an elastomeric reinforcing sheet around vents and membrane penetrations. Place and seal reinforcing sheet using hot rubberized bitumen and a mechanical joint. For penetrations into the deck, use prefabricated metal sleeves.

3.3 Membrane

.1 Apply hot rubberized asphalt and install membrane flashings reinforced with polyester fabric of elastomeric reinforcing sheet as required, to minimum requirements of CAN/CGSB-37.51 and manufacturer's instructions. Note the more stringent requirements apply.
.2 The first coat of rubberized bitumen must be applied in a continuous fashion and at a thickness of 3 mm.

.3 Completely cover the first coat of membrane with a 1000 mm wide fabric reinforcing, taking care to overlap each joint a minimum of 50 mm. Apply final 3 mm thick coat of membrane to cover the fabric.

.4 Average thickness of the two coats must be 6 mm, with no readings less than 4 mm.

3.4 Protection Sheet

.1 Place the separation sheets in the bitumen while it is still warm enough to get a good bond, without damaging the sheets.

.2 Overlap each sheet of 50 mm.

3.5 Insulation and Drainage Panels

.1 Drainage panels

.1 Install the drainage course on vertical surfaces in accordance with the manufacturer's recommendations.

.2 Layout and position 2 layers of drainage course. Cut and fit drainage course to perimeter and penetrations.

.3 Bond all geotextile overlap edges to adjacent drainage core geotextile with an acceptable adhesive to insure geotextile integrity.

.4 Place subsequent topping materials as soon as possible.

.2 Insulation placement

.1 Tightly butt together all insulation boards. The maximum acceptable opening between insulation boards is 10 mm. Insulation must be installed within 20 mm of all projections, penetrations, etc.

.2 Do not use mechanical fastener to attach insulation board. Do not perforate the membrane.

3.6 Cleaning

.1 Clean work area in accordance with Section 01 74 11 – Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Section 04 03 06 - Masonry Cleaning.

.2 Section 04 03 07 - Masonry Repointing and Repair.

.3 Section 07 13 52 – Hot Applied Rubberized Membrane

.4 Section 09 24 33 – Portland Cement Parging

1.2 References

.1 Definitions:

.1 Aesthetic joint: joint for appearance of installation ease. Also known as aesthetic reveals, grooves and reglets used to provide starting and stopping points during application of finish coat.

.2 Back wrapping: at edges (termination) of EIFS where the reinforcing mesh and base coat extend from the back side of the insulation around the termination edge and onto the front of the insulation.

.3 Base coat: layer consists of polymer modified, typically mixed with Portland cement and applied to face of insulation board and reinforced with one or more layers of mesh to function as a weather barrier.

.4 Lamina: base coat, reinforcing mesh and finish.

.2 Reference Standards:

.1 ASTM International

.1 ASTM C144-[11], Standard Specification for Aggregate for Masonry Mortar.

.2 ASTM D2247-[11], Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

.3 ASTM E96/E96M-[10], Standard Test Methods for Water Vapor Transmission of Materials.

.4 ASTM E2430-[05], Standard Specification For Expanded Polystyrene (EPS) Thermal Insulation Boards For Use In Exterior Insulation and Finish Systems (EIFS).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.162-[2004], Emulsion Coating for Stucco and Masonry.

.2 CAN/CGSB-19.24-[M90], Multicomponent, Chemical-Curing Sealing Compound.

.3 CSA International

.1 CAN/CSA-A3000-[08], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.4 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-[11], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this section, with NCC Representative and qualified workers in accordance with [Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building construction subtrades.

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:

.1 Indicate on drawings:

.1 Wall layout, details, connections, expansion joints, finish system, installation sequence, including interface with doors, windows, air barriers, vapour retarders and other components.

.4 Samples:

.1 Submit one 300 x 300 mm sample of each colour of finished wall system prior to fabrication of mock-up.

.5 Manufacturer's Instructions:

.1 Provide to indicate special handling criteria, installation sequence, cleaning procedures..

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installation of exterior insulation and finish wall system by qualified applicators. Provide proof/certification of qualification 1 week prior of commencement of work.

.2 Mock-ups

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock up of complete system on typical exterior wall 300mm x 500mm. incorporating:

.1 Wrappings and terminations: back wrapping and edge wrapping.

.2 Joints to demonstrate aesthetic

.3 Construction at changes in substrate.

.4 Construction at corner stop.

.5 Construction at flashing,

.6 Adhesive fastening systems,

.7 Colour, texture and finish.

.3 Construct mock-up where indicated.

.4 Allow 72 hours for inspection of mock-up by NCC Representative before proceeding with work.

.5 Mock-up will be used

.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this work.

.1 Approved mock-up may remain as part of finished work is there is no color change in subsequent applications.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

.1 Ambient Conditions:

.1 Temperature, relative humidity, moisture content.

.1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

.2 Maintain ambient temperature above 12 degrees C during adhesive application and until cured minimum 24 hours.

.3 Maintain ambient temperature above 12 degrees C during base coat application and until cured minimum 24 hours.

.4 Maintain ambient temperature above 12 degrees C during finish coat application and until cured minimum 24 hours.

.2 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of insulation, adhesive and caulking materials.

.3 Ventilation:

.1 Provide continuous ventilation in enclosed space during and after application and cure.

1.8 WARRANTY

.1 For work of this Section 07 24 00 - Exterior Insulation and Finish System warranty period shall be of 60 months.

.2 Contractor warrants that exterior insulation and finish system will not leak or delaminate in accordance with General Conditions but for 60 months.

PART 2 PRODUCTS

2.1 System Description

.1 Exterior insulation and finish system to be site applied cladding system consisting of adhesive, insulation board, base coat with reinforcing mesh and finish.

.1 Insulation shall be adhesive applied. In order to protect the membrane, no mechanical fasteners are allowed.

2.2 Performance Requirements

.1 Ensure installed modified polymer coat wall system has performance properties as follows:

.1 Tests performed by an independent laboratory on the specified materials can be requested.

.2 Properties shall meet or exceed the following values when tested by methods listed:

Test Method	Result
1) Durability Under Climatic Conditions: CCMC TG Appendice A2 (60 cycles)	No cracking, leaking or bubbling of basecoat. No delamination or cracking of finish coat.
2) Accelerated Weather Resistance: ASTM G155 (exposed 2000 hours)	No deleterious effect.
3) Salt Spray Resistance: ASTM B117 (exposed 300 hrs)	No deleterious effect.
4) Mildew and Fungus Resistance: CCMC 6.8	No mildew or fungal growth.
5) Water Permeability: CCMC 6.6	$\geq$ 2 hours.
6) Water Absorption: CCMC 6.7	$\leq$ 20%.
7) Water Vapour Transmission: ASTME96,desiccantmethod	$\geq$ 170 ng/Pa.s.m^2.

2.3 Adhesives

.1 For insulation board to be compatible with membrane.

2.4 Rigid Thermal Insulation

.1 Polystyrene board insulation for below grade

.1 Insulation shall meet CAN/ULC S 701 Type IV.

.2 Minimum compressive strength, ASTM D-1621, 210 kPa, square ends and edges except where otherwise indicated, thickness as indicated.

.1 Minimum RSI 0.87 $m^{2.o}C/W$ per 25 mm thickness.

2.5 Base Coat

.1 Modified acrylic polymer based compound: non-cementitious, fibre reinforced, premixed base coat system:

.1 Acceptable material: Nivelex from ADEX Systems Inc. or approved equivalent.

2.6 Reinforcing Mesh

.1 Reinforcing Mesh to ASTM D-5034 standards:

.2 Balanced, glass fibre fabric made from twisted multi-end strands, treated, alkali resistant, compatible with chemical bonding system base coat and finish coat, weight intermediate - 375 g/m^2.

1. Speciality Mesh: Starter mesh 155g/m² and corner mesh 500g/m² where needed.

2.7 Finish Coat

.1 Shall be factory-mixed, 100% acrylic-based, ready-to-use, containing integral colour and texture;

.2 Trowel applied.

.3 Texture and colour to match existing and approved by NCC Representative.

.1 Acceptable material: Monaco from ADEX Systems Inc. or approved equivalent.

2.8 Primer

.1 Factory mixed liquid acrylic and silica primer that can be applied by roller.

.1 Acceptable material: Primex from ADEX Systems Inc. or approved equivalent.

2.9 Accessories

.1 Accessories: PVC corner beads, casing beads, stop beads, starter strips and accessories, as recommended by exterior insulated wall system manufacturer to suit system components.

.2 Sealant: compatible with systems materials, recommended by system manufacturer.

2.10 Mixes

.1 General:

.1 Mixer: high speed, clean and rust free.

.2 Mixing pail: clean and rust free.

.3 Mixes: additive free.

.2 Primer: mixed to uniform consistency in accordance with manufacturer's written instructions.

.3 Adhesive: mixed in accordance with manufacturer's written instructions.

.4 Base coat: mixed to uniform consistency in accordance with manufacturer's written instructions.

.5 Finish coat: mixed to uniform consistency in accordance with manufacturer's written instructions.

PART 3 EXECUTION

3.1 Installer

.1 Acceptable Installers: use only installers or applicators who are qualified by manufacturers of system used.

3.2 Examination

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

.1 Inspect the substrate to verify that it is structurally sound and solid, ensuring there are not any irregular voids or projections.

.2 Inspect all metal flashing to ensure that it is properly installed, making certain that moisture will be deflected to the exterior of the system.

.3 Advise the architect and general contractor of any discrepancies that may impair the proper installation of the system. Work shall not proceed until unsatisfactory conditions are corrected.

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

3.3 Preparation

.1 Preparatory protection:

.1 Protect adjacent surfaces from damage resulting from Work of this Section.

.2 Protect finished Work from water penetration at end of each day or on completion of each section of Work.

.3 Protect installation from moisture for 48 hours minimum after completion of each portion of Work.

.4 Protect top of plinth until flashings are installed.

.2 Surface preparation:

.1 Ensure environmental and site conditions are suitable for installation of system.

.2 Prepare surfaces in accordance with manufacturer's written instructions.

3.4 Installation

.1 Insulation Boards

.1 Preparation of Insulation Board surface:

.1 Fill open joints in insulation board with slivers of insulation or spray foam as recommended by manufacturer's written instructions.

.2 Rasp surface to achieve smooth, level, even surface after insulation boards have firmly adhered to substrate.

.1 Remove ultraviolet ray damage.

.2 Rasp smooth any irregularities in insulation board greater than 1.6 mm.

.3 Ensure insulation board in accordance with manufacturer's written instructions.

.2 Using a notched trowel, apply adhesive in vertical ribbon orientation (10mm (3/8") wide by 5mm (3/16") thick, spaced 50mm (2")) onto the substrate;

.3 Install extruded insulation boards onto the substrate, starting from the bottom. The long edge of the insulation board shall be horizontal;

.4 Stagger the vertical joints of insulation boards and interlock insulation boards at all corners;

.5 Stagger insulation board and sheathing board joints at least 150mm (6") apart from each other;

.6 Ensure insulation board joints are not aligned with the corners of any wall openings (such as windows, door openings, etc);

.7 Reveals/V-Grooves shall not be in alignment with insulation board joints or at the corners of openings;

.8 The entire surface of the insulation boards shall be clean prior to the application of the base coat.

.2 Base Coat and Reinforcing Mesh:

.1 Apply 225 x 300 mm diagonal strips of detail mesh at corners of windows, doors and penetrations through insulation. Embed strips in wet base coat and trowel from centre to mesh edge to avoid wrinkles.

.2 Apply detail mesh at reveals. Embed mesh in wet base coat and trowel from base of reveal to mesh edges.

.3 Apply corner mesh at inside and outside corners. Embed mesh in wet base coat and trowel from corner of mesh edges.

.4 Fasten mesh over the entire surface of the extruded insulation boards using the proper mechanical fasteners,

.5 Mechanical fasteners shall be spaced 400mm (16") apart from each other;

.6 The mesh shall be lapped a minimum of 64mm (2-1/2") on all sides;

.7 Mesh (and base coat) shall cover PVC moulding flanges;

.8 Ensure edge of insulation board is wrapped with base coat prior to installation to substrate.

.9 Apply strip of detail mesh with adhesive to substrate at level base line and at terminations.

.10 Ensure width of detail mesh is adequate to adhere [100] mm of mesh onto substrate and to wrap around insulation board edge with minimum [64] mm coverage on outside of insulation board.

.11 After adhering detail mesh to substrate ensure, mesh ends hang free for completion of back wrapping procedure after insulation application.

.12 The base coat shall be applied over the glass fibre mesh to a thickness of 3.2mm (1/8") to fully cover the mesh;

.13 Install an additional 300mm (12") long piece of Starter mesh (at a 45º angle) at the corners of all wall openings;

.14 Smooth and level the surface of the base coat until the mesh is fully embedded;

.15 After the first coat has dried, apply a second coat of NIVELEX mixture creating a total thickness of 6.4mm (1/4");

.16 Additional coats of the NIVELEX base coat may be required if, after drying, there are imperfections or the mesh is not completely embedded;

.17 A period of 24 hours shall elapse before installing the finish coat.

.3 Primer and Finish Coat:

.1 With a roller, apply an even coat of primer (same colour as the finish coat) prior to installing the finish coat;

.2 Do not install separate batches of finish coat side by side.

.3 Do not apply finish into or over sealant joints.

.4 Trowel-apply a tight coat of Finish coat, texture to a thickness not greater than the largest aggregate. Apply the finish coat in a continuous fashion, maintaining a wet edge. Levelling and texturing shall take place in one operation to give the Finish a uniform appearance;

.5 Avoid applications in direct sunlight;

.6 Avoid applying finish coat at locations where caulking will be installed;

.7 Ensure all PVC moulding connections are properly sealed.

3.5 Clean-Up

1. Remove waste and left over materials (used in this Section) from the job site.
2. Clean all adjacent materials and surfaces, and repair any defects caused to this application or any other work.

3.6 Protection

1. Ensure that the general contractor protects all work against moisture infiltration and other damages by installing the necessary flashing and caulking in a timely manner.
2. Provide protection against dirt, moisture, high humidity, and freezing temperatures until materials are fully dry.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Read and be governed by conditions of the contract and sections of Division 1

1.2 REFERENCES

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

.1 Material Safety Data Sheets (MSDS).

.2 Underwriter's Laboratories of Canada (ULC)

.1 ULC-S115-05 Fire Tests of Fire stop Systems.

.3 National Building Code of Canada 2010.

1.3 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.

.1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit fire resistance rating test listings for firestopping and smoke seal systems.

.3 Manufacturer’s engineering judgement identification number and shop drawing details when no ULC or cUL or Warnock Hersey system is available for an application. Engineered judgement must include both *project* name and *Subcontractor’s* name who will install firestop system as described in shop drawing.

.4 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.

.2 Quality assurance submittals: submit following.

.1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.

.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: person competent in fire stopping installations trained and recognized by fire stopping manufacturer.

.2 Pre-Installation:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

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

.3 Single source responsibility for firestopping and smoke seal materials:

.1 Obtain firestopping and smoke seal materials from single manufacturer for each different product required.

.2 Manufacturer shall instruct applicator in procedures for each material.

.4 Regulatory Requirements:

.1 Firestop system installation must meet requirements of ULC S115-05 and ASTM E1966-07 tested assemblies that achieve a fire rating equal to that of construction being penetrated.

.2 Proposed firestopping and smoke seal materials and methods shall conform to applicable governing codes having local jurisdiction.

1.6 SYSTEM DESCRIPTION

.1 Provide firestop and smoke seal systems consisting of a material, or combination of materials installed to retain the integrity of fire-rated construction by effectively impeding the spread of flame, smoke, and/or hot gases through penetrations, blank openings or gaps, membrane penetrations, construction joints, or at perimeter fire containment in or adjacent to fire-rated barriers.

.2 Provide also smoke sealants applied over firestopping materials or combination smoke seal/firestop seal material to form air tight barriers to retard the passage of gas and smoke.

.3 Provide fire-resistance rating equivalent to the rating of the adjacent floor, wall or other fire separation assembly.

.4 Provide firestopping and smoke sealant system assemblies as practical and as required to coordinate with the schedule and sequencing of the Work.

.5 Confirm locations of exposed/non-exposed firestopping/smoke seal surfaces with Departmental Representative prior to application.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

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

.2 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:

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

.2 Replace defective or damaged materials with new.

1.8 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of firestop sealants including special conditions governing use.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS / INSTALLATION SPECIALISTS

.1 General: Manufacturers of firestopping and smoke seal system Products and installation specialists for the work of this section are limited to applicable assemblies as requited for the Work and having ULC or cUL or Warnock Hersey labelled packaging.

.2 Acceptable manufactures:

.1 3M Canada Inc.
.2 A/D Fire Protection Systems Inc.
.3 Hilti Canada Corp.
.4 Nuco – Self-Seal Firestoppping Products
.5 Tremco Canada Ltd.

2.2 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.

.2 Fire stop system rating: 1 Hour, unless noted otherwise.

.2 Service penetration assemblies: systems tested to CAN-ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Fire stopping and smoke seals at openings around fire-resistance rated assemblies for combustible pipes: firestop collar purpose designed to suit application.

.8 For combustible pipe penetrations through a fire separation required to have a fire resistance rating, provide firestop system with a “F” Rating equal to fire resistance rating of the construction being penetrated.

.9 Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems).

.10 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.11 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.12 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.13 Sealants for vertical joints: non-sagging.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Coordinate with other sections to assure that pipes, conduit, cable and other items that penetrate fire rated construction, have been permanently installed prior to installation of firestop assemblies.

.3 Schedule the Work to assure that penetrations and other construction that conceals penetrations are not erected prior to the installation of firestop and smoke seals.

.4 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.6 Tool or trowel exposed surfaces to neat finish.

.7 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Departmental Representative.

.2 Mechanical pipe insulation:

.1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

.1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

3.6 CLEANING

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

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

.1 Fire stop and smoke seal at:

.1 Penetrations through first layer of gypsum board ceiling membrane.

END OF SECTION

PART 1 GENERAL

1.1 Related Documents

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary of Work

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to apply Portland cement parging to the surfaces of the foundation walls, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:

.1 Section 04 03 06 - Masonry Cleaning.

.2 Section 04 03 07 - Masonry Repointing and Repair.

.3 Section 04 03 42 - Replacement of Stone.

.4 Section 07 13 14 – Waterproofing Hot – Applied Rubberized membrane

.5 Section 09 24 23 - Stucco

1.3 References

.1 Canadian Standards Association (CSA):

.1 CSA-A179-04, Mortar and Grout for Unit Masonry.

1.4 Submittals

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Product Data:

.1 Provide manufacturer's complete technical product data for each specified product.

.2 Include application instructions for parging.

.3 Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Service (WHMIS) requirements.

1.5 Delivery, Storage and Handling

.1 Deliver materials to job site in dry condition.

.2 Deliver packaged products in original unopened packaging with legible manufacturer's identification.

.3 Storage and Protection:

.1 Keep materials dry until use.

.2 Store cementitious materials on elevated platforms, under cover, and in a dry location.

1.6 Environmental Conditions

.1 Do not apply parging in wet weather or freezing conditions.

.2 For all masonry works, maintain at all times an ambient temperature of 12°C minimum and 25°C maximum and relative humidity above 60%:

.1 When ambient temperature is above 25°C, work shall stop and/or workspace shall be protected from direct sun and be ventilated to maintain the ambient temperature below 25 °C and a relative humidity of 60% at the wall surface.

.2 Protect from direct sunlight and from winds above 25 km/h.

.3 When ambient temperature is below 12 °C, workspace shall be protected with an air tight heated enclosure. The Contractor shall ensure that the heat is distributed evenly through the work space to avoid a temperature difference between the top and bottom of the wall and/or the ends of the work surface. Maintain at all times a relative humidity above 60%.

.4 Store mortar components intended for immediate use in heated enclosures, and let these materials reach a temperature of at least 12 °C before using them.

.5 To perform masonry work - surface temperature shall be not less than 10°C and no more than 25°C

.6 Heat and maintain the water at a temperature of at least 12 °C and at the most 20 °C.

.7 At time of use, mortar temperature should be at least 12 °C and maximum 25 °C.

.8 Relative humidity during 7 days moist cure should be no less than 80%.

.3 Install thermometers and relative humidity data loggers at every 5 meters of distance from one to the other along the foundation walls in exterior conditions.

.1 Data loggers should record temperatures and relative humidity information every hour even during night time (24 hours per day and 7 days a week for the duration of the masonry works).

.2 The contractor must transmit all data of all thermometers and data loggers on a weekly basis in Excel format to Departmental Representative. All readings under 12 °C and over 25°C must be highlighted in the Excel file.

.4 Obtain approval from NCC Representative for methods of protection and fabrication of enclosures.

.5 No masonry work will be permitted outside these parameters.

.6 Do not remove heat enclosures where masonry is not thoroughly dried out. Request and obtain the NCC Representative's permission before removing the heat or the enclosure.

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Cement/lime/sand parging mix: To CSA-A179, proprietary, premixed, mixture of Type S sand, hydrated lime, Portland cement and agents designed to enhance bond and workability, formulated specifically for parging masonry walls above and below grade. Standard of acceptance:

.1 Bétomix Plus, Type S mortar or approved equivalent.

.2 Alternative materials approved by Addendum in accordance with Instructions to Tenderers.

.2 Water: Potable.

2.2 Mixing

.1 Empty contents of bag into a mortar mixer.

.2 Add clean water and mix according to manufacturer's documentation.

.3 Test mix for workability on application of masonry wall. If too stiff, add approximately .25 litres of water and remix. If too slurry, discard and mix new batch with .25 litres less water.

PART 3 EXECUTION

3.1 Examination

.1 Examine areas and conditions under which work is to be performed and notify the NCC Representative in writing of conditions detrimental to the proper and timely completion of the work.

.2 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the applicator.

.3 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 Surface Preparation

.1 Surfaces must be structurally sound.

.2 Clean surfaces free of dirt, sand, dust, paint and other foreign material, by brushing vigorously with a broom or stiff brush and water.

.3 If small amounts of grease or oil are present, scrub vigorously with a strong detergent solution and flood with large volumes of water.

3.3 Parging Application

.1 Thoroughly saturate the area to be parged with clean water and remove any free standing water. Some very porous materials may require several applications of water to ensure complete saturation.

.2 Apply parging to a humid surface, not more than 10 mm in thickness, using a trowel. Finish coat with a damp sponge to have a uniformed soft surface.

.3 If a greater thickness is necessary to produce the required finish, rough up surface with a coarse broom, and allow to harden 24 hours before repeating the process.

.4 Trowel-finish to a smooth flat surface, suitable to receive the Hot applied rubberized membrane specified in Section 07 13 14.

3.4 Curing

.1 After setting, keep damp for 7 days, including weekends by misting occasionally with water and covering with wet burlap and polyethylene sheeting. % Humidity at surface should be 80% and more.

.2 After first 7 days of damp cure, protect from wind and rain and let parging dry for another 7 days before applying rubberized membrane.

3.5 Cleaning

.1 Upon completion of the application, remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.

.2 Clean any drippage and spills of surplus parging mortar from adjacent surfaces.

.3 Make good any damage caused by the work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Read and be governed by conditions of the contract and sections of Division 1.

1.2 REFERENCES

.1 Green Seal Environmental Standards (GS)

.1 GS-11-2008, 2nd Edition], Paints and Coatings.

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

.1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113-A2007, Architectural Coatings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Submit 2 copies of WHMIS MSDS.

.2 Samples:

.1 Submit for review and acceptance of each unit.

.2 Submit duplicate 200 x 300 mm sample panels of each paint finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards.

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

.4 Submittals:

.1 Low-Emitting Materials:

.1 Submit listing of paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store painting materials and supplies away from heat generating devices.

.3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.3 Fire Safety Requirements:

.1 Supply 1 9 kg Type ABC fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.5 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces.

.2 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.

.2 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Additional application requirements:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

Part 2 Products

2.1 MATERIALS

.1 Supply paint materials for paint systems from single manufacturer.

.2 Conform to latest MPI requirements for painting work including preparation and priming.

.3 Materials in accordance with MPI - Architectural Painting Specification Manual "Approved Product" listing.

.1 Use MPI listed materials having E2 rating where indoor air quality requirements exist.

.2 Primer: VOC limit 100 g/L maximum to GS-11.

.3 Paint: VOC limit 100 g/L maximum to GS-11.

.4 Colours:

.1 Submit proposed Colour Schedule to NCC Representative for review.

.2 Base colour schedule on selection of 5 base colours and 3 accent colours.

.5 Mixing and tinting:

.1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations. Obtain written approval from NCC Representative for tinting of painting materials.

.2 Use and add thinner in accordance with paint manufacturer's recommendations.

.1 Do not use kerosene or similar organic solvents to thin water-based paints.

.3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.

.4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

.6 Gloss/sheen ratings:

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level-Category	**Gloss @ 60 degrees**	**Sheen @ 85 degrees**
Gloss Level 1 - Matte Finish	Max. 5	Max. 10
Gloss Level 2 - Velvet	Max.10	10 to 35
Gloss Level 3 - Eggshell	10 to 25	10 to 35
Gloss Level 4 - Satin	20 to 35	min. 35
Gloss Level 5 - Semi-Gloss	35 to 70	
Gloss Level 6 - Gloss	70 to 85	
Gloss Level 7 - High Gloss	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

.7 Exterior painting:

.1 Dressed Lumber: window and window frames, casings, battens, smooth facias, etc.

.1 EXT 6.3B - Alkyd G5 finish.

.8 Interior Painting:

.1 Metal Doors and Frames:

.1 INT 5.3A latex - G5 finish.

.1 One (1) coat bonding primer – MPI#26.

.2 Two (2) coats latex– MPI#54 (G5).

.2 Dressed Lumber: doors, door and window frames, casings, mouldings, etc.:

.1 INT 6.3A - Latex G5 finish. New wood windows to be painted by the window trade.

.3 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock" type material, etc.

.1 INT 9.2A - Latex G1 (ceilings) G3 (walls) finish (over latex sealer).

.1 One (1) coat bonding primer – MPI#50.

.2 Two (2) coats latex– MPI#52 (G3), MPI#53(G1).

Part 3 Execution

3.1 GENERAL

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.

.2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual except where specified otherwise.

3.2 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to NCC Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

.1 Protection of in-place conditions:

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by NCC Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.2 Surface Preparation:

.1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.

.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of NCC Representative.

.4 Clean and prepare existing exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and surface debris by brushing, wiping with dry, clean cloths, or compressed air.

.2 Wash surfaces with a biodegradable detergent (and bleach where applicable) and clean warm water using a stiff bristle brush to remove dirt, oil and surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Use trigger operated spray nozzles for water hoses.

.5 Allow surfaces to drain completely and to dry thoroughly.

.6 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.

.7 Many water-based paints cannot be removed with water once dried. However, minimize the use of kerosene or such organic solvents to clean up water-based paints.

.5 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual specific requirements and coating manufacturer's recommendations.

.6 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.7 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.

.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.3 Tint filler to match stains for stained woodwork.

.8 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.9 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

.10 Touch up of shop primers with primer as specified.

3.4 EXISTING CONDITIONS

.1 Prior to commencing work, examine site conditions and existing exterior substrates to be repainted and report in writing to NCC Representative damages, defects, unsatisfactory or unfavourable conditions of surfaces that will adversely affect this work.

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to NCC Representative. Maximum moisture content not to exceed specified limits.

.3 No repainting work to commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.

.4 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in the MPI Maintenance Repainting Manual. MPI DSD ratings and descriptions are as follows:

Condition	Description

Condition	Description
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (indicating fading; gloss reduction, slight surface contamination, minor pin holes and scratches).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, and staining).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required).

3.5 APPLICATION

.1 Paint only after prepared surfaces have been accepted by NCC Representative.

.2 Use method of application approved by NCC Representative.

.1 Conform to manufacturer's application recommendations.

.3 Apply coats of paint in continuous film of uniform thickness.

.1 Repaint thin spots or bare areas before next coat of paint is applied.

.4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.5 Sand and dust between coats to remove visible defects.

.6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.7 Finish inside of cupboards and cabinets as specified for outside surfaces.

.8 Finish closets and alcoves as specified for adjoining rooms.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.10 Mechanical/Electrical Equipment:

.1 Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.

.2 Do not paint over nameplates.

.3 Keep sprinkler heads free of paint.

.4 Paint fire protection piping red.

.5 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.6 Paint natural gas piping yellow.

.7 Paint both sides and edges of backboards for telephone and electrical equipment before installation.

.1 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.11 Standard of Acceptance:

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.6 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Place paint, stains, primer defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

END OF SECTION

SECTION 13155 – DECORATIVE POOL SYSTEMS

PART 1 – GENERAL REQUIREMENTS

1.1 CONFORMANCE

A. Conform to Division 1 – General Requirements

1.2 DESCRIPTION

A. Description of Work:

1. The work described in this section includes the design, supply, supervision, labor, transportation, temporary construction, equipment, tools, services and incidentals to install the mechanical and electrical systems for the NCC Residence Front Entrance water features as detailed on the drawings and this specification prepared by The Waterworx Company. Provide start-up assistance, maintenance manuals, replacement parts and instruction to Owner for water feature care and operation.
2. It is the responsibility of the Contractor to provide all programming, software services, programming implementation, programming adjustments, and on-call software and programming adjustments (as needed to correct malfunctions for a one (1) year period of time commencing with the date of substantial completion of the completed fountain system). All references to the “Programming” in these specifications obligate the contractor for all specified services.
3. The Contractor shall produce and provide a daily program where there are a variety of jet configurations using 5 set water heights (above the finished grade) as follows;
    1. Off (0mm ht.)
    2. Very Low (25mm ht.)
    3. Low (300 mm ht.)

4. Medium (900mm ht.)
5. Tall (2000 mm ht.)

4. The general intent is to have the fountain "wake up" gradually over the day with more frequent height changes during visitors' hours to create different fountain looks and water experiences. On the hour, every hour from 8am to 12am, is marked by the jets rising up over 5 seconds to tall height, standing for 15 seconds beginning on the hour before dropping down over 5 seconds to the very low height for 5 seconds. With the exception of the on the hour program, the transition time to change from one height to another is to be 5 seconds. This applies to both the raising and lowering of the jets. If two interval heights are to be changed (e.g. very low to medium or tall down to low then the transition time is to be 10 seconds.

2. The Contractor shall provide the following programs for the fountain:

Night Program
12:01AM to 7:00AM - Filtration and water treatment systems on, lights off, jets off.

Day Program
7:00AM to 6:00PM. Filtration and water treatment systems on, lights off, jets on at the following:

7AM to 8AM - Jets on Very Low,
8AM to 8:00:30 - 8:00AM to 8:00:05AM Jets to Tall
8:00:05AM to 8:00:20AM - Jets on Tall
8:00:20AM to 8:00:25AM - Jets to Very Low,
8:00:25AM to 8:00:30AM Jets on Very Low
8:00:30AM to 9AM - Jets on Low
9AM to9:00:05AM Jets to Tall
9:00:05AM - 9:00:20AM - Jets on Tall
9:00:20AM to 9:00:25AM - Jets to Very Low
9:00:25AM to 9:00:30AM - Jets on Very Low
9:00:30AM to 10AM - Jets on Medium
10:00AM to10:00:05AM Jets to Tall
10:00:05AM to 10:00:20AM - Jets on Tall
10:00:20AM to 10:00:25AM - Jets to Very Low
10:00:25AM to 10:00:30AM - Jets on Very Low
10:00:30AM to 10:15AM - Jets on Low
10:15AM to 10:30AM – Jets on Medium
10:30AM to 10:45AM - Jets on Low

10:45AM to 11:00AM – Jets on Medium
11:00AM to11:00:05AM - Jets to Tall
11:00:05AM to 11:00:20AM - Jets on Tall
11:00:20AM to 11:00:25AM - Jets to Very Low
11:00:25AM to 11:00:30AM - Jets on Very Low
11:00:30AM to 11:15AM - Jets on Low
11:15AM to 11:30AM – Jets on Medium
11:30AM to 11:45AM - Jets on Low
11:45AM to 12:00PM – Jets on Medium
12:00PM to 12:00:05PM - Jets to Tall
12:00:05PM to 12:00:20PM - Jets on Tall
12:00:20PM to 12:00:25PM - Jets to Very Low
12:00:25PM to 12:00:30PM - Jets on Very Low
12:00:30PM to 12:05PM - Jets on Low
12:05PM to 12:10PM - Jets on Medium
12:10PM to 12:15PM - Jets on Tall
12:15PM to 12:20PM - Jets on Medium
12:20PM to 12:25PM - Jets on Low
12:25PM to 12:30PM - Jets on Medium
12:30PM to 12:35PM - Jets on Tall
12:35PM to 12:40PM - Jets on Medium
12:40PM to 12:45PM - Jets on Tall
12:45PM to 12:50PM - Jets on Medium
12:50PM to 12:55PM - Jets on Low
12:55PM to 1:00PM - Jets on Very Low
1:00PM to 2:00PM - Repeat the 12:00PM to 1:00PM program
2:00PM to 2:00:05PM - Jets to Tall
2:00:05PM to 2:00:20PM - Jets on Tall
2:00:20PM to 2:00:25PM - Jets to Very Low
2:00:25PM to 2:00:30PM - Jets on Very Low
2:00:30PM to 2:15PM - Jets on Low
2:15PM to 2:30PM - Jets on Medium
2:30PM to 2:45PM - Jets on Tall
2:45PM to 2:59PM – Jets on Medium
2:59PM to 3:00PM – Jets on Low
3:00PM to 4:00PM – repeat the 2:00PM to 3:00PM program
4:00PM to 5:00PM – repeat the 2:00PM to 3:00PM program
5:00PM to 6:00PM – repeat the 2:00PM to 3:00PM program
6:00PM to 7:00PM – repeat the 2:00PM to 3:00PM program.

Evening Program

7:00PM to 12:00AM - Filtration and water treatment systems on, lights on and jets on at variety of heights as follows:

7:00PM to 7:00:05PM - Jets to Tall
7:00:05PM to 7:00:20PM - Jets on Tall
7:00:20PM to 7:00:25PM - Jets to Very Low
7:00:25PM to 7:00:30PM - Jets on Very Low
7:00:30PM to 7:15PM - Jets on Low
7:15PM to 7:30PM - Jets on Medium
7:30PM to 7:45PM - Jets on Low
7:45PM to 7:59PM – Jets on Medium
7:59PM to 8:00PM – Jets on Low
8:00PM to 9:00PM – repeat the 7PM to 8PM program
9:00PM to 10:00PM – repeat the 7PM to 8PM program
10:00PM to 11:00PM – repeat the 7PM to 8PM program
11:00PM to 12:00AM – repeat the 7PM to 8PM program.

Windy Conditions Day Program
7:00AM to 7:00PM on windy days. Filtration and water treatment systems on, lights on and jets on at variety of heights as follows:

7:00AM to 10:00AM - Jets on Low
10:00AM to 11:00AM - Jets on Medium
11:00AM to 11:15AM - Jets on Low
11:15AM to 11:30AM - Jets on Medium
11:30AM to 11:45AM - Jets on Low
11:45AM to 12:00PM - Jets on Medium
12:00PM to 12:05PM - Jets on Low
12:05AM to 12:10PM - Jets on Medium
12:10AM to 12:15AM - Jets on Low
12:15PM to 12:20PM - Jets on Very Low
12:20PM to 12:25PM - Jets on Low
12:25PM to 12:30PM - Jets on Medium
12:30PM to 12:35PM - Jets on Low
12:35PM to 12:40PM - Jets on Very Low
12:40PM to 12:45PM - Jets on Low
12:45PM to 12:50PM - Jets on Medium
12:50PM to 12:55PM - Jets on Low
12:55PM to 1:00PM - Jets on Medium
1:00PM to 2:00PM - Repeat the 12:00PM to 1:00PM program
2:00PM to 2:15PM - Jets on Low
2:15PM to 2:30PM - Jets on Medium
2:30PM to 2:45PM - Jets on Low

2:45PM to 3PM – Jets on Very Low
3:00PM to 4:00PM – repeat the 2:00PM to 3:00PM program
4:00PM to 5:00PM – repeat the 2:00PM to 3:00PM program
5:00PM to 6:00PM – repeat the 2:00PM to 3:00PM program
6:00PM to 7:00PM – repeat the 2:00PM to 3:00PM program.

Windy Conditions Evening Program
7:00PM to 12:00AM - On windy days. Filtration and water treatment systems on, lights on and jets on at variety of heights as follows:

7:00PM to 7:05PM - Jets on Low
7:05PM to 7:10PM - Jets on Medium
7:10PM to 7:15PM - Jets on Low
7:15PM to 7:20PM - Jets on Very Low
7:20PM to 7:25PM - Jets on Low
7:25PM to 7:30PM - Jets on Medium
7:30PM to 7:35PM - Jets on Low
7:35PM to 7:40PM - Jets on Very Low
7:40PM to 7:45PM - Jets on Medium
7:45PM to 7:50PM - Jets on Low
7:50PM to 7:55PM - Jets on Very Low
7:55PM to 8:00PM - Jets on Medium
8:00PM to 9:00PM - Repeat 7PM to 8PM program
9:00PM to 10:00PM - Repeat 7PM to 8PM program
10:00PM to 11:00PM - Repeat 7PM to 8PM program
11:00PM to 11:15PM - Jets on Low
11:15PM to 11:30PM - Jets on Medium
11:30PM to 11:45PM - Jets on Low
11:45PM to 12:00AM - Jets on Very Low.

Override Program
Lighting and jet programs are manually overridden to suit special events. Filtration and water treatment systems remain on.

B. Description of the Water Features

1. General

a) The Front Entrance Fountain consists of a circular infinity-edge pool with water jets and lights. The pool floor is a suspended stone and stainless steel grating system with openings for the nozzles and lifting points .
b) The fountain is protected from splashing outside the pool area due to high winds by a wind sensing device which signals the fountain programmer to reduce motor speeds to lower the fountain sprays and initiate programs that suit the windy conditions.
c) The equipment room which houses the controls, pumps and water treatment systems for the fountain will be located directly below the fountain.
d) The jet programs will typically operate as an immersive, barrier free water feature during the day, a formal fountain in the evening and as a reflecting pool at night.
e) Due to the fact the water feature is an interactive feature and accessible to the public, the operating pressure of the jets are not to exceed 14 fps (feet per second) to avoid any potential injury to persons as they interact with the feature.
f) All components are specifically designed to be flush-mounted into the suspended deck to provide a safe environment to persons as they interact with the feature.
g) The nozzle arrangement and associated equipment are to be arranged so each jet operates uniformly and is fully controllable with smooth, even level changes with all jets capable of leveling out to the same level within a tolerance of 25 millimeters. No stepping will be accepted and no variation in the minimum and maximum jet heights will be accepted.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Specification Sections including

1. Division 2 Site Work
2. Division 3 Concrete
3. Division 4 Masonry
4. Division 5 Metals
5. Division 7 Thermal and Moisture Protection
6. Division 9 Finishes
7. Division 22 Plumbing
8. Division 23 Heating Ventilating, and Air Conditioning.
9. Division 25 Integrated Automation.

10. Division 26 Electrical.

A. Related Work Specified Elsewhere:

1. Power Supply – Refer to drawings for characteristics of power requirements to water feature equipment, including fused main disconnect switches or circuit breakers for power supply line disconnect. Power supply is to be brought to the line side of fountain control panel by Division 26.
2. Water Supply – Refer to drawings for characteristics of water supply requirements to water feature equipment. Positive pressure backflow preventer and shut-off valve in equipment space to be provided by Division 22.
3. Drainage – Refer to drawings for pool and equipment space drainage requirements. Drains and drainage in equipment room by Division 22.
4. Bonding – Water features require loop bonding as per Canadian Electric Code requirements.
5. Ventilation – Equipment room to have forced air ventilation by Division 23.
6. Lighting and Receptacle – Equipment room to have adequate lighting and power receptacle by Division 26.

1.4 QUALITY ASSURANCE

A. General: Quality Control shall be assisted on this project by the following required procedures:
1. Performance of all work according to applicable codes and standards
2. Performance of all work according to applicable municipal, provincial, and national codes along with applicable and proper permits.
3. Use of qualified personnel
4. Proper submittals as required by these Specifications and General Conditions.

5. Use of proper materials and equipment
6. Final project demonstration and review.

B. Regulatory Requirements

1. Plumbing Code – For plumbing work included in the water feature work, comply with Ontario Plumbing Code and National Plumbing Code of Canada.
2. Electrical Code – For electrical work included in the water feature work, comply with Local Codes and the Canadian Electrical Code.
3. All work must meet or exceed the latest standards for local building code, electrical safety code, health and safety codes and all other applicable codes and regulations set by jurisdictional authorities.

C. Qualifications

1. The Contractor shall use only experienced workers that are skilled in the trade involved. Such workers shall be “certified” according to a prescribed and properly documented procedure.
2. All work sub-contracted by the principal Contractor shall be announced at the time of bid. Declaration shall include source of sub-trade, and that scope of work. The NCC Representative, at its sole discretion, reserves the right to review and approve the specific use of outside Contractors in accordance with the experience and qualifications listed in this Section.
3. In addition, special qualifications are required as follows:
   a) *Equipment Supplier*s: The equipment suppliers for the specialty components, as identified on the Equipment List on the drawings, shall have a minimum 10 years experience in the fabrication and supply of automated fountains. For experience purposes, an automated fountain is defined as:

1. Automated water effects performing a variety of tasks, intermittent and directed operation.
2. A combination of nozzles and lighting synchronization at a demonstrated level similar to this fountain.

The equipment suppliers shall work closely with the installer throughout the construction and commissioning of the water features to ensure proper installation, application, testing and adjustment of equipment.

D. Coordination

1. Pre-Installation Conference – The Contractor shall coordinate a pre-installation conference at the project site to be attended by the NCC Representative.
2. Coordinate water feature work with the work of other trades, for proper time and sequence to avoid construction delays.
3. Coordinate waterproofing test with waterproofing trades along with the fixing of all specialty water feature equipment that penetrate the waterproof envelope. It is the responsibility of the waterproofing contractor to remove and re-install all clamps and fasteners of specialty water feature equipment that penetrates the waterproof envelope.
4. Before starting any fountain filtration or water treatment system, a Manufacturer's Representative of the equipment shall be present at the job site to inspect the equipment and authorized the initial startup of the equipment. All expenses incurred to provide these certifications are the responsibility of the Contractor.
5. Start-Up – The fountain equipment suppliers shall supply qualified personnel with a minimum of five (5) years experience to supervise start-up and programming of water features and equipment.
6. Coordinate training of NCC Representative on the maintenance and operations of the water features including start up and operations procedures, daily, weekly and monthly

maintenance activities, programming and winterizing. The Contractor shall supply qualified personnel with a minimum of five (5) years experience to provide the training and shall conduct the training sessions in the presence of the NCC Representative.

E. Submittals

1. Samples – Submit samples in accordance with Specifications, in color and finish selected. Samples shall be prepared with materials and to thicknesses specified.
2. Product Data – Submit manufacturer's product specifications and installation instructions for complete water feature system, including all pipe work, valves and fittings, pipe work & plumbing isolators & hangers and for each component or product used in system. Include complete listing and description of performance and control product data. Submit manufacturer's product specifications and installation characteristics, clearly indicating wherein actual components will be in any way modified from requirements, and how these differences exceed minimum requirements.
3. Construction and Shop Drawings – Submit shop drawings of entire water feature mechanical and electrical systems. Include piping and wiring control diagrams, light fixtures, drains, filters and various parts of the system. Show plan locations, required rough-in's, anchoring and building-in requirements, and all details of penetrations of waterproofing.
4. Inspection Certification and Test Reports – Provide 2 certified copies of all Inspection Certifications and Reports as required by regulatory agencies and these Specifications. Provide test records and summaries containing "as-installed" performance and operational data including water flow rates, pressures, motor currents, lighting circuit currents, etc. All tests must be witnessed by NCC Representative. Provide certified test reports clearly indicating compliance with performance requirements specified.

5. Provide completed Pre-Startup Checklist included in these Specifications three (3) business days prior to beginning of scheduled fountain startup. See attached document in Appendix 1.
6. Maintenance Manuals – Submit three (3) copies of bound maintenance manuals for water feature(s). Include full maintenance and operating instructions, parts, lists, recommended spare parts and emergency parts inventory, sources of purchase for major and critical components and similar information. Include mechanical and electrical certification from authorities having jurisdiction.

F. Use of Proper Materials and Equipment

1. The contractor shall use only approved materials and equipment.

1.5 PRODUCT HANDLING AND PROTECTION

A. Handle and store materials in accordance with manufacturer's directions. Arrange for suitable storage areas.

B. Be responsible for damage to work until project is complete and accepted by NCC Representative. Make good damaged materials.

C. Cover and protect work of other sections in the area of work from damage. Make good all damage to the satisfaction of NCC Representative.

D. Provide special protective devices, caps, plugs and covers for exposed fountain hardware during construction period.

1.6 WATER TIGHTNESS TEST

Test pool and piping for water tightness prior to installing finishes. Test must be performed to waterproofing manufacturer's recommendations. Test must be witnessed by Owner's Representative. Minimum five (5) days notice in writing must be given to all parties prior to test.

1.7. PRODUCTS

A. Where practical, the product of a single manufacturer for each type category of material or equipment shall be utilized throughout as rectified under this Section.

B. All equipment and materials shall be capable of both continuous and intermittent duty rating and operation.

C. All materials and equipment shall be new, undamaged, and fully protected throughout the construction period in order than all equipment and materials shall be in perfect condition at the time of acceptance of the facility by the NCC.

D. It shall be responsibility of the contractor to replace any damaged equipment or materials furnished within the scope of his work.

PART 2 – PRODUCTS

2.1 GENERAL

A. The drawings indicate control and flow diagrams explaining the intended water feature operations. Diagrams are for information only; verify all equipment and connections are suitable for intended purpose.

B. Establish final sizes of equipment and connections based on manufacturer's equipment complying with intended purpose.

C. Schedules on drawings indicate principle required equipment of the water feature system and product numbers of one manufacturer indicate minimum acceptable quality. Final equipment configuration, including required quantities is the responsibility of the water feature equipment supplier.

2.2 SPECIALIZED EQUIPMENT

A. General

1. All specialty equipment, as indicated on the equipment list on the drawings, shall be single-source supplied from a supplier with a minimum of 10 years experience in supplying specialty fountain components and systems. Due to the specialized nature of the water feature's operational system, only specific components will be eligible for substitution. Note that only substitutions authorized and approved in writing by the NCC Representative may be used.
2. All specialized water feature materials used in mechanical and electrical systems shall be first quality lines, non-corrosive, separated from dissimilar metals, long lasting types having full C.S.A. or C.U.L. Certification where necessary. All submersible and cast-in items in the pools will be constructed of bronze, copper, 316 stainless steel or where otherwise noted in this specification.

3. The layout and dimensions of specialty components have been used by the Water Feature Consultant. Any changes will require the contractor to provide the additional design and engineering necessary to allow review and approval by the Water Feature Consultant. The following will apply for all changes:

a) The Contractor shall assume full responsibility for additional expenses as required in any way to design and meet changes from the original materials or equipment specified.

b) No substitution will be considered unless there is a substantial benefit to the NCC.

B. Mention of Brand

1. The naming of a certain brand or manufacturer on the drawings or in the specifications is to establish a quality and performance standard for the article desired. Due to the specialized nature of the majority of equipment required to provide a fully-programmed operational system, only specific components will be eligible for substitution. Note that only substitutions authorized and approved in writing by the NCC Representative may be used.

2. Approved Manufacturers:

Pumps:	Peerless or approved equal. Water
Treatment:	Vissers Sales or approved equal.
Filtration Tanks:	PAC Fab, Sta-rite or approved equal
Inlets and Drains:	DEFO or approved equal.
Nozzles:	DEFO or approved equal.
Submersible Junction boxes:	DEFO or approved equal.
Suction and Discharge Strainers:	DEFO or approved equal.
Control Panels	E.A. Electric Inc. or approved equal.
Stainless Steel gratings:	Hendricks Grating Co. or approved equal.

C. Equipment List

1. Drawings and installation specifications are based on manufacturer's literature. Manufacturers shall comply with the minimum quality standard of material and detailing indicated on the drawings or specified herein. The following is a list of the equipment as outlined on the drawings and on the equipment list on the drawings:

Item 1: Bronze Cascade nozzle with swivel and 75mm N.P.T. inlet connection. Nozzle to be capable of operating to a height of 3 metres above pool finishes through kadee 98 grating. Height to be adjusted through variable frequency drive based on program and wind conditions. DEFO NCA-300LSSP model (Quantity of 1).

Item 2: Bronze pool penetrating fitting with membrane for pool waterproof membrane and under deck clamp 75mm N.P.T. inlet connection. DEFO DTS-300LUSP model (Quantity of 1).

Item 3: 10 hp 575 volt, 3 phase, Premium Efficiency, TEFC, inverter duty rated, base mounted motor with end suction centrifugal close coupled pump with flanged connections, rated for a flow of 200 gallons per minute at the nozzle. Pump supplier to confirm head requirements based on installed pipework and fittings. (Pump no.1). Motor to be rated for use with variable frequency drive (Quantity of 1).

Item 4: Large Area Basket Strainer with drain connection rated for flow of 200 gallons per minute. DEFO ATS-400FSP model (Quantity of 1).

Item 5: Bronze pool suction fitting with large area basket strainer and anti-vortex plate. Strainer complete with membrane clamp for pool membrane and under deck clamp. DEFO DSA-400LUSP model (Quantity of 2).

Item 6: Bronze Cascade nozzle with swivel and 50mm N.P.T. inlet connection. Nozzle to be capable of operating to a height of 2 metres above pool finishes through Kadee 98 grating. Height to be adjusted through variable frequency drive based on program and wind conditions. DEFO NCA-200LSSP model (Quantity of 4).

Item 7: Bronze pool penetrating fitting with membrane for pool waterproof membrane and under deck clamp 50mm N.P.T. inlet connection. DEFO DTS-200LUSP model (Quantity of 4).

Item 8: 10 h.p. 575 volt, 3 phase, Premium Efficiency, TEFC, inverter duty rated, base mounted motor with end suction centrifugal close coupled pump with flanged connections, rated for a flow of 300 gpm at nozzles. Pump supplier to confirm head requirements based on installed pipework and fittings. (Pump no.2). Motor to be rated for use with variable frequency drive (Quantity of 1).

Item 9: Large Area Basket Strainer with drain connection rated for flow of 300 gpm. DEFO AST-600FSP model (Quantity of 1).

Item 10: Bronze pool suction fitting with large area basket strainer and anti-vortex plate. Strainer complete with membrane clamp for pool membrane. DEFO DSA-600LUSP model (Quantity of 2).

Item 11: Bronze plume type nozzle with flow straightener, swivel and 1" N.P.T. inlet connection. Nozzle to be capable of operating to a height of 2 metres. Height to be adjusted through variable frequency drive based on program and wind conditions. DEFO NEA-100SP model (Quantity of 70).

Item 12: Spray Ring to be custom manufactured from 4" diameter Schedule 80 P.V.C. or stainless steel. Spray ring pipe distribution manifold with (8) supply connection couplings and (70) equally spaced couplings for nozzles. Manifold complete with support brackets and 40mm clean out plugs on bottom located between each supply connection. Manifold complete with saddle supports for light fixtures between nozzles. (Quantity of 1).

Item 13: Bronze pool penetrating fitting with membrane for pool waterproof membrane and under deck clamp 100mm N.P.T. inlet connection. DEFO DTS-400LUSP model (Quantity of 8).

Item 14: 20 h.p. 575 volt, 3 phase, Premium Efficiency, TEFC, inverter duty rated, base mounted motor with end suction centrifugal close coupled pump with flanged connections, rated for a flow of 1050 gpm at nozzles.
Pump supplier to confirm head requirements based on installed pipe work and fittings. (Pump no.3). Motor to be rated for use with variable frequency drive (Quantity of 1).

Item 15: Large Area Basket Strainer with drain connection rated for flow of 500 gpm. DEFO AST-800FSP model (Quantity of 1).

Item 16: Bronze pool suction fitting with large area basket strainer and anti-vortex plate. Strainer complete with membrane clamp for pool membrane and under deck clamp. DEFO DSA-400LUSP model (Quantity of 8).

Item 17: Bronze pool inlet fitting with distribution 'T' and membrane clamp. DEFO DSA-300LSP model (Quantity of 2).

Item 18: Polymeric 30" diameter sand filter with six position multi valve and sand media as required. Filter flow rated for 80 gallons per minute. Triton model TR100 (Quantity of 2).

Item 19: 7.5 hp 208 volt, 3 phase, Premium Efficiency, TEFC, inverter duty rated, base mounted motor with end suction centrifugal close coupled pump with flanged connections, rated for a flow of 160 gallons per minute at pool inlets. Pump

supplier to confirm head requirements based on installed pipe work and fittings. Pump no.4 (Quantity of 1).

Item 20: Large Area Basket Strainer with drain connection rated for flow of 100 gpm. DEFO AST-400FSP model (Quantity of 1).

Item 21: Bronze reservoir suction fitting with anti-vortex plate. Drain complete with membrane clamp for pool membrane. DEFO DTS-400LSP model (Quantity of 1).

Item 22: High Efficiency Ultra Violet water treatment packaged unit complete. Unit to have electropolish 316L stainless steel UV reactor. Visser model VSCSP03A30L4MTB-1-4. (Quantity of 1).

Item 23: Skid mounted Automated chlorine based water treatment unit including dosing pumps, metering pumps, ORP-PH probes, booster pump as required solenoid control valve, chemical feed tanks and chlorine mixing / solution system. Visser model CHLO TAB 3150-BC-NP-024 model (Quantity of 1).

Item 24: Brass auto fill valve 1” diameter. DEFO AVQ-100BSP model (Quantity of 1).

Item 25: Bronze and copper combination pool overflow and pool drain fitting with taper fit standpipe. Overflow complete with membrane clamp for pool membrane and under deck clamp. DEFO DOA-400LUSP model (Quantity of 2).

Item 26: Bronze pool suction fitting with anti-vortex plate. Drain complete with membrane clamp for pool membrane. DEFO DSA-800LSP model. (Quantity of 2).

Item 27: Stainless steel grating as outlined on drawing FO-07 rated for HS20 truck loading. Hendrick circular grate.

Item 28: Stainless steel grating as outlined on drawing FO-07 rated for HS20 truck loading. Hendrick circular grate.

Item 29: Bronze reservoir inlet fitting with membrane clamp for reservoir membrane. DEFO DTS-800LSP model (Quantity of 2).

Item 30: Bronze 60 watt white light low profile free standing LED light fixture rated for 120 volt operation. Fixture complete with convex cast glass clear lens, 9 ft. of cord and lens guard. DEFO LEDA020 model (Quantity of 8).

Item 31: Bronze electrical junction box complete with cord seals for light fixtures. DEFO EBJ-208 model (Quantity of 1).

Item 32: Red brass and bronze electrical stub-up complete with membrane clamp for pool membrane and under deck clamp. DEFO EPC-100 model (Quantity of 1).

Item 33: Bronze 28 watt white light low profile free standing LED light fixture rated for 12 volt AC operation. Fixture complete with convex cast glass clear lens, 9 ft. of cord and lens guard. Fixture complete with 316 stainless steel mounting bracket for mounting on top of manifold. DEFO LED0400003SP model (Quantity of 70).

Item 34: Bronze electrical junction box complete with cord seals for light fixtures. DEFO EBJ-208 model (Quantity of 10).

Item 35: Red brass and bronze electrical stub-up complete with membrane clamp for pool membrane and under deck clamp. DEFO EPC-100 model (Quantity of 10).

Item 36: Bronze and brass floor mounted triple function water level sensor with adjustable float switches for static dynamic and safe off water levels. DEFO ESS-300 model (Quantity of 1).

Item 37: Bronze electrical junction box complete with cord seals for light fixtures. DEFO EBJ-204 model (Quantity of 1).

Item 38: Red brass and bronze electrical stub-up complete with membrane clamp for pool membrane and under deck clamp. DEFO EPC-100 model (Quantity of 1).

Item 39: Bronze and brass floor mounted dual function water level sensor with adjustable float switches for static dynamic and safe off water levels. DEFO ESS-200 model (Quantity of 1).

Item 40: Bronze electrical junction box complete with cord seals for light fixtures. DEFO EBJ-202 model (Quantity of 1).

Item 41: Red brass and bronze electrical stub-up complete with membrane clamp for pool membrane and under deck clamp. DEFO EPC-075 model (Quantity of 1).

Item 42: Wind control unit complete with anemometer, 300 ft. of shielded cable as supplied by manufacturer, and control panel. DEFO ECW model series (Quantity of 1).

Item 43: The water feature control panel will be supplied as (2) separate panels (Main Control panel and Motor Control Panel) located in the electrical room within the main building. Local disconnects are required in the equipment room below the water feature for each pump.

C. Water Feature Main Control Panel: Mounted in a Nema 12, 316 stainless steel enclosure and complete with Main Disconnect, lighting start contactor, fused 120 vac 15 amp circuit for U.V. , fused 120 vac 15 amp circuit for chemical treatment system, Horner PLC/HMI controller, Triple water level controller, single water level controller, wind sensor unit, quick fill solenoid, E-stop push button relay, system ON pilot light, 24vac LED power supply for (70) 3 watt light fixtures, GFCI protection for (8) 60 watt 120 vac LED submersible light fixtures, Nema 12 vent package, assorted wire, din rail fusing and terminals, control design drawings and manuals, custom program with TOD, VFD speed control, ;eve; and fill controls and alarm status.

D. Motor Control Panel: Mounted in a Nema 12 steel enclosure and complete with Main disconnect, (3) 575 volt 10hp variable frequency drives for feature pumps, (1) 575 volt 2 hp contactor and overload for filtration pump, E-stop push button, system on pilot light, H/O/A/ switches for pumps, analog remote IO for VFD speed control, digital remote IO for pump control, Nema 12 vent package, assorted wire, din rail fusing and terminals, control design drawings and manuals, custom program with TOD, VFD speed control, ;eve; and fill controls and alarm status. Supplier to include for programmer to be at site for (4) days to adjust final program as required by owner and owners representative. Refer to section 2.3 for requirements of equipment to be used in control panels.

2.3 AUTOMATED CONTROL SYSTEMS – GENERAL

A. The fountain control system for each water feature and associated machine room is a custom control and operator interface specifically design for operating and controlling water features.

B. All fountain control panels shall be manufactured by the same source for ease of operation and maintenance.

C. Each system comprises of the following elements:

Motor control Center (MCC) includes:

1. Main disconnect and fusing
2. All Invertors and VFD's
3. Control integration and communication systems
4. All load points for system panels
5. All starters and contactors. Starters to be complete with Veris H-931 Current Sensors.

Fountain Control Panel:

1. Computer systems
2. Logic controllers
3. I/O points for field termination of sensors and controls
4. Control of all automated nozzles
5. Connection points for BAS and BMS. BAS must be able to have Enable/Disable control of the water feature. Provide for status of pump operation, fountain water level alarms, water treatment system status and alarms.
6. Sequencers

Sequencing controller

1. Storage and playback of sequences
2. connection to other fountain rooms
3. Programming systems
4. Internet and telephone systems

Lighting control panels

1. Control systems for lighting control sub panels
2. Integration control for building lighting
3. Opto isolation or connection to sub panels
4. DMX control arbitrator

Lighting Transformer panels

1. Local transformer panels and communication centers to control lighting systems
2. load terminals for all in fountain lighting control modules
3. fusing for lighting control boxes
4. Communication and feedback for lighting system

D. All panels are linked and use identical protocols.

E. All panels are to be assembled and connected to each other at the factory. The entire system is to be tested prior to shipping to site.

F. All water feature control panels described herein shall be provided by a single source manufacturer to ensure full compliance with the design intent and contract specifications.

2.4 MOTOR CONTROL CENTER (MCC)

A. Enclosure

1. All Drives shall be enclosed in one main MCC and shall conform to governing codes for use in the mechanical room environment.
2. Drives and enclosure shall be C.S.A. / cUL approved.
3. Drive and enclosures including sizing and load draws shall be submitted to the Engineer for review and approval prior to purchase.
4. The MCC shall have enough free space/bays to allow for inclusion of PLC output modules, and interface.

B. The MCC at a minimum shall be equipped with the following minimum items:

1. Main Disconnect.
2. Individual Drive Disconnects
3. Individual RUN lights
4. Individual Hand Off Auto Selector Switches.
5. Fan and ventilation as required.
6. All Starters and overloads shall be included in this MCC with Veris H-931 current sensors.

G. The MCC shall be installed to allow operators working on pumps and motors a free and clear view of the front side (controls side) of the MCC during his performance of work and maintenance or serviceman disconnects shall be provided.

H. Provide local lockable disconnect for each pump located in the equipment vault below the water feature. Disconnect to be Square D or approved equivalent.

2.5 AUTOMATED PROGRAMABLE LOGIC SEQUENCER AND CONTROL SYSTEM

A. This specification describes the functional requirements, design features, hardware, software, performance, services, and documentation required for programmable logic control system. For the purposes of this specification, a programmable logic control system is defined as one that provides a robust, secure, cost-effective, and flexible solution with easy-to-use hardware and software. The specific programmable logic controller specifications shall be submitted to the Engineer for a complete review and approval.

B. The programmable logic control system shall Provide as a minimum the following functions as defined in the specific sections of this specification:

1. Integrated Alarms and Events
2. User friendly operator interface
3. Data ports for a modem connection
4. Producer Requirements: The Technical Producer shall be a recognized leader in Fountain Control capable of supplying all necessary support services including hardware and software support, system installation and commissioning, and on-going support.

C. Applicable Codes: The integrated controller described in this specification shall be intended for use in a below-grade equipment room environment.

D. System Architecture: The programmable logic control system shall be based around a utilizing industry standard operating systems, and protocols. The protocols required shall include

CsCAN, Device Net, CAN TCPIP, DMX 512a. Refer to the Project Drawings for system layout. Refer to feature design narrative and Control method statement document for description of operation parameters.

E. Integrated Controllers

The integrated controller shall be capable of handling the following control requirements:

1. Continuous processes control
2. Discrete operations
3. Machine control
4. Animation and choreographic control
5. Lighting systems control

F. Building Control Integration

The open control system must provide a terminal strip (or equivalent) to enable a future connection with a building/facilities control system. (BAS/BMS) The building control system must control the:

1. Ability to control lighting on and off times
2. Monitor wind velocity devices
3. Monitor mechanical rooms fault status
4. Monitor each water features current operating status.
5. Ability to start and stop the features automated program (schedule)

G. Physical Requirements

The programmable logic controller shall be mounted in a chassis (rack) or within a control panel with a power supply, appropriate network interface modules, and I/O modules. The chassis shall be a wall-mountable design for use on sub-panels in enclosures. The chassis' shall also be available in a number of sizes. The power supply shall be separate from the chassis so that it

does not consume any I/O slots. Power supplies shall be available in 220/240 VAC and 24 VDC models. The integrated controller shall be able to survive a power loss of up to four days without loss of memory or programming. Options must be provided for a replaceable battery as well as a rechargeable battery.

2.6 CONTROL RELAYS

A. Control relays shall be "industrial duty" and rated for continuous operation. Each unit shall be 2-pole and equipped with both normally closed and normally open contacts for each pole.

B. A control relay shall be provided to activate the operation of the underwater fountain lights in groups as indicated on the drawings.

C. A control relay shall be provided to de-activate all underwater lights as controlled by a photocell. This will prevent the underwater lights from inadvertently operating during daylight conditions.

D. All voltages above 24 volt must be isolated from control equipment using 24 volt interposing relays.

2.7 VARIABLE FREQUENCY DRIVES (INVERTERS)

A. Provide Variable frequency Drives for each of the features main Pumps sized appropriately for the motor size. Drives shall be manufactured by Danfoss or approved equal. All drives shall include 3% Input Reactors of appropriate size for the Drive.

B. An authorized representative of the drive manufacturer shall commission drives. The commissioning statement shall include all tests provided and comments, of this professional. The system commissioning shall be arranged with this Engineer who shall be present test during commissioning.

C. The VFD's shall be rated to operate within an environment that has a maximum high temperature of 100.4 -deg F. All motors wired to VFD's shall be premium efficiency, in accordance with NEMA MGI part 30 & 31.

2.8 CONTROL SYSTEM INTERFACE

A. Motor Overloads, Variable Frequency Drives (inverters) shall be connected to the Automation Control Center. Connection shall be via a direct line with no splices or joins between points.

B. All Variable Frequency drives shall be equipped to connect to the Automation control Panel via Devicenet or analog interface. The drive manufacture shall ensure the drives are set up to communicate with the fountain control panel in the presence of the Fountain Control Producer and Choreographer to prevent communication problems.

C. Cabling within the MCC shall conform to the same standards as the Automation Control Center.

2.9 FOUNTAIN CONTROL PANEL

A. Enclosure/Panel

1. Main enclosure shall be constructed of Painted Steel.
2. Junction boxes shall be NEMA type 4, non-ventilated. Sub-panels and raceways shall be white or beige.
3. Enclosures shall be sized to provide 20 percent space for future expansion.
4. The control panel shall have a Fused Disconnect Switch.
5. Disconnect switch shall meet the requirements of IEC 947-3. Incoming power conductors shall terminate at the line side of the disconnect switch.
6. Blades will be de-energized when disconnect switch is open.
7. Handle shall be defeatable.
8. Components in enclosures shall be well organized and the wiring routed in raceways.

9. Spacing between components and raceways shall be as per manufacturer's specification for proper ventilation and cooling.
10. Raceway and Ducting shall be no more than sixty (60) percent filled.
11. There shall be ducting on the field side of the terminal strip.
12. All electrical equipment that is mounted in non-ventilated NEMA type 4, 316 stainless steel enclosures designed to operate continually and reliably within an enclosure ambient temperature of $0^{o}C$ to $60^{o}C$.
13. When ventilation or positive pressure within a panel is required, fans with a fine filter shall be used (boxer fans with foam filters are acceptable).

B. Nameplates

Nameplates inside control panels shall be a lamacoid type attached with double sided tape or epoxy glue.

1. The typical nameplate shall be white on a black background.
2. The control panel shall have a nameplate secured to the outside of the panel.
3. It shall contain as a minimum the:
    a) Input power
    b) Manufacturer
    c) Serial number
    d) Manufacturer's contract number and panel number
    e) Manufacturer's phone number
4. Enclosures that are floor mounted shall have a minimum clearance of 300 mm between the floor and any component.

C. Terminal Blocks

1. Provide an adequate number of terminal blocks to provide necessary for a complete and functional system such that:

a) No more than two wires shall be terminated under one terminal screw,

b) The greatest of TEN percent or two extra terminal blocks are provided in all enclosures.

c) All devices to be terminated to a terminal block. Acceptable items are Weidmuller WDU Series or approved equal.

D. Fuses / Protection

1. Provide all necessary fuses for a fully functional system as per NEC or CEC International Electrical Standards or local governing codes.
2. Such that:
   a) High Voltage A/C shall use type J or CC type fuses
   b) VDC fuses shall be of AGC type, using Weidmuller terminal block fuse holders.
3. Provide one U-Ground convenience receptacle fused at 2.5 amps for local programming power. Receptacle is to be on the interior of the panel and labeled “FOR PROGRAMMING ONLY” Provide external Power ON/Emergency Stop Buttons as indicated in the Bill of materials
4. Additional emergency stops requirements:
   c) Emergency Stops shall be a non-illuminated red Push-Pull mushroom head 22-mm buttons.
   d) The equipment shall contain enough emergency stops to disable the machine with minimal effort from all sides.
   e) An emergency stop will be located on the main control panel.
5. Emergency stops will contain two sets of normally closed contacts.
   f) One set will be used in a hard-wired circuit that disables the master control relay.
   g) The other will be wired to a PLC input.
6. Provide “System On” Pilot Light (Green)
   h) This light shall be energized only when the state of the MCR is true, (see below.)
   i) Lights shall be 24 VDC. Lights will be LED’s where available for longer life expectancy.

j) Stack lights shall be placed to be visible to the nearest operators and indicate which portion of the equipment may be malfunctioning.

E. Master Control Relay (MCR)

1. The Master Control Relay (MCR) will be a hard-wired 24 VDC circuit.
2. A “Power On” green illuminated pushbutton will energize the MCR if no emergency stops are pushed.
3. The MCR will enable power to all PLC outputs when energized.
4. The MCR will not control power to the PLC, PLC inputs, DC Power Supply or devices in the emergency circuit.
5. An auxiliary contact on the MCR will be wired to a PLC input to monitor the state of the system.

F. Control Relays

1. Provide additional control relays as required.
2. Control relays are Allen Bradley or approved equal.
3. All AC and DC loads shall use suitably rated surge suppressors and diodes to limit reverse voltage spikes to UL 1449 type 4..

G. Transformers and Power Supplies

1. Transformers will conform to NEMA standard ST-1 or equivalent
2. Transformers shall be copper-wound with an isolated secondary
3. The secondary neutral of 220 VAC transformers shall be grounded
4. The transformer shall be fused on the primary and secondary sides
5. Transformers shall be sized appropriately for the anticipated load plus ten percent.

6. 24 VDC power supplies shall be a regulated power supply with built in over voltage and short circuit protection that is sized for the applications.
7. Electrical drawings shall contain a power consumption work sheet for transformers and power supplies.

2.10 OPERATOR INTERFACE

A. The Operator interface shall be the principal control surface for all fountain functions.

B. The principle operators' interface and HMI for the fountain system shall be a custom programmed Horner Graphical Touch display.

C. The system shall be programmed at the direction of the Engineer in compliance with the general performance of the fountain system.

D. The Contractor shall provide a remote E-Stop in the plant room and in other locations designated on the drawings for Emergency use.

E. The Contractor shall supply remote E-Stops at an on-grade location within 20 feet of the fountain for remote stopping of the fountain operations as required by the owner.

F. The operator interface shall include but not limited to:
   1. Machine Control and monitoring
   2. Feature water level control
   3. Variable frequency speed control
   4. Lighting control
   5. Emergency monitoring and shut-off – including:
   6. Programming and coding for:
      a) System reporting
      b) HMI interface

c) Time of day and operation programming.

d) Error and fault logging.

e) Serial communicator to chorographic devices

f) Communication for audio systems.

g) Wind sensor and control

h) Optional upgrade to send SMS and Cellular information over the local cellular system.

2.11 LOGIC INTERFACE

A. Logic programming will be written in CSCAPE ladder logic version 9.1 or better.

B. The installing contractor shall be responsible for keeping the fountains operating system up to date for a period of one year.

C. The Programmer shall have a minimum of:

1. 5 years experience in programming similar PLC's, controllers, and sequencers
2. 3 years programming water features
3. 5 years experience writing serial code
4. The programmer shall be knowledgeable of DMX->Serial communications to ensure accurate communication.

D. The PLC shall communicate:

1. Via Devicenet or Analog Signals to the VFD's as supplied. All programming of this logic shall be the PLC programmers' responsibility.
2. To the Audio System via Serial RS232C

3. To the Sequencing System via Serial RS232C

2.12 CHOREOGRAPHY INTERFACE

A. DMX Nozzle Relays:

1. The sequence valves of the fountain shall be controlled via fast acting Solid State relays.
2. Relay cards shall be Horner electric Smart stick relays
3. The OCS platform will be able to translate DMX encoded signals to trigger the PLC hardware.

B. Playback and Sequences:

1. Programming and playback of show sequences shall be accomplished via a DMX storage and playback unit. The unit shall be capable of synchronization with a SMPTE LTC Time code player.
2. The memory of the playback unit shall be expandable
3. The number of sequences that can be stored shall be a product of memory only.
4. The playback device shall be an Alcorn McBride lightcue(s) controller as manufactured by High end systems or approved equal.
5. The device shall be capable of simultaneous transmission of 1 universes of 512 control channels in a single packet.
6. The unit shall conform to USITT DMX-512A standards.

2.13 LIGHTING INTERFACE

A. Sub-panel to contain water features lighting system

B. Provide electrical panels in accordance with the above general specifications to provide power to the water features lighting system.

1. The design shall incorporate all necessary transformers and supplies to power all the lights on with multiple 24V contact from the system PLC panel and sequence the LED lighting systems.
2. The lighting will be triggered using custom LED control technology.
3. Each load circuit of the lighting system shall be protected with adequate fusing.
4. Each load circuit of the lighting system shall be fully GFI protected.
5. The panel shall have its own exterior mounted disconnect switch
6. The Engineer and Producer / Choreographer shall approve the Ground faulting method prior to panel fabrication.

C. The panel builder shall ensure space requirements and airflow requirements are met, so as not to overheat the interior of the panel during operation.

2.14 ULTRAVIOLET DISINFECTION EQUIPMENT

A. The primary disinfection system shall be comprised of an Ultraviolet (UV) disinfection system, which is to be installed in the water treatment system after filtration and before chlorination. The UV water treatment unit shall be a pressurized reactor UV treatment system engineered using amalgam UV lamps and electronic ballasting technologies to provide a reliable, high performance and energy efficient system. This system shall be specifically designed, and its' performance targeted, at DNA inactivation of cysts such as cryptosporidium.

B. The tender shall include the following information on the UV system:
   1. Submittal shall include details of Reactor and Control Panel, lamp and ballast descriptions, and engineering report stating headloss and UV System efficiency prescribed as the ratio of the total electrical input power in Watts per US gallon treated, at the design flow rate, UV transmission, and UV Fluence (or dosage).

2. To be acceptable, the manufacturer shall submit supportive documentation to demonstrate that the proposed UV system design will deliver the specified dose at the design UV Transmittance and flow rate.

C. The UV equipment shall include the following, but not be limited to:
   1. Electropolished 316L stainless steel UV Reactor and associated fittings.
   2. Nema electrical enclosure, rated for site requirements, to house a standard industrial PLC Controller and electronic ballasting.
   3. 254nm UV intensity monitor with reactor over-temperature detector.

D. Provide UV equipment, which shall disinfect filtered, re-circulating, municipal water with the following characteristics:

1.	Flow Range:	35 USGPM
2.	Water Temperature Range:	1º to 40ºC
3.	Air Temperature Range	1º to 40ºC
4.	Relative Humidity	95% non-condensing
5.	Maximum operating pressure:	150 psi
6.	Ultraviolet Transmittance @ 253.7 nm:	85%
7.	UV Design Dosage at end of lamp life	60 mJ/cm^2
8.	Maximum number of units:	1 each feature
9.	Equipment Redundancy:	1 each feature
10.	Iron	≤ 0.3 mg/l
11.	Hardness	≤ 120 mg/l
12.	Manganese	≤ 0.05mg/l

E. General Requirements
   1. To be acceptable, the UV equipment must operate in an enclosed pressure vessel and use Amalgam UV lamps.

2. The UV system is to be furnished with the latest components and equipment available at the time of shipment.
3. Supply a UV system complete with UV reactor, control panel, and UV intensity monitoring system, as herein specified.
4. System shall be designed to allow for either UV Unit to be shutdown without reducing the UV dosage below the design level.
5. The supplier shall take into consideration the pressure drop through the UV unit and its impact on the system pump capacity. A copy of the existing pump's specifications, including pump curve, is attached.

F. Design, Materials and Construction

1. All metal components in contact with the feed water shall be Type 316L stainless steel.
2. All materials exposed to UV light shall be Type 316L stainless steel, General Electric Type 214 quartz glass, or equivalent, or a suitably UV resistant material such as Teflon® or Viton®.
3. The system shall be designed for complete immersion of the quartz sleeve housed UV lamps, including electrodes, such that the lap of the water is exposed to the UV rays emitting perpendicularly from the entire length of the lamp's arc.
4. The major axis of the UV lamps shall be parallel to flow.
5. The system shall be capable of operation for minimum periods of 10 minutes of zero flow before a high reactor temperature critical alarm is generated.
6. If any stoppage of the water flow is expected during operation of the UV System, overheating of the UV Reactor must be prevented. In such a case, a water bleeding system must be incorporated into the outlet piping of the UV Reactor. This water bleeding system shall consist of a solenoid valve, being controlled by a thermal switch or timer, to periodically bleed water through the UV reactor, to keep it cool, and prevent an over-temperature alarm condition.

G. UV Reactor

1. Each UV reactor shall be shall be configured such that the inlet assembly introduces turbulence into the water flow and directs the flow parallel to the longitudinal axis of the UV Reactor. The outlet shall be orientated perpendicular to the same axis and positioned beyond the end of the lamp's arc. Two substantial mounting legs shall be located on the bottom of the UV reactor to evenly support its wet weight.
2. Each UV reactor shall have an NPT drain fitting affixed to the bottom of the inlet end of the reactor and another NPT fitting at the top of the outlet end of the UV reactor to serve as a chemical cleaning outlet port.
3. Each UV reactor shall accept its respective UV lamps and quartz sleeves through only one end of the vessel. This end of the UV reactor shall allow for complete reactor entry so internal inspection and/or service can be accomplished.
4. UV reactors shall be able to operate indefinitely at a maximum inlet pressure of 150 psi and be furnished with a factory certified pressure test report detailing the minimum hydrostatic pressure test.
5. Access to UV lamps shall be via quick release bayonet style fittings to permit rapid lamp replacement.

H. UV Lamps

1. UV lamps shall be low pressure, high intensity, amalgam type with ruggedized filaments to withstand shock and vibration.
2. Lamp bases are to be made from ceramic to resist UV light and high temperatures.
3. All electrical connections to the UV lamps shall be terminated at one end and interface to a ceramic lamp connector, being resistant to UV light and high temperature.
4. Lamp cabling shall be oil and water resistant, submersible, outdoor type, which is temperature rated for -60° to +105°C, voltage rated at 600Vrms and have a UV resistant jacket.
5. UV lamps shall have a monochromatic spectral output with the emissions peaking at 254 nanometres. 254nm UV lamp output shall be to be guaranteed to be at least 80%

of initial output, after 12,000 hours of operation, with no more than three controlled on/off power cycles per day.

I. UV Ballasts

1. UV ballasts shall be electronic and compatible with the low pressure, high intensity amalgam lamps supplied.
2. UV ballasts shall be powered by 230VAC +/-10%, 50/60 Hz, single phase power.
3. UV ballasts shall be have an electrical efficiency of 94% or greater.

J. Lamp End Seals and Lamp Holder

1. The open end of the UV lamp sleeves will be sealed to the sleeve guide by a suitable compression O-ring made from Viton®.
2. The o-ring compression is made by a 316L stainless steel sleeve retainer that will require no special tools for installation or removal.

K. UV Lamp Sleeves

1. Sleeves will be clear fused quartz, GE Type 214 or equivalent, with a minimum UV transmissivity of 89 percent per millimetre of wall thickness.
2. Sleeves will be domed at one end and be accessible through the reactor service entrance.

L. UV System Controller

1. The Controller shall be a standard industrial, globally available, Programmable Logic Controller (PLC) and interface to an LCD screen to display UV System operating status.
2. The LCD screen shall continuously display the relative UV intensity at the reactor wall, as a percentage, and the UV System operating hours.
3. Any Alarm condition, including but not limited to, lamp failure or over-temperature condition, shall take precedence over normal screen data. Screen shall display alarm condition to inform the operator of the specific fault. e.g. “Lamp 5 Off”

4. The AC power supplied to the UV System controller power supply shall be 230 +/- 10%, 50/60 Hz, single phase and shall be conditioned if damaging power line disturbances such as surges, spikes or brown out conditions are possible.
5. Upon powering up the UV System, a lamp start delay shall be provided to ensure the amalgam lamps have had the opportunity to cool from previous operation. Following the lamp start delay, ballasts shall be powered sequentially to minimize AC line surges and nuisance circuit breaker tripping.
6. Dry relay "Alarm" contacts shall be provided for use as a remote Alarm indicator.

M. Spare Parts

1. Spare parts for one year of operation shall be supplied including (1) spare lamp and (1) set of seals for each unit.
2. Required safety equipment shall be supplied.

N. Testing/Commissioning

1. Testing shall be carried out in the presence of the Engineer or Engineer's Representative.
2. The Supplier shall be responsible for carrying out all tests and for expenses incurred in this connection.
3. The Supplier or their authorized representative shall demonstrate the operation of the UV System and maintenance procedures.

O. UV Equipment Warranty

1) The UV equipment shall be Warranted to be free from defects in material and workmanship, from the date of installation, for the following respective time periods: a minimum of ten (10) years for the UV reactor and associated fittings; a

minimum of one (1) year for the UV Sensor; a minimum of two (2) years for the electronic ballasts, lamp cabling, electronic control system and any visual display.

2.15 CHEMICAL CONTROLLERS

A. A programmable chemical automaton system shall be supplied for continuous monitoring and control of pH and sanitizer ORP (oxidation-reduction potential). The controller shall also display the Langelier saturation index. The controller shall include a programmable microprocessor with a four (4)-line display screen and a sixteen (16)-key keyboard for operator access.

B. The controller shall automatically activate the appropriate chemical feeders in order to maintain the sanitizer activity level within +/- 10mV (millivolts) of ORP and the pH within +/- 0.2 pH unit of the set points selected by the operator. ORP function shall include a seven-day, level-based chemical saver program. All set point and calibration levels shall be adjustable with a numeric keypad mounted on the front panel of the unit. Controllers with internal switches or calibration adjustments and/or requiring special signal generating equipment to service will not be considered equal.

C. The controller shall be capable of operating all outputs in the following operator-selectable modes of operation: automatic, manual, timer or off. In the automatic mode, the operator shall be able to choose between on/off control with adjustable deadband or proportional feed control with adjustable deadband and progressive control zones.

D. The controller shall include a programmable seven-day shock program with operator selectable ON and OFF times for each day of the week.

E. The controller shall continuously calculate and display the langelier Saturation Index using either sensor data and/or manual input for pH, temperature, total alkalinity and

calcium hardness. The resulting calculated water condition shall be displayed on the main screen as either “Scaling”, “Corrosive” or “OK”.

F. The controller shall be contained in a NEMA Type 4X (rain and splash proof) lockable fiberglass cabinet with an LCD graphic display screen of four (4) lines of twenty (20) alphanumeric characters each. The main display screen shall show the current values, control mode and operational status for ORP, and pH.

G. The controller shall be factory set to water treatment industry standards. The operator shall be able at any time to adjust all programmable functions to preferred settings. The controller shall have a reset mode to reset all or selected functions to the original factory standards.

H. The controller shall have the capability to calibrate all sensor inputs, depending on the accuracy needed, using either 1, 2, or 3-point calibration to determine respectively the origin, slope and curvature of the calibration curve.

I. The controller shall include programmable high and low alarm levels for all control functions with operator-selectable feed lockout and alarm buzzer options. A Remote Alarm relay shall be included in parallel with alarm buzzer for operator-selectable voltage or dry contact output.

J. The controller shall continuously monitor and alert for failure of ORP and pH probes using dynamic probe testing before the water chemistry gets out of range. Failure alarms based on safety timers or out-of-range alarms will not be considered equal.

K. The controller shall record and display the elapsed run time for each activation event and a cumulative run time resettable at any time by the operator. The controller shall

provide for operator-adjustable event run time limits and total run time alarms for all control functions.

L. The controller shall include a battery for memory storage with minimum reserve power for six (6) months.

M. The controller shall have an on-board memory for storing of test data on operator-selectable schedules. RS-232 serial communications port shall be included for on-site downloading of test data. Test data storage must consist of the following sensor inputs: ORP, pH (PPM, Temperature, Conductivity or TDS available with optional sensors). Controllers failing to data log all listed parameters will not be considered equal.

N. The manufacturer of the chemical controller shall provide qualified personnel to inspect the installation of all equipment, start up all equipment, and track the operation of the equipment. Complete operator training on all equipment shall be supplied.

O. An immersion chlorine feeder system shall be provided.

2.16 FILTRATION UNITS

A. Strainers

1. Strainers to be constructed of food grade Fiberglass Reinforced Isophthalic or Vinylester Resin (F.R.P.), PVC and stainless steel material. The strainers are totally non-corrosive and have a high gloss gel-coat finish with UV protection. Strainers to be designed for working pressures of 30 P.S.I.G. or 65 P.S.I.G. and a vacuum service of 20" of mercury.
2. Strainer designs to come with integrally molded influent/ effluent 2" to 14" vanstone flange connections, F.R.P./ clear acrylic cover, hinged lid fastening hardware and drain/ vent plugs.
3. Strainers to be certified to ANSI/ NSF Standards for this project application.

C. Strainer Baskets

1. Shall be vertically pleated corrosion resistant non-welded strainer basket, producing 0-P.S.I.G. head loss when operating at designed flow rates.

2. The strainer basket to consist of food grade FRP end caps, 16- gauge stainless steel straining element with 1/8" perforated holes and stainless steel connecting rods.

3. All strainer baskets to have a minimum of a 4 to 1 open area ratio of the strainer basket to influent flange connection.

4. Strainer baskets to be self aligning and come with a molded flow indication arrow to insure proper flow direction.

a. PUMPS

A. General

1. Pumps are required for installation in the equipment room and as indicated on the equipment list on the drawings.
2. Pumps shall be of the “Centrifugal” type and provide the performance and construction characteristics specified herein.
3. Each pump shall be rated for ”self-priming” duty and be rated for continuous and intermittent duty.
4. Pumps shall be constructed of stainless steel or have a cast iron volute as indicated below and on the Equipment List on the Drawings and are to be suitable for continuous fountain duty in treated water conditions. The pump case shall be designed to withstand 75 psi hydrostatic pressure and hydraulically tested before shipping.
5. The discharge orientation shall be vertically upward. The pump shall be provided with a mating bracket or structure to maintain positive shaft alignment between the motor and pump head.
6. The pump impeller shall be balanced to provide smooth operation. The impeller shall be keyed to the shaft and locked with a suitable cap or setscrew.

7. The pump assembly shall include a motor in the size specified constructed to NEMA standards. The motor-pump construction shall be suitable for variable speed operation. The assembly shall be provided with a solid structural base plate for mounting.
8. The construction and design shall allow the rotating element and motor to be easily removed without disturbing connecting piping. Each pump shall be supplied with a suction port strainer basket made of fiberglass or stainless steel and a stainless steel strainer basket, which is easily removable for cleaning.
9. Pumps shall be supplied with a hair and lint suction strainer.
10. The contractor shall furnish and install as shown in the plans and described in these specifications.
11. Pump(s) shall meet or exceed the efficiency shown in the pump schedule.
12. To insure cavitation-free operation, each pump's NPSH Requirement must be low enough to permit stable, continuous operation at 120% or greater of best efficiency point. Note that these pumps are to be installed in the below-grade feature equipment room.
13. Each pump shall be capable of continuous operation without producing noise in excess of the Hydraulic Institute and OSHA guidelines.
14. Pump shaft shall be fitted with a leakless mechanical seal suitable for the temperatures and pressures indicated.
15. The pumps shaft shall be of stainless steel #316.
16. It is mandatory that each pump arrive at the project site with the following connected related equipment and features:
    a) Connected / mounted to a pre-manufactured pump skid
    b) Connected to the pump base plate with rubber-padding-type connectors to reduce pump noise and vibration effects
    c) Mounted lifting hooks and connectors to allow the installation of the pumps into the below-grade equipment room
    d) Each pump skid shall be sized to allow entrance into the below-grade feature room access opening.

Pump(s) shall be of end suction, frame mounted, flexible coupled, centrifugal type.

Pump shall be capable of delivering flow and total head as outlined in the equipment list with an efficiency of not less than 80.3% at the specified condition.

Pumped liquid will be at a temperature of 68 °F with a specific gravity of 1.

Casing: Pump casing shall be cast iron with smooth water passages and fitted with a bronze replaceable wearing ring. Maximum casing working pressure shall be 175 Psi. Suction and discharge connections shall be Equivalent to 125 lb. ANSI flanged type

Impeller: The impeller supplied for the specified conditions shall be one piece bronze casting of a diameter not greater than 90% of the casing cutwater diameter.

Shaft: Pump shaft shall be carbon steel and of a size and design to limit shaft deflection at the stuffing box to no more than .002 inches.

Bearings: Pump bearings shall be grease lubricated and sized for a minimum of 20,000 hours L10 life which is equivalent to 100,000 hours average bearing life.

Sealing: Sealing of the pump liquid cavity shall be accomplished with:

Mechanical Seal Pumps - Bronze Fitted: A face type mechanical seal with ceramic stationary seat, carbon washer, Buna N rubber flexible members, 18-8 stainless steel metal parts and 18-8 stainless steel spring. Seal shall be mounted over a bronze shaft sleeve. Seal to be rated for 225o F. maximum.

Driver: Pump shall be flexible coupled to a NEMA frame 444TS (TEFC) electric motor rated for horse power as outlined on the equipment list and complete with 575 Volt 3 Ph 60 Hz. Motor and pump shall be mounted and aligned on a steel base and coupled with a factory choice flexible coupling having a steel fabricated coupling guard.

B. Guarantee

1. System to be guaranteed by the supplier with a minimum, unconditional 1-Year guarantee on all components.

2.18 FOUNTAIN COMPONENTS

A. Devices - General

1. All Specialty fountain components shall be new and of top quality. The mixture of components from various manufacturers is not acceptable.
2. The electrical contractor shall install all electrical devices and the Division 99 mechanical contractor shall install all other fountain equipment that has no electrical interface or connection.
3. Bidders shall be familiar with general specification of these devices from body of fountain specification.

B. Main Drains

1. All drain fittings shall be of stainless steel and / or bronze construction fitted with a large area basket strainer and anti-vortex plate. Each fitting shall be complete with a bronze membrane clamp for clamping of waterproofing as required by water proofing manufacturer. Drain fittings shall be as identified on the equipment listing.

C. Inlet Fittings

1. All inlet fittings shall be of stainless steel and /or bronze construction fitted with a large area basket strainer and anti-vortex plate. Each fitting shall be complete with a bronze membrane clamp for clamping of waterproofing as required by water proofing manufacturer. Floor-mounted water inlet fittings shall be as identified on the equipment listing. Eyeball circulation fitting shall be complete with flow control plate built into unit.

D. Water Level Sensors

1. Water level sensors shall be constructed of cast bronze, brass, copper and stainless steel. Level switches shall be reed type relay enclosed in plastic, magnetically actuated float with minimum of 1” level adjustment. Voltage shall be 12VAC 0.5 amp. Non-inductive.
2. Provide water-level sensors into each fountain as identified on the equipment listing..

3. Each device shall provide sensing signals to activate a relay and solenoid valve located in the filtration equipment room. Sensors shall turn all pumps and lights associated with the water feature "OFF" in the event of a low water
4. The units shall be electrically terminated to the main fountain control panel.
5. All water levels sensors shall be terminated to the main Fountain Control Panel as required

E. Drain and Overflow Fittings

1. All drain and overflow fittings shall be of stainless steel and /or bronze and copper construction fitted with a bronze membrane clamp for clamping of waterproofing as required by water proofing manufacturer.
2. Provide multiple overflows and drain devices into each fountain per the equipment listing.
3. Drain and overflow fittings shall be as identified on the equipment listing.
4. These devices shall connect to the master drain piping from each fountain.

F. Wind Anemometer/ Velocity Sensor

1. The wind sensor shall consist of a control panel and an anemometer sensing head.
2. The control panel shall be mounted in a NEMA 4X rated housing.
3. Provide wind sensor heads and controller as identified on the equipment listing.
4. Provide shielded cable as required for signal from sensor head to controller.
5. Each device shall provide sensing signals to activate a relay and provide a signal for the programmable controller located in the below-grade equipment room. The sensors shall provide a variable signal to infinitely adjust the fountain spray heights depending upon the wind velocity being measured.
6. Supply and install this sensor device as indicated on the Drawings.

7. The electrical contractor shall install, wire and terminate sensor heads for wind sensing on top of Security Hut located to the north of the water feature as indicated on drawing FO-01.

G. Nozzles

1. Cascade nozzles shall be water level dependent cascade type nozzles constructed of cast bronze. Nozzles will have an integral swivel base and shall be capable of reaching a height as specified on drawings and parts list. Refer to drawings for quantities and locations.
2. Ring nozzles shall be water level independent type nozzles 1" NPN constructed of cast bronze. Nozzles will have an integral swivel base. Refer to drawings for quantities and locations.

H. Underwater Lights

1. Lights to be as per the equipment lists in the Drawings.
2. Each light unit shall be provided with a low-water cutoff device.
3. Each electrical connection shall be potted using paraffin wax in accordance with the Canadian Electrical code.
4. Supply each underwater light with sufficient cord length to connect to the related underwater junction box when routed beneath the upper fountain floor.
5. The underwater lights shall have mounting brackets or stands supplied to allow the uppermost portions of the fixtures' lens to be no more than 2" below the water surface.
6. Each lamp shall be protected with a Class 'A' CFGI as outlined in NEC.
7. Each lamp shall have an independent Neutral routed back to the Lighting control panel.
8. The use of Common Neutrals or ganging of neutrals in not acceptable.

I. Miscellaneous Fountain Accessories

1. Refer to the drawings for the required fountain accessories that are required to be supplied and installed by the Contractor.

J. Special Tools or Equipment

1. The Contractor shall provide all special tools for proper and continued operation and maintenance of the equipment and materials provided under this Section.
2. The contractor shall deliver one complete set of these tools to the Owner's Operating Personnel during the startup and testing of the equipment.

K. Maintenance Accessories

Contractor to provide maintenance staff with the following materials:

1. One fresh water connection complete with isolation valve, hose bib and 10 meters (30ft.) of flexible rubber hose in ½" diameter on a wall mount support in each equipment space.
2. One set of hip waders in size twelve (North American size), 10 litre (2 ½ gallon) plastic bucket, a lightweight 15 ½ ft telescopic pole with dual locking clamps, a heavy duty 18" wall brush with nylon bristles with telescopic pole adapter, a polypro mesh leaf skimmer bag with contoured reinforced sides (2 sets of each).
3. Professional swimming pool water quality test kit including bromine, PH, Total alkalinity and calcium hardness for water treatment systems. (4 sets of each)
4. One set of plastic laminated 11" x 17" "Process Flow" diagram, "System Electrical Schematic" diagram and "Control Panel Wiring" diagram to be mounted on equipment space wall.
5. 5 gallon wet/dry vacuum.
6. PAVETECH Slab Extractor part number 011199.

L. Spare Parts

Contractor to provide maintenance staff with the following emergency spare parts:

1. 1 set of control panel fuses and control panel indicator lights.
2. 5 sets of replacement gaskets for each style of submersible lights (where specified).
3. 5 sets of replacement lenses for each style of submersible lights (where specified).
4. 5 sets of replacement cord seals and cover gaskets for submersible junction boxes (where specified).
5. 1 package of 18-8 stainless steel replacement fasteners for all submersible equipment (where specified).
6. 5 replacement nozzles Ring system.

2.20 PLUMBING COMPONENTS AND FIXTURES

A. Use only 95/5 solder.

B. Use red brass, bronze or copper (Type L) only for stub-ups through pool floor and walls. Provide a membrane clamp or flange if a waterproofing membrane is used, or a suitable puddle flange if there is no membrane. Flange type must be approved by Water Feature Consultant prior to installation.

C. Interconnecting piping between pool(s) and water feature equipment room – use copper (buried-type L, exposed-type M) or fabricated stainless steel (14 gauge, type 302/316) or C.P.V.C. schedule 80 (if permissible). Drainage piping to waste may be cast iron.

D. Use brass gate valves 2 inches diameter or smaller.

E. Use gear operated, butterfly, gate, ball (for isolation only), plug or equivalent low loss infinitely variable valve or as specified for valves larger than 2 inches diameter used on discharge lines. Valves to be bronze or stainless steel fitted with EPDM seals.

F. Use butterfly type or gate valves with low loss characteristics. Do not use Ball type check valves unless specified. Valves to be bronze or stainless steel fitted with EPDM seals.

G. Use only silent type check valves with low loss characteristics. Do not use ball type check valves unless specified. Valves to be bronze or stainless steel fitted with EPDM seals.

H. Use stainless steel flexible type couplings to isolate all pumps from interconnecting piping. Metroflex metrosphere or equal.

I. Use 4" dial liquid filled pressure gauges on discharge end of all pumps to monitor operating pressures.

2.21 ELECTRICAL COMPONENTS AND FIXTURES

A. Use red brass pipe for conduit located within the pool and for stub-ups through the pool floor.

B. Use rigid PVC conduit for interconnecting conduit outside the pool where conduit is to be encased in concrete only. Use rigid galvanized steel or EMT conduit in other locations as permitted by code.

C. Make connections between dissimilar metals with dielectric fittings.

PART 3 – EXECUTION

3.1 INSPECTION

Examine conditions under which fountain work is to be installed. Notify Contractor, in writing, of conditions detrimental to proper performance of fountain work. Do not proceed with

fountain installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

A. General – Comply with codes, governing regulations, the requirements and recommendations of the fountain manufacturer, and with the requirements of Division 15 and 16.

B. Plumbing:

1. Pipe Assembly

a) Install piping straight and true in accordance with the best practice.

b) Make pipe runs as direct as possible, using a minimum number of fittings.

c) Cut pipe ends accurately to fit. Bending or springing of pipe will not be permitted, unless so specified.

d) Cut pipe ends square and thoroughly ream or file ends, and wipe clean to remove all burrs prior to joining.

e) Run pump and/or filter suction lines straight into the pump eye for at least eight pipe diameters, unless otherwise specified or shown on the drawings.

f) Use long radius elbows in pump and/or filter suction lines whenever change in direction is required, unless otherwise specified or shown on the drawings.

g) Make pipe size reductions with reducing fittings. Bushings will not be permitted.

h) Make screwed joints tight with tongs and wrenches.

i) Make soldered joints for copper tubing without corrosive paste flux. Use solder approved for application.

j) Install unions or flanged connections on at least one side of all check valves, solenoid valves and control valves. Install unions or flanged connections at all equipment locations (pumps, filters, etc.) so that such equipment may be readily disconnected.

2. Thermal Expansion
   a) Provide swing joints, turns, expansion loops or long offsets wherever shown on plans, or whenever necessary to allow for proper expansion and contraction of piping.

3. Noise and Vibration
   a) Install piping, equipment and systems with utmost precautions to prevent noise and vibration transmission. Use hangers and isolators as recommended by pipework manufacturer to minimize noise.
   b) Isolate equipment that would tend to cause noise or vibration with suitable vibration dampeners to reduce noise or vibration transmission to buildings and/or other equipment. Also isolate piping connected to this equipment.
   c) Ensure all pipework is adequately supported to prevent movement and vibration.

4. Pipe Coding
   a) Identify all equipment room components with engraved plastic white on black surface identification labels complete with stainless steel or brass chain, in an approved manner as to service and characteristics.
   b) Identify flow direction on all pipework systems with colored directional adhesive labels in an approved manner.

5. Valves, Union and Flanges
   a) Locate valves required for control or isolation of any part of the fountain mechanical system in accessible positions. Where several valves are related as to function, group together, wherever possible, or as indicated on the plans.

b) Use brass “U’ valves with non-rising stem and positive shut-off or equivalent for valves 2 inches or smaller.

c) Use gear operated butterfly valves on discharge lines larger than 2 inches diameter.

d) Use butterfly type or gate valves on suction lines larger than 2 inches diameter.

e) In submerged locations, use valves designed for such use and/or approved for such use by the Water Feature Consultant/Engineer.

f) Use unions suitable for not less than 125 psi and of the same size and material as the adjacent piping.

g) Use flanges of the companion type faced and drilled, complete with necessary adapter and suitable for not less than 125 psi. Use flanges of the same size and material as the adjacent piping.

6. Insulation

a) Insulate all pipework associated with fountain using 1” thick fiberglass pipe insulation for pipework up to and including 4” diameter. Use 1 ½” thick fiberglass pipe insulation for pipework over 4” diameter. All pipe insulation to meet code requirements. Submit proposed pipe insulation for approval by Water Feature Consultant prior to installing.

C. Electrical:

1. Wiring Materials

a) Install electrical conductors connected to equipment having a tendency to cause noise or vibration in sealtight flexible conduit not to exceed four feet in length.

b) Install other electrical conductors in rigid PVC conduit, unless otherwise specified or indicated on drawings. Make connections with approved fittings.

c) Use 20mm minimum conduit size unless otherwise specified or indicated on the drawings.

d) Select wire, flexible cord, cable and/or conductors as to size, type, current carrying capacity, voltage and insulation based on intended service

e) Use connecting and terminating devices used for making connections, taps and/or splices as approved for specific application.

f) Use junction and/or pull boxes, located outside the pool, that conform to applicable codes, are of sufficient size, suitable design, and approved.

g) Construction to meet site requirements.

2. Installation of Electrical Work

a) Furnish and install new conduits from the fountain junction boxes to fountain equipment room. Install all fittings, junction boxes, wiring and other electrical equipment located within the fountain pool and as indicated on the drawings.

b) Make connections to junction boxes in the pool tight with thread sealant.

3. Installation of Conduit

a) Install and seal wiring in conduit in accordance with the best practice. Use flexible cord approved for submersible application between underwater pool light fixtures and underwater junction boxes.

b) Conceal conduit in finished areas, unless otherwise specified or indicated on the drawings.

c) Cut square and carefully ream the ends of all conduit cut. Remove rough edges.

d) Seal open ends of conduit with approved conduit seals during construction.

e) Provide a bushing where a conduit enters a box or fitting to protect conductors from abrasion.

f) Use approved fittings for exposed runs of conduit. Make fittings covers accessible. Bends will not be permitted around corners of beams, walls or equipment.

g) Make threadless couplings and connectors suitable for preventing water from entering the conduit where conduit is installed in wet locations or is buried in concrete or ground. Running threads will not be permitted.

h) Provide sliding expansion joints with bonding straps where conduits cross building expansion joints.

i) Make bends in conduit so that the conduit is not damaged and the inside diameter of the conduit is not effectively reduced. Use no more than four 90 degree bends on any single run of conduit between outlets and/or other fittings.

j) Provide adequate support for concealed and/or exposed conduit.

4. Installation of Conductors

a) Install conductors in conduit after conduit, except exposed conduit with removable conduit seals, has been completed.

b) Remove debris and moisture from all conduit, boxes and other fittings before installing conductors. Do not use cleaning agents or lubricants that might have a detrimental effect on conductor coverings.

c) Connect conductors to terminals using approved connectors. Neatly group wires to panel cabinets, pull boxes and wiring gutters. Fan wires out to the terminals.

d) Protect conductors from damage resulting from further mechanical work. Replace damaged conductors.

e) Refer to main Division 16 electrical contract for minimum wire size and type to be used.

5. Conductor Color Coding

a) Use conductors (600 volts and under) color-coded and identified by one color. Maintain color continuity throughout the project.

b) Use the following color-coding to CSA C22.1 (4-033).

6. Grounding

a) Ground electrical systems to maintain a continuous positive electrical ground throughout the entire system.

b) Ground all metal objects in and around pool as required by the National Electric Code.

c) Provide grounding lug on metal items requiring grounding.

d) Identify circuit wiring in the motor control center and feeders in an approved manner.

D. Tests and Adjustment

1. Arrange for all testing as required of all connections to meet municipal codes and regulations, and as further on drawings. Do not backfill or enclose any fitting until tests have been carried out and work has been accepted.
2. Thoroughly flush pipe and equipment prior to operating system. Protect sensitive equipment from clogging, including sensors and valves.
3. Do pressure test to 517 kPa (75psi) on plumbing lines, and test electrical services. Electrical system shall be ground fault tested. All pressure tests to be documented and witnessed by NCC representative.
4. Pressure test filter and drainage system at 206 kPa (30psi) for 24 hours prior to backfilling or concealing piping system.
5. Correct and/or repair any leaks and run tests again. Test remaining fountain systems as indicated on drawings.
6. Adjust water systems for volume and water flow characteristics to reflect design intent and as directed by NCC representative.

E. Clean-up and Instructions

1. Upon completion of work, clean up all areas affected by this work, remove excess materials, debris and tools.

2. Give NCC representative instructions on use and maintenance of system.

END OF SECTION

APPENDIX 1

PART 1 - PRE START-UP CHECKLIST - ITEMS TO BE INSPECTED IN THE POOL			YES	NO
1.	Nozzles	Location within pool to dwgs	❑	❑
2.	Stub-Ups	Location within pool to dwgs	❑	❑
3.	Overflow Drains	Location within pool to dwgs	❑	❑
4.	Suction Drains	Location within pool to dwgs	❑	❑
5.	Electrical Stub-ups	Location within pool to dwgs	❑	❑
6.	Junction Boxes	Location within pool to dwgs	❑	❑
		Can junction box be spun onto stub up	❑	❑
7.	Gratings	Installed to manufacturer's specs	❑	❑
		Penetrations located correctly	❑	❑
		Easy to reassemble	❑	❑
8.	Water Feature Construction	Pool level	❑	❑
		Wall details – coping, tile complete	❑	❑
9.	Waterproofing	Tested and water tightness verified	❑	❑
10.	Plumbing/piping installed		❑	❑
11.	Water level sensor in pool (to be adjusted by Specialty Equipment Supplier)		❑	❑
12	Drainage connection for overflow and pool drains		❑	❑

13.	Inventory of items on site completed	❑	❑
14.	Grounding of in pool components completed	❑	❑
15.	Copies of inspection/test certificates (if required)	❑	❑
16.	Wiring within pool completed	❑	❑

PART 2 - PRE START-UP CHECKLIST (ITEMS TO BE INSPECTED IN EQUIPMENT ROOM)

		YES	NO
1.	Pumps suction inlets connected	❑	❑
2.	Pump suction strainer location correct	❑	❑
3.	Pump location correct	❑	❑
4.	Pump discharge pipe work route correct	❑	❑
5.	Pump discharge pipe work wall penetrations	❑	❑
6.	Control panel location as per code	❑	❑
7.	Conduit and wiring routed between panel and:		
	Pumps	❑	❑
	Specialty control valves	❑	❑
	Water fill valves	❑	❑
	Wind sensor unit and anemometer	❑	❑
	Flow sensors	❑	❑

	Pressure sensors	❑	❑
	Pool (# conductor and type)	❑	❑
	Ground connection	❑	❑
8.	Main power supply wiring into line side of panel	❑	❑
9.	Water fill line system piped? Backflow preventor?	❑	❑
10.	Floor drain location and size checked	❑	❑
11.	Ventilation duct location and associated equipment	❑	❑
12.	Housekeeping pad size and dimensions	❑	❑
13.	Access hatch/door for equipment removal installed	❑	❑
14.	Vapor proof lighting in room and switch location	❑	❑
15.	Receptacles – GFI protected	❑	❑
16.	All plumbing/pipe installed as per local codes	❑	❑
17.	Heating location and size as per local codes	❑	❑

ITEM 30

Function

Versatile, low profile white LED 120 VAC / 60 W max. is ideal for lighting heavy water effects. cETLus listed to safety standards for use in fountains other than in swimming pools and spas.

Specifications

LEDA020, Low Profile Free Standing is the basic model of the LED-020 family. Construction of housing shall be cast bronze. Comes complete with U-shaped molded gasket. Lamp holder and all fasteners shall be stainless steel. Hinged rock guard is optional, constructed of cast bronze. Cable and lens to be ordered separately and pre-installed.
Cable - Type 16/3 submersible of selective lengths
Lens - Convex cast glass, tempered and heat resistant, clear or colored.
Lamp - 120V / 60W (max.) white bulb.

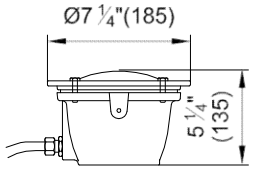
LEDB020, Low Profile Floor Mounting
Same as LEDA020, comes complete with a pair of pre-installed T-Foot.
Construction shall be cast bronze. Tilts 20°.

LEDC020, Free Standing or Floor Mounting
Same as LEDA020, comes complete with a pre-installed Crows Foot.
Construction shall be cast bronze and red brass. Tilts 20°and turns 360°.
Standard height is 7 3/4" (195), optional height to 16" (400) available, required height can be obtained by cutting stem. Contact factory for custom heights.

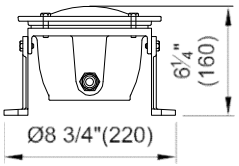
LEDD020, Deep Niche for Recessed Mounting
Same as LEDA020, comes complete with stainless steel niche, cast bronze mounting and face rings. Comes standard with rock guard. Provision of 1/2" PVC socket connection for submersible cable in wet conduit (not incl.).
Optional drain connection shall be 3/4" female n.p.t. welded on niche.
Tilts 20°and turns 360°.

LEDS020, Slab Hanger for Suspended Deck Mounting
Same as LEDA020, comes complete with cast bronze slab hanger. Grate on slab hanger protects lens from rock of size 1-1/2" (38mm). Supply with two 3/8" x 1" (25mm) long set screw for mounting.

Build Your Light
To order, use tables below and specify Part Numbers.
i.e. "Light Fixture" + "Cable Length" + "Lens"
e.g. LEDA020P + LED020C140 + LED020C132 + EL CORD 020A109 + EL LENS 2-C



LEDA



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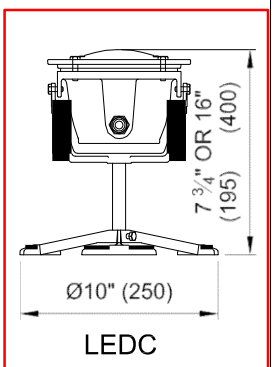
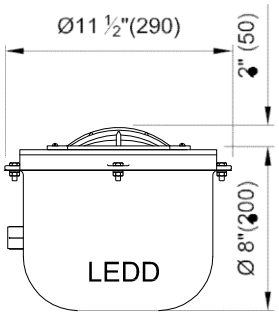
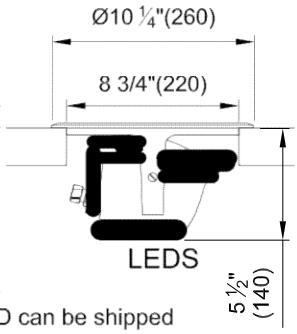


LEDC



LEDD



LEDS

Niche for LEDD can be shipped before light fixture to meet pouring schedule upon request.

Light Fixture		Part No.
Series	Options	
LEDA	n/a	LEDA020
	lens guard	LEDA020-P
LEDB	n/a	LEDB020
	lens guard	LEDB020-P
LEDC	7 3/4" (195)h.	LEDC020
	16" (400) high	LEDC020-L
	low w/. guard	LEDC020-P
	high w/.guard	LEDC020-LP
LEDD	n/a	LEDD020
	drain conn.	LEDD020-D
LEDS	n/a	LEDS020

REFLECTOR	
LED020C140	24DEG BEAM FLOOD
LED020C145	14DEG BEAM SPOT

COLOR TEMPERATURE	
LED020C131	5600 K - Cool
LED020C132	3500 K -Warm

Cable Length	Thermal Cut-Off	Part No.
9 ft (2.7m)	No	EL CORD 020A109
	Yes	EL CORD 020T109
20 ft (6m)	No	EL CORD 020A120
	Yes	EL CORD 020T120
30 ft (9m)	No	EL CORD 020A130
	Yes	EL CORD 020T130
40 ft (12m)	No	EL CORD 020A140
	Yes	EL CORD 020T140
Over 40 ft.	Yes/No	Contact Factory

Lens	Part No.
Color	
clear	EL LENS 2-C
amber	EL LENS 2-A
blue	EL LENS 2-B
green	EL LENS 2-G
red	EL LENS 2-R
turquoise	EL LENS 2-T

Notes
1. Fixtures to be operated minimum 2" (50mm) under water, measured from top of lens.
2. Fixtures must be installed by a qualified electrician, in accordance with local and national codes.
3. Low voltage fixtures require special attention during design. Cable sizes, conduits and distance to the power supply to get the correct voltage to the fixture must be calculated
4. Contact Crystal Fountains Inc. for detailed specification, installation and operation details.

IP68

CUT SHEET# LED020-D101

PAGE 1 OF 1

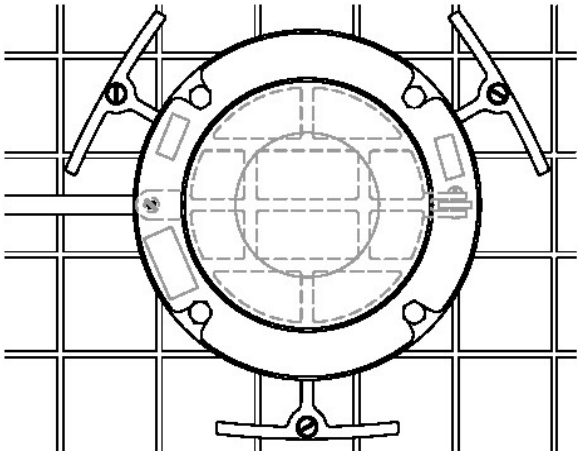
www.crystalfountains.com
Crystal where ideas flow™
TEL. 1-905.660.6674 FAX. 1-905.660.6916

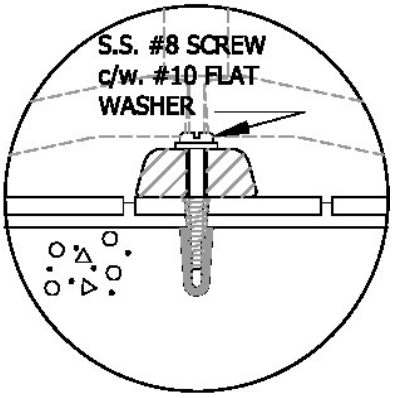
120V - 60W LED UNDERWATER FOUNTAIN LIGHT

SERIES LED020

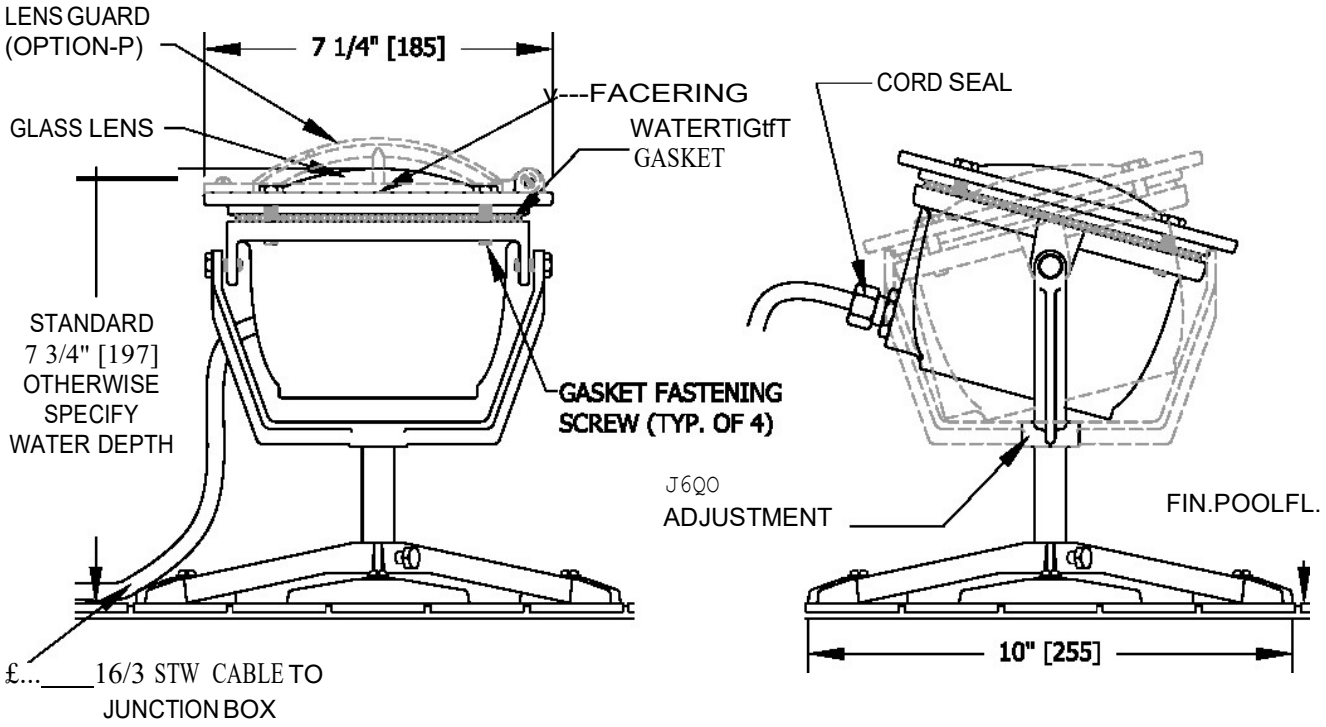
REV. E JUNE 2015

ITEM 30





TYP.FI. MOUNT DETAIL



INOTES

(1) REFER TO FOUNTAIN SPECJFICATION
(2) REFER TO INSTALLATION INSTRUCTIONS SHIPPED WITH PRODUCT
(3) FIXTURE L.ED020 IS ETI LISTED
(4) TO BE INSTALLED BY LICENCED EL.ECTRICAN ACCORDING TO LOCAL CODES
(5) CONNECT SUBMERSIBLE CABLES TO DEFO EBJ SUBMERSIBL.f JUNCTION BOXES
(6) MUST BE GROUND FAULT (QASS "An) PROTECTED
(7) DO NOT SCALE DRAWJNG

INSTAIIATION DRAWING
L.EDC02D-D103

-.cryMIIII'auntaN.com
Cs /R.IN-
TI!L(101) aDa74 FAX. (IDI).....11

120V/60W WHITE LED LIGHT
WITH CROWFOOT BASE
LEDC020

SERIES
LED020

REV.
06.17.2011

ITEM 31

Function

Submersible conduit mounted junction boxes for underwater connections.

Specification

Construction shall be cast bronze equipped with neoprene gasket, stainless steel fasteners and copper ground connections (EBJ216: total4 internal incl. 2 lugs; other models: 1 external and 2 internal incl. 1 lug).

Notes

1. Trade size 1/2" and 3/4" plugs and cord seals are to be tightened with a torque of 90Nm (801bf.in).
2. Lid fasteners are to be tightened with a torque of 2 Nm (191bf.in).
3. Thread sealant compound or Teflon tape must be used for a leak-free seal.

Listings

UL and ULC listed to safety standards for use in water other than in swimming pools and spas. IP68 Rated

For swimming pools and spas use, or junction box to be flush mounted, refer to Crystal Fountains' EBN208.

Options

Junction Box Potting Compound

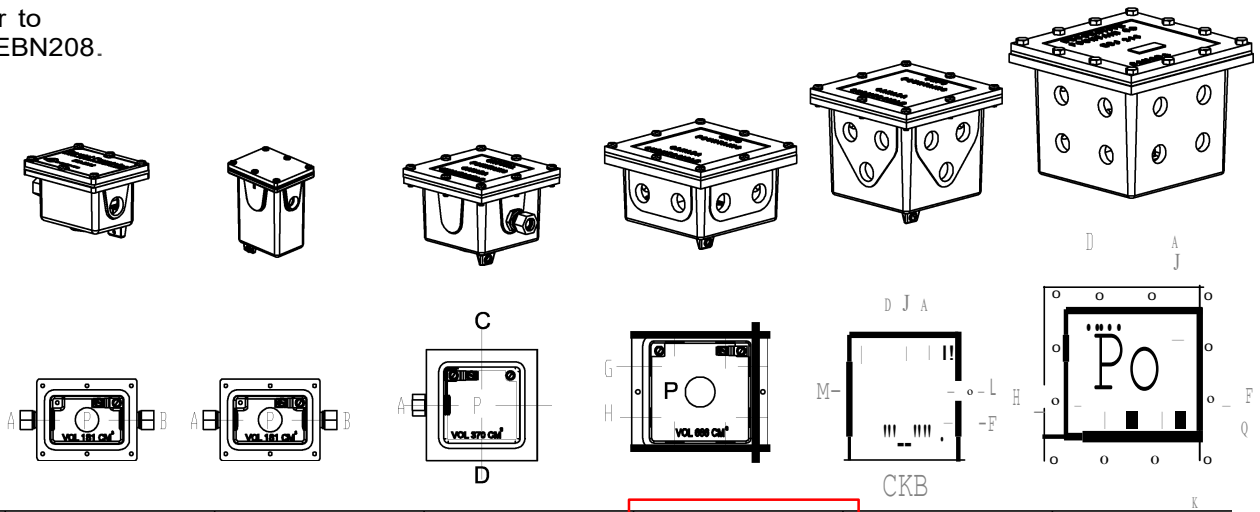
EBJ C10- 21 oz
EBJ C20- 12 oz

Junction Box Cord Seal

EGS series -for watertight connections of underwater cables connecting junction boxes with lights, water level sensors and pumps.

Stub Up

EP series - flanged bronze conduit stub ups provide watertight and secure penetrations through concrete and slabs directly into fountain pools.



Junction Box Part No.		EBJ202	EBJ203	EBJ204	EBJ208	EBJ212	EBJ216
Bottom Hub	(N.P.T)	3/4"	3/4"	3/4"	1"	1 1/4"	1 1/2"
Side Hubs	(N.P.T)	(2) x 1/2"	(2) x 1/2"	(4) x 1/2"	(8) x 1/2"	(12) x 1/2"	(16) x 1/2"
Overall Dims	(Inches)	4" x 3 1/4" x 3 1/4"	4" x 3 1/4" x 5 1/4"	4 1/2" x 4 1/2" x 3 3/4"	5 1/2" x 5 1/2" x 3 1/2"	5 1/2" x 5 1/2" x 4 1/2"	7" x 7" x 5 1/2"
"L" x" W "x	(mm)	102 x 82 x 82	102 x 82 x 134	115 x 115 x 95	140 x 140 x 90	140 x 140 x 115	178 x 178 x 140
Inside Volume	(Cu In.)	11.1	25	22.6	40.6	64.7	119
	(Cu. Cm)	181	409	370	666	1061	1950

Field-Drilled / Tapped Boxes	Part No.	EBJ202A100	EBJ203A100	EBJ204A100	EBJ208A100	EBJ212A100	EBJ216A100
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1"	Max. 1"	Max. 1 1/4"	Max. 1 1/4"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 1/2"	Max. (8) x 3/4"	(8) x 3/4" + (4) x 1/2"	Max. (16) x 3/4"

Hubs should be between 3-1/2 and 5 threads. Field-drilled boxes must be tapped all the way through a hole and not exceed trade sizes listed above

Factory-Drilled / Tapped Boxes	Part No.	EBJ202A101	EBJ203A101	EBJ204A101	EBJ208A101	EBJ212A101	EBJ216A101
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1 1/4"	Max. 1 1/2"	Max. 2"	Max. 2"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 3/4"	Max. (8) x 3/4"	Max. (12) x 3/4"	Max. (16) x 3/4"

When ordering factory-drilled boxes, specify the part number, hub locations and the the hub sizes. (eg. EBJ204A101 - Side Hubs A=B=1/2", C=3/4"; Bottom hub

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CUT SHEET EBJ-D101

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UNDER WATER JUNCTION BOX

SERIES EBJ

REV. E AUG2015

ITEM 32

Function

Flanged bronze conduit stub ups are leak-proof and strong. Stub ups provide watertight and secure penetrations through concrete and membranes directly into fountain pools. Use as terminal connections with Crystal Fountains 'EBJ' bronze underwater junction boxes.

Specifications

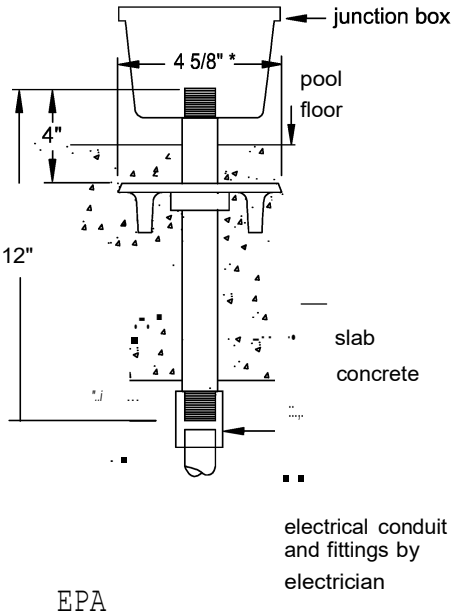
Construction of stub up pipe shall be red brass with cast bronze flange soldered to pipe, equipped with copper ground lug and stainless steel bolts. Standard threading on both ends shall be N.P.T

Underdeck clamp for EPC shall be cast bronze with galvanized rods, washers and nuts.

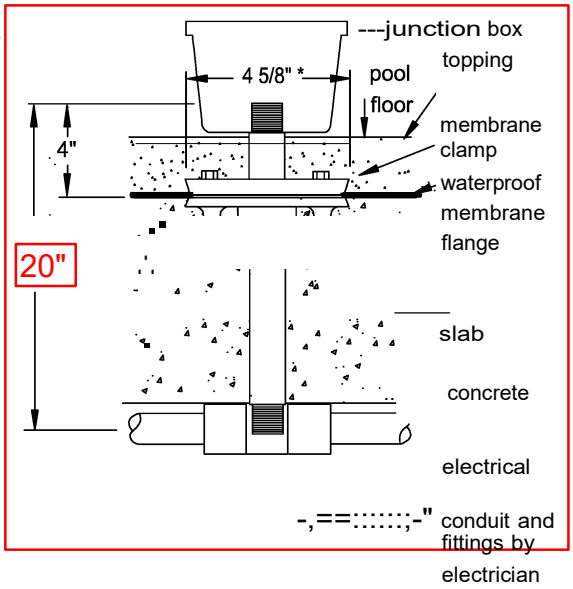
	PART number		
connection	no membrane	sub surface membrane	cored hole
1/2"	EPA050	EPB050	EPC050
3/4"	EPA075	EPB075	EPC075
1"	EPA100	EPB100	EPC100
11/4"	EPA125	EPB125	EPC125
11/2"	EPA150	EPB150	EPC150
2"	EPA200	EPB200	EPC200
3"	EPA300	EPB300	EPC300

Notes

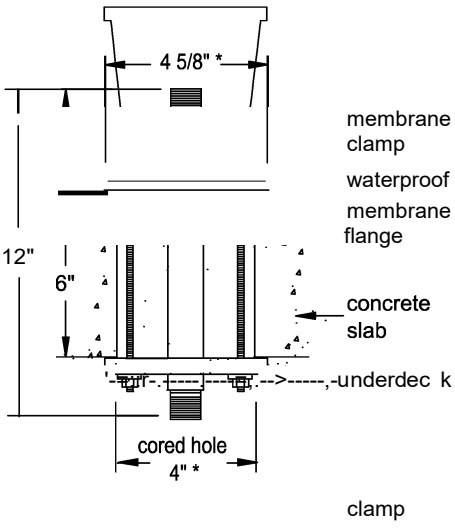
*1. Diameters of flange, membrane and underdeck clamps for EPA300/ EPB300 / EPC300 stub ups are 6/4", cored hole to be 5 %".
2. Contact Crystal Fountains for customized pipe lengths.
3. Standard flange position is shown, custom heights are available.
4. Standard EPC handles a 6" (max.) thick slab. Specify slab thickness if it is greater.



EPA
no membrane application



EPB
sub surface membrane application



EPC
cored hole application

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Function

ITEM 33

UP

CUT SHEET
EP-0101

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SERIES
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REV.
B
JUNE 2015

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ITEM 33

Function

Part of Crystal's Architectural light series, the LED040 Series is a cost effective light designed for underwater use:

- Compact
- Ideal for lighting mid-size underwater applications

Technology Features:

- Internal temperature control prevents overheating [2]
- Reverse polarity prevents damage during installation

Show Programming:

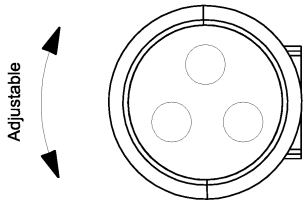
- Reduce configuration, monitoring and system set-up time using Crystal's ROM (Remote Device Management) LED devices.

Available with multiple stand configurations with spot or flood light options. cETLus listed and CE marking for use in traditional basin style fountains (Not for swimming pools and spas). Made of 316 stainless steel and high resistance polycarbonate. Base is made of 304 stainless steel. Crystal LED products produce a high intensity light and deliver perfect optical performance. For more comprehensive information about creating a complete LED system, please contact Crystal.

Specifications

Construction of fixture shall be plastic and stainless steel. It comes with Floor mount stand and cable pre installed (refer to Step 3).

- Power: 20 W
- Input Voltage: 12 VDC to 24VDC
- Cable: 18/5 ST, SO or H07RN-F submersible
- Top Face: High resistance Polycarbonate
- Technology: ROM- Remote Device Management protocol driver



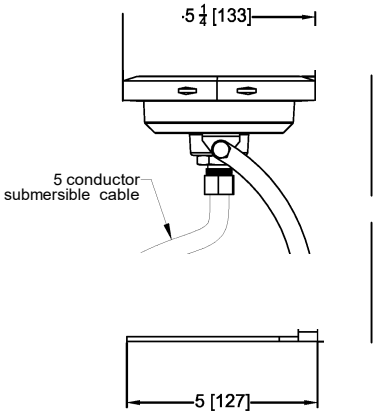
Order your Light

Step 1: Choose a Light

Part#	Color Optics
LED040001	RGBW
LED040002	RGB
LED040003	Warm White Non Dimmable
LED040004	Cool White Non Dimmable
LED040005	Tunable White

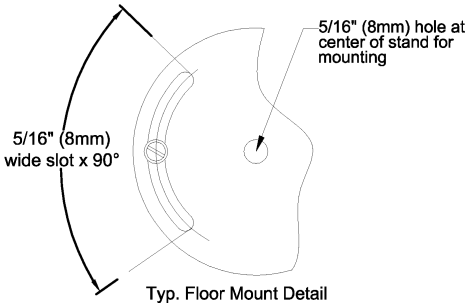
Step 2: Add Optics

Part#	Degree
LED040A018	18° Spot
LED040A044	44° Flood



Step 3: Add a Cable

Part # (North America)	Part# (European)	Length
ELCORD160L09	ELCORD160M03	NA: 9FT 18/5 STW EU: 3M 5x1 H07RN-F
ELCORD160L20	ELCORD160M06	NA: 20FT 18/5 STW EU: 6M 5x1 H07RN-F



Options

1. EL PKIT9 - ROM Addressing and Play Show Tool.
2. Contact Crystal Fountains for other cable lengths.

Notes

1. Fixture must be installed by a qualified electrician in accordance with all state and local codes.
2. Light will dim if the LED reaches 75°C and cool down to 55°C then will start to increase the intensity.
3. Contact Crystal Fountains for detailed specification, installation and operation.
4. Wet submersible applications only.

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MID-RANGE 12VDC TO 24VDC /20W
LED LIGHT W/ FLOOR MOUNT STAND

CUT SHEET
LED040001-005-D101

SERIES
LED040

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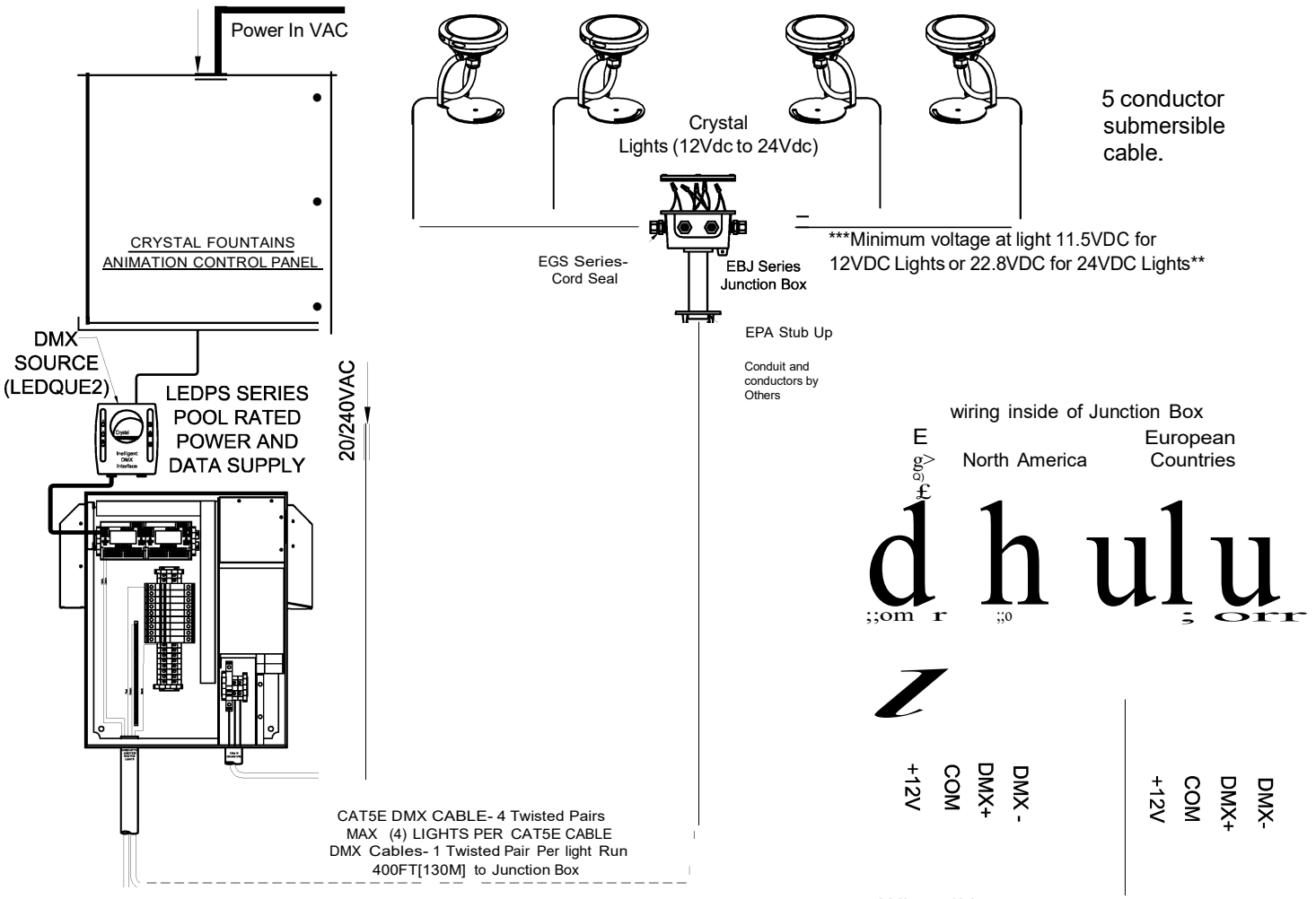
DEC 2015

Wiring Diagram for LED040 Lights

Note: Conductors and DMX cables to be wet rated



wiring inside of Junction Box

North America European Countries

Wires IN

RGB,RGBW and White

Dimmable Wiring

Note:

For White LED Light with NO DMX the DMX wires should not be connected. Isolate them not to create short in the circuit.

Notes:

1. The power supply must incorporate a transformer of the isolated winding type, with an ungrounded secondary that has a grounded metal barrier between the primary and secondary windings, or one that incorporates an approved system of double insulation between the primary and secondary windings. The maximum output voltage in normal use and under any single fault condition shall not exceed 30VDC. Use Crystal Fountains Pool Rated Power Supply.
2. All conductors and CAT5e cabling must be wet rated for use in buried conduit. Acceptable conductors include type "THWN" and "THHW". Acceptable cat5e cabling includes "MOHAWK- VERSALAN CMR/CMX" and Beldon - Datatuff 7934a and 7937a". Please refer to the national electrical or other applicable governing codes prior to installation of components.
3. Voltage at light shall be no less than 12VDC ± 5%.
4. For Single run do not exceed 400FT[130M] of CTA5 Cable (DMX only).
5. The lengths of cable run directly to Animation Panel should be equal.
6. Animation Panel, Power Supply, And Junction Boxes are sold separately.

ITEM 34

Function

Submersible conduit mounted junction boxes for underwater connections.

Specification

Construction shall be cast bronze equipped with neoprene gasket, stainless steel fasteners and copper ground connections (EBJ216: total4 internal incl. 2 lugs; other models: 1 external and 2 internal incl. 1 lug).

Notes

1. Trade size 1/2" and 3/4" plugs and cord seals are to be tightened with a torque of 90Nm (801bf.in).
2. Lid fasteners are to be tightened with a torque of 2 Nm (191bf.in).
3. Thread sealant compound or Teflon tape must be used for a leak-free seal.

Listings

UL and ULC listed to safety standards for use in water other than in swimming pools and spas. IP68 Rated

For swimming pools and spas use, or junction box to be flush mounted, refer to Crystal Fountains' EBN208.

Options

Junction Box Potting Compound

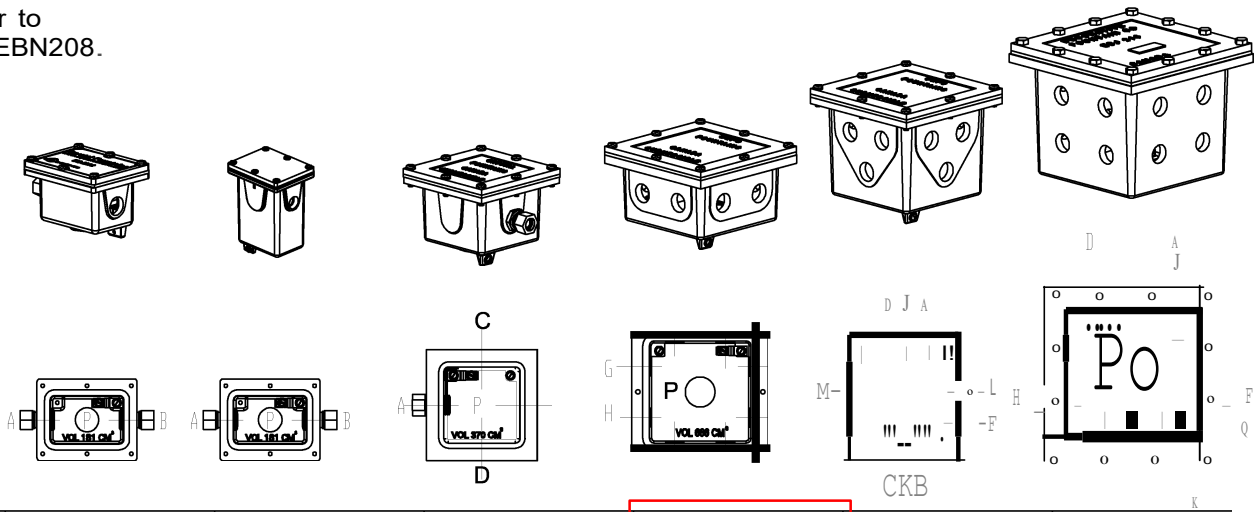
EBJ C10- 21 oz
EBJ C20- 12 oz

Junction Box Cord Seal

EGS series -for watertight connections of underwater cables connecting junction boxes with lights, water level sensors and pumps.

Stub Up

EP series - flanged bronze conduit stub ups provide watertight and secure penetrations through concrete and slabs directly into fountain pools.



Junction Box Part No.		EBJ202	EBJ203	EBJ204	EBJ208	EBJ212	EBJ216
Bottom Hub	(N.P.T)	3/4"	3/4"	3/4"	1"	1 1/4"	1 1/2"
Side Hubs	(N.P.T)	(2) x 1/2"	(2) x 1/2"	(4) x 1/2"	(8) x 1/2"	(12) x 1/2"	(16) x 1/2"
Overall Dims "L" x" W "x	(Inches)	4" x 3 1/4" x 3 1/4"	4" x 3 1/4" x 5 1/4"	4 1/2" x 4 1/2" x 3 3/4"	5 1/2" x 5 1/2" x 3 1/2"	5 1/2" x 5 1/2" x 4 1/2"	7" x 7" x 5 1/2"
	(mm)	102 x 82 x 82	102 x 82 x 134	115 x 115 x 95	140 x 140 x 90	140 x 140 x 115	178 x 178 x 140
Inside Volume	(Cu In.)	11.1	25	22.6	40.6	64.7	119
	(Cu. Cm)	181	409	370	666	1061	1950

Field-Drilled / Tapped Boxes	Part No.	EBJ202A100	EBJ203A100	EBJ204A100	EBJ208A100	EBJ212A100	EBJ216A100
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1"	Max. 1"	Max. 1 1/4"	Max. 1 1/4"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 1/2"	Max. (8) x 3/4"	(8) x 3/4" + (4) x 1/2"	Max. (16) x 3/4"

Hubs should be between 3-1/2 and 5 threads. Field-drilled boxes must be tapped all the way through a hole and not exceed trade sizes listed above

Factory-Drilled / Tapped Boxes	Part No.	EBJ202A101	EBJ203A101	EBJ204A101	EBJ208A101	EBJ212A101	EBJ216A101
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1 1/4"	Max. 1 1/2"	Max. 2"	Max. 2"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 3/4"	Max. (8) x 3/4"	Max. (12) x 3/4"	Max. (16) x 3/4"

When ordering factory-drilled boxes, specify the part number, hub locations and the the hub sizes. (eg. EBJ204A101 - Side Hubs A=B=1/2", C=3/4"; Bottom hub

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UNDER WATER JUNCTION BOX

SERIES EBJ

REV. E AUG2015

ITEM 35

Function

Flanged bronze conduit stub ups are leak-proof and strong. Stub ups provide watertight and secure penetrations through concrete and membranes directly into fountain pools. Use as terminal connections with Crystal Fountains 'EBJ' bronze underwater junction boxes.

Specifications

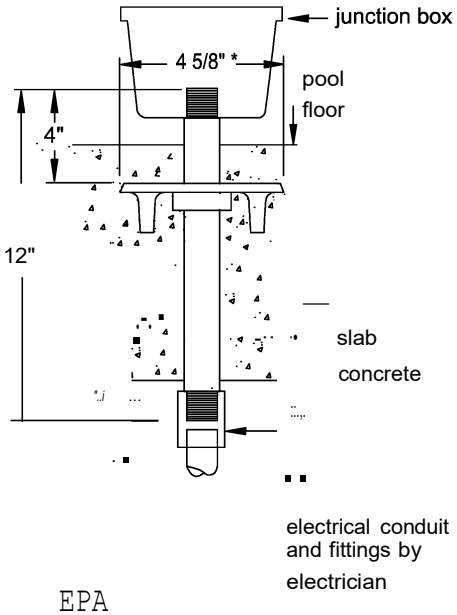
Construction of stub up pipe shall be red brass with cast bronze flange soldered to pipe, equipped with copper ground lug and stainless steel bolts. Standard threading on both ends shall be N.P.T

Underdeck clamp for EPC shall be cast bronze with galvanized rods, washers and nuts.

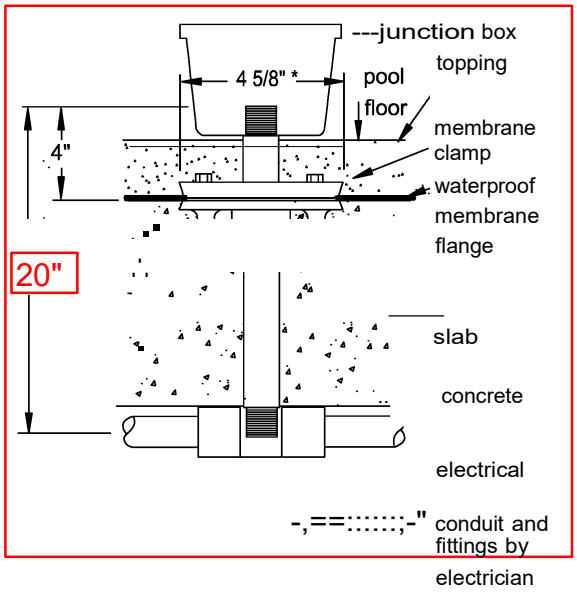
	PART number		
connection	no membrane	sub surface membrane	cored hole
1/2"	EPA050	EPB050	EPC050
3/4"	EPA075	EPB075	EPC075
1"	EPA100	EPB100	EPC100
11/4"	EPA125	EPB125	EPC125
11/2"	EPA150	EPB150	EPC150
2"	EPA200	EPB200	EPC200
3"	EPA300	EPB300	EPC300

Notes

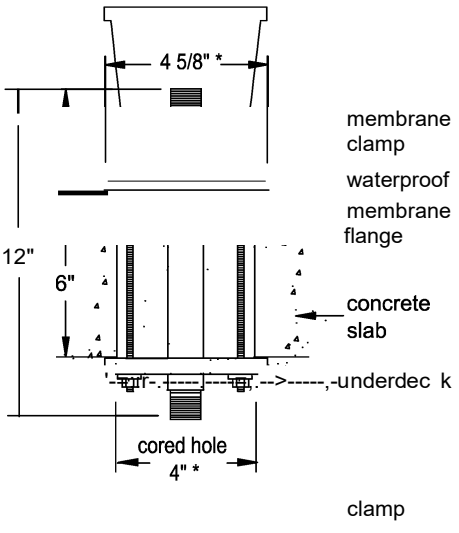
*1. Diameters of flange, membrane and underdeck clamps for EPA300/ EPB300 / EPC300 stub ups are 6/4", cored hole to be 5 %".
2. Contact Crystal Fountains for customized pipe lengths.
3. Standard flange position is shown, custom heights are available.
4. Standard EPC handles a 6" (max.) thick slab. Specify slab thickness if it is greater.



EPA
no membrane application



EPB
sub surface membrane application



EPC
cored hole application

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JUNE 2015

Function

ITEM 35

alfountains.com

STUB UP

CUT SHEET
EP-0101

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SERIES
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REV.
B

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JUNE 2015

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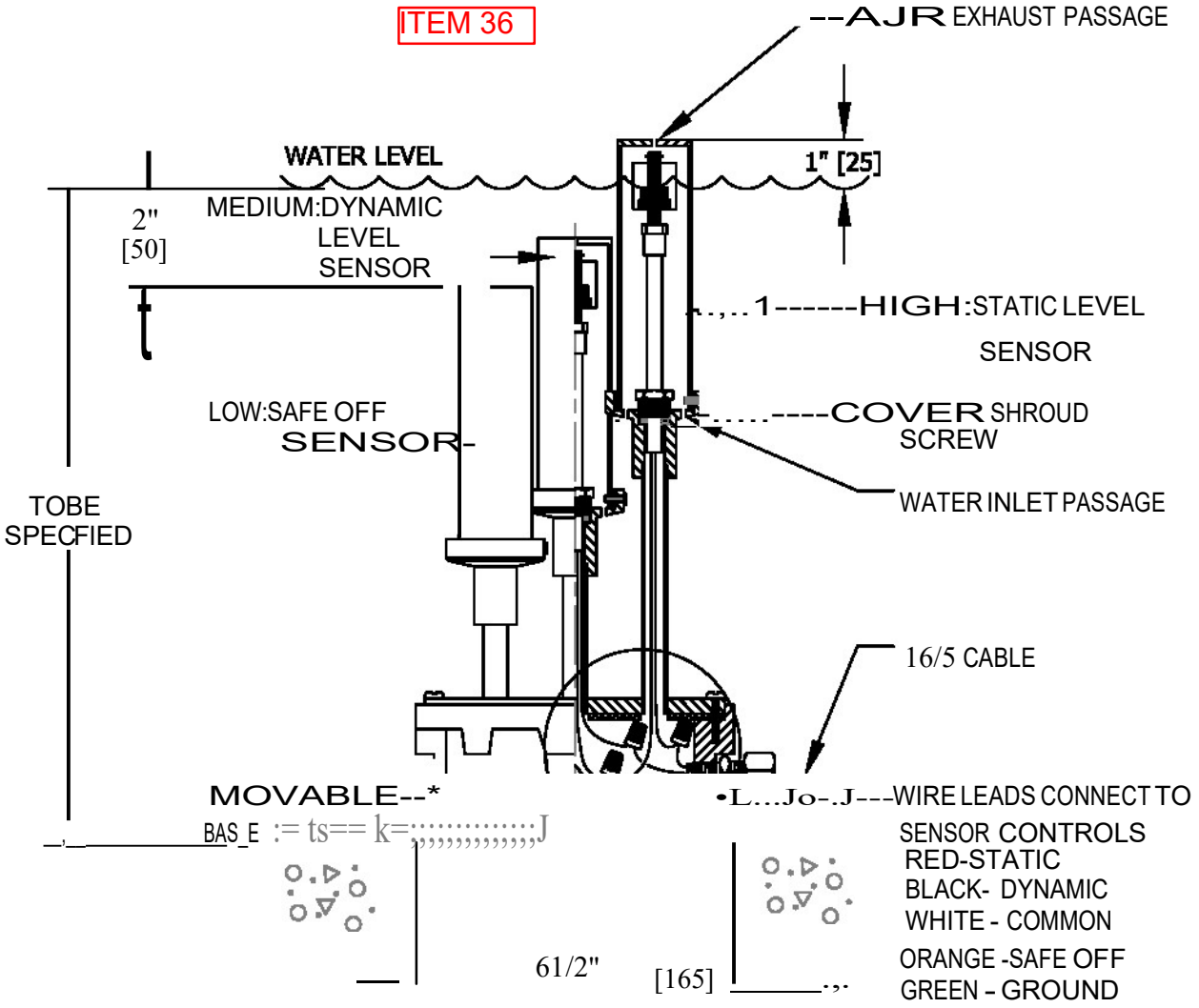

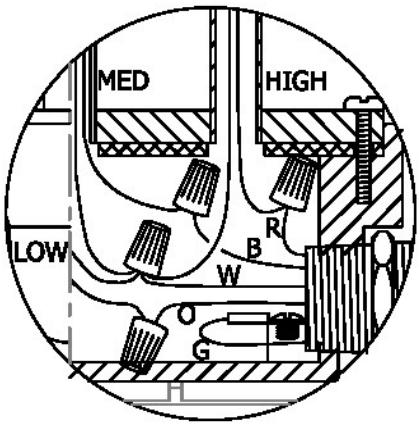

NOTES

(1) REFER TO FOUNTAIN SPECIFICATION
(2) REFER TO INSTALLATION INSTRUcnONS SHIPPED WITH PRODUCT
(3) DO NOT SCALE DRAWING

INSTAI..LATIONDRAWINQ
ESS300.0103

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MOVABLE LEVEL SENSOR QUICK FILL, SAFE-OFF & MAXI LEVEL CONTROL

SERIES
ESS

REV.
B
8.02.2012

ITEM 36

Function

Movable electronic water level sensor automatically monitors quick fill and safe-off functions in very shallow water depths. Sensor is adjustable in height after installation. Low voltage for safety. Connects to Crystal Fountains' ECL series control panel. Install vertically.

Specifications

Construction of sensor box and lid shall be cast bronze. Sensor enclosure shall be brass and copper with neoprene gasket and seal. Sensor shall be reed switch enclosed in a polypropylene, magnetically actuated float with 1" level adjustment. Submersible cable shall be 9ft., 16/3 (ESS100), 18/4 (ESS200) or 16/5 (ESS300).

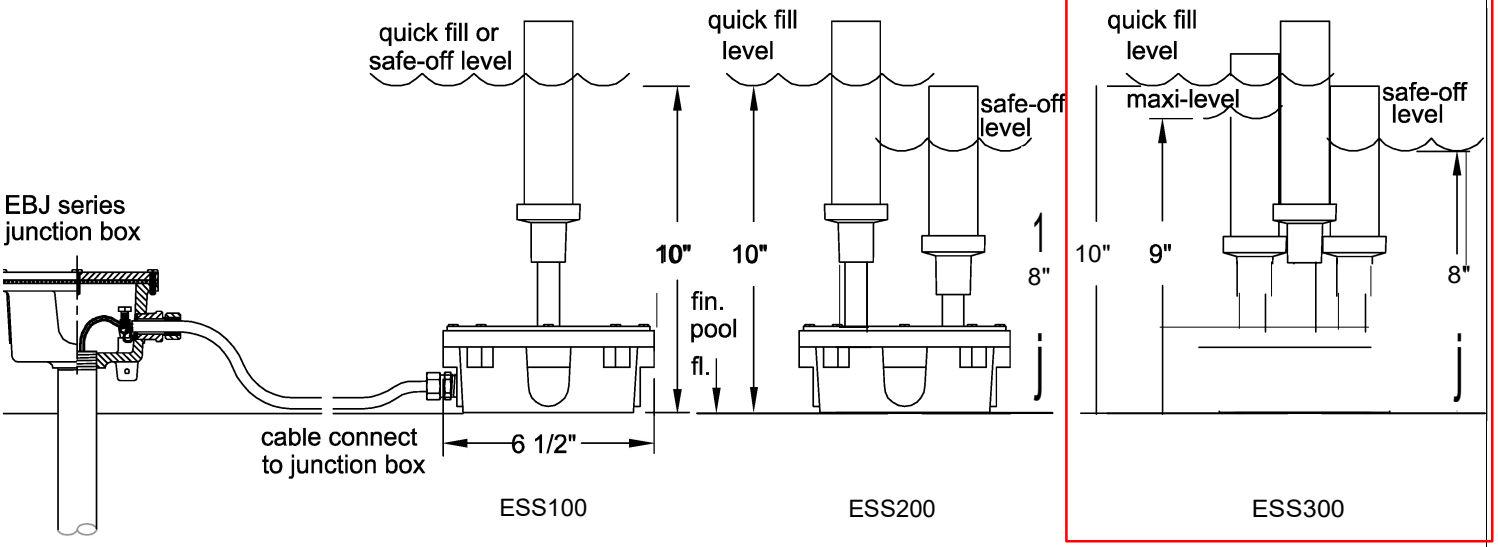
ESS100- 1 sensor, quick fill or safe-off
ESS200- 2 sensors, quick fill and safe-off
ESS300- 3 sensors, quick fill, safe-off and maxi-level control

Voltage and current ratings:
24 VAC/DC, 0.28A

Notes

1. UL and ULC listed.
2. For use in Class 2 circuits only.
3. Wiring methods must comply with Class 3 or better circuits.
4. Custom sizes available upon request.
5. Connect to Crystal Fountains junction box (EBJ series).

SENSORS HEIGHTS TO BE ADJUSTED TO SUIT STATIC, DYNAMIC AND SAFE OFF MODES ON SITE. REFER TO DRAWING FO-06 FOR ORIENTATION AND



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MOVABLELEVELSENSOR

CUT SHEET ESS-D101

SERIES ESS

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REV. D

JUNE 2015

ITEM 37

Function

Submersible conduit mounted junction boxes for underwater connections.

Specification

Construction shall be cast bronze equipped with neoprene gasket, stainless steel fasteners and copper ground connections (EBJ216: total4 internal incl. 2 lugs; other models: 1 external and 2 internal incl. 1 lug).

Notes

1. Trade size 1/2" and 3/4" plugs and cord seals are to be tightened with a torque of 90Nm (801bf.in).
2. Lid fasteners are to be tightened with a torque of 2 Nm (191bf.in).
3. Thread sealant compound or Teflon tape must be used for a leak-free seal.

Listings

UL and ULC listed to safety standards for use in water other than in swimming pools and spas. IP68 Rated

For swimming pools and spas use, or junction box to be flush mounted, refer to Crystal Fountains' EBN208.

Options

Junction Box Potting Compound

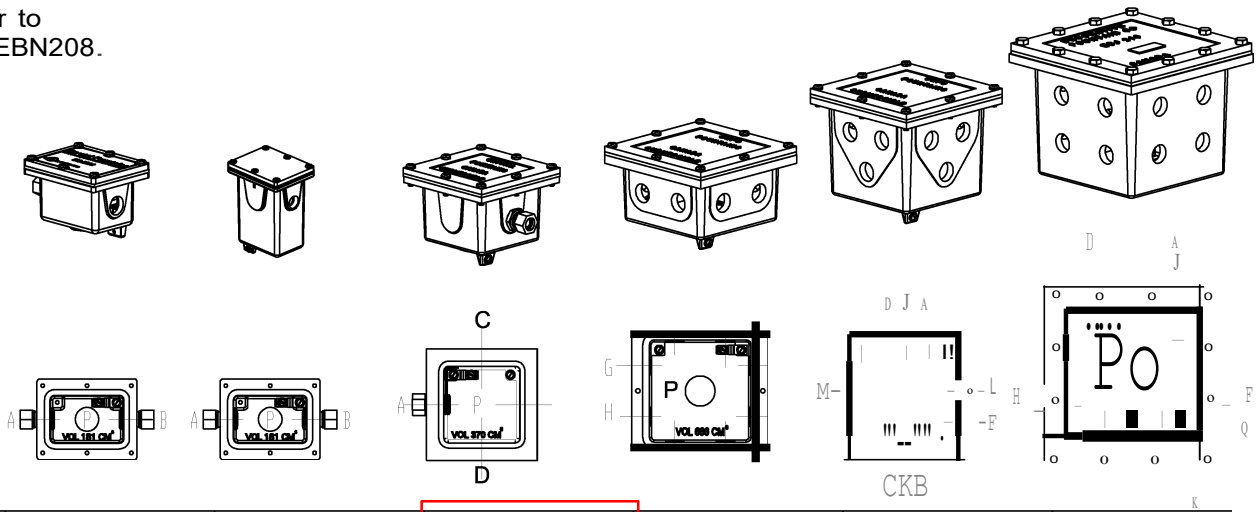
EBJ C10- 21 oz
EBJ C20- 12 oz

Junction Box Cord Seal

EGS series -for watertight connections of underwater cables connecting junction boxes with lights, water level sensors and pumps.

Stub Up

EP series - flanged bronze conduit stub ups provide watertight and secure penetrations through concrete and slabs directly into fountain pools.



Junction Box Part No.		EBJ202	EBJ203	EBJ204	EBJ208	EBJ212	EBJ216
Bottom Hub	(N.P.T)	3/4"	3/4"	1"	1"	1 1/4"	1 1/2"
Side Hubs	(N.P.T)	(2) x 1/2"	(2) x 1/2"	(4) x 1/2"	(8) x 1/2"	(12) x 1/2"	(16) x 1/2"
Overall Dims	(Inches)	4" x 3 1/4" x 3 1/4"	4" x 3 1/4" x 5 1/4"	4 1/2" x 4 1/2" x 3 3/4"	5 1/2" x 5 1/2" x 3 1/2"	5 1/2" x 5 1/2" x 4 1/2"	7" x 7" x 5 1/2"
"L" x" W "x	(mm)	102 x 82 x 82	102 x 82 x 134	115 x 115 x 95	140 x 140 x 90	140 x 140 x 115	178 x 178 x 140
Inside Volume	(Cu In.)	11.1	25	22.6	40.6	64.7	119
	(Cu. Cm)	181	409	370	666	1061	1950

Field-Drilled / Tapped Boxes	Part No.	EBJ202A100	EBJ203A100	EBJ204A100	EBJ208A100	EBJ212A100	EBJ216A100
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1"	Max. 1"	Max. 1 1/4"	Max. 1 1/4"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 1/2"	Max. (8) x 3/4"	(8) x 3/4" + (4) x 1/2"	Max. (16) x 3/4"

Hubs should be between 3-1/2 and 5 threads. Field-drilled boxes must be tapped all the way through a hole and not exceed trade sizes listed above

Factory-Drilled / Tapped Boxes	Part No.	EBJ202A101	EBJ203A101	EBJ204A101	EBJ208A101	EBJ212A101	EBJ216A101
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1 1/4"	Max. 1 1/2"	Max. 2"	Max. 2"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 3/4"	Max. (8) x 3/4"	Max. (12) x 3/4"	Max. (16) x 3/4"

When ordering factory-drilled boxes, specify the part number, hub locations and the the hub sizes. (eg. EBJ204A101 - Side Hubs A=B=1/2", C=3/4"; Bottom hub

CUT SHEET EBJ-D101

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UNDER WATER JUNCTION BOX

SERIES EBJ

REV. E AUG2015

ITEM 38

Function

Flanged bronze conduit stub ups are leak-proof and strong. Stub ups provide watertight and secure penetrations through concrete and membranes directly into fountain pools. Use as terminal connections with Crystal Fountains 'EBJ' bronze underwater junction boxes.

Specifications

Construction of stub up pipe shall be red brass with cast bronze flange soldered to pipe, equipped with copper ground lug and stainless steel bolts. Standard threading on both ends shall be N.P.T

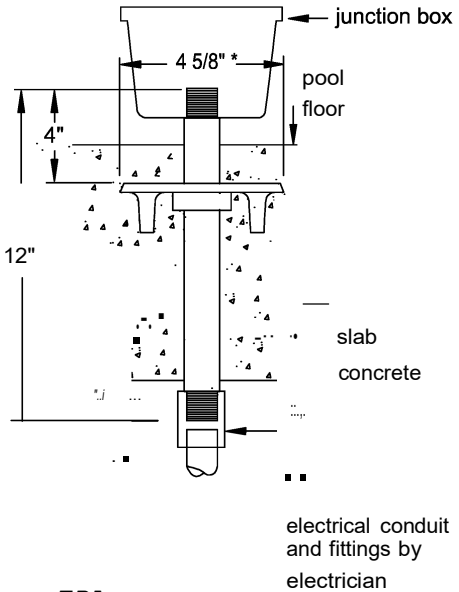
Underdeck clamp for EPC shall be cast bronze with galvanized rods, washers and nuts.

	PART number		
connection	no membrane	sub surface membrane	cored hole
1/2"	EPA050	EPB050	EPC050
3/4"	EPA075	EPB075	EPC075
1"	EPA100	EPB100	EPC100
11/4"	EPA125	EPB125	EPC125
11/2"	EPA150	EPB150	EPC150
2"	EPA200	EPB200	EPC200
3"	EPA300	EPB300	EPC300

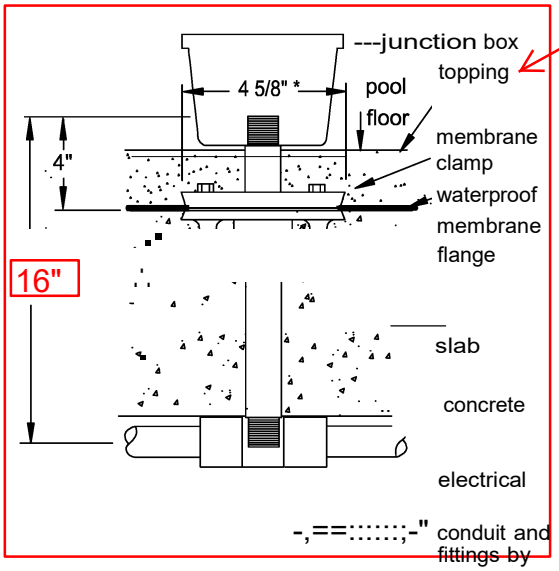
Notes

*1. Diameters of flange, membrane and underdeck clamps for EPA300/ EPB300 / EPC300 stub ups are 6/4", cored hole to be 5 %".
2. Contact Crystal Fountains for customized pipe lengths.
3. Standard flange position is shown, custom heights are available.
4. Standard EPC handles a 6" (max.) thick slab. Specify slab thickness if it is greater.

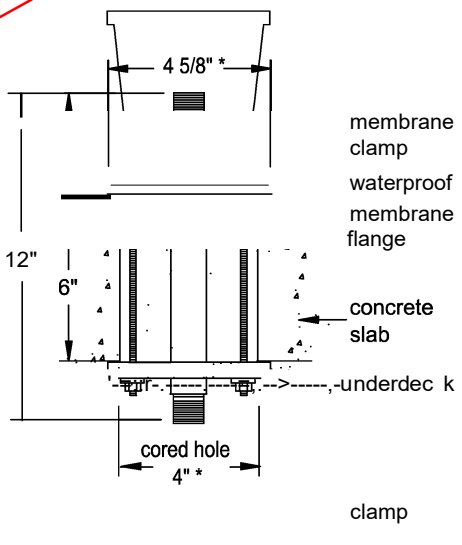
NO TOP COAT IN RESERVOIR



EPA
no membrane application



EPB
sub surface membrane application



EPC
cored hole application

TEL. 1-905.6[illegible] 905.660.6916
www.crystalfountains.com

JUNE 2015

Function

ITEM 38

alfountains.com

STUB UP

CUT SHEET
EP-0101

PAGE
1 OF 1

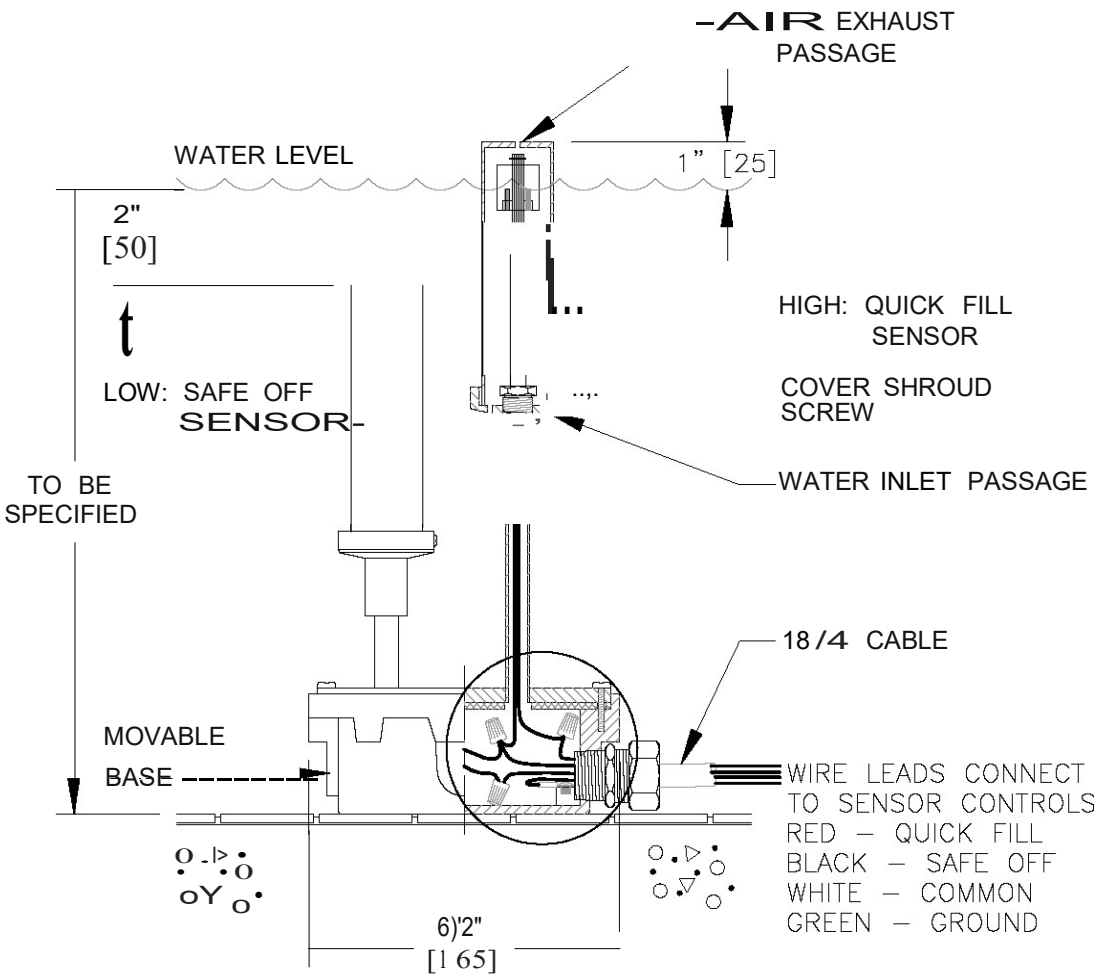
SERIES
EP

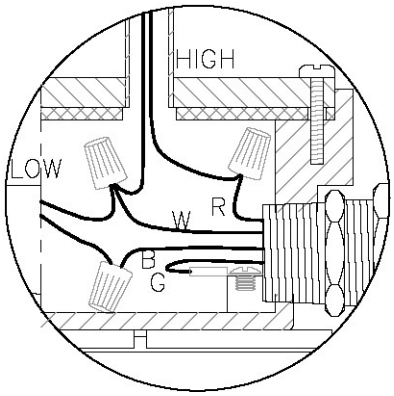
REV.
B

TEL. 1-905.660.6674 FAX. 1-905.660.6916

JUNE 2015

ITEM 39





NOTES

(1) REFER TO FOUNTAIN SPECIFICATION
(2) REFER TO INSTALLATION INSTRUCTIONS SHIPPED WITH PRODUCT
(3) DO NOT SCALE DRAWING

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Crystal Fountains
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MOVABLE LEVEL SENSOR -QUICK FILL AND SAFE-OFF

SERIES	REV.
ESS200	
INST DWG# ESS200-D103	OCT 2002

ITEM 39

Function

Movable electronic water level sensor automatically monitors quick fill and safe-off functions in very shallow water depths. Sensor is adjustable in height after installation. Low voltage for safety. Connects to Crystal Fountains' ECL series control panel. Install vertically.

Specifications

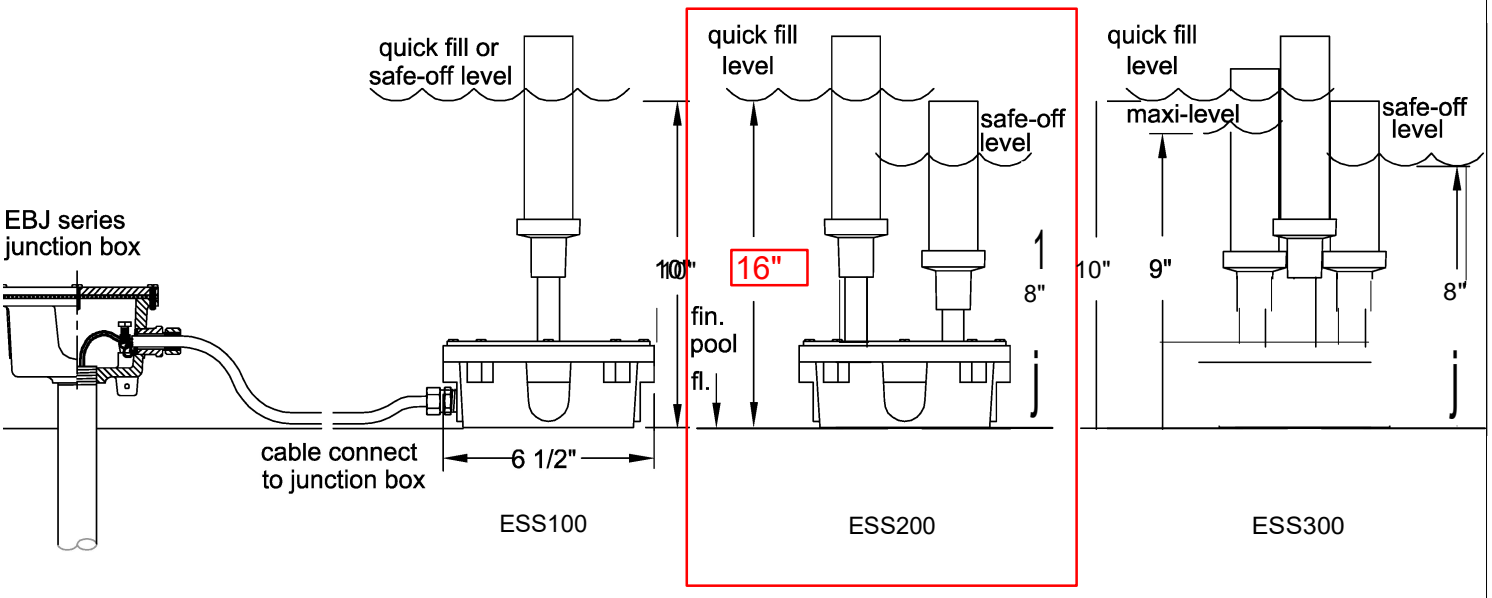
Construction of sensor box and lid shall be cast bronze. Sensor enclosure shall be brass and copper with neoprene gasket and seal. Sensor shall be reed switch enclosed in a polypropylene, magnetically actuated float with 1" level adjustment. Submersible cable shall be 9ft., 16/3 (ESS100), 18/4 (ESS200) or 16/5 (ESS300).

ESS100- 1 sensor, quick fill or safe-off
ESS200- 2 sensors, quick fill and safe-off
ESS300- 3 sensors, quick fill, safe-off and maxi-level control

Voltage and current ratings:
24 VAC/DC, 0.28A

Notes

1. UL and ULC listed.
2. For use in Class 2 circuits only.
3. Wiring methods must comply with Class 3 or better circuits.
4. Custom sizes available upon request.
5. Connect to Crystal Fountains junction box (EBJ series).



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MOVABLELEVELSENSOR

CUT SHEET ESS-D101

SERIES ESS

REV. D

JUNE 2015

ITEM 40

Function

Submersible conduit mounted junction boxes for underwater connections.

Specification

Construction shall be cast bronze equipped with neoprene gasket, stainless steel fasteners and copper ground connections (EBJ216: total4 internal incl. 2 lugs; other models: 1 external and 2 internal incl. 1 lug).

Notes

1. Trade size 1/2" and 3/4" plugs and cord seals are to be tightened with a torque of 90Nm (801bf.in).
2. Lid fasteners are to be tightened with a torque of 2 Nm (191bf.in).
3. Thread sealant compound or Teflon tape must be used for a leak-free seal.

Listings

UL and ULC listed to safety standards for use in water other than in swimming pools and spas. IP68 Rated

For swimming pools and spas use, or junction box to be flush mounted, refer to Crystal Fountains' EBN208.

Options

Junction Box Potting Compound

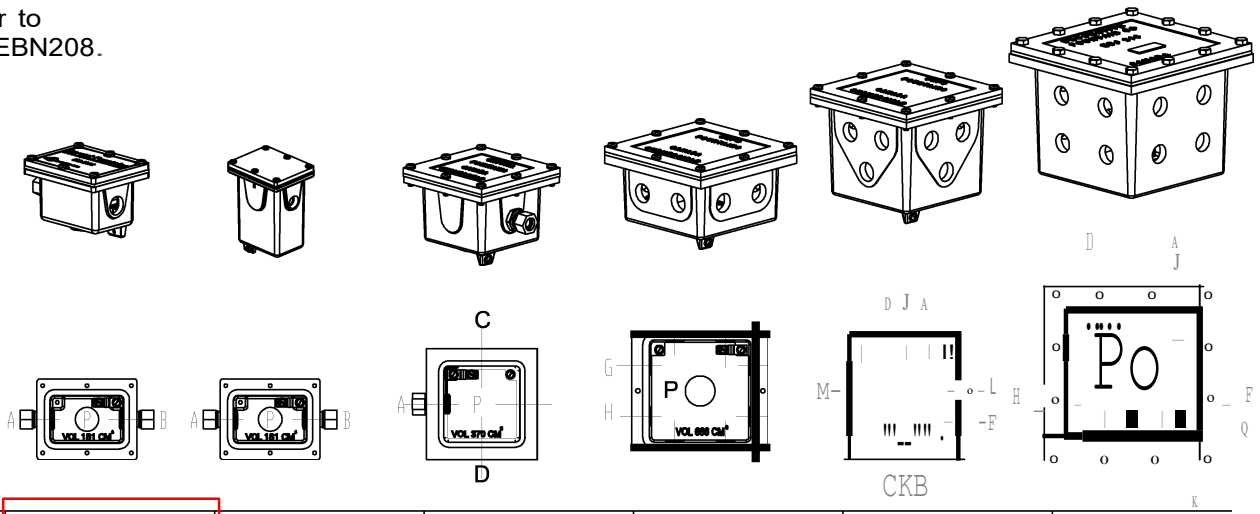
EBJ C10- 21 oz
EBJ C20- 12 oz

Junction Box Cord Seal

EGS series -for watertight connections of underwater cables connecting junction boxes with lights, water level sensors and pumps.

Stub Up

EP series - flanged bronze conduit stub ups provide watertight and secure penetrations through concrete and slabs directly into fountain pools.



Junction Box Part No.		EBJ202	EBJ203	EBJ204	EBJ208	EBJ212	EBJ216
Bottom Hub	(N.P.T)	3/4"	3/4"	3/4"	1"	1 1/4"	1 1/2"
Side Hubs	(N.P.T)	(2) x 1/2"	(2) x 1/2"	(4) x 1/2"	(8) x 1/2"	(12) x 1/2"	(16) x 1/2"
Overall Dims	(Inches)	4" x 3 1/4" x 3 1/4"	4" x 3 1/4" x 5 1/4"	4 1/2" x 4 1/2" x 3 3/4"	5 1/2" x 5 1/2" x 3 1/2"	5 1/2" x 5 1/2" x 4 1/2"	7" x 7" x 5 1/2"
"L" x" W "x	(mm)	102 x 82 x 82	102 x 82 x 134	115 x 115 x 95	140 x 140 x 90	140 x 140 x 115	178 x 178 x 140
Inside Volume	(Cu In.)	11.1	25	22.6	40.6	64.7	119
	(Cu. Cm)	181	409	370	666	1061	1950

Field-Drilled / Tapped Boxes	Part No.	EBJ202A100	EBJ203A100	EBJ204A100	EBJ208A100	EBJ212A100	EBJ216A100
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1"	Max. 1"	Max. 1 1/4"	Max. 1 1/4"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 1/2"	Max. (8) x 3/4"	(8) x 3/4" + (4) x 1/2"	Max. (16) x 3/4"

Hubs should be between 3-1/2 and 5 threads. Field-drilled boxes must be tapped all the way through a hole and not exceed trade sizes listed above

Factory-Drilled / Tapped Boxes	Part No.	EBJ202A101	EBJ203A101	EBJ204A101	EBJ208A101	EBJ212A101	EBJ216A101
	Bottom Hub	Max. 3/4"	Max. 3/4"	Max. 1 1/4"	Max. 1 1/2"	Max. 2"	Max. 2"
	Side Hubs	Max. (2) x 1/2"	Max. (3) x 1/2"	Max. (4) x 3/4"	Max. (8) x 3/4"	Max. (12) x 3/4"	Max. (16) x 3/4"

When ordering factory-drilled boxes, specify the part number, hub locations and the the hub sizes. (eg. EBJ204A101 - Side Hubs A=B=1/2", C=3/4"; Bottom hub

CUT SHEET EBJ-D101

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CW-

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UNDER WATER JUNCTION BOX

SERIES EBJ

REV. E AUG2015

ITEM 41

Function

Flanged bronze conduit stub ups are leak-proof and strong. Stub ups provide watertight and secure penetrations through concrete and membranes directly into fountain pools. Use as terminal connections with Crystal Fountains 'EBJ' bronze underwater junction boxes.

Specifications

Construction of stub up pipe shall be red brass with cast bronze flange soldered to pipe, equipped with copper ground lug and stainless steel bolts. Standard threading on both ends shall be N.P.T

Underdeck clamp for EPC shall be cast bronze with galvanized rods, washers and nuts.

EPA

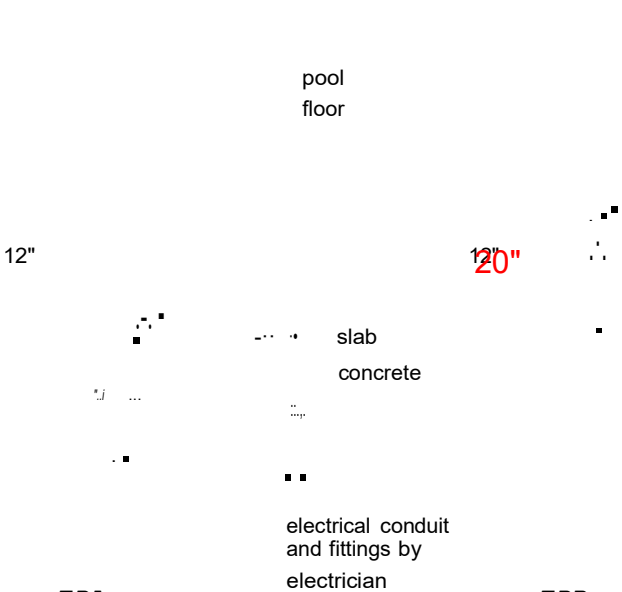
EPB

EPC

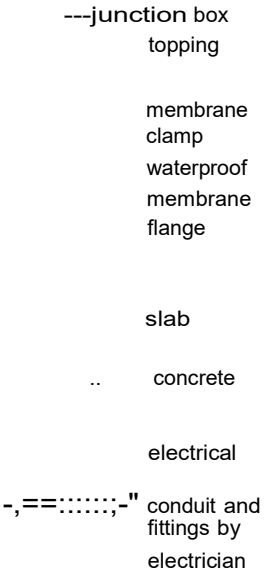
connection	PART number		
	no membrane	sub surface membrane	cored hole
1/2"	EPA050	EPB050	EPC050
3/4"	EPA075	EPB075	EPC075
1"	EPA100	EPB100	EPC100
11/4"	EPA125	EPB125	EPC125
11/2"	EPA150	EPB150	EPC150
2"	EPA200	EPB200	EPC200
3"	EPA300	EPB300	EPC300

Notes

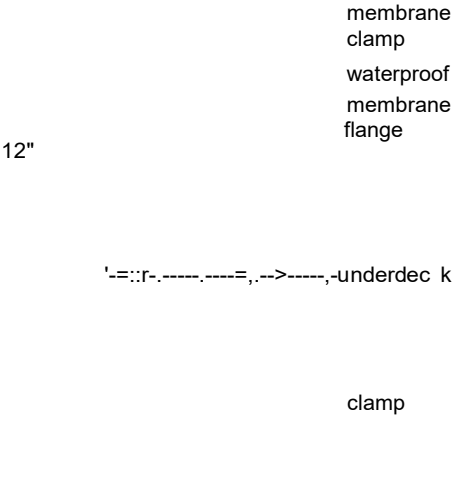
*1. Diameters of flange, membrane and underdeck clamps for EPA300/ EPB300 / EPC300 stub ups are 6/4", cored hole to be 5 %".
2. Contact Crystal Fountains for customized pipe lengths.
3. Standard flange position is shown, custom heights are available.
4. Standard EPC handles a 6" (max.) thick slab. Specify slab thickness if it is greater.



EPA
no membrane application



EPB
sub surface membrane application



EPC
cored hole application

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STUB UP

SERIES EP

REV. B

JUNE 2015

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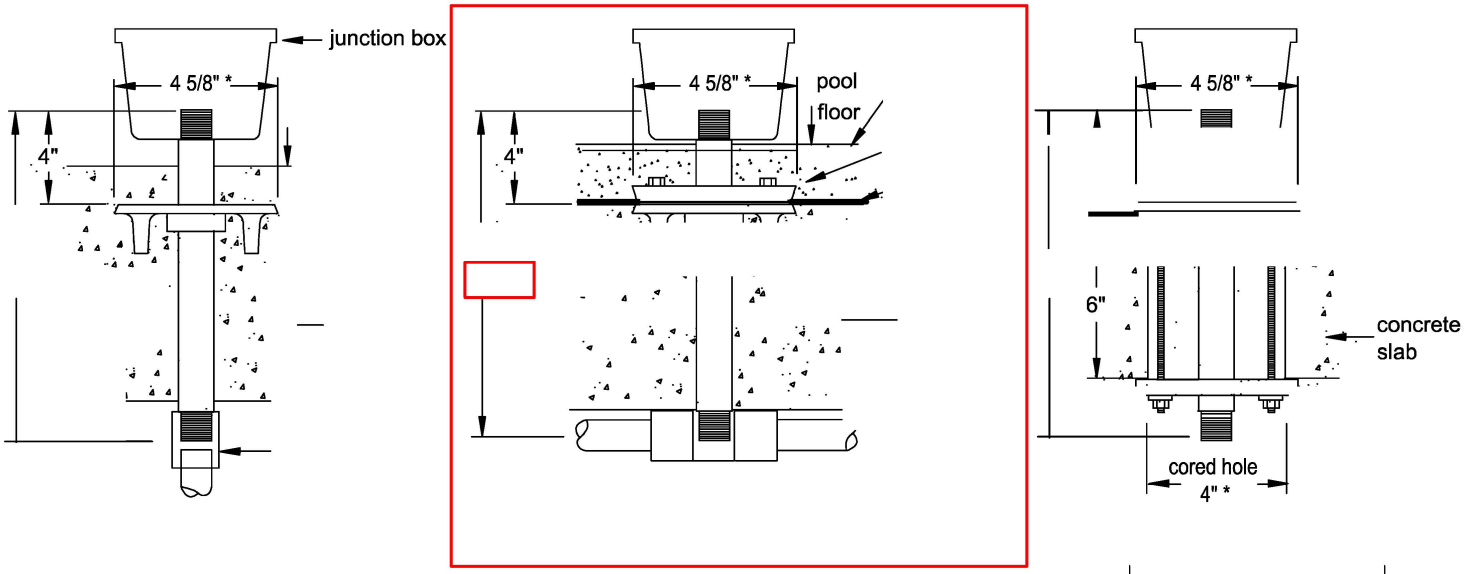
Function

ITEM 41

ISO 9001

CUT SHEET
EP-0101



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STUB UP

SERIES
EP

REV.
B
JUNE 2015

ITEM 42

Function

The wind control panel is a microprocessor based sentry that accurately senses wind velocity and adjusts the fountain controls to enable the system to continue operation even in less than perfect conditions.

Specification

Control panel housing shall be plastic NEMA 4X rated. Wind anemometer shall have a plastic sensing head, rubber boot enclosure, and copper and aluminum stem. Cable supplied shall be 300' (90m) in length,

Features

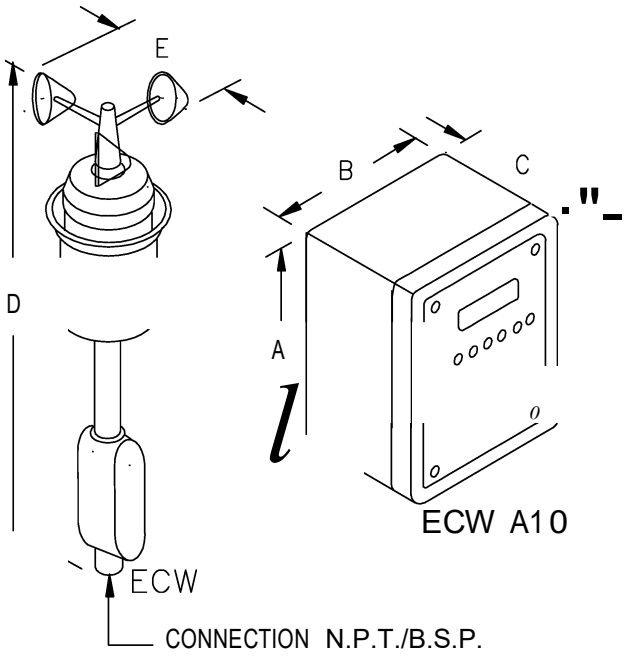
- LCD display
- adjustable wind speed set points
- multi-mode operation
- dual sensor capability
- controls up to 4 relays
- memory backup

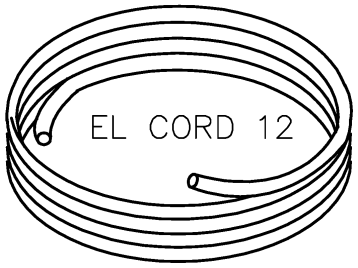
Electrical Rating

Line voltage 120V/60Hz or 220/240V, 50Hz. lamp

Note

Contact Crystal Fountains for detailed specification, installation and operation details.





Dimensions

Part no.	a dim.	b dim.	c dim.	d dim.	e dim.
ECW-100	6 "	8"	5"	13 1/4"	6"

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WIND CONTROL UNIT

CUT SHEET ECW-D101

SERIES ECW

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REV. 1

JUNE 2015

NCC RESIDENCE FRONT ENTRANCE LANDSCAPE REHABILITATION 2016 - NCC DC-2611-110

FOR TENDER - 22 APRIL, 2016

RÉSIDENCE DE LA CCN: RÉFECTION DE L'AMÉNAGEMENT PAYSAGER DE L'ENTRÉE PRINCIPALE 2016 - CCN DC-2611-110

PUBLIÉ POUR APEL D'OFFRES - 22 AVRIL, 2016

DRAWING INDEX / LISTE DES DESSINS

LANDSCAPE DRAWINGS | DESSINS D'AMÉNAGEMENT PAYSAGER

FOUNTAIN DRAWINGS | DESSINS DE FONTAINE

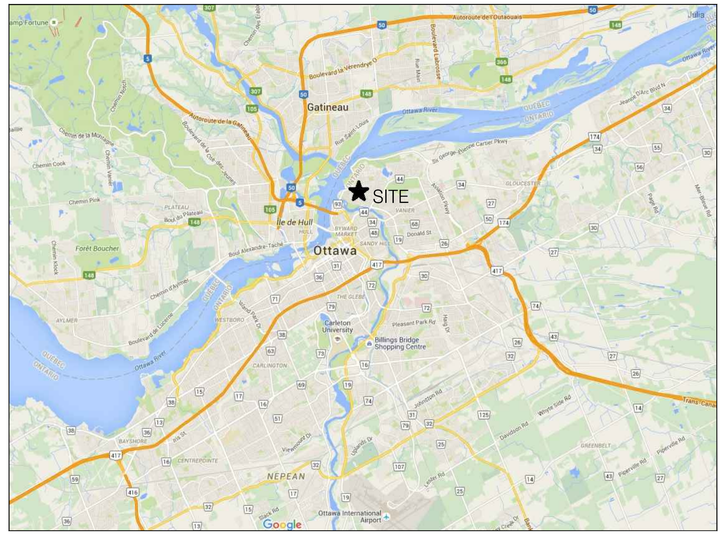
CIVIL DRAWINGS | DESSINS DE GÉNIE CIVIL

STRUCTURAL DRAWINGS | DESSINS DE CHARPENTE

MECHANICAL DRAWINGS | DESSINS DE MÉCANIQUE

ELECTRICAL DRAWINGS | DESSINS D'ÉLECTRICITÉ

ARCHITECTURE DRAWINGS | DESSINS D'ARCHITECTURE



KEY PLAN
NOT TO SCALE

PLAN CLÉ
PAS À ÉCHELLE

CONSULTANTS / EXPERTS-CONSEILS

LANDSCAPE | ARCHITECTURE DE PAYSAGE : LASHLEY + ASSOCIATES

FOUNTAIN DESIGN | CONCEPTION DE LA FONTAINE : THE WATERWORX COMPANY

CIVIL | GÉNIE CIVIL: NOVATECH ENGINEERING CONSULTANTS LTD.

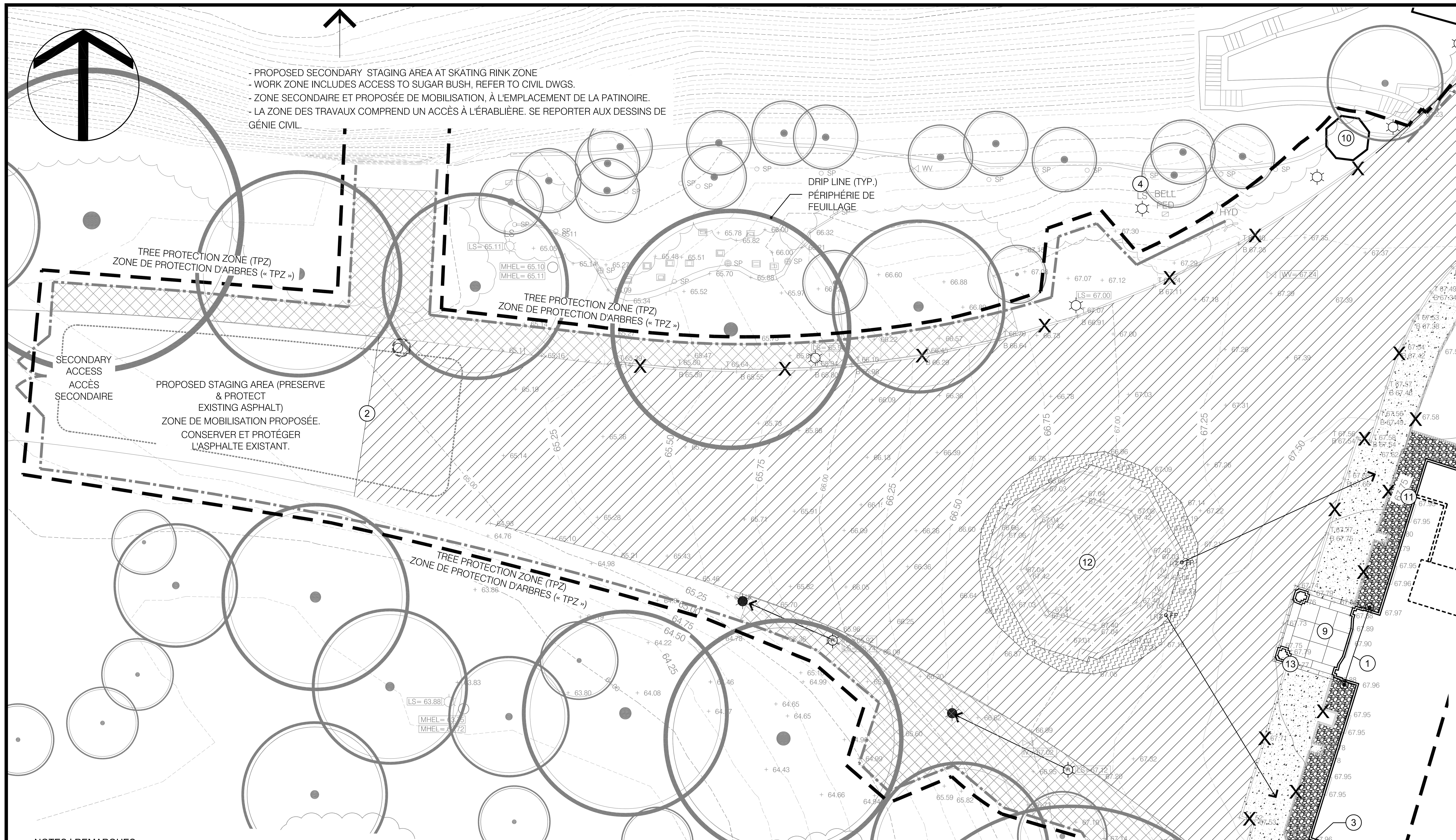
STRUCTURAL | CHARPENTE : CLELAND JARDINE ENGINEERING LTD.

MECHANICAL | MÉCANIQUE : GOODKEY WEEDMARK AND ASSOCIATES LTD.

ELECTRICAL | ÉLECTRIQUE : GOODKEY WEEDMARK AND ASSOCIATES LTD.

LIGHTING DESIGN | CONCEPTION D'ÉCLAIRAGE : MARTIN CONBOY LIGHTING DESIGN

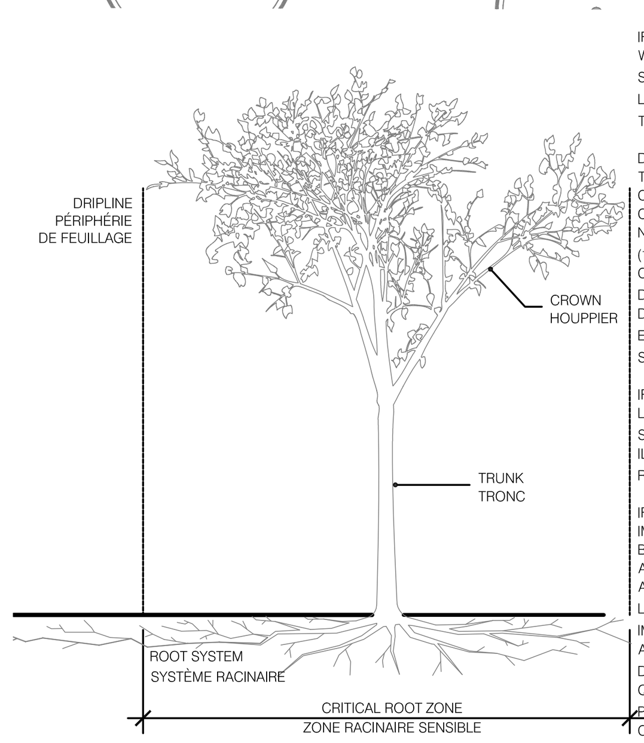
ARCHITECTURE | ARCHITECTURE : DFS INC.



NOTES | REMARQUES:

- REMOVE SURFACES AND EXCAVATE TO DEPTH AS REQUIRED TO CONSTRUCT NEW PAVEMENTS AND STRUCTURES | ENLEVER LES SURFACES ET EXCAVER AU NIVEAU REQUIS POUR CONSTRUIRE LE NOUVEAU PAVÉ ET LES NOUVELLES STRUCTURES
- DISPOSE OF ALL MATERIALS OFF-SITE UNLESS SPECIFIED OTHERWISE | DISPOSER DE TOUS LES MATÉRIAUX HORS-SITE À MOINS D'INDICATION CONTRAIRE
- ALL WORK TO BE PERFORMED INSIDE LIMIT OF CONTRACT AS SHOWN ON PLAN. ADVISE NCC REPRESENTATIVE OF ANY DISTURBANCES OUTSIDE AREA SHOWN PRIOR TO COMPLETING THE WORK | TOUS LES TRAVAUX DOIVENT ÊTRE EFFECTUÉS À L'INTÉRIEUR DES LIMITES DU CONTRAT TEL QUE DÉMONTRÉ SUR LES PLANS. AVISER LE REPRÉSENTANT DE LA CCN DE TOUS DÉRANGEMENT À L'EXTÉRIEURE DE L'AIRE DÉMONTRÉE AVANT LE DÉBUT DES TRAVAUX
- REPAIR ALL DAMAGES TO ADJACENT SURFACES TO THE SATISFACTION OF THE NCC REPRESENTATIVE | RÉPARER TOUS DOMMAGES AUX SURFACES ADJACENTES À LA SATISFACTION DU REPRÉSENTANT DE LA CCN
- ALL GRANITE COBBLES TO BE SALVAGED, AND DELIVERED TO NCC FOR STORAGE | SAUVEGARDER ET PROTÉGER TOUS LES PAVÉS EN GRANITE, PUIS LES EXPÉDIER À LA CCN ET CE, À DES FINS D'ENTREPOSAGE

1. DOWN SPOUTS TO BE MODIFIED AND RECONNECTED - SEE ARCHITECTURE DRAWINGS |BEC DE DESCENTE À MODIFIER ET RECONNECTER - VOIR LES DESSINS D'ARCHITECTURE
2. SAW CUT EXISTING SURFACES AND REMOVE AS SHOWN | COUPER LES SURFACES EXISTANTES ET ENLÈVER LES SURFACES SELON LES DIRECTIVES DU DESSIN
3. GROUND WIRE TO BE PROTECTED | FIL DE MISE AU SOL À PROTÈGER
4. AUTOMATIC SPRINKLER TO BE PRESERVED | GICLEUR AUTOMATIQUE À CONSERVER
5. ELECTRICAL PANEL TO BE PROTECTED| TABLEAU DE COURANT À PROTÈGER
6. LIFT AND RELAY COBBLESTONE EDGING | SOULEVER ET REPOSER LA BORDURE DE PAVÉ DE GRANITE COBBLE
7. GRASS TO BE REMOVED | GAZON À ENLEVER
8. EXISTING GRANITE PAVING IN PORT-COCHERE TO BE SALVAGED AND RELAID | LES PAVÉS DE GRANITE DANS LA PORTE-COCHÈRE DOIT ÊTRE SAUVEGARDÉS ET REPOSÉS
9. GUARD HOUSE | POSTE DE GARDE
10. REMOVE EXISTING VEGETATION | ENLEVER LA VEGETATION EXISTANTE
11. PROVIDE WATERPROOF PENETRATIONS THROUGH BUILDING FOUNDATION AS PER ELECTRICAL AND MECHANICAL WORKS. ELEVATION OF PENETRATIONS TO BE BELOW FOOTING OF NEW RETAINING WALL AS SHOWN ON L3-3 | FOURNIR DES PÉNÉTRATION IMPERMÉABLES À TRAVERS LE BATIMENT SELON LES TRAVAUX ÉLECTRIQUES ET MÉCANIQUES. L'ÉLÉVATION DES PÉNÉTRATIONS DOIT ÊTRE DESSOUS LA BASE DU NOUVAEAU MUR DE SOUTENNEMET SELON LE DESSIN L3-3.
12. SALVAGE ALL STONES FROM THE EXISTING FOUNTAIN AND TRASNPORT TO THE NCC STORAGE FACILITY AT WOODROFFE AVE | SAUVEGARDER LES PIERRES DE LA FONTAINE EXISTANTE ET LES TRANSPORTER À L'ENTREPÔT DE LA CCN SUR L'AVENUE WOODROFFE
13. MIC BOX TO BE PRESERVED - SEE ELECTRICAL | BOITE A MICRO À ÊTRE CONSERVER - VOIR ÉLECTRIQUE

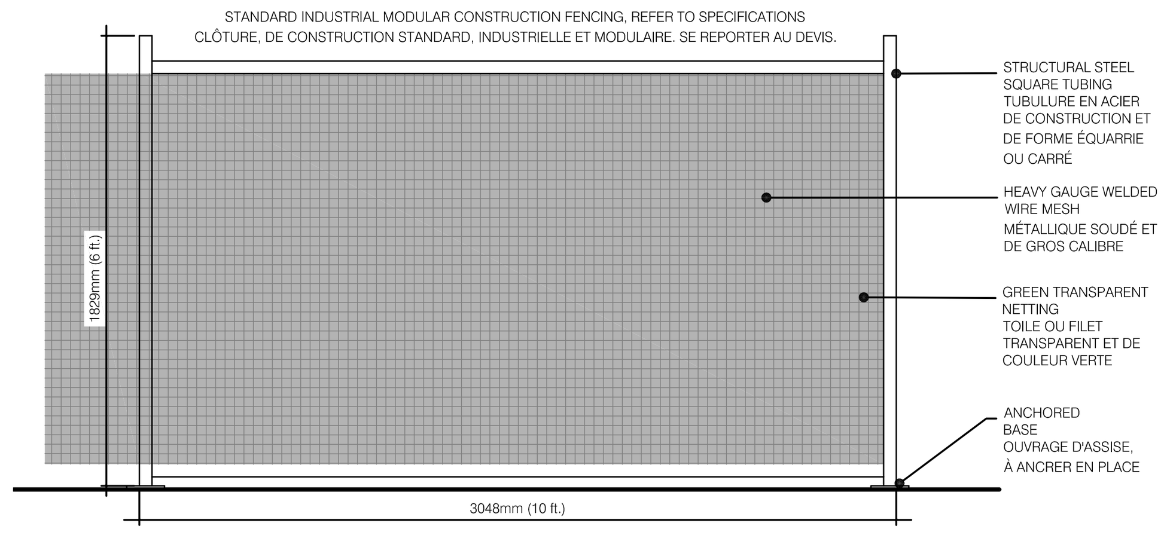


IF EXCAVATION MUST TAKE PLACE WITHIN THE DRIPLINE, HAND DIG ONLY. S'IL FAUT ENTREPRENDRE DES TRAVAUX D'EXCAVATION À 'INTÉRIEUR DE LA PÉRIPHÉRIE DU FEUILLAGE, L'ON SE DEVRA ALORS DE CREUSER UNE TRANCHÉ À LA MAIN.

DO NOT CUT OR DAMAGE ROOTS GREATER THAN 25mm (1") DIAMETER IN THE CRITICAL ROOT ZONE. IF YOU NEED TO CUT LARGER ROOTS, CONSULT A TREE SPECIALIST FIRST (IF PERMITTED, ROOTS SHOULD BE CUT CLEANLY WITH A HAND SAW). NE PAS COUPER NI ENDOMMAGER DE RACINES DE PLUS DE 25 mm (1 PO.) DE DIAMÈTRE ET CE, À L'INTÉRIEUR DE LA ZONE RACINAIRE CRITIQUE. SI L'ON SE DOIT DE COUPER DES RACINES DE PLUS GRANDS DIAMÈTRES, IL FAUDRA D'ABORD REPORTER LE CAS À UN ARBORISTE; ET DANS LE CAS D'UNE AUTORISATION DE COUPER DE TELLES RACINES, ELLES DEVRONT ÊTRE SCIÉES DE FAÇON BIEN DÉFINIE ET CE, EN SE SERVANT D'UNE ÉGOÏNE.).

IF THERE ARE NO ROOTS GREATER THAN 25mm DIAMETER, LEAVE AT LEAST TWO OF THE LARGEST ROOTS PER METER OF TRENCH. S'IL N'Y A PAS DE RACINES DONT LE DIAMÈTRE EST SUPÉRIEUR À 25 mm, IL FAUDRA ALORS LAISSER AU MOINS DEUX DES PLUS GROSSES RACINES PAR MÈTRE DE TRANCHÉE.

IF ANY ROOTS ARE EXPOSED DURING CONSTRUCTION, THEY SHOULD BE IMMEDIATELY REBURIED WITH SOIL OR WRAPPED IN PEAT MOSS AND BURLAP, KEPT MOIST UNTIL THEY CAN BE BURIED PERMANENTLY AND AVOID EXPOSING ROOTS DURING HOT/ DRY WEATHER. ADVENANT QUE DES RACINES DEVIENNENT APPARENTES AU COURS DE LA CONSTRUCTION, L'ON SE DEVRA ALORS DE LES RÉ-ENSEVELIR IMMÉDIATEMENT ET CE, EN SE SERVANT DE SOL APPROPRIÉ; ALTERNATIVEMENT, L'ON POURRA LES RECOUVRIR DE SPHAIGNE ET D'UNE TOILE DE JUTE ET DE LES GARDER À L'ÉTAT HUMIDE JUSQU'À CE QU'ELLES SOIENT ENSEVELIES DE FAÇON PERMANENTE; EN OUTRE, PRENDRE SOIN D'ÉVITER UNE EXPOSITION DES RACINES PAR TEMPS CHAUD ET (OU) SEC.



NOTES:

- THE TREES ON THIS SITE ARE CEREMONIAL TREES AND ARE DESIGNATED CULTURAL ASSETS OF GREAT IMPORTANCE. THEY ARE IRREPLACEABLE. A SUBSTANTIAL FINE, AS DETERMINED BY THE OFFICIAL RESIDENCES (OR) GROUNDS MANAGER, WILL BE ENFORCED FOR ANY DAMAGE TO THE TREES INCLUDING UNAUTHORIZED PRUNING. | LES ARBRES SUR CE SITE SONT DES ARBRES COMMÉMORATIFS ET DÉSIGNÉS COMME ÉTANT DES BIENS CULTURELS DE GRANDE IMPORTANCE. CES ARBRES SONT IRREMPLAÇABLES. UNE AMENDE IMPORTANTE, TELLE QUE DÉTERMINÉE PAR LE GESTIONNAIRE DES RÉSIDENCES OFFICIELLES ET (OU) DE CE TERRAIN SERA IMPOSÉE EN RAPPORT AVEC TOUT ENDOMMAGEMENT À CES ARBRES ET CE, COMPTE TENU DE TOUT OUVRAGE D'ÉMONDAGE NON AUTORISÉ.
- EXISTING TREES (INCLUDING CROWN, TRUNK AND ROOT SYSTEM) ARE TO BE PROTECTED DURING ALL STAGES OF WORK. THE ROOTS OF A TREE CAN EXTEND FROM THE TRUNK TO APPROXIMATELY 2-3 TIMES THE DISTANCE OF THE DRIPLINE. | ARBRES EXISTANTS (Y COMPRIS LA CIME, LE TRONC ET LE SYSTÈME RACINAIRE), À PROTÉGER TOUT AU LONG DE TOUS LES STADES DES TRAVAUX. LES RACINES D'UN ARBRE PEUVENT SE PROLONGER D'UN TRONC À ENVIRON 2 À 3 FOIS LA DISTANCE DE LA LIGNE DE DÉGOUTTEMENT.
- NO MATERIAL, CONSTRUCTION EQUIPMENT, OR VEHICLES ARE TO BE STORED IN THE TREE PROTECTION ZONE (TPZ) OR UNDER THE DRIP LINE OF TREES AT ANY TIME | NE PAS ENTREPOSER DE MATÉRIAUX, DE MATÉRIEL DE CONSTRUCTION NI DE VÉHICULES À L'INTÉRIEUR DE LA ZONE DE PROTECTION DES ARBRES (« TPZ ») NI EN DESSOUS DE LA LIGNE DE DÉGOUTTEMENT DES ARBRES ET CE, EN TOUT TEMPS.
- NO MOVEMENT OF VEHICLES, EQUIPMENT OR PEDESTRIANS IN THE TPZ WILL BE PERMITTED | NE SERONT TOLÉRÉS AUCUNE CIRCULATION DE VÉHICULES NI DÉPLACEMENT D'APPAREILS, NI DE PIÉTONS À L'INTÉRIEUR DE LA ZONE DE PROTECTION DES ARBRES.
- REFER TO SPECIFICATION 32 01 91 - TREE PRESERVATION FOR DETAILED INSTRUCTIONS | SE REPORTER À LA SECTION DE DEVIS 32 01 91 (CONSERVATION DES ARBRES) DU DEVIS AFIN DE RETROUVER DES INSTRUCTIONS DÉTAILLÉES.

2 / L1-1 — TREE PROTECTION/ CONSTRUCTION FENCING
CLÔTURES DE CONSTRUCTION ET (OU) DE PROTECTION D'ARBRES — 1:30

LEGEND | LÉGENDE

- LIMIT OF WORK | DÉLIMITATION DES TRAVAUX
- EXISTING TREE TO BE PROTECTED - SEE 2/L1-1 | ARBRE EXISTANT, À PROTÉGER. VOIR 2/L1-1
- EXISTING TREE CANOPY | FRENCH
- EXISTING TREE TRUNK TO BE PROTECTED | TRONC D'ARBRE EXISTANT, À PROTÉGER
- SP — SPRINKLER HEAD TO REMAIN | TÊTE DE GICLAGE, À CONSERVER.
- EXISTING LIGHT STANDARD TO REMAIN | POTEAU EXISTANT D'ÉCLAIRAGE, À CONSERVER.
- EXISTING LIGHT STANDARD TO BE RELOCATED | POTEAU EXISTANT D'ÉCLAIRAGE, À DÉPLACER
- MHSA — SANITARY MANHOLE TO REMAIN | PUITS D'ACCÈS SANITAIRE, À CONSERVER.
- MHWV — MH WATER VALVE TO REMAIN | SOUPAPE D'EAU DE PUITS D'ACCÈS, À CONSERVER
- BELL PED — BELL PEDESTAL TO REMAIN | PIÉDESTAL DE LA SOCIÉTÉ BELL, À CONSERVER.
- HYD — FIRE HYDRANT TO REMAIN | BORNE D'INCENDIE, À CONSERVER.
- CB — CATCH BASIN TO REMAIN | BASSIN COLLECTEUR, À CONSERVER.
- IRRIGATION VALVE BOX TO REMAIN | BOÎTE DE SOUPAPE D'IRRIGATION, À CONSERVER.
- FP — EXISTING FLAG POLE TO BE RELOCATED | MÂT EXISTANT DE DRAPEAU, À DÉPLACER.
- LR — LIGHTING ROD TO REMOVE | TIGE DE PROTECTION CONTRE LA FOUDRE, À ENLEVER.
- MHEL — ELECTRICAL MANHOLE TO REMAIN | PUITS D'ACCÈS DE COURANT, À CONSERVER.
- PLAQUE TO REMAIN | PLAQUE, À CONSERVER.
- R — DRINKING FOUNTAIN TO BE DISMANTLED, SALVAGED AND REINSTALLED | FONTAINE À BOIRE À ÊTRE DÉMONTÉ, SAUVEGARDÉE ET RÉINSTALLÉE
- 00.00 — EXISTING CONTOURS | CONTOURS EXISTANTS
- + 00.00 — EXISTING SPOT ELEVATIONS | ÉLÉVATIONS EXISTANTES PAR POINTS
- ASPHALT TO BE REMOVED | ASPHALTE, À ENLEVER.
- INTERLOCK PAVERS TO BE SALAVAGED | PAVÉS UNIS, À CONSERVER.
- INTERLOCK PAVERS TO BE REMOVED | PAVÉS UNIS, À ENLEVER.
- CONCRETE CURB TO BE REMOVED | BORDURE EN BÉTON, À ENLEVER.
- CONCRETE SIDEWALK TO BE REMOVED | TROTTOIR EN BÉTON, À ENLEVER.
- EXISTING FOUNTAIN STRUCTURE TO BE DISMANTLED, DEMOLISH SUB-STRUCTURE | DÉMONTER LA FONTAINE EXISTANT ET DÉMOLIR LE STRUCTURE DESSOUS
- COBBLE STONE TO BE REMOVED AND DELIVERED TO NCC STORAGE FACILITY | CAILLOUTIS, À ENLEVER ET TRANSPORTER À L'ENTREPÔT DE LA CCN
- RIVERSTONE TO BE SALVAGED AND REUSED ONSITE | CAILLOUX DE RIVIÈRE, À SAUVEGARDER ET RÉUTILISER
- STONE DUST SURFACE TO BE REMOVED | SURFACE EN POUSSIERE DE PIERRE, À ENLEVER
- GROUND PROTECTION AS SPECIFIED | PROTECTION DU SOL SELON LES DEVIS DE CONSTRUCTION
- TREE PROTECTION/ CONSTRUCTION FENCING SEE 2/L1-1 | CLÔTURES DE CONSTRUCTION ET (OU) DE PROTECTION D'ARBRES - VOIR 2/L1-1

SCALE | ÉCHELLE 1:200
0 1 2 3 4 5 10 m

NCC CCN Canada

Real Estate Management, Design and Construction Branch
Gestion des biens immobiliers. Direction du design et de la construction

Design and Construction Division
Division du design et de la construction

director - Claude Robert - directeur

consultant
expert-conseil

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TÉL. : 613-233-8579
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W LashleyLA.com
E Mail@LashleyLA.com

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soumission ou révision

n°	description	date
11	FOR TENDER | POUR SOUMISSION	22/04/2016
10	REISSUED FOR 100% REVIEW	21/03/2016
9	REISSUED FOR 100% REVIEW	04/03/2016
8	ISSUED FOR 100% REVIEW	18/02/2016

project
projet

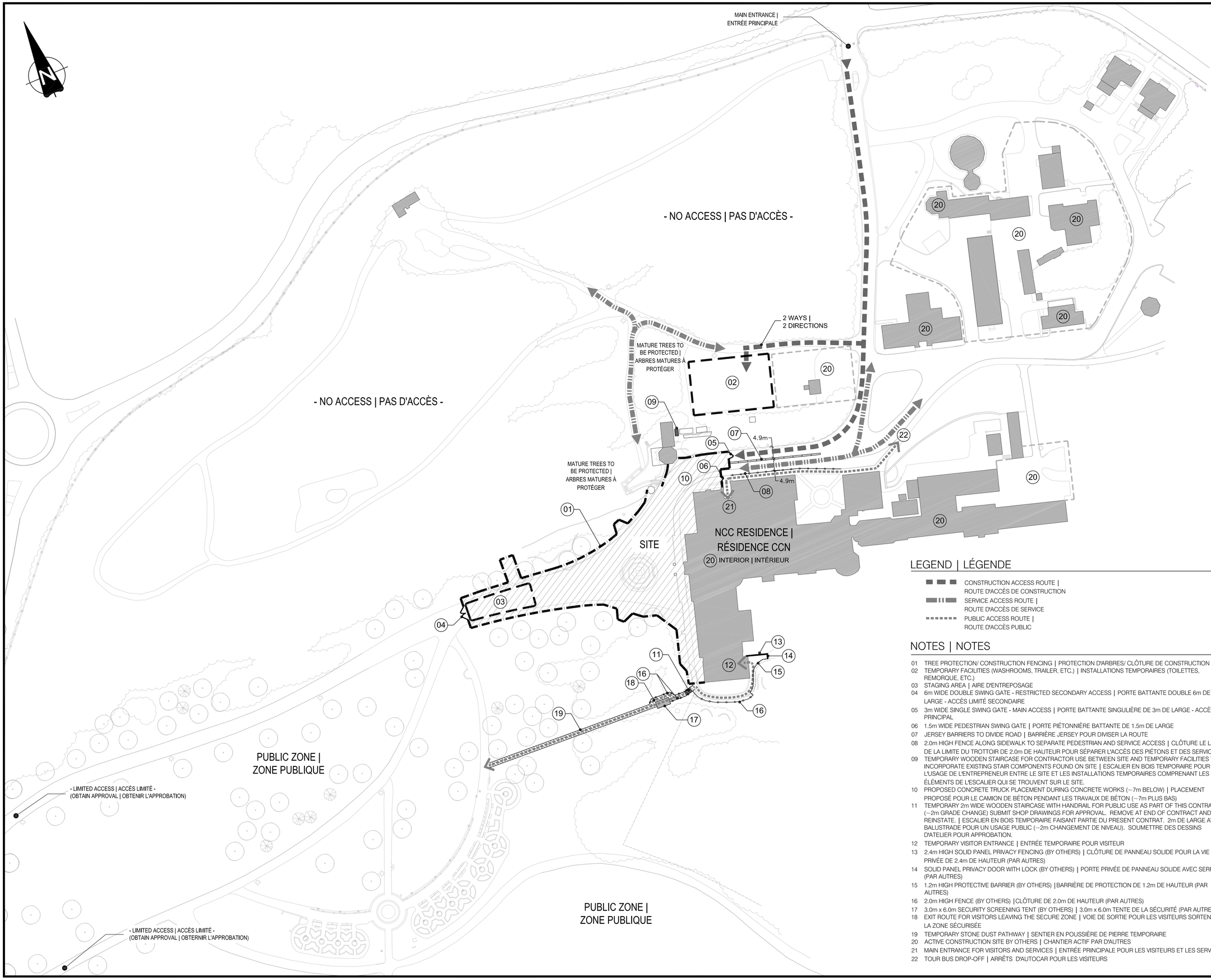
NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

DEMOLITION PLAN
PLAN DES OUVRAGES DE DÉMOLITION

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par: R.D.,D.B.,J.G.,M.L.,P.B
date: 08/08/2012
scale / échelle: 1:200
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: L1-1

May-03-16 4:25:10 PM \\Nccneta28\remdc-gidc\DesignAndConstruction\LA\CrossanCarole\OR-Rideau Hall Front Entrance\62- Implementation\Dwg_2016\Drawings\NCC - Working Files\NCC-Specs_april14\Dwgs\1.0 Landscape\NCC_15615-1_FrontEntrance_PLANS13_04 FR.dwg



LEGEND | LÉGENDE

- CONSTRUCTION ACCESS ROUTE | ROUTE D'ACCÈS DE CONSTRUCTION
- SERVICE ACCESS ROUTE | ROUTE D'ACCÈS DE SERVICE
- PUBLIC ACCESS ROUTE | ROUTE D'ACCÈS PUBLIC

NOTES | NOTES

01 TREE PROTECTION/ CONSTRUCTION FENCING | PROTECTION D'ARBRES/ CLÔTURE DE CONSTRUCTION
02 TEMPORARY FACILITIES (WASHROOMS, TRAILER, ETC.) | INSTALLATIONS TEMPORAIRES (TOILETTES, REMORQUE, ETC.)
03 STAGING AREA | AIRE D'ENTREPOSAGE
04 6m WIDE DOUBLE SWING GATE - RESTRICTED SECONDARY ACCESS | PORTE BATTANTE DOUBLE 6m DE LARGE - ACCÈS LIMITÉ SECONDAIRE
05 3m WIDE SINGLE SWING GATE - MAIN ACCESS | PORTE BATTANTE SINGULIÈRE DE 3m DE LARGE - ACCÈS PRINCIPAL
06 1.5m WIDE PEDESTRIAN SWING GATE | PORTE PIÉTONNIÈRE BATTANTE DE 1.5m DE LARGE
07 JERSEY BARRIERS TO DIVIDE ROAD | BARRIÈRE JERSEY POUR DIVISER LA ROUTE
08 2.0m HIGH FENCE ALONG SIDEWALK TO SEPARATE PEDESTRIAN AND SERVICE ACCESS | CLÔTURE LE LONG DE LA LIMITE DU TROTTOIR DE 2.0m DE HAUTEUR POUR SÉPARER L'ACCÈS DES PIÉTONS ET DES SERVICES
09 TEMPORARY WOODEN STAIRCASE FOR CONTRACTOR USE BETWEEN SITE AND TEMPORARY FACILITIES TO INCORPORATE EXISTING STAIR COMPONENTS FOUND ON SITE | ESCALIER EN BOIS TEMPORAIRE POUR L'USAGE DE L'ENTREPRENEUR ENTRE LE SITE ET LES INSTALLATIONS TEMPORAIRES COMPRENANT LES ÉLÉMENTS DE L'ESCALIER QUI SE TROUVENT SUR LE SITE.
10 PROPOSED CONCRETE TRUCK PLACEMENT DURING CONCRETE WORKS (–7m BELOW) | PLACEMENT PROPOSÉ POUR LE CAMION DE BÉTON PENDANT LES TRAVAUX DE BÉTON (–7m PLUS BAS)
11 TEMPORARY 2m WIDE WOODEN STAIRCASE WITH HANDRAIL FOR PUBLIC USE AS PART OF THIS CONTRACT (–2m GRADE CHANGE) SUBMIT SHOP DRAWINGS FOR APPROVAL. REMOVE AT END OF CONTRACT AND REINSTATE. | ESCALIER EN BOIS TEMPORAIRE FAISANT PARTIE DU PRESENT CONTRAT. 2m DE LARGE AVEC BALUSTRADE POUR UN USAGE PUBLIC (–2m CHANGEMENT DE NIVEAU). SOUMETTRE DES DESSINS D'ATELIER POUR APPROBATION.
12 TEMPORARY VISITOR ENTRANCE | ENTRÉE TEMPORAIRE POUR VISITEUR
13 2.4m HIGH SOLID PANEL PRIVACY FENCING (BY OTHERS) | CLÔTURE DE PANNEAU SOLIDE POUR LA VIE PRIVÉE DE 2.4m DE HAUTEUR (PAR AUTRES)
14 SOLID PANEL PRIVACY DOOR WITH LOCK (BY OTHERS) | PORTE PRIVÉE DE PANNEAU SOLIDE AVEC SERRURE (PAR AUTRES)
15 1.2m HIGH PROTECTIVE BARRIER (BY OTHERS) |BARRIÈRE DE PROTECTION DE 1.2m DE HAUTEUR (PAR AUTRES)
16 2.0m HIGH FENCE (BY OTHERS) |CLÔTURE DE 2.0m DE HAUTEUR (PAR AUTRES)
17 3.0m x 6.0m SECURITY SCREENING TENT (BY OTHERS) | 3.0m x 6.0m TENTE DE LA SÉCURITÉ (PAR AUTRES)
18 EXIT ROUTE FOR VISITORS LEAVING THE SECURE ZONE | VOIE DE SORTIE POUR LES VISITEURS SORTENT DE LA ZONE SÉCURISÉE
19 TEMPORARY STONE DUST PATHWAY | SENTIER EN POUSSIÈRE DE PIERRE TEMPORAIRE
20 ACTIVE CONSTRUCTION SITE BY OTHERS | CHANTIER ACTIF PAR D'AUTRES
21 MAIN ENTRANCE FOR VISITORS AND SERVICES | ENTRÉE PRINCIPALE POUR LES VISITEURS ET LES SERVICES
22 TOUR BUS DROP-OFF | ARRÊTS D'AUTOCAR POUR LES VISITEURS

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Direction de la gestion de l'immobilier, design et construction

Design and Construction Division
Division design et construction

director - Claude Robert - directeur

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émis ou revisé

no.	description	date
1	.	.

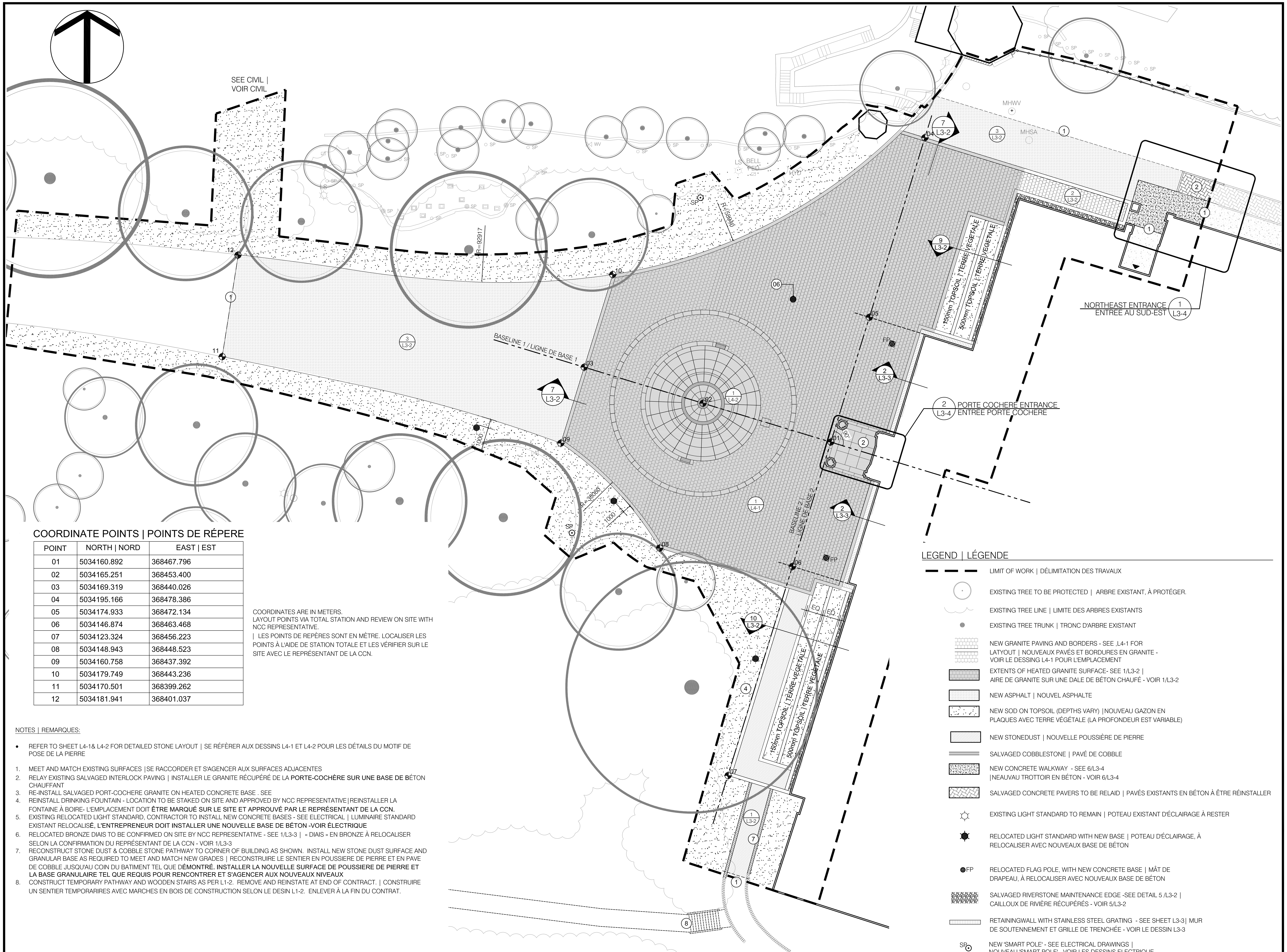
project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE CCN

drawing
dessin

CIRCULATION & STAGGING PLAN
PLAN DE CIRCULATION & D'ENTREPOSAGE

approved by / approuvé par	CC		
designed by / conçu par	CC		
drawn by / dessiné par	JH		
date	MAY 4, 2016	scale / échelle	1:750
NCC project no. / no. du projet de la CCN	DC 2611-110	sheet no. / no. de la feuille	L1-2



COORDINATE POINTS | POINTS DE RÉPERE

POINT	NORTH | NORD	EAST | EST
01	5034160.892	368467.796
02	5034165.251	368453.400
03	5034169.319	368440.026
04	5034195.166	368478.386
05	5034174.933	368472.134
06	5034146.874	368463.468
07	5034123.324	368456.223
08	5034148.943	368448.523
09	5034160.758	368437.392
10	5034179.749	368443.236
11	5034170.501	368399.262
12	5034181.941	368401.037

COORDINATES ARE IN METERS.
LAYOUT POINTS VIA TOTAL STATION AND REVIEW ON SITE WITH NCC REPRESENTATIVE.
| LES POINTS DE REPÈRES SONT EN MÈTRE. LOCALISER LES POINTS À L'AIDE DE STATION TOTALE ET LES VÉRIFIER SUR LE SITE AVEC LE REPRÉSENTANT DE LA CCN.

NOTES | REMARQUES:

- REFER TO SHEET L4-1& L4-2 FOR DETAILED STONE LAYOUT | SE RÉFÈRER AUX DESSINS L4-1 ET L4-2 POUR LES DÉTAILS DU MOTIF DE POSE DE LA PIERRE

1. MEET AND MATCH EXISTING SURFACES |SE RACCORDER ET S'AGENCER AUX SURFACES ADJACENTES
2. RELAY EXISTING SALVAGED INTERLOCK PAVING | INSTALLER LE GRANITE RÉCUPÉRÉ DE LA PORTE-COCHÈRE SUR UNE BASE DE BÉTON CHAUFFANT
3. RE-INSTALL SALVAGED PORT-COCHERE GRANITE ON HEATED CONCRETE BASE . SEE
4. REINSTALL DRINKING FOUNTAIN - LOCATION TO BE STAKED ON SITE AND APPROVED BY NCC REPRESENTATIVE|REINSTALLER LA FONTAINE À BOIRE- L'EMPLACEMENT DOIT ÊTRE MARQUÉ SUR LE SITE ET APPROUVÉ PAR LE REPRÉSENTANT DE LA CCN.
5. EXISTING RELOCATED LIGHT STANDARD, CONTRACTOR TO INSTALL NEW CONCRETE BASES - SEE ELECTRICAL | LUMINAIRE STANDARD EXISTANT RELOCALISÉ, L'ENTREPRENEUR DOIT INSTALLER UNE NOUVELLE BASE DE BÉTON -VOIR ÉLECTRIQUE
6. RELOCATED BRONZE DIAIS TO BE CONFIRMED ON SITE BY NCC REPRESENTATIVE - SEE 1/L3-3 | « DIAIS » EN BRONZE À RELOCALISER SELON LA CONFIRMATION DU REPRÉSENTANT DE LA CCN - VOIR 1/L3-3
7. RECONSTRUCT STONE DUST & COBBLE STONE PATHWAY TO CORNER OF BUILDING AS SHOWN. INSTALL NEW STONE DUST SURFACE AND GRANULAR BASE AS REQUIRED TO MEET AND MATCH NEW GRADES | RECONSTRUIRE LE SENTIER EN POUSSIERE DE PIERRE ET EN PAVE DE COBBLE JUSQU'AU COIN DU BATIMENT TEL QUE DÉMONTRÉ. INSTALLER LA NOUVELLE SURFACE DE POUSSIERE DE PIERRE ET LA BASE GRANULAIRE TEL QUE REQUIS POUR RENCONTRER ET S'AGENCER AUX NOUVEAUX NIVEAUX
8. CONSTRUCT TEMPORARY PATHWAY AND WOODEN STAIRS AS PER L1-2. REMOVE AND REINSTATE AT END OF CONTRACT. | CONSTRUIRE UN SENTIER TEMPORARIRES AVEC MARCHES EN BOIS DE CONSTRUCTION SELON LE DESIN L1-2. ENLEVER À LA FIN DU CONTRAT.

LEGEND | LÉGENDE

- LIMIT OF WORK | DÉLIMITATION DES TRAVAUX
- EXISTING TREE TO BE PROTECTED | ARBRE EXISTANT, À PROTÉGER.
- EXISTING TREE LINE | LIMITE DES ARBRES EXISTANTS
- EXISTING TREE TRUNK | TRONC D'ARBRE EXISTANT
- NEW GRANITE PAVING AND BORDERS - SEE ,L4-1 FOR LATYOUT | NOUVEAUX PAVÉS ET BORDURES EN GRANITE - VOIR LE DESSING L4-1 POUR L'EMPLACEMENT
- EXTENTS OF HEATED GRANITE SURFACE- SEE 1/L3-2 | AIRE DE GRANITE SUR UNE DALE DE BÉTON CHAUFFÉ - VOIR 1/L3-2
- NEW ASPHALT | NOUVEL ASPHALTE
- NEW SOD ON TOPSOIL (DEPTHS VARY) |NOUVEAU GAZON EN PLAQUES AVEC TERRE VÉGÉTALE (LA PROFONDEUR EST VARIABLE)
- NEW STONEDUST | NOUVELLE POUSSIÈRE DE PIERRE
- SALVAGED COBBLESTONE | PAVÉ DE COBBLE
- NEW CONCRETE WALKWAY - SEE 6/L3-4 |NEAUVAU TROTTOIR EN BÉTON - VOIR 6/L3-4
- SALVAGED CONCRETE PAVERS TO BE RELAID | PAVÉS EXISTANTS EN BÉTON À ÊTRE RÉINSTALLER
- EXISTING LIGHT STANDARD TO REMAIN | POTEAU EXISTANT D'ÉCLAIRAGE À RESTER
- RELOCATED LIGHT STANDARD WITH NEW BASE | POTEAU D'ÉCLAIRAGE, À RELOCALISER AVEC NOUVEAUX BASE DE BÉTON
- FP RELOCATED FLAG POLE, WITH NEW CONCRETE BASE | MÂT DE DRAPEAU, À RELOCALISER AVEC NOUVEAUX BASE DE BÉTON
- SALVAGED RIVERSTONE MAINTENANCE EDGE -SEE DETAIL 5 /L3-2 | CAILLOUX DE RIVIÈRE RÉCUPÉRÉS - VOIR 5/L3-2
- RETAININGWALL WITH STAINLESS STEEL GRATING - SEE SHEET L3-3| MUR DE SOUTENNEMENT ET GRILLE DE TRENCHÉE - VOIR LE DESSIN L3-3
- SP NEW 'SMART POLE' - SEE ELECTRICAL DRAWINGS | NOUVEAU 'SMART POLE' - VOIR LES DESSINS ELECTRIQUE.

SCALE | ÉCHELLE 1:200
0 1 2 3 4 5 10 m

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n°	description	date
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9	REISSUED FOR 100% REVIEW	04/03/2016
8	ISSUED FOR 100% REVIEW	18/02/2016

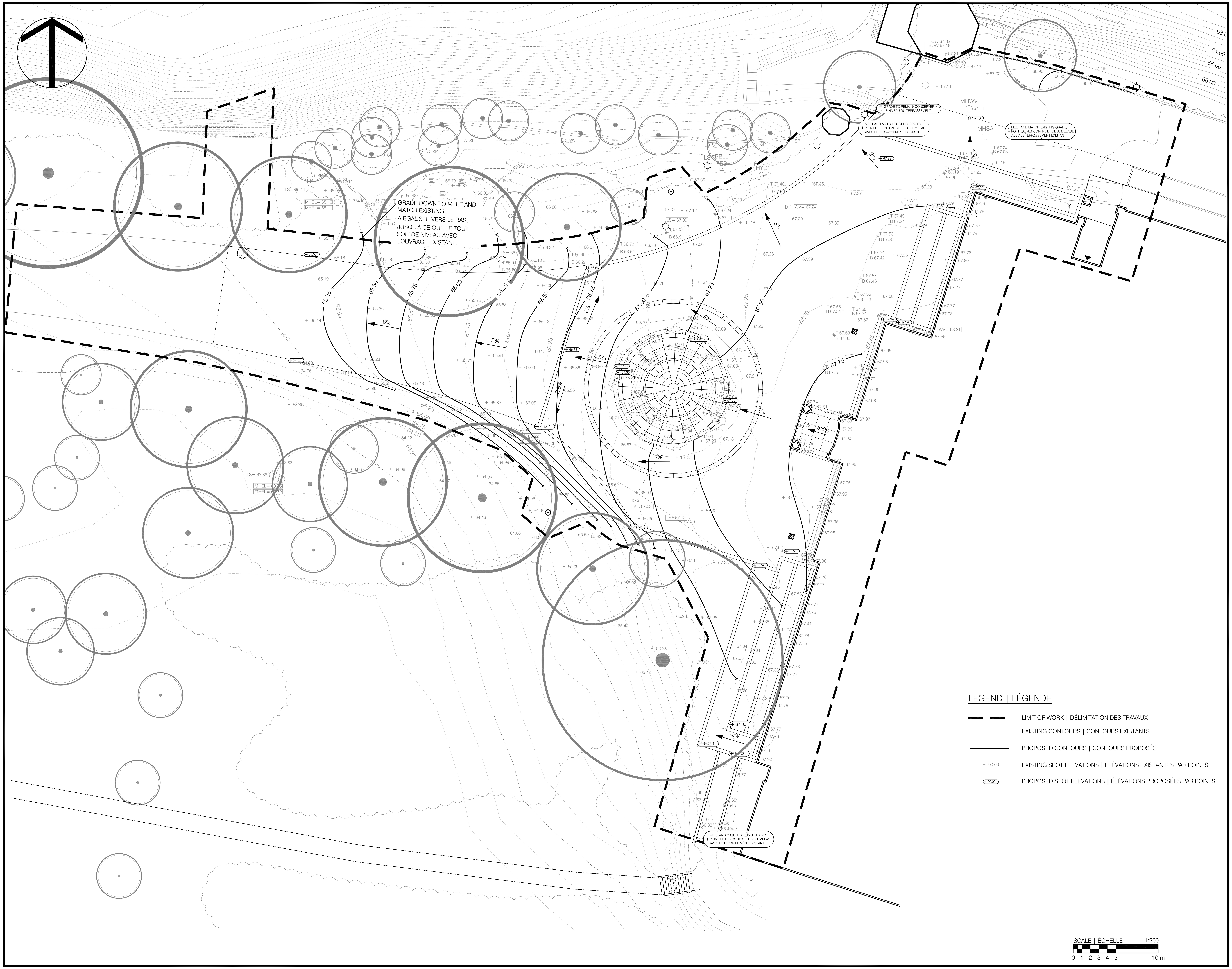
project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

LAYOUT AND MATERIALS PLAN | PLAN DE L'AMÉNAGEMENT ET DES MATÉRIAUX

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par: R.D.,D.B.,J.G.,M.L.,P.B
date: 08/08/2012
scale / échelle: 1:200
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: L2-1



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soumission ou révision

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10	REISSUED FOR 100% REVIEW	21/03/2016
9	REISSUED FOR 100% REVIEW	04/03/2016
8	ISSUED FOR 100% REVIEW	18/02/2016

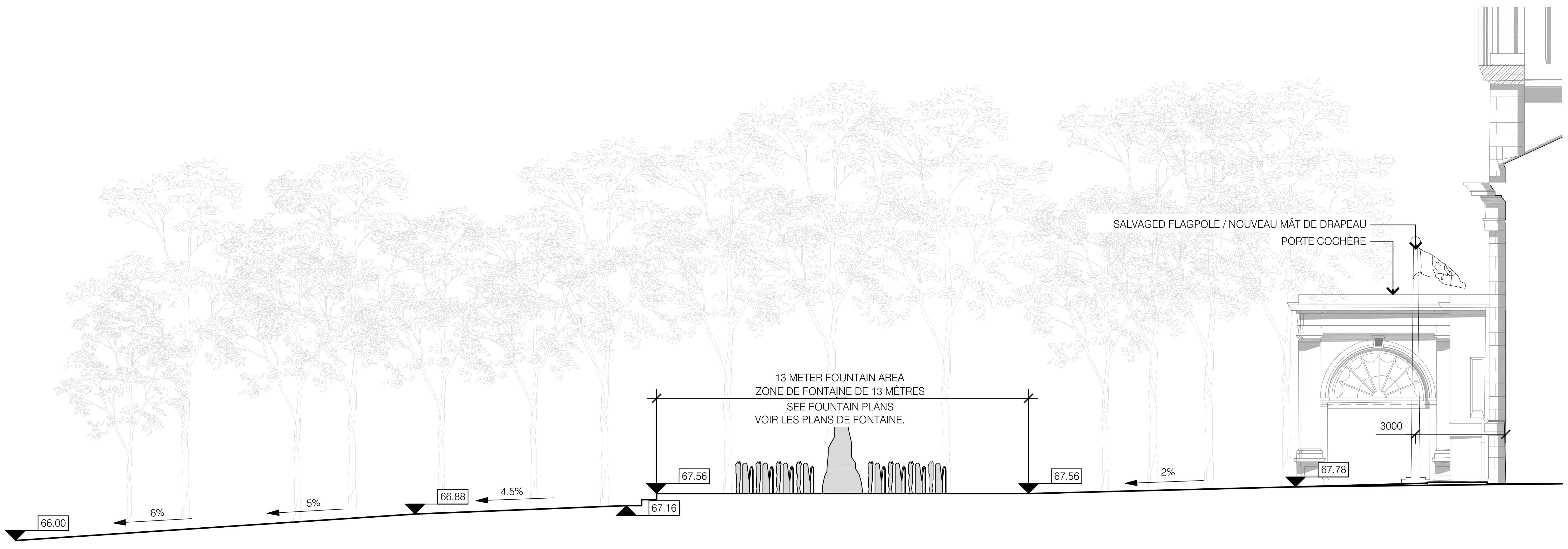
project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

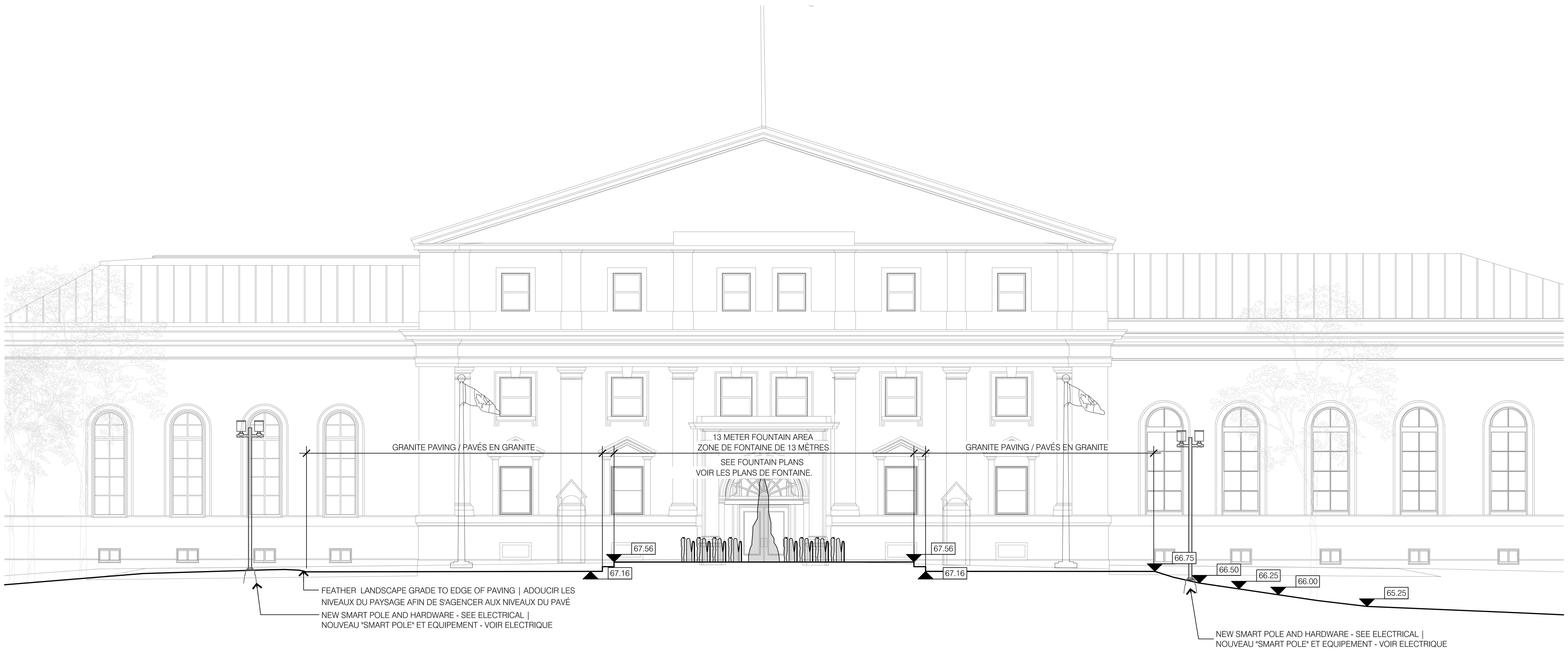
GRADING PLAN |
PLAN DE NIVELLEMENT

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par: R.D.,D.B.,J.G.,M.L.,P.B
date: 08/08/2012
scale / échelle: 1:200
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: L2-2



1 L3-1 EAST-WEST SECTION / COUPE EST-OUEST

1:100



2 L3-1 NORTH-SOUTH SECTION / COUPE NORD-SUD

1:100

GRAPHIC SCALE
ÉCHELLE GRAPHIQUE 1:100
0 1 2 3 4 5 m

NCC
CCN
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Real Estate Management, Design and Construction Branch
Direction de la gestion de l'immobilier, design et construction

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NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

SECTIONS AND ELEVATIONS | COUPES ET ÉLÉVATIONS

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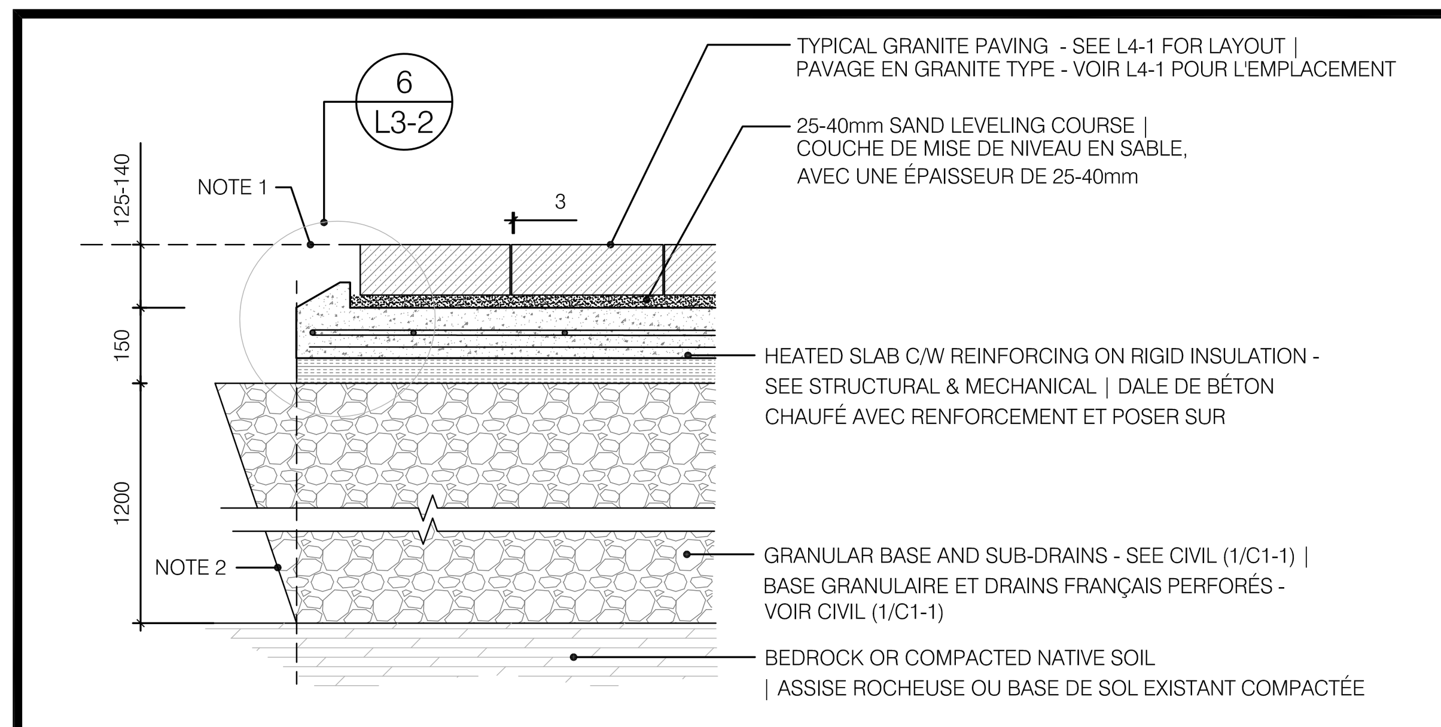
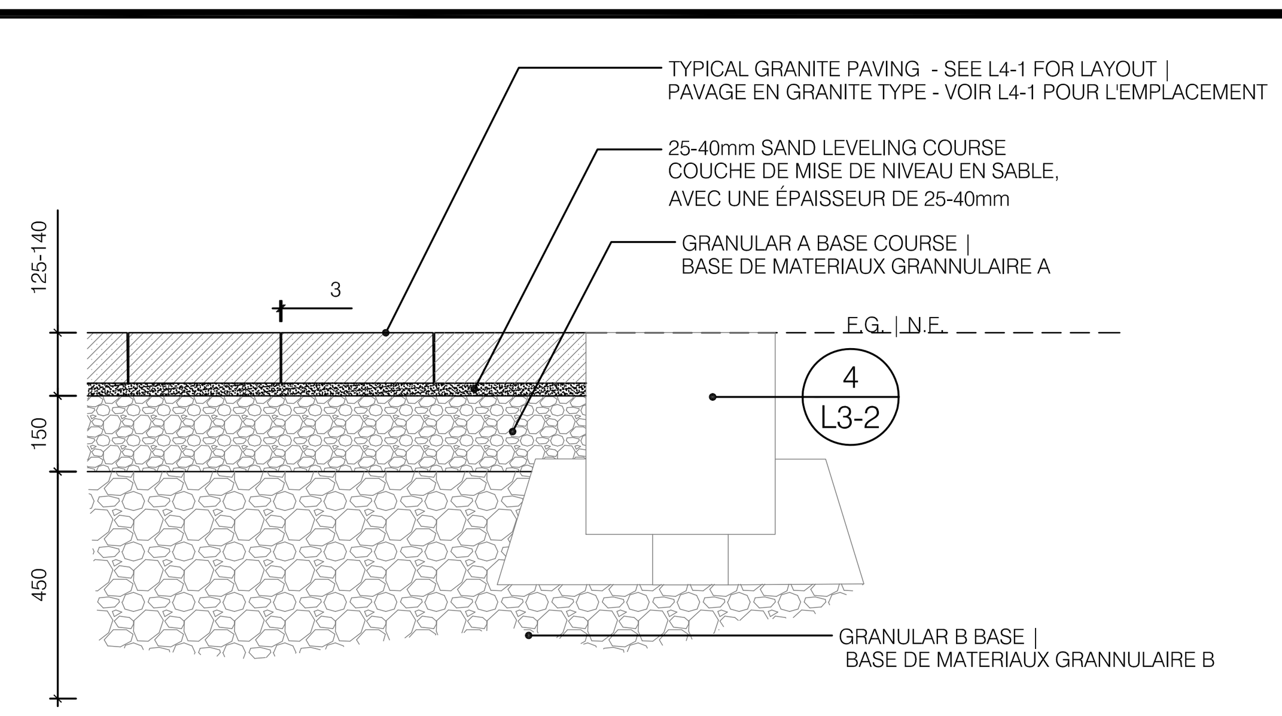


NOTES | REMARQUES :
1. ADJACENT SURFACES VARY - SEE L2-1 | LES SURFACES AJACENTES SONT VARIABLES. VOIR L2-1
2. EXCAVATE AT MAXIMUM ANGLE OF REPOSE | EXCAVER À L'ANGLE MAXIMALE DE RETENUE DU SOL.
- ENSURE POSITIVE DRAINAGE AS SHOWN ON GRADING PLANS | ASSURER UN DRAINAGE POSITIF SELON LE PLAN DE NIVELLEMENT.
- ENSURE GRADES OF HEATED SLAB ARE ACCURATE TO ACHIEVE FINISHED GRADES PRIOR TO POURING | ASSURER QUE LES NIVEAUX DE LA DALE DE BÉTON CHAUFFÉE SONT CORRECTS POUR ATTEINDRE LES NIVEAUX FINS AVANT DE COULER LA DALE.
- JOINTS TO BE SWEPT WITH WET SAND TO ENSURE TIGHT BONDING. ALL SURFACES TO BE THOROUGHLY BROOM CLEANED | SE SERVIR DE SABLE HUMIDE ET LE BALAYER DANS LES JOINTS ET CE, AFIN D'ASSURER UN LIAISONNEMENT FERMÉ OU SERRÉ. TOUTES LES SURFACES DEVRONT ÊTRE NETTOYÉES PAR BALAYAGE EN PROFONDEUR.

1 L3-2 TYPICAL HEATED GRANITE PAVING | PAVÉS CHAUFFÉS EN GRANITE, TYPE
1:20



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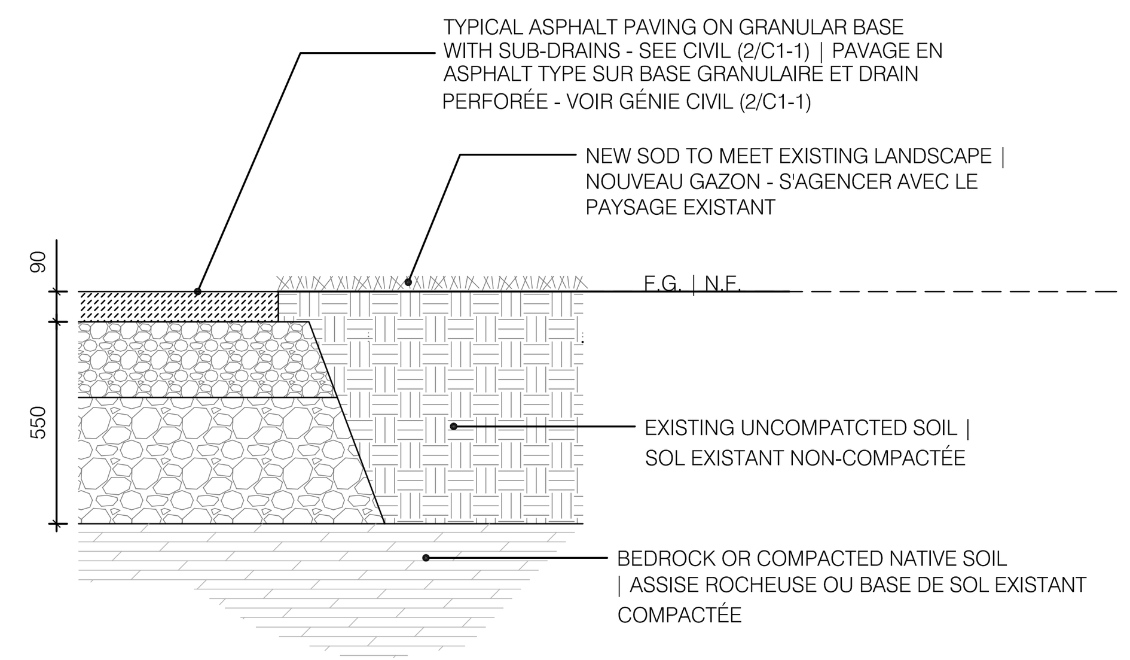
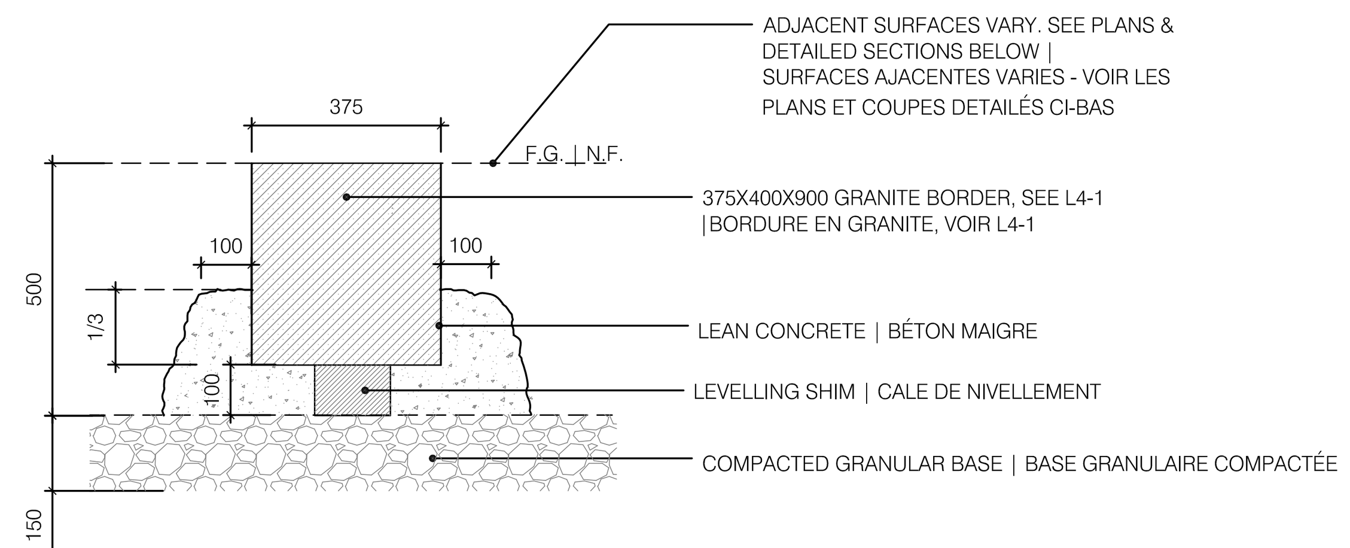
- ADJACENT SURFACES VARY - REFER TO L2-1 FOR CONDITIONS | LES SURFACES ADJACENTES VARIES - VOIR LE PLAN L2-1 POUR LES CONDITIONS D'INSTALLATIONS.

2 L3-2 GRANITE ON GRANULAR BASE | GRANITE SUR FONDATION GRANULAIRE
1:20

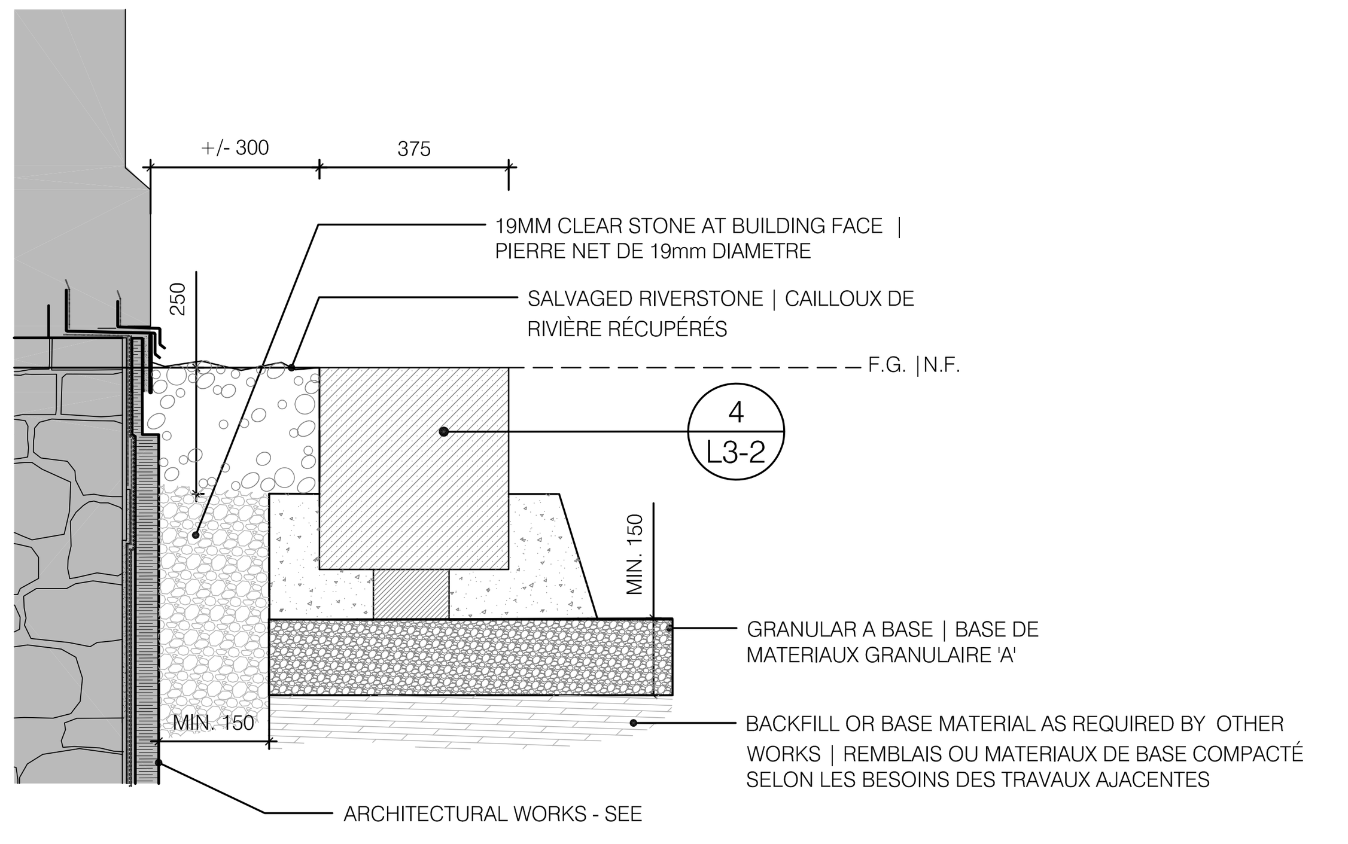


3 L3-2 NEW ASPHALT @ SOD | PLANTATION D'ARBUSTES
1:15



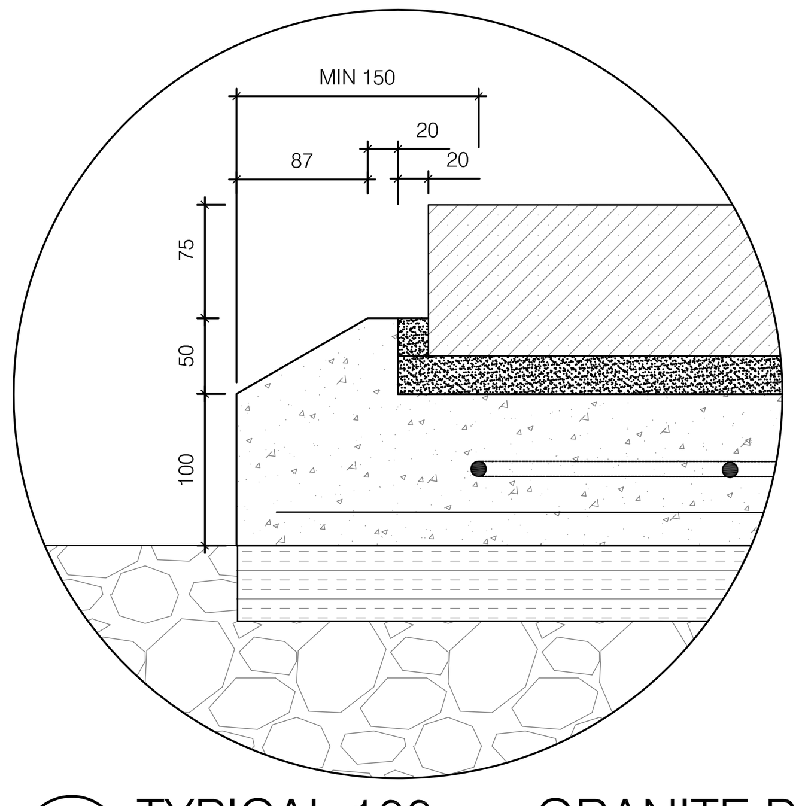
NOTES | REMARQUES
- SET BORDERS ON LEVELLING SHIMS TRUE AND FLUSH WITH ADJACENT GRADES |
- POUR LEAN 15MPA CONCRETE AROUND BOTTOM 1/3 OF BORDER AND FILLING ALL VOIDS BENEATH SEGMENTS.
- BACKFILL AROUND BORDER TO CONSTRUCT ADJACENT SURFACES AS SHOWN.

4 L3-2 TYPICAL 400mm GRANITE BORDURE | BORDURE EN GRANITE DE 400mm TYPE
1:15



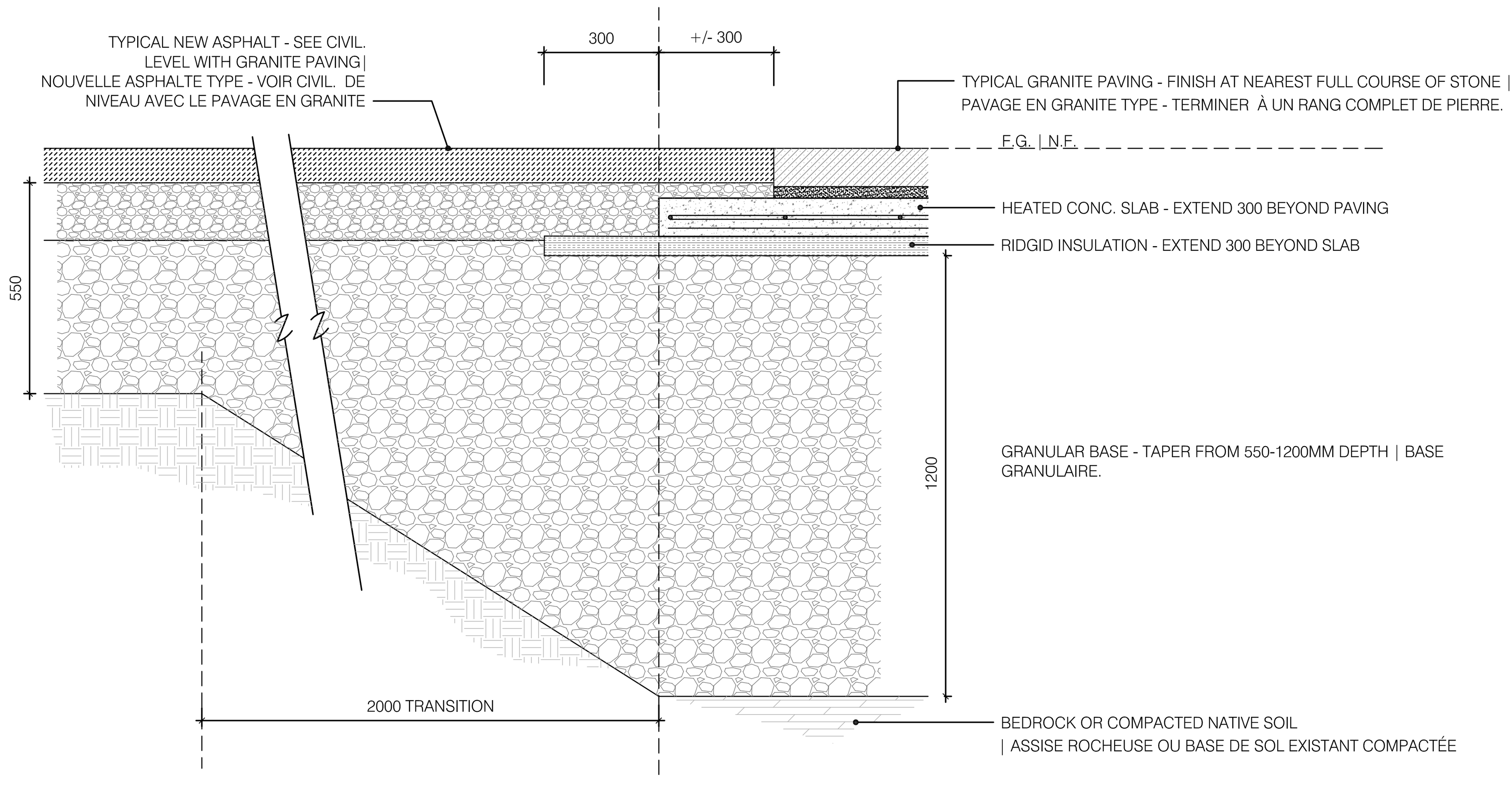
- KEEP SALVAGED RIVERSTONE CLEAN AND SEPARATE FROM OTHER MATERIALS | GARDER LES CAILLOUX DE RIVIERE RÉCUPÉRÉS PROPRES ET SEPARÉS DES AUTRES MATERIAUX.
- WASH STONE IF REQUIRED PRIOR TO REINSTALLATION | LAVER LES CAILLOUX DE RIVIERE SI NECESSAIRE AVANT DE LES INSTALLER.
- SUPPLEMENT WITH ADDITIONAL RIVERSTONE AS NEEDED TO ACHIEVE DEPTH SHOWN | FOURNIR DES CAILLOUX DE RIVIERE SUPPLEMENTAIRES SI BESOIN POUR ATTAINDRE LA PROFONDEUR IDENTIFIÉE AU PLAN.
- ADJACENT SURFACES VARY - REFER TO PLANS FOR INSTALLATION CONDITIONS | LES SURFACES ADJACENTS SONT VARIABLES. SE REPORTER AUX PLAN POUR LES CONDITIONS D'INSTALLATION.
- MODIFY LEAN CONCRETE BASE AS NECESSARY TO ACCOMODATE CLEAR STONE AT BUILDING FACE | MODIFIE LE BASE EN BÉTON MAIGRE AFIN DE ACCOMODER LE PIERRE DE DRAINAGE AU FONDATION DU BATIMENT.

5 L3-2 MAINTENANCE EDGE AT BULIDING | REBORD D'ENTRETIEN À L'ÉDIFICE
1:15

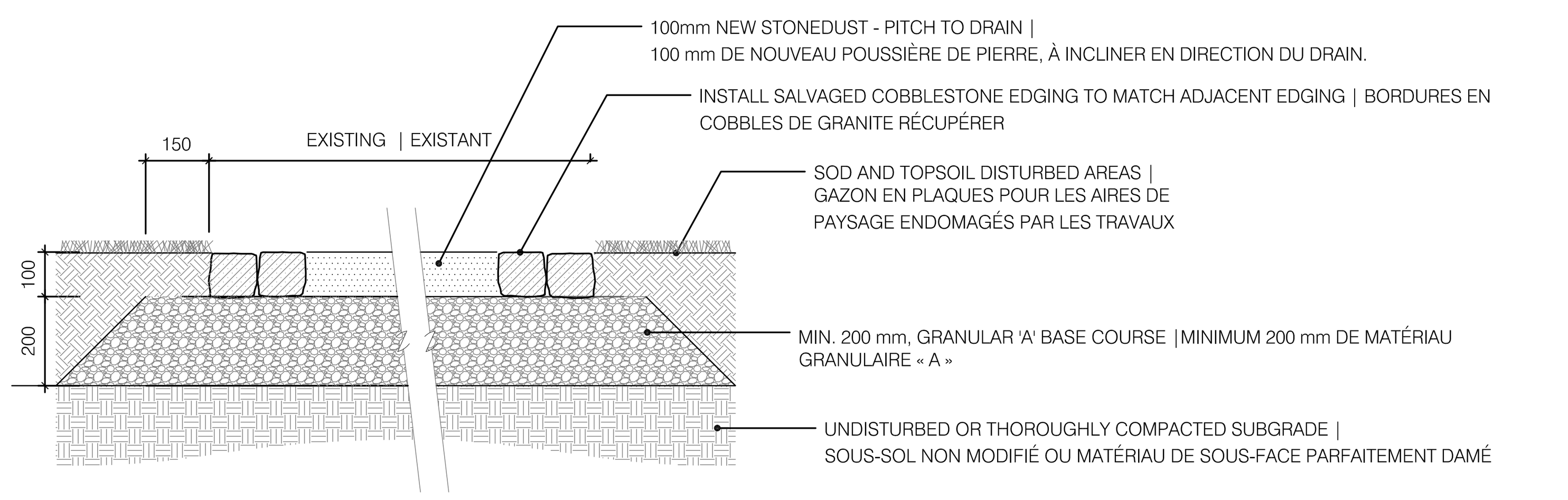


NOTES | REMARQUES:
- FORM EDGE OF CONCRETE SLAB TO RETAIN TYPICAL 100mm GRANITE BORDER STONES | FORMER LE BORD DE LA DALLE DE BÉTON POUR RETENIR LES PAVÉ EN GRANITE.
- FILL GAP AT EDGE OF SLAB WITH SAND TO HOLD GRANITE BORDER | REMPLIR LE VIDE AU BORD DE LA DALE DE BÉTON AVEC DE LA SABLE POUR RETENIR LE PAVÉ EN GRANITE.
- KEEP GLYCOL LINES MIN. 150MM FROM EDGE OF SLAB | GARDER LES TUYAUX DE GLYCOL À UNE DISTANCE MINIMALE DE 150MM DE LA BORD DE LA DALE.
- CUT FORMED EDGE TO RECEIVED ABUTTING 400MM DEPTH GRANITE BORDERS WHERE REQUIRED | COUPER LE BORD FORMÉ DE LA DALE DE BÉTON POUR S'AGENCER AVEC LES BORDURES EN GRANITE DE 400MM
- DO NOT FORM EDGE WHERE PAVERS ABUT ASPHALT SURFACES - SEE DETAIL 7/L3-2 | NE FORME PAS LE BORD DE LA DALE OU LES PAVÉS EN GRANITE SONT POSER AJACENTE À UNE SURFACE EN ASPHALTE. VOIR LA DÉTAIL 7/L3-2

6 L3-2 TYPICAL 100mm GRANITE BORDER | BORDURE EN GRANITE DE 100mm TYPE
1:5

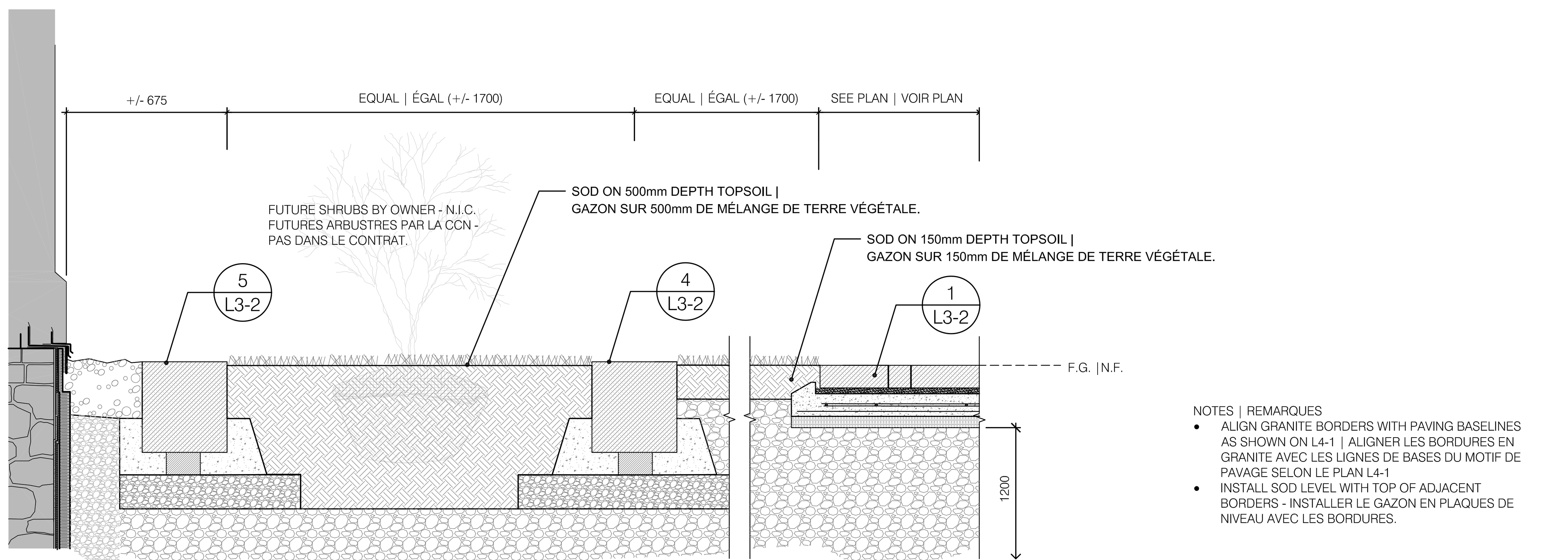


7 L3-2 TRANSITION FROM ASPHALT TO HEATED PAVING | TRANSITION ENTRE L'ASPHALTE ET LE PAVAGE CHAUFÉ
1:15



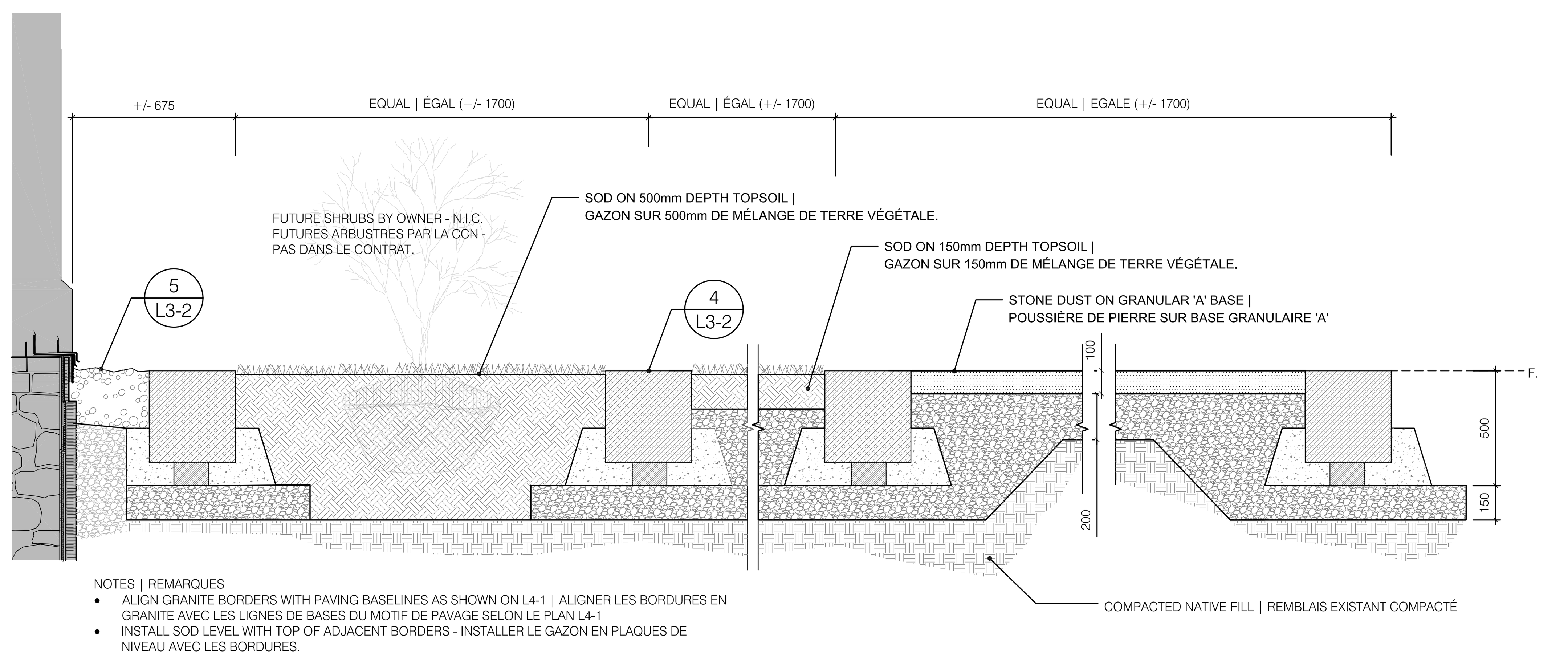
NOTES | REMARQUES:
- CONSTRUCT PATHWAY AT NEW GRADES TO MEET AND MATCH ADJACENT SURFACES | CONSTRUIT LE SENTIER A LES NOUVEAUX ELEVATIONS POUR AGENCER LES NIVEAUX EXISTANTS

8 L3-2 COBBLE & STONE DUST PATHWAY | SENTIER EN POUSSIER DE PIERRE ET COBBLE DE GRANITE
1:15



NOTES | REMARQUES
- ALIGN GRANITE BORDERS WITH PAVING BASELINES AS SHOWN ON L4-1 | ALIGNER LES BORDURES EN GRANITE AVEC LES LIGNES DE BASES DU MOTIF DE PAVAGE SELON LE PLAN L4-1
- INSTALL SOD LEVEL WITH TOP OF ADJACENT BORDERS - INSTALLER LE GAZON EN PLAQUES DE NIVEAU AVEC LES BORDURES.

9 L3-2 SECTION THROUGH SOD AND HEATED GRANITE | COUPE À TRAVERS LE GAZON ET GRANITE CHAUFFÉ
1:20



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10 L3-2 SECTION THROUGH SOD AND STONE DUST PATHWAY | COUPE À TRAVERS LE GAZON ET SENTIER EN POUSSIÈRE DE PIERRE
1:20

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TYPICAL DETAILS
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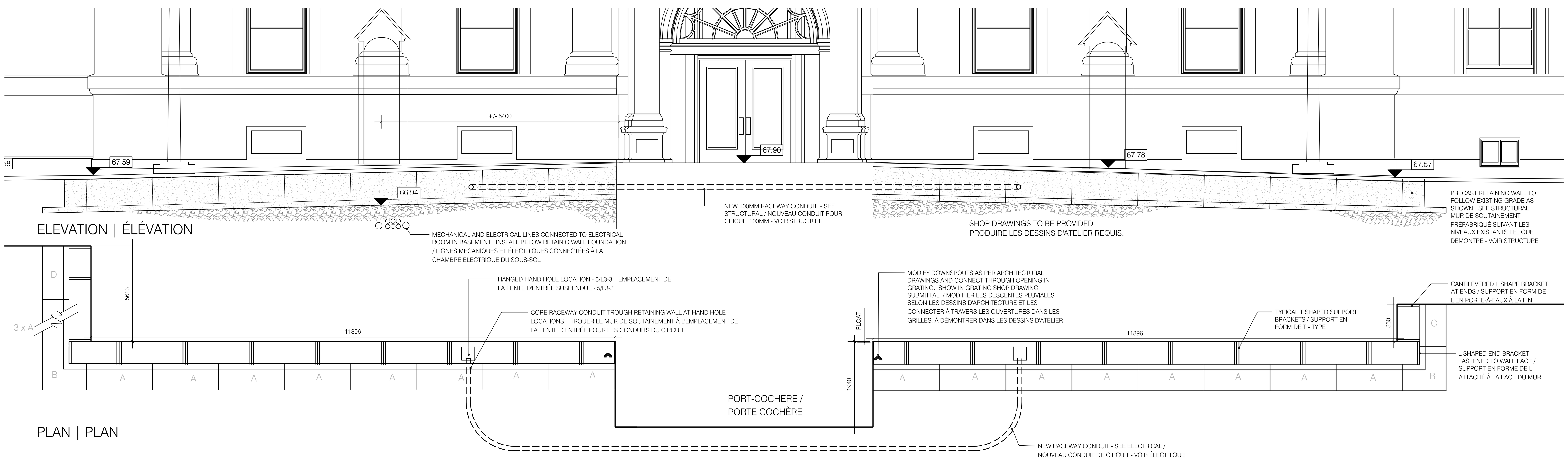
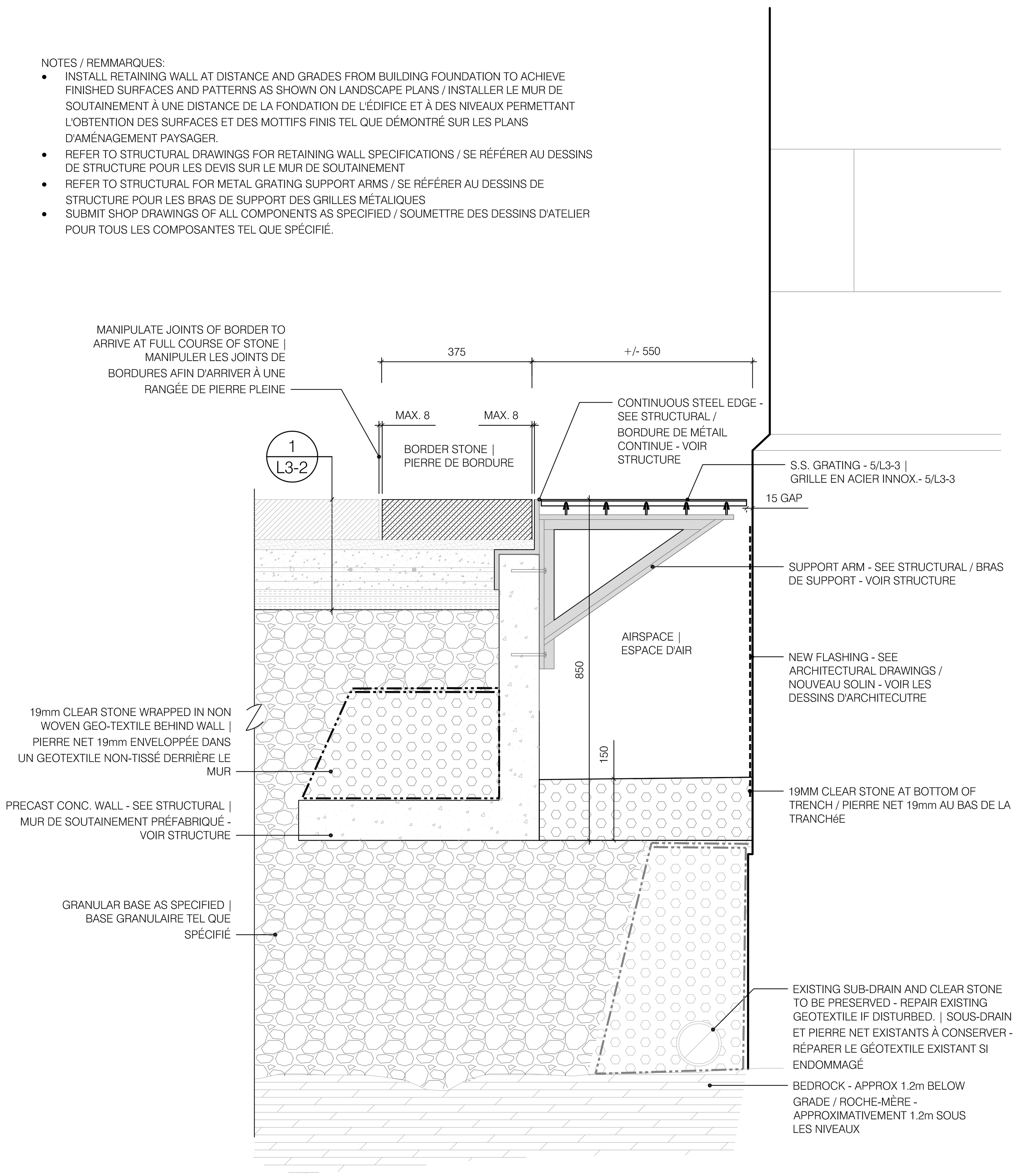
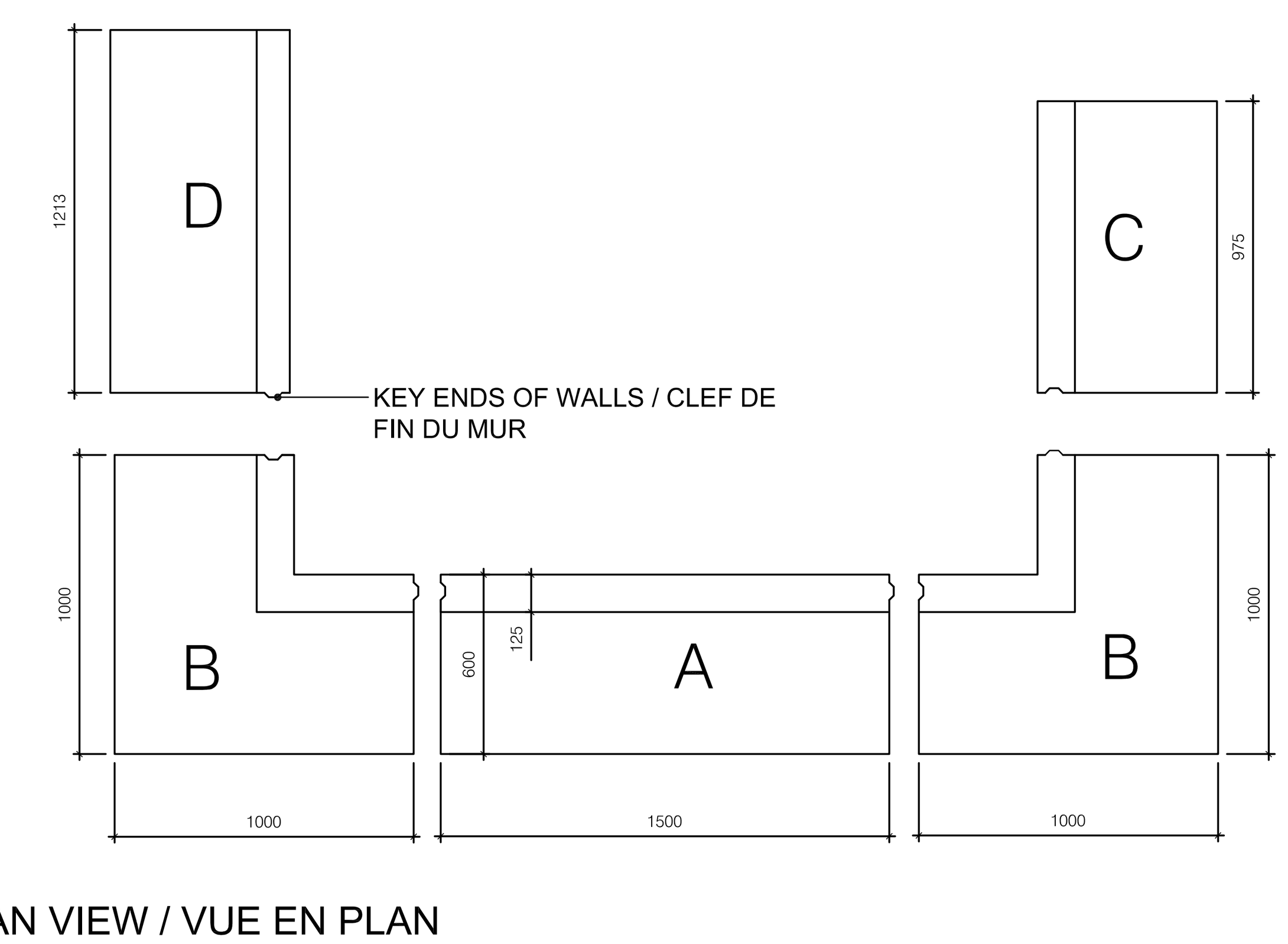


1 / L3-3 TRENCH PRECAST CONCRETE WALL SECTION ELEVATION
ÉLÉVATION DE COUPE - MUR DE TRANCHÉE EN BÉTON PRÉFABRIQUÉ
1:50

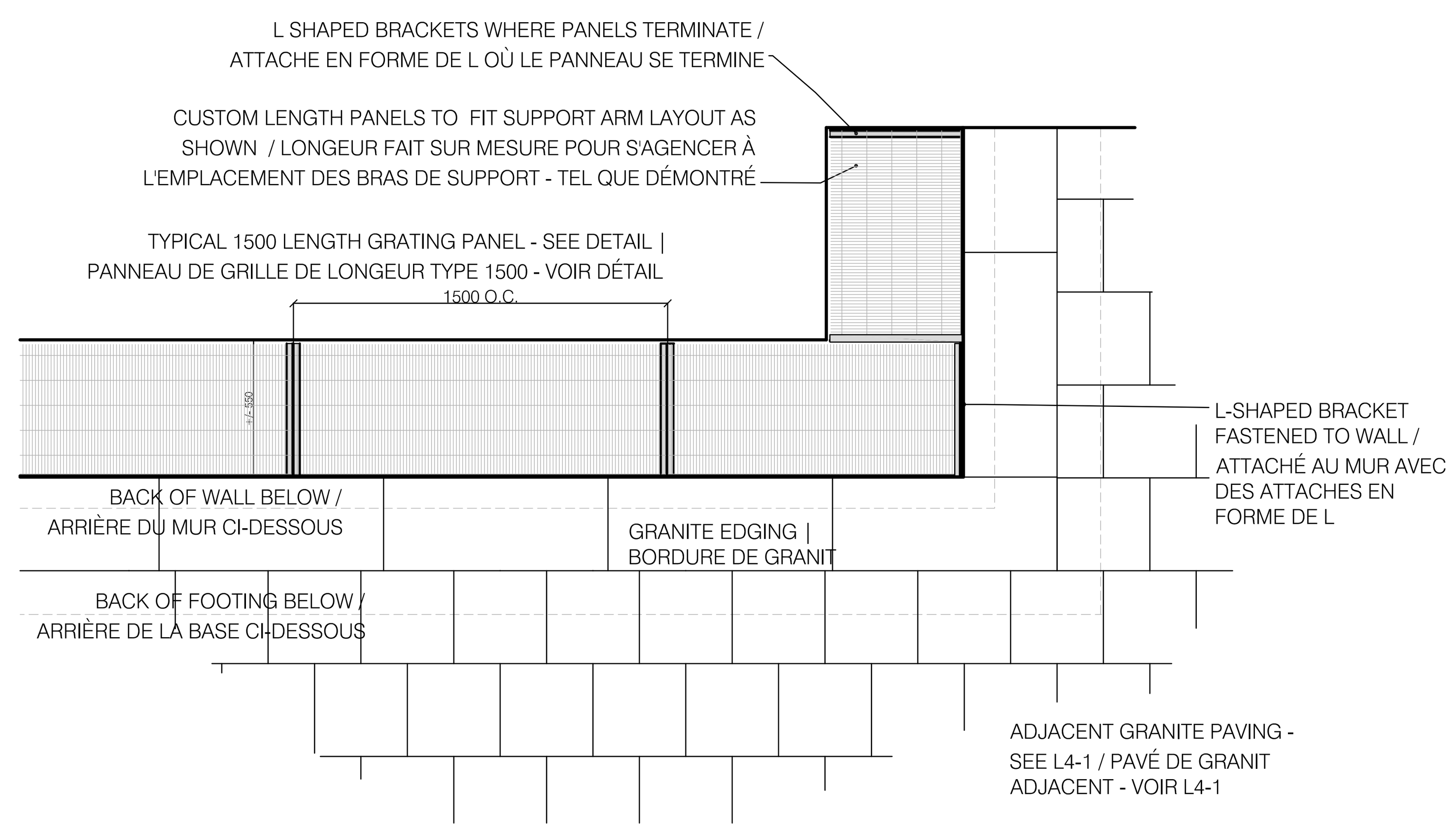
NOTES / REMMARQUES:
- INSTALL RETAINING WALL AT DISTANCE AND GRADES FROM BUILDING FOUNDATION TO ACHIEVE FINISHED SURFACES AND PATTERNS AS SHOWN ON LANDSCAPE PLANS / INSTALLER LE MUR DE SOUTAINEMENT À UNE DISTANCE DE LA FONDATION DE L'ÉDIFICE ET À DES NIVEAUX PERMETTANT L'OBTENTION DES SURFACES ET DES MOTIFS FINIS TEL QUE DÉMONTRÉ SUR LES PLANS D'AMÉNAGEMENT PAYSAGER.
- REFER TO STRUCTURAL DRAWINGS FOR RETAINING WALL SPECIFICATIONS / SE RÉFÉRER AU DESSINS DE STRUCTURE POUR LES DEVIS SUR LE MUR DE SOUTAINEMENT
- REFER TO STRUCTURAL FOR METAL GRATING SUPPORT ARMS / SE RÉFÉRER AU DESSINS DE STRUCTURE POUR LES BRAS DE SUPPORT DES GRILLES MÉTALIQUES
- SUBMIT SHOP DRAWINGS OF ALL COMPONENTS AS SPECIFIED / SOUMETTRE DES DESSINS D'ATELIER POUR TOUS LES COMPOSANTES TEL QUE SPÉCIFIÉ.



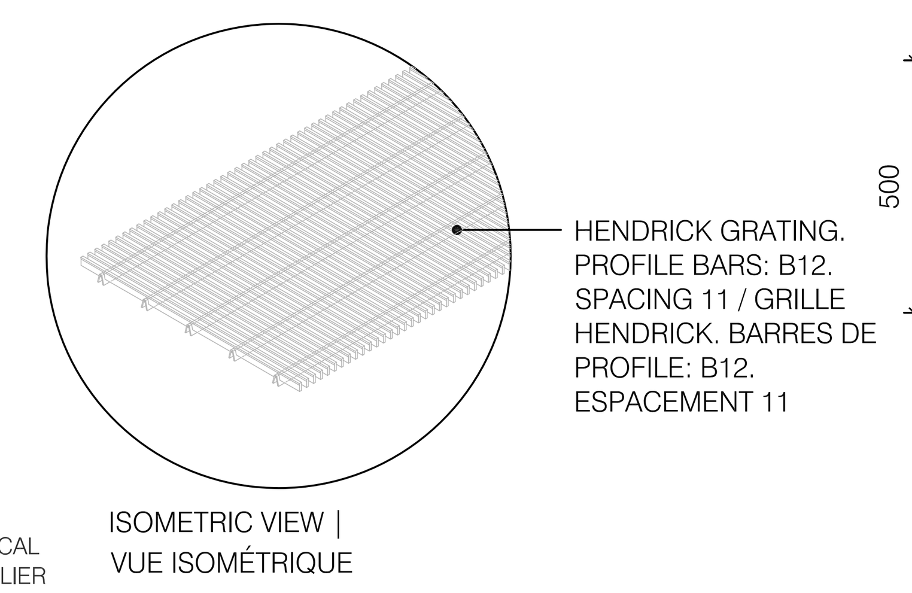
2 / L3-3 TRENCH SECTION AT BUILDING FACE
COUPE DE LA TRANCHÉE ADJACENT À L'ÉDIFICE
1:30

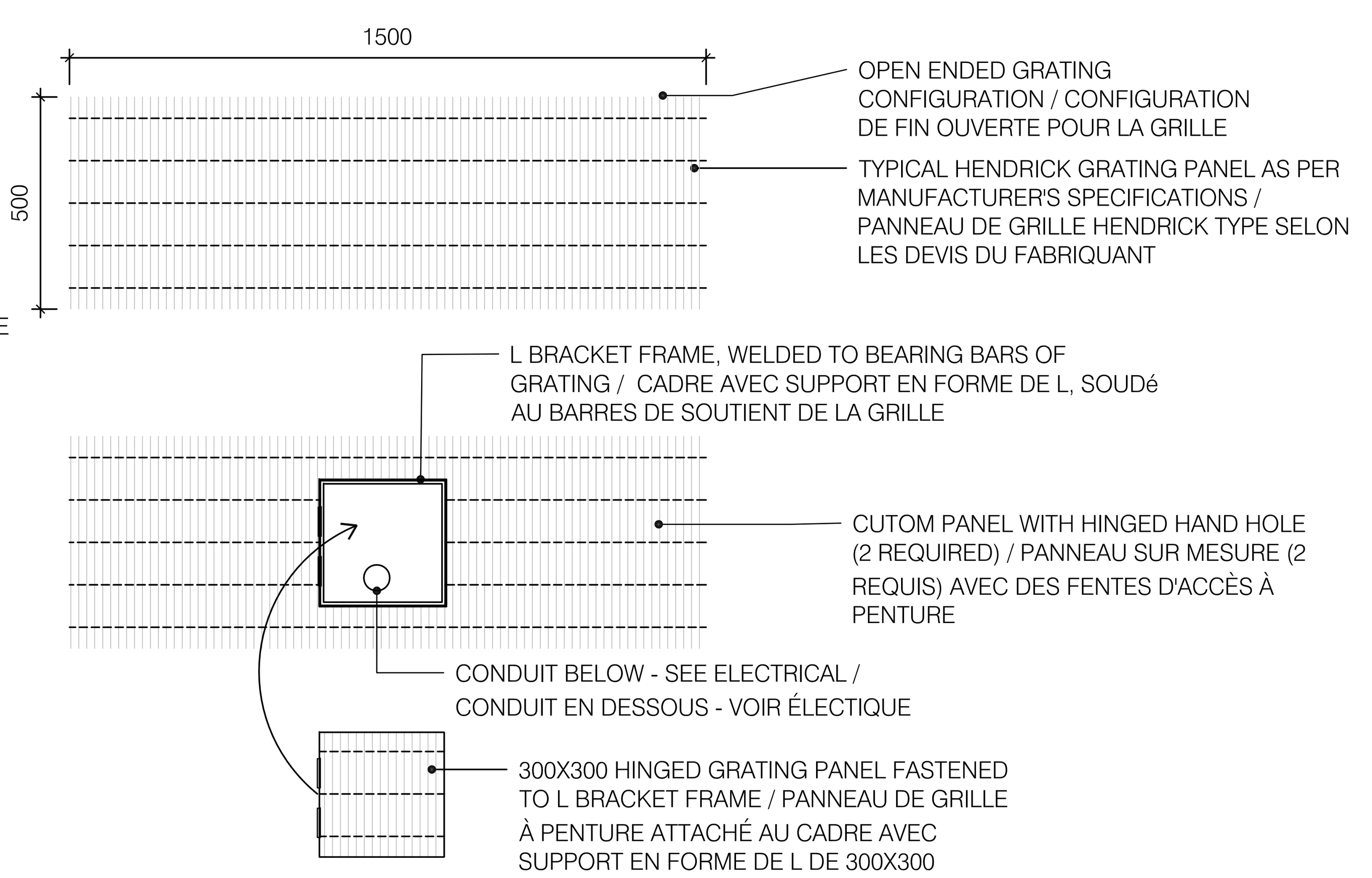


3 / L3-3 RETAINING WALL MODULES
MODULE DE MUR DE SOUTAINEMENT
1:25



4 / L3-3 PLAN VIEW OF GRATING AT BUILDING
VUE EN PLAN DE LA GRILLE À L'ÉDIFICE
1:25





NOTES / REMMARQUES:
- SUBMIT MANUFACTURER'S SHOP DRAWINGS FOR ALL TYPICAL AND CUSTOM GRATING. / SOUMETTRE DES DESSINS D'ATELIER DU FABRIQUANT POUR TOUTES LES GRILLES TYPES ET FAITES SUR MESURE.
- COORDINATE FABRICATION OF STEEL BRACKET (SEE STRUCTURAL) WITH PRECAST CONCRETE WALL. / COORDONNER LA FABRICATION DES ÉQUERRES EN ACIER (VOIR STRUCTURE) AVEC LE MUR DE BÉTON PRÉFABRIQUÉ.
- DIMENSIONS ARE NOMINAL. SUBMIT SHOP DARWINGS SHOWING VERIFIED FIELD MEASUREMENTS. / LES DIMENSIONS SONT NOMINALES. SOUMETTRE DES DESSINS D'ATELIER DÉMONTRANT LES MESURES EXACTES PRISES SUR LE TERRAIN.

5 / L3-3 STAINLESS STEEL GRATING
GRILLE EN ACIER INNOXIDABLE
1:15

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Gestion des biens immobiliers. Direction du design et de la construction

Design and Construction Division
Division du design et de la construction

director - Claude Robert - directeur

consultant
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10	REISSUED FOR 100% REVIEW	21/03/2016
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8	ISSUED FOR 100% REVIEW	18/02/2016

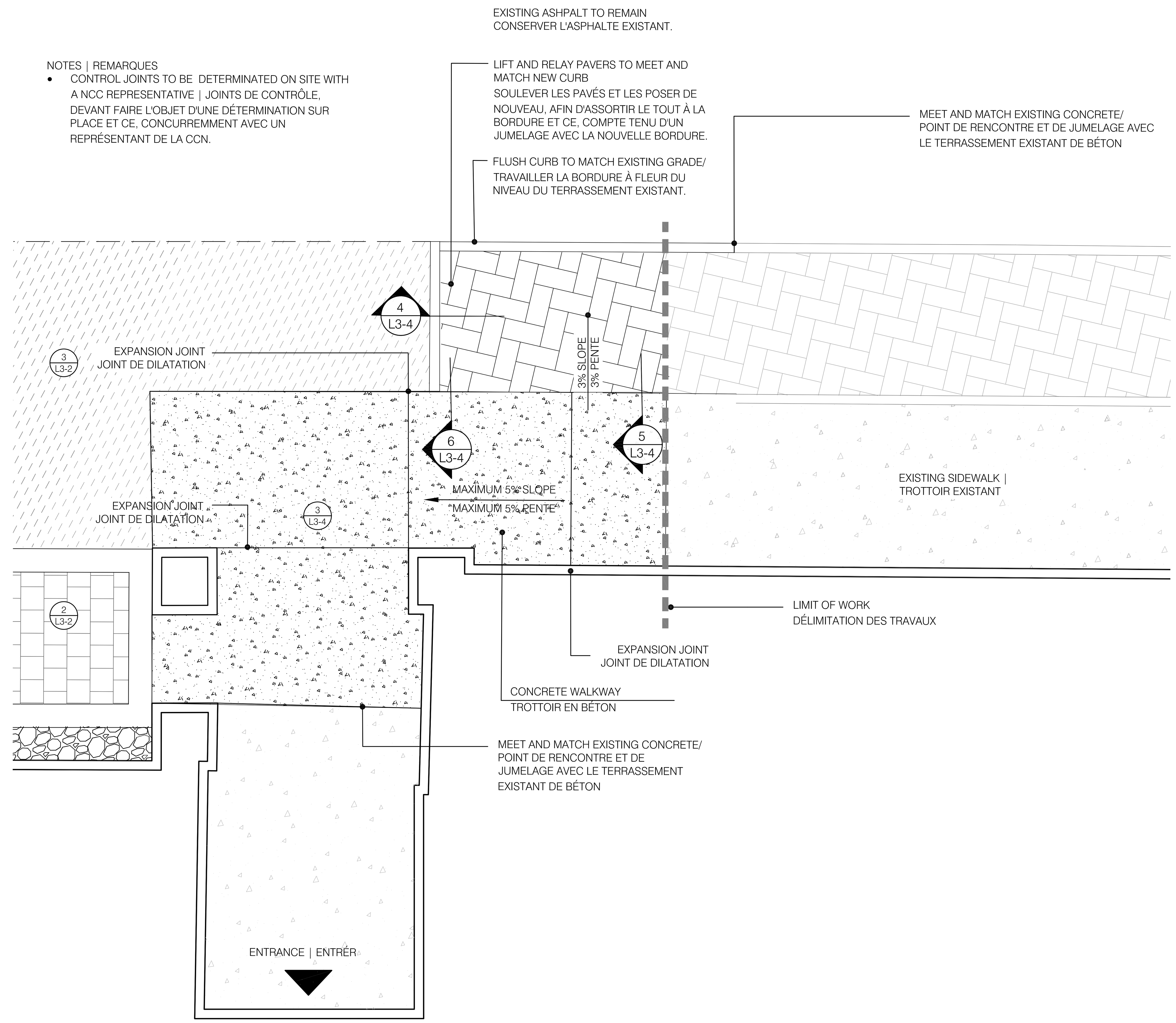
project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

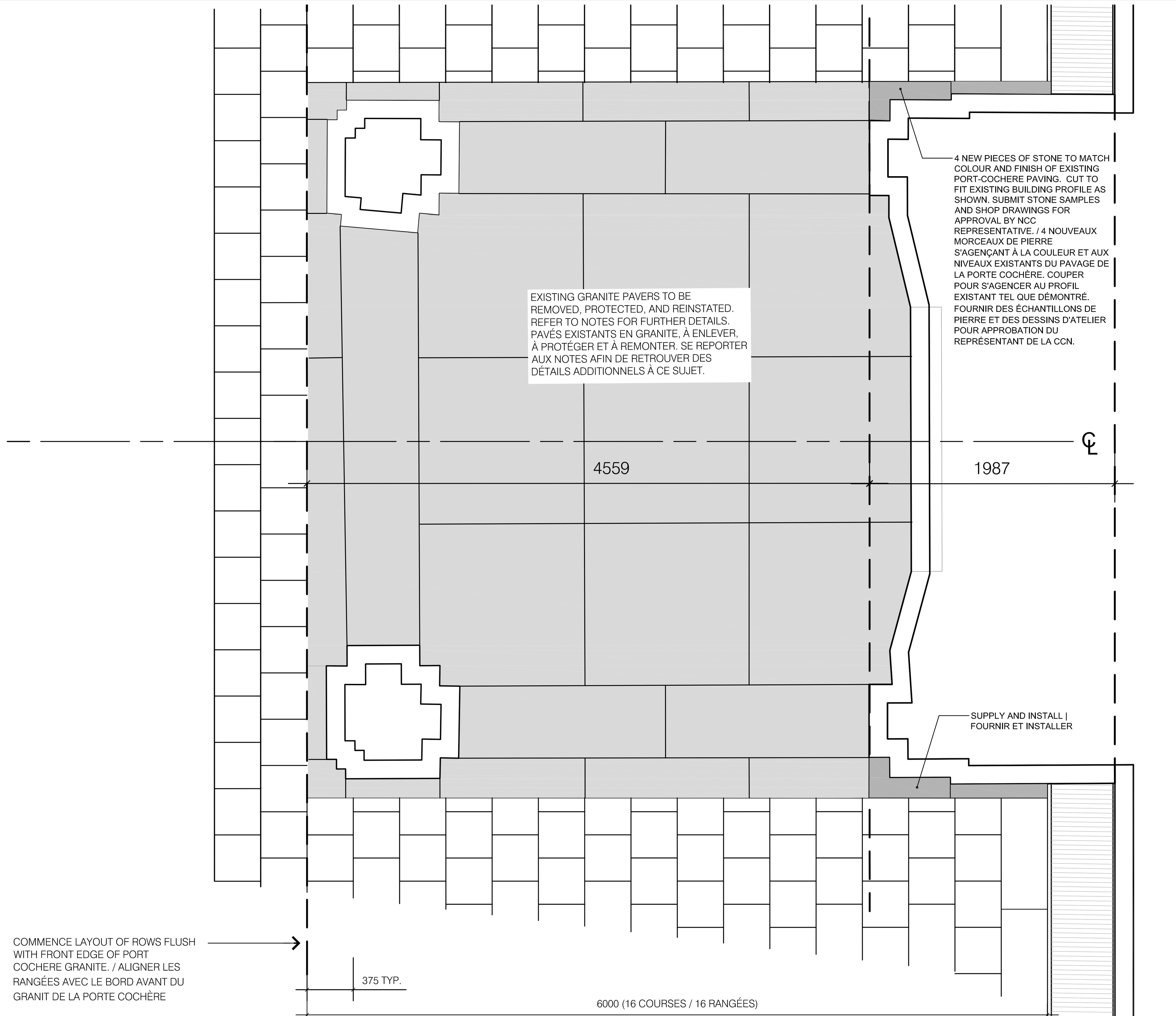
drawing
dessin

TRENCH GRATING DETAILS
DÉTAILS DE LA GRILLE DE TRANCHÉE

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par: R.D.,D.B.,J.G.,M.L.,P.B
date: 08/08/2012
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: L3-3



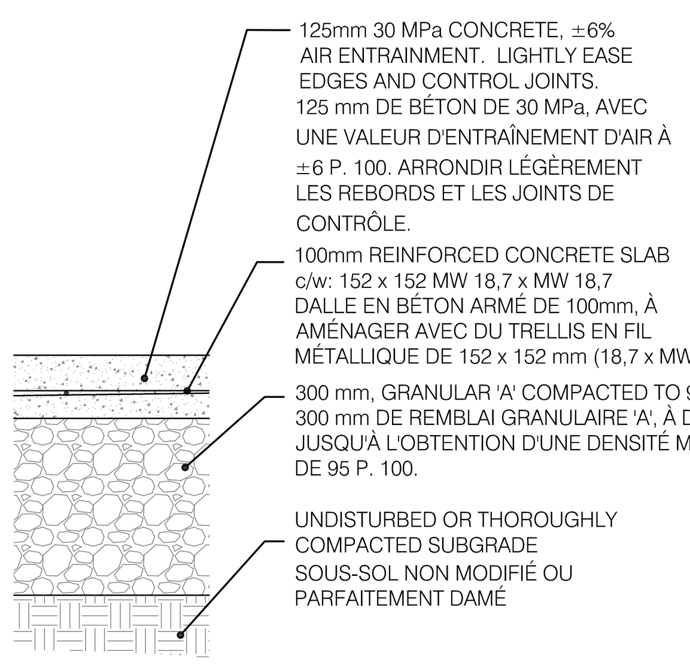
1 L3-4 NORTHEAST ENTRANCE
ENTRÉE DU NORD-EST
1:20



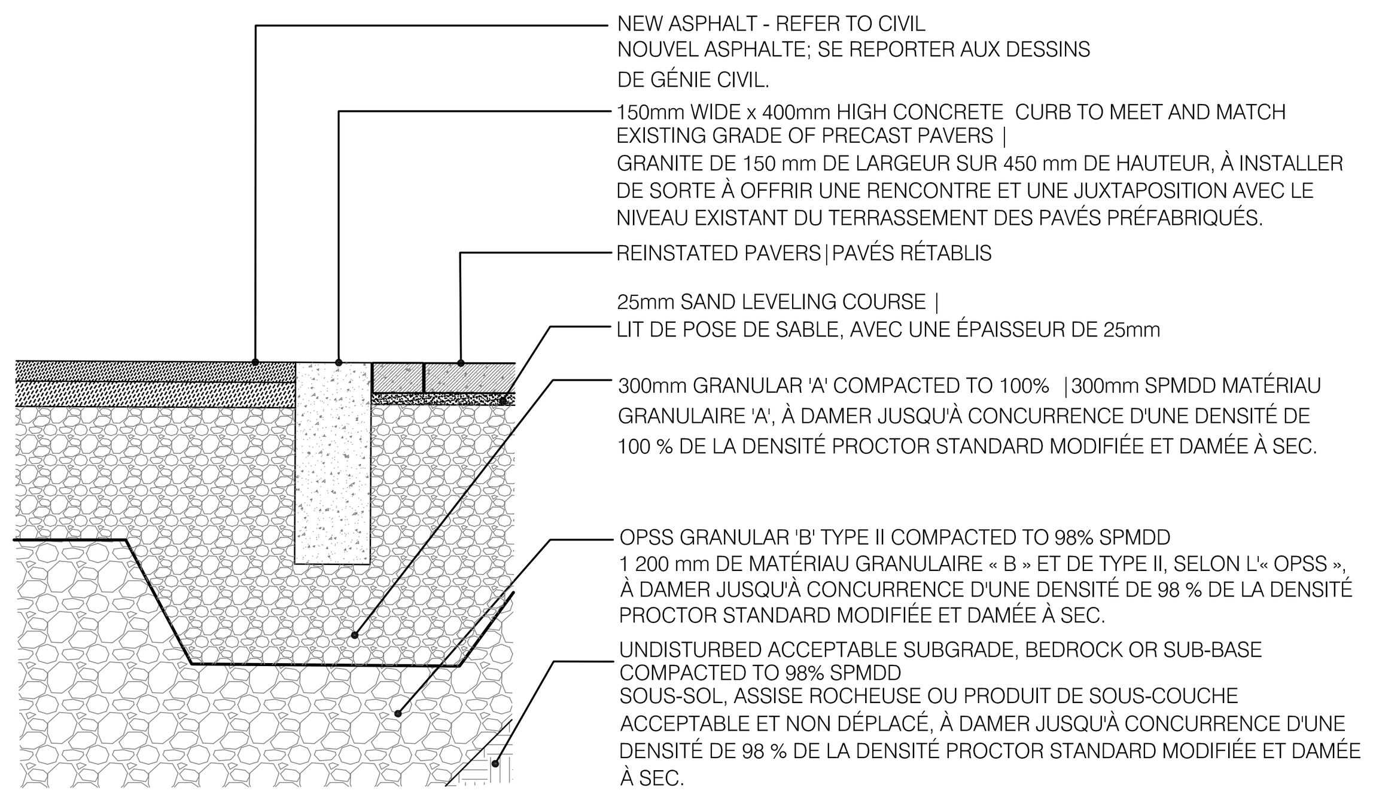
NOTES:
REMOVAL, STORAGE AND PROTECTION:
1. THE CONTRACTOR SHALL PHOTOGRAPH RECORD EACH SEGMENT OF THE PAVING, PRIOR TO REMOVALS TO ASSIST IN THE STONE PATTERN REINSTATEMENT.
2. REMOVE STONE UNITS, TEMPORARY MARK AND STORE ON SITE.
3. PROTECT DISMANTLED STONE UNITS FROM EXPOSURE TO ELEMENTS, AND POTENTIAL MECHANICAL DAMAGE.
REINSTATEMENT OF STONE SURFACE:
1. INSTALL STONES WITH JOINTS TO MATCH EXISTING SURROUNDING JOINTING OF SIMILAR STONES.
2. SURFACE OF FINISED PAVEMENT: REFER TO CIVIL DRAWINGS FOR SUB-SURFACE, GRADES, SLOPES AND POSITIVE DRAINAGE.
3 THE PAVER BLOCKS SHALL BE INSTALLED SO THAT THE STONES MATCH THE ORIGINAL LAYOUT TO THE APPROVAL OF THE CLIENT REPRESENTATIVE.

ENLÈVEMENT, ENTREPOSAGE ET PROTECTION :
1. L'ENTREPRENEUR SE DEVRA DE PHOTOGRAPHIER PAR ENREGISTREMENT CHAQUE SEGMENT DE CHAUSSÉE ET CE, AVANT LA MISE EN ROUTE DES TRAVAUX D'ENLÈVEMENT, AFIN D'OFFRIR DE L'AIDE DANS LE RÉTABLISSEMENT DU MOTIF DE POSE DE LA PIERRE.
2. ENLEVER LES ÉLÉMENTS EN PIERRE, LES MARQUER OU LES IDENTIFIER DE FAÇON TEMPORAIRE ET LES ENTREPOSER SUR PLACE.
3. PROTÉGER LES ÉLÉMENTS DE PIERRE DÉMONTÉS CONTRE TOUTE EXPOSITION AUX ÉLÉMENTS ET AUX ENDOMMAGEMENTS MÉCANIQUES POTENTIELS.
RÉTABLISSEMENT DE LA SURFACE EN PIERRE :
1. INSTALLER LES PIERRES DE SORTE QUE LES JOINTS S'ASSORTISSENT AUX TRAVAUX DE JOINTOIEMENT AVOISINANTS ET EXISTANTS D'OUVRAGES SEMBLABLES EN PIERRE.
2. SURFACE DE LA CHAUSSÉE FINIE. SE REPORTER AUX DESSINS DE GÉNIE CIVIL AFIN DE RETROUVER LES DÉTAILS DE SURFACES SOUS-JACENTES, LES NIVEAUX DE TERRASS., LES PENTES ET LE DRAINAGE POSITIF.
3. INSTALLER LES BLOCS CONSTITUANT LES PAVÉS DE SORTE QUE LES PIERRES S'ASSORTISSENT À L'AMÉNAGEMENT D'ORIGINE ET CE, À L'APPROBATION DU REPRÉSENTANT DU CLIENT.

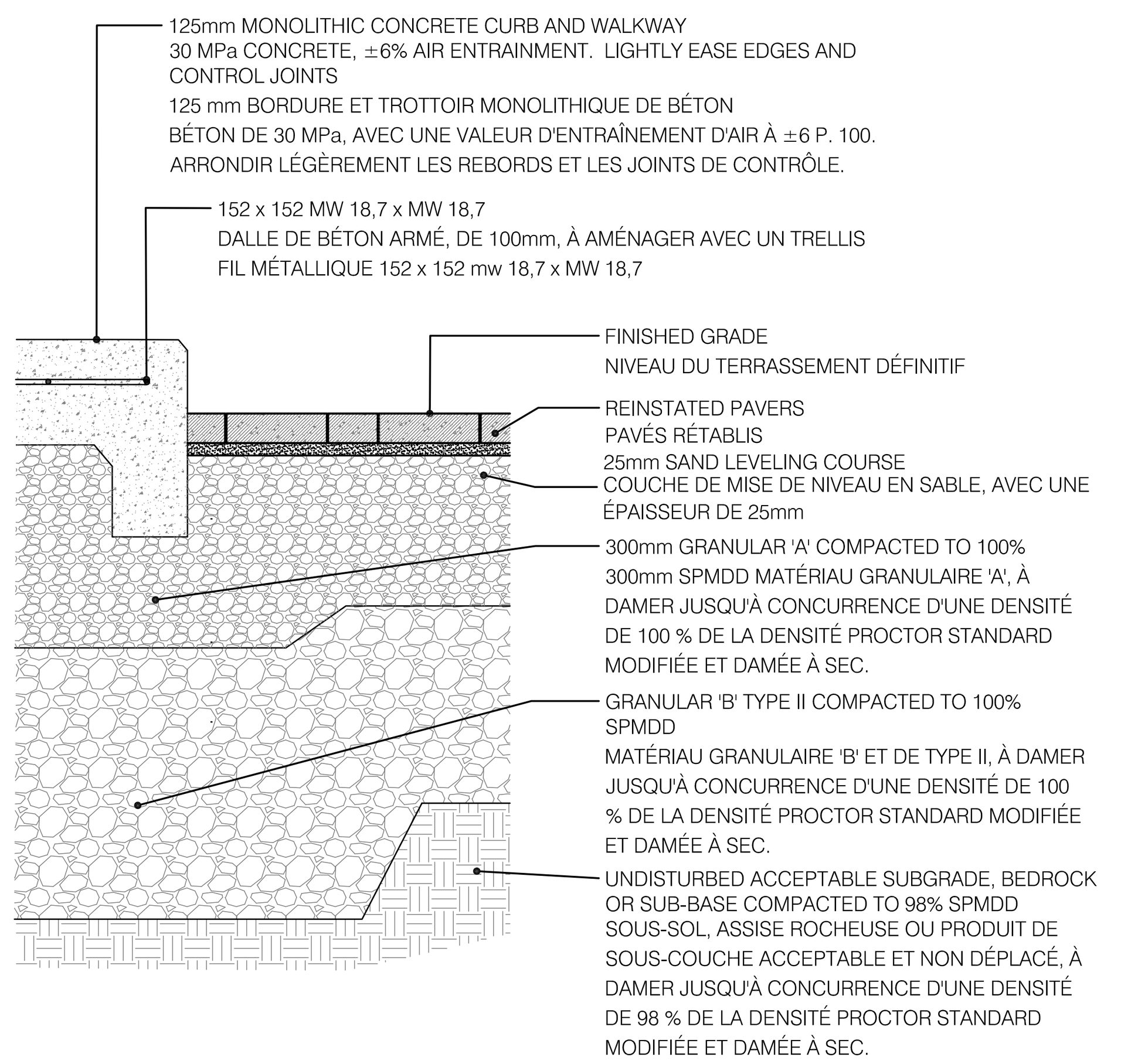
2 L3-4 PORTE COCHERE ENTRANCE
ENTRÉE DE PORTE-COCHÈRE
1:30



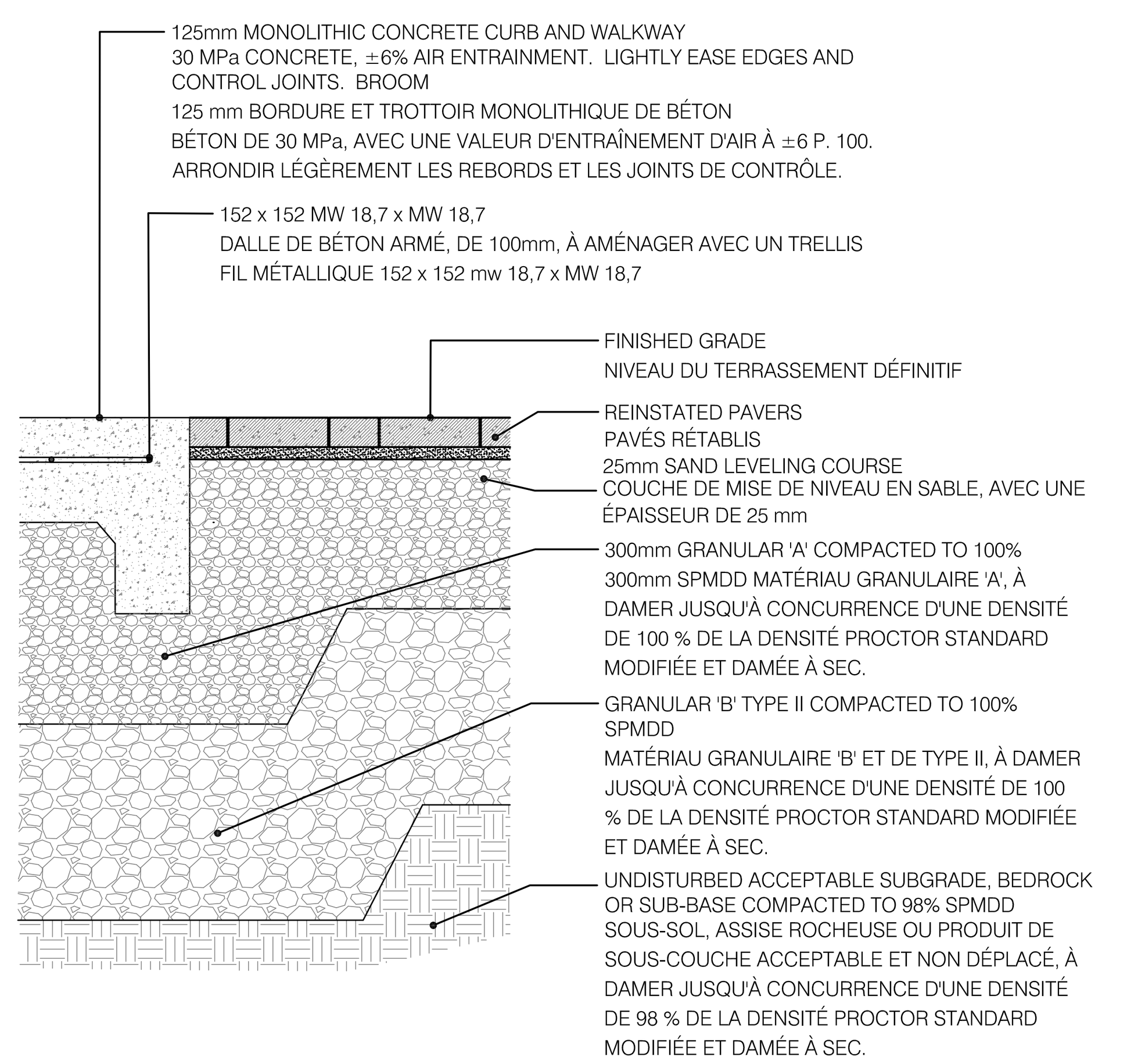
3 L3-4 CONCRETE WALKWAY
SENTIER EN BÉTON
1:15



4 L3-4 ASPHALT @ EXISTING PAVERS
ASPHALTE, À L'EMPLACEMENT DES PAVÉS EXISTANTS
1:15



5 L3-4 MONOLITHIC CONC. WALKWAY (CURB) @ EXISTING PAVERS
PASSERELLE OU TROTTOIR EN BÉTON MONOLITHIQUE, DE MONTAGE EN BORDURE - PAVÉS EXISTANTS
1:15



6 L3-4 MONOLITHIC CONC. WALKWAY (FLUSH) @ EXISTING PAVERS
PASSERELLE OU TROTTOIR EN BÉTON MONOLITHIQUE, DE MONTAGE AFFLEURÉ - PAVÉS EXISTANTS
1:15

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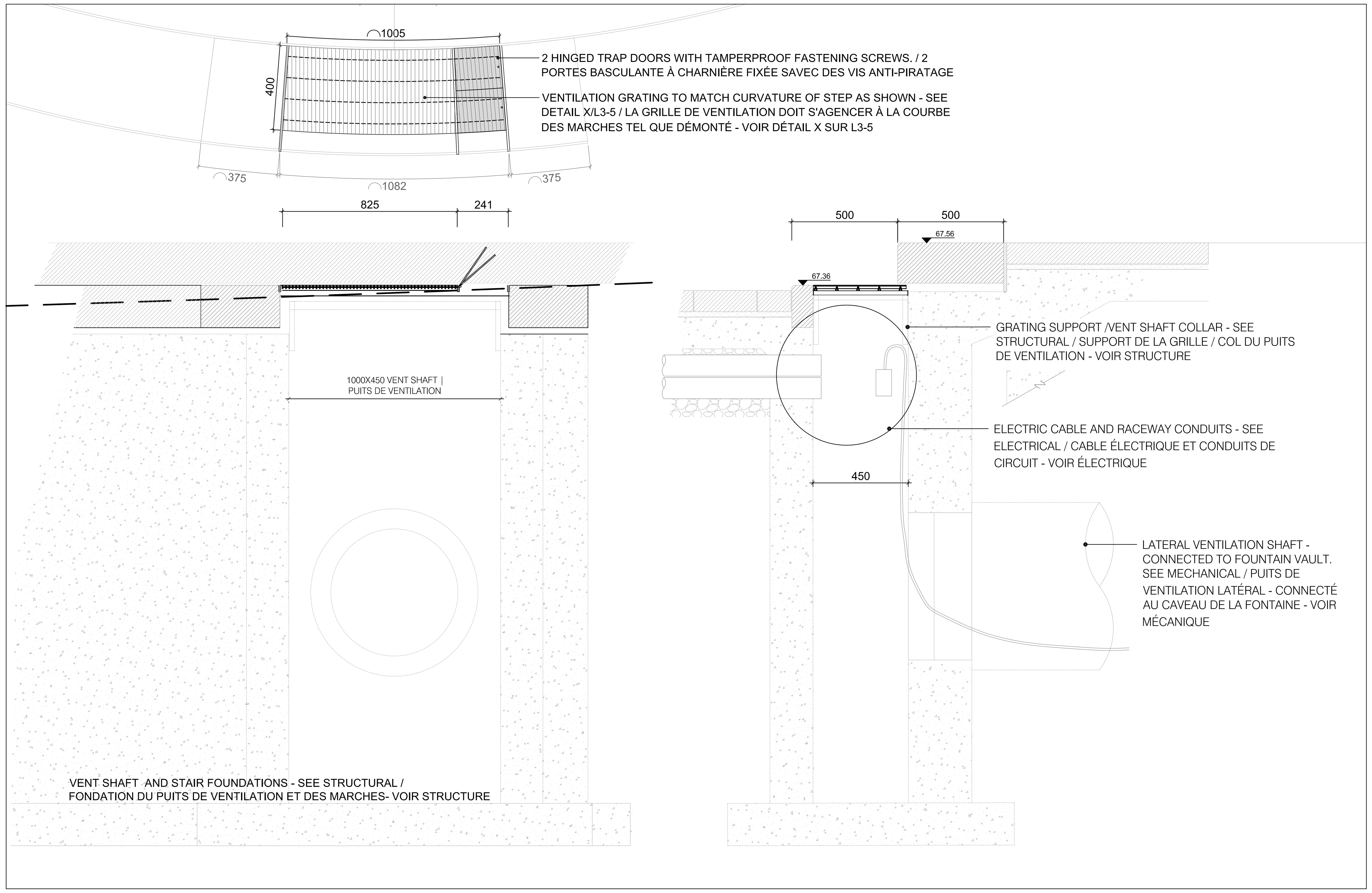
project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

ENTRANCE ENLARGEMENTS | AGRANDISSEMENTS DES ENTRÉES

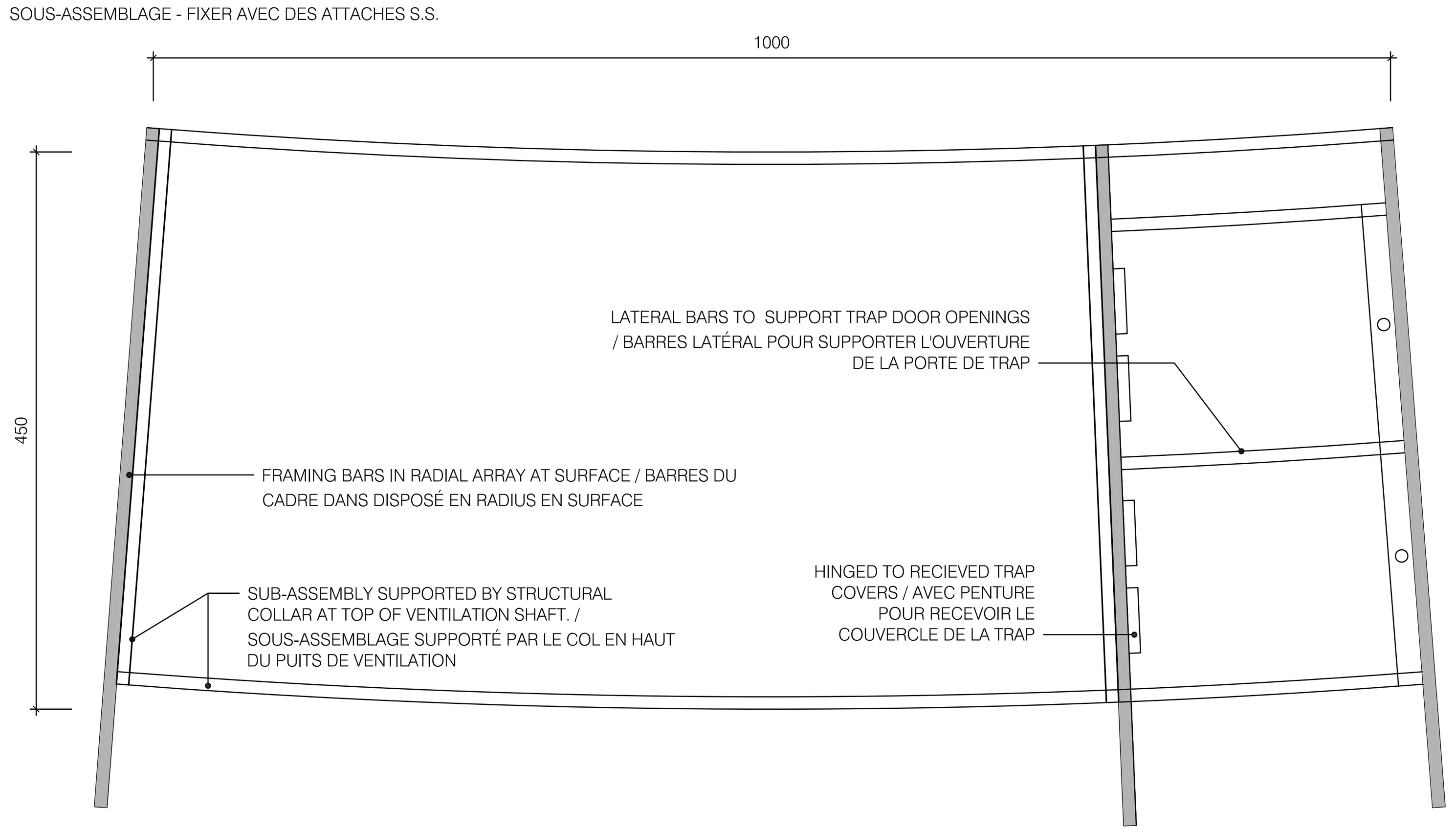
approved by / approuvé par	D. LASHLEY, C.CROSSAN
designed by / conçu par	D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par	R.D.,D.B.,J.G.,M.L.,P.B
date	08/08/2012
scale / échelle	AS INDICATED SELON LES IND.
NCC project no. / n° du projet de la CCN	DC-2611-110
sheet no. / n° de la feuille	L3-4



1 L3-5 VENT GRATE AT GRANITE STEP
GRILLE DE VENTILATION AUX MARCHES EN GRANITE

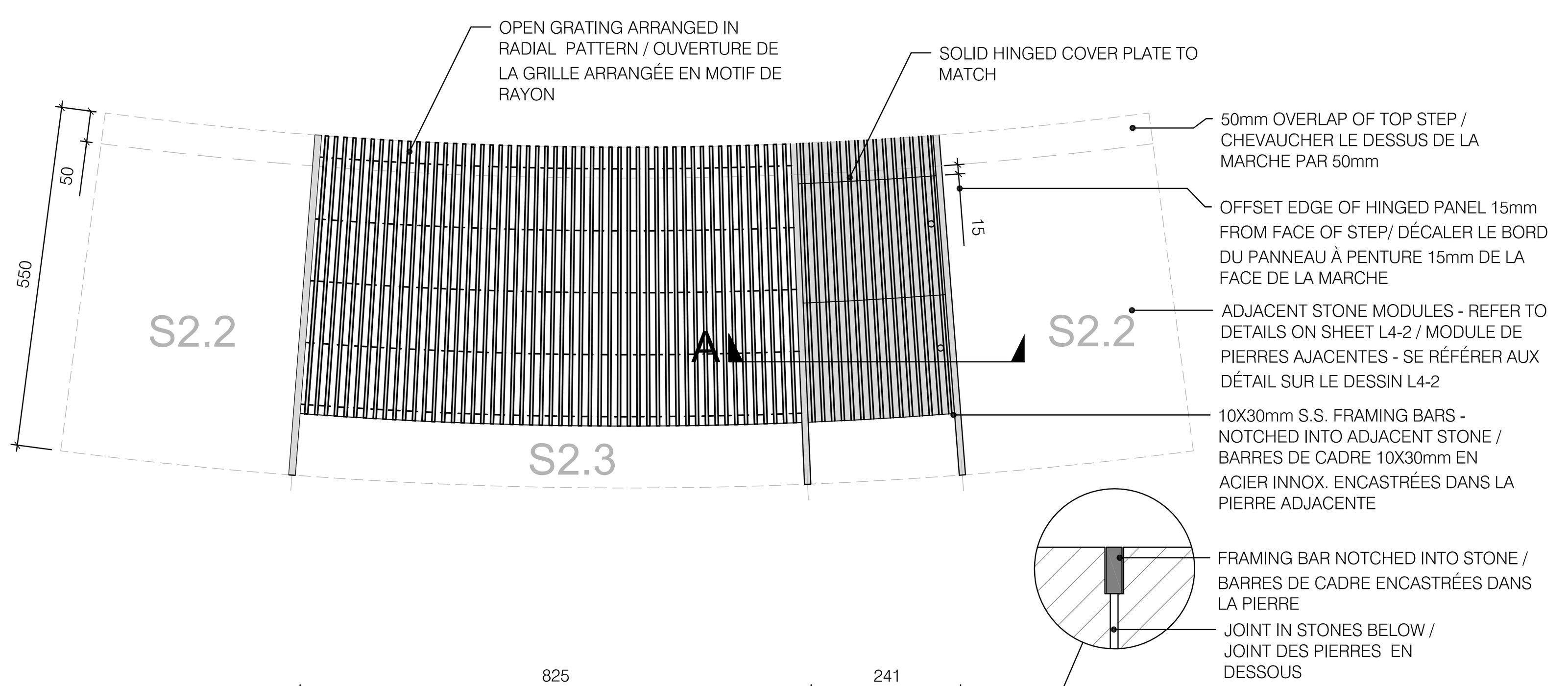
SCALE / ÉCHELLE 1:15

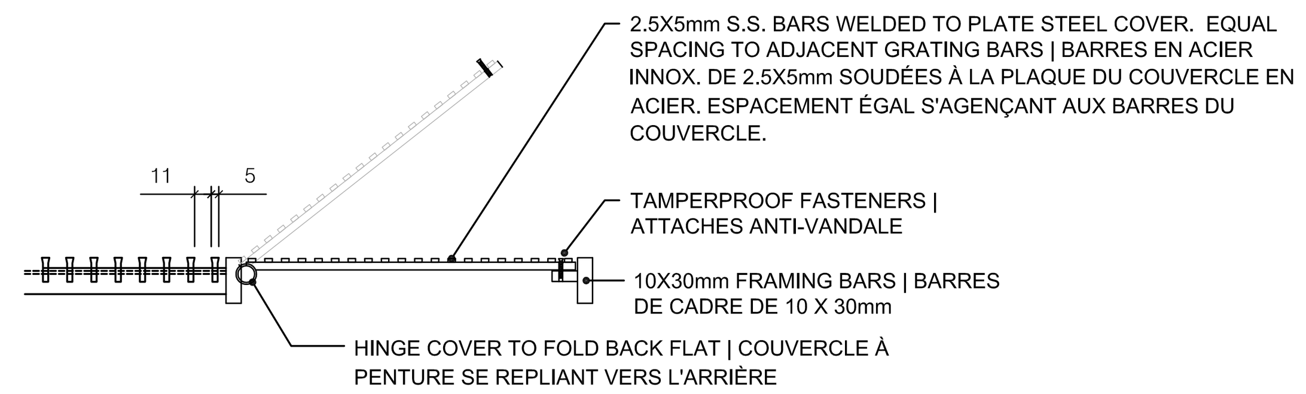
NOTES / REMMARQUES:
1. GRATING BARS AND COVER PLATES NOT SHOWN FOR CLARITY. / LES BARRES DE LA GRILLE ET LA PLAQUE DE COUVERCLE NE SONT PAS DÉMONTRÉS POUR FIN DE CLARITÉ
2. GRATING BARS TO BE SEPARATE FROM FRAMING BARS AND SUB-ASSEBLY - FASTEN S.S. FASTENERS / LES BARRES DE LA GRILLE DOIVENT ÊTRE SÉPARÉES DES BARRES DU CADRE ET DU SOUS-ASSEMBLAGE - FIXER AVEC DES ATTACHES S.S.



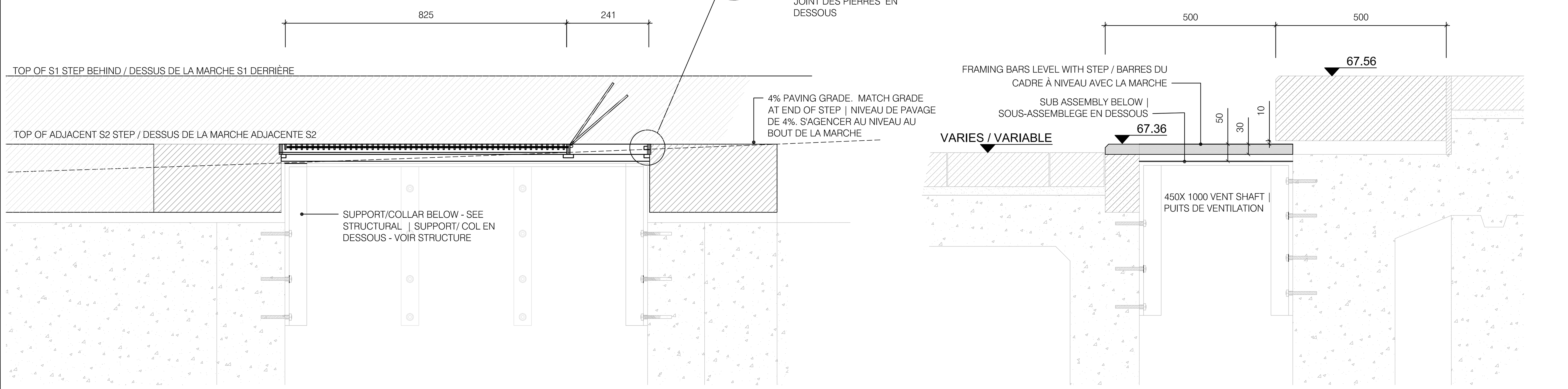
3 L3-5 GRATING FRAME
CADRE DE LA GRILLE

1:5





SECTION 'A' | COUPE 'A'
(ENLARGEMENT 1:5 | AGRANDISSEMENT 1:5)



NOTES / REMMARQUES:
- CUSTOM VENT GRATES TO BE FABRICATED USING RADIAL PANEL OF HENDRICK'S STAINLESS STEEL GRATING AS TO MATCH OTHER GRATING ELEMENTS. / LES GRILLES DE VENTILATION DOIVENT ÊTRE FABRIQUÉES AVEC DES PANNEAUX RADIAUX DES GRILLES D'ACIER INOXYDABLE HENDRICK`S AFIN DE S'AGENCER AUX AUTRES GRILLES SUR LE SITE.
- SUBMIT SHOP DRAWINGS FOR APPROVAL. / SOUMETTRE DE DESSINS D'ATELIER POUR APPROBATION
- DIMENSIONS SHOWN ARE NOMINAL, SHOP DRAWINGS TO SHOW ALL JOINT TOLERANCES, WELDS AND FASTENERS. / LES DIMENSIONS DÉMONTRÉES SONT NOMINALES, DES DESSINS D'ATELIER DÉMONTRANT TOUTES LES TOLÉRANCES DES JOINTS, LES SOUDURES ET LES FIXTURES DOIVENT ÊTRE SOUMIS.
- 10X30 BEARING BARS TO BE RECESSED INTO ADJACENT STONE AS SHOWN. PREPARE SHOP DRAWINGS FOR METAL WORKS IN CONJUNCTION WITH STONE CUTTING DIAGRAMS. / LES BARRES PORTEUSES 10 X30 DOIVENT ÊTRE ENCASTRÉES DANS LA PIERRE ADJACENTE TEL QUE DÉMONTRÉ. PRÉPARER DES DESSINS D'ATELIER POUR LES TRAVAUX DE MÉTAL EN CONJONCTURE AVEC LES DIAGRAMMES DE COUPE DE PIERRE.

2 L3-5 STAINLESS STEEL VENTILLATION GRATING
GRILLE DE VENTILATION EN ACIE INNOXIDABLE

1:10

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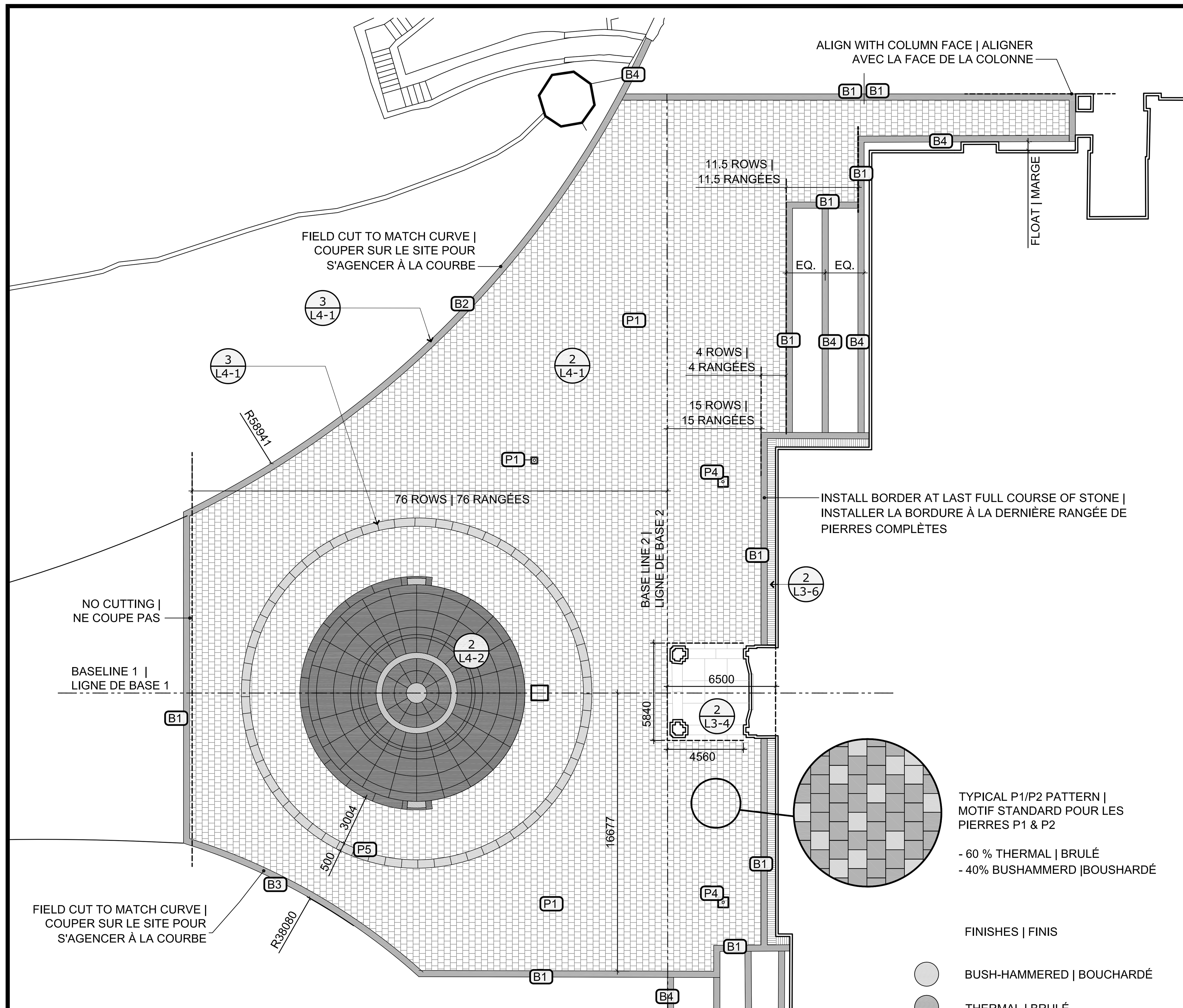
project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

VENTILATION SHAFT GRATING | GRILLE DE VENTILLATION

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par: R.D.,D.B.,J.G.,M.L.,P.B
date: 13/04/2016
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: L3-5

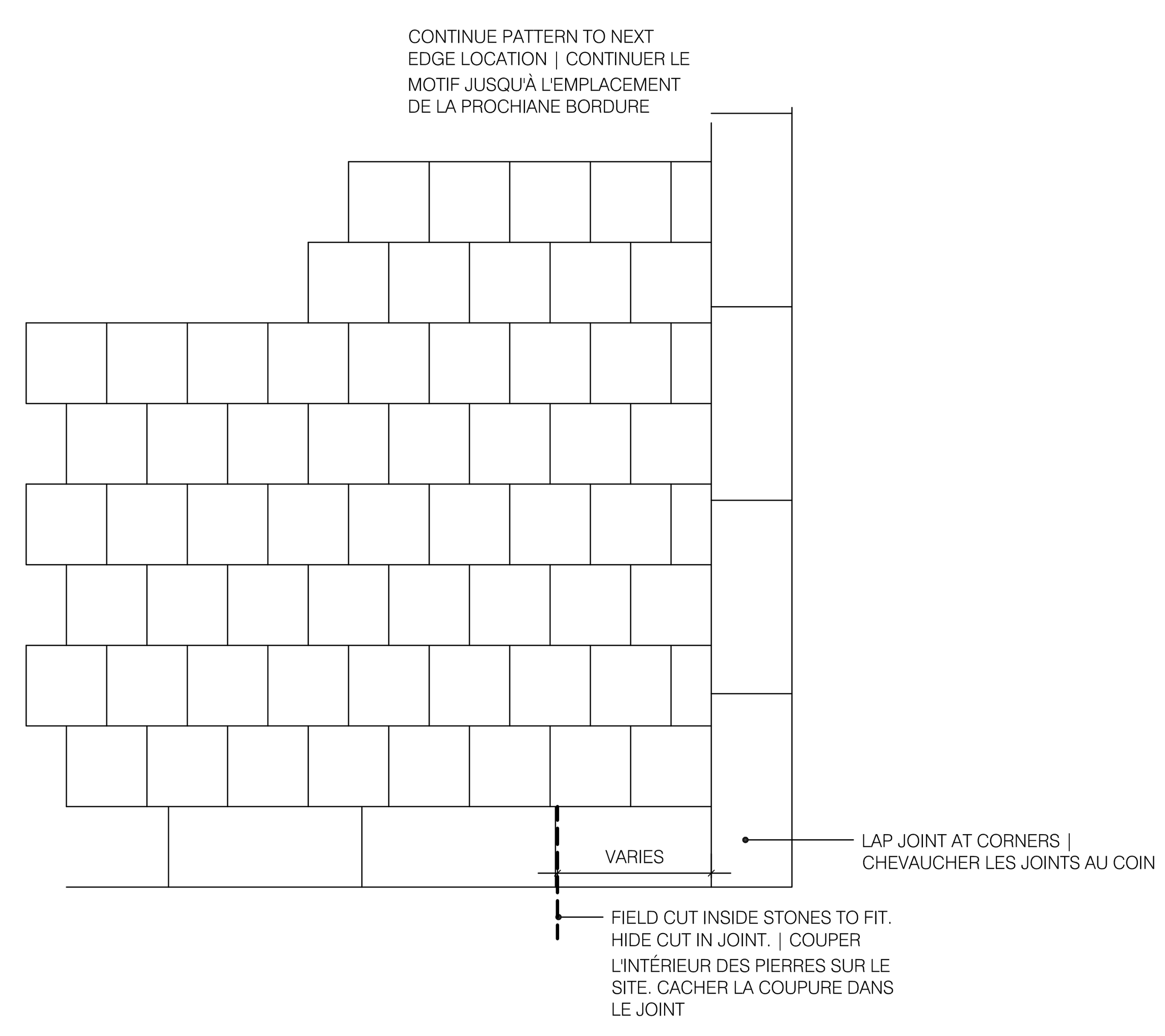


NOTES | REMARQUES:

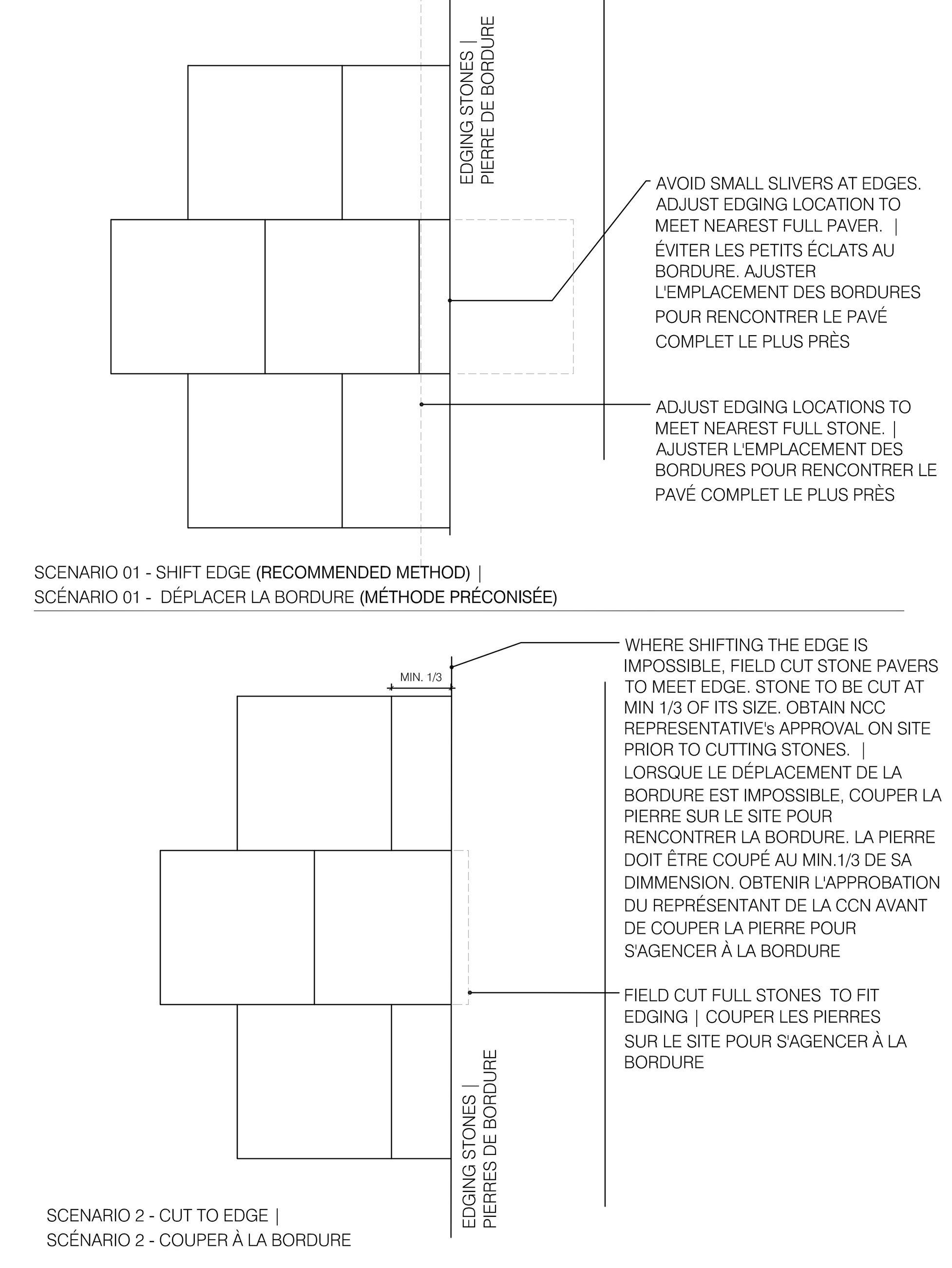
- ALL GRANITE TO BE MYSTIC BROWN AS SPECIFIED OR APPROVED EQUIVALENT. | TOUT LE GRANIT DOIT ÊTRE "*MYSTIC BROWN*" TEL QUE SPÉCIFIÉ OU ÉQUIVALENT APPROUVÉ
- STONE HATCH PATTERN IS ILLUSTRATIVE ONLY, REFER TO LAYOUT DIMENSIONS AS SHOWN. | LE MOTIF DE HACHURE POUR LA PIERRE EST À TITRE INDICATIF SEULEMENT, SE RÉFÉRER AU DIMMENSION DE POSE TEL QUE MONTRÉ.
- CONTRACTOR TO REVIEW LAYOUT OF STONE ON SITE WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION. | L'ENTREPRENEUR DOIT REVOIR LE MOTIF DE PIERRE SUR LE SITE AVEC LE REPRÉSENTANT DE LA CCN AVANT L'INSTALLATION.
- NCC REPRESENTANT TO APPROVE ON SITE MOCK-UP PRIOR TO STONE INSTALLATION AS SPECIFIED | LE REPRÉSENTANT DE LA CCN DOIT APPROUVER LA MAQUETTE SUR LE SITE AVANT L'INSTALLATION DU PAVÉ TEL QUE SPÉCIFIÉ.
- AVOID CUTTING STONES. LAYOUT STONES TO NEAREST FULL ROW AS SHOWN IN DETAIL 2 THIS SHEET.| ÉVITER DE COUPER LES PIERRES. METTRE EN PLACE LES PIERRES À LA RANGÉE COMPLÈTE LA PLUS PROCHE TEL QUE DÉMONTRÉ SUR LE DÉTAIL 2 DE CETTE PAGE.
- ADVISE NCC LANDSCPE ARCHITECT OF AREAS WHERE ADJUSTMENT OR CUTTING ARE REQUIRED TO ACHIEVE LAYOUT AS SHOWN. | AVISER L'ARCHITECTE PAYSAGISTE DE LA CCN DES ENDROITS NÉCÉSSITANT DES AJUSTEMENTS OU DES COUPES POUR PARVENIR AU MOTIF DE POSE DÉMONTRÉ.
- FIELD CUT STONE TO MEET CURVED EDGES AS SHOWN IN DETAIL 3 THIS SHEET. STONE TO BE FIELD CUT ONLY AT LOCATIONS SHOWN ON PLANS. | COUPER LES PIERRES SUR LE SITE AFIN DE S'AGENCER AUX BORDURES EN COURBE TEL QUE DÉMONTRÉ AU DÉTAIL 3 DE CETTE PAGE. LES PIERRES DOIVENT ÊTRE COUPÉES SEULEMENT AUX ENDROITS DÉMONTRÉS SUR LES PLANS.

1 L4-1 STANDARD GRANITE PAVING KEY PLAN
PLAN CLÉ - PAVÉS STANDARD EN GRANITE

1:200



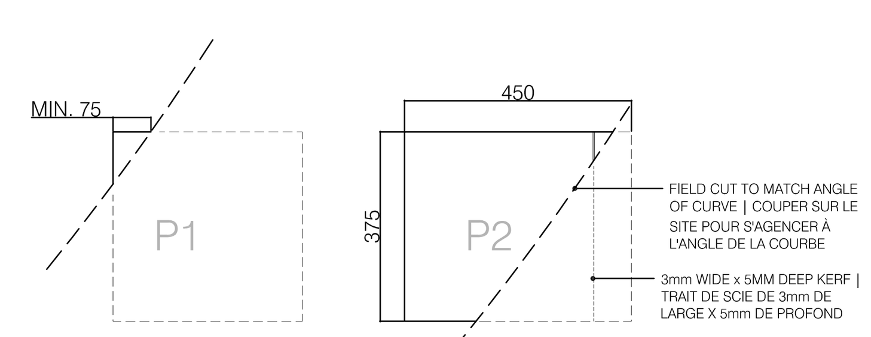
PLAN VIEW | VUE EN PLAN (1:30)



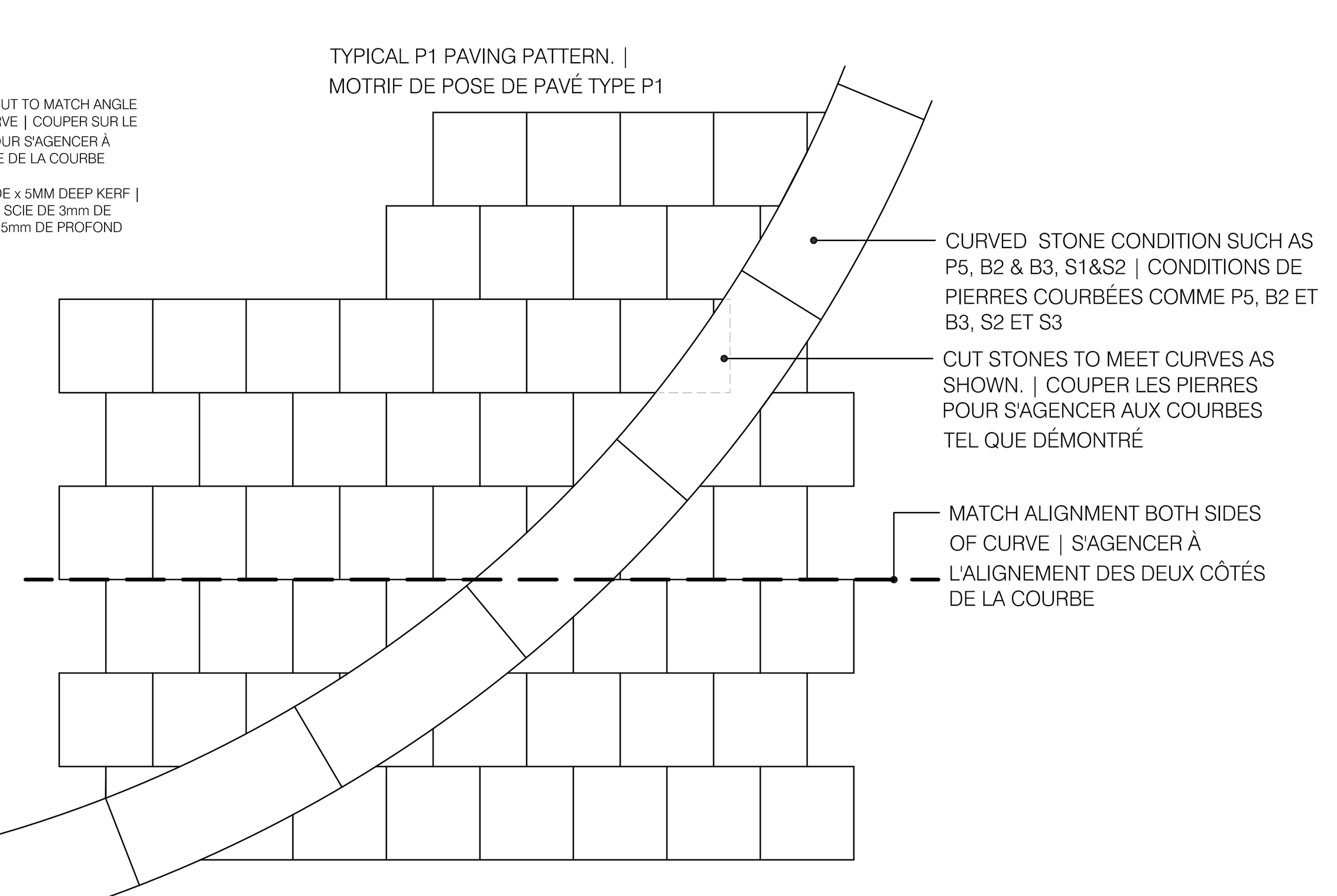
EDGING SCENARIOS | SCÉNARIOS DE BORDURE (1:15)

2 L4-1 STRAIGHT EDGING DETAIL
DÉTAIL DE FINITION EN LIGNE DROITE

1:30



CUTTING DETAIL |
DÉTAIL DE COUPE (1:15)



PLAN VIEW | VUE EN PLAN (1:30)

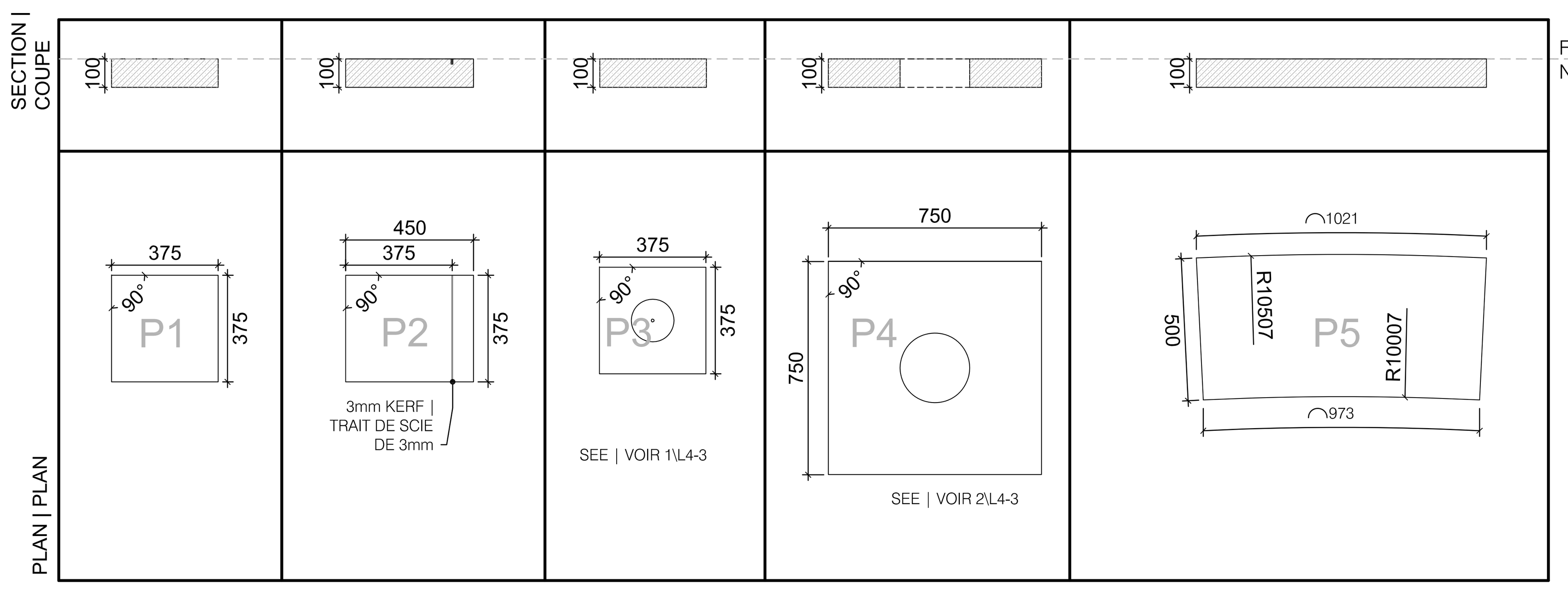
3 L4-1 CURVED BORDER/ PAVING DETAIL
BORDURE COURBÉE / DÉTAIL DE PAVAGE

1:30

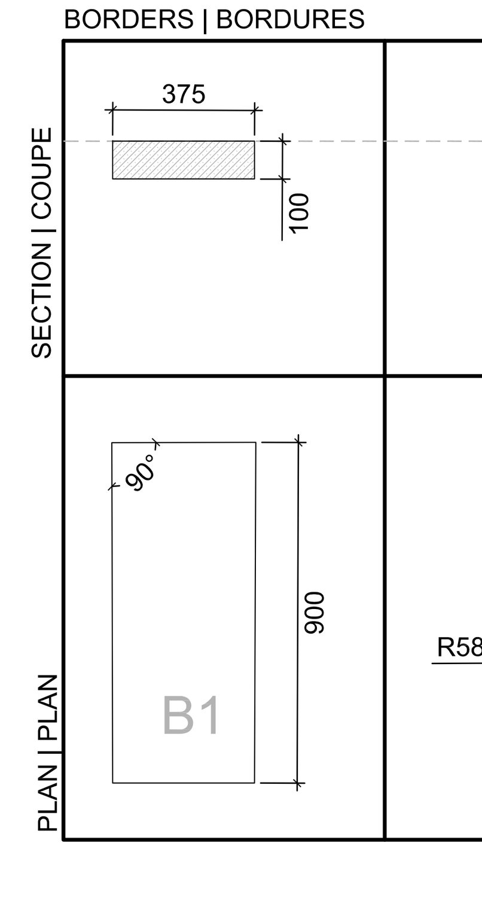
NOTES:

- SUBMIT SHOP DRAWINGS FOR ALL STONE MODULES. | SOUMETTRE DES DESSINS D'ATELIER POUR TOUS LES MODULES DE PIERRE.
- STONE DIMENSIONS ARE NOMINAL. ACCOUNT FOR 3mm JOINT SPACING IN SHOP DRAWING SUBMITTALS. | LES DIMENSIONS SONT NOMINALES. COMPTER POUR DES JOINTS DE 3mm D'ESPACE DANS LES SOUMISSIONS DES DESSINS D'ATELIER.
- EASE ALL EDGES WITH 1mm BEVEL. | ADOUCIR LES BORDS AVEC DES CHANFREIN DE 1mm.
- FINISHES AS PER KEY PLAN ABOVE. NOTE FINISHES ON SHOP DRAWINGS | FINIR LES PIERRES SELON LE PLAN CLÉ CI-HAUT. NOTER LES FINIS SUR LES DESSINS D'ATELIER.

PAVING | PAVAGE



BORDERS | BORDURES



4 L4-1 SCHEDULE OF STONE MODULES
PROGRAMME DES MODULES DE PIERRE

1:20

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Gestion des biens immobiliers. Direction du design et de la construction

Design and Construction Division
Division du design et de la construction

director - Claude Robert - directeur

consultant
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n°	description	date
11	FOR TENDER | POUR SOUMISSION	22/04/2016
10	REISSUED FOR 100% REVIEW	21/03/2016
9	REISSUED FOR 100% REVIEW	04/03/2016
8	ISSUED FOR 100% REVIEW	18/02/2016

project
projet

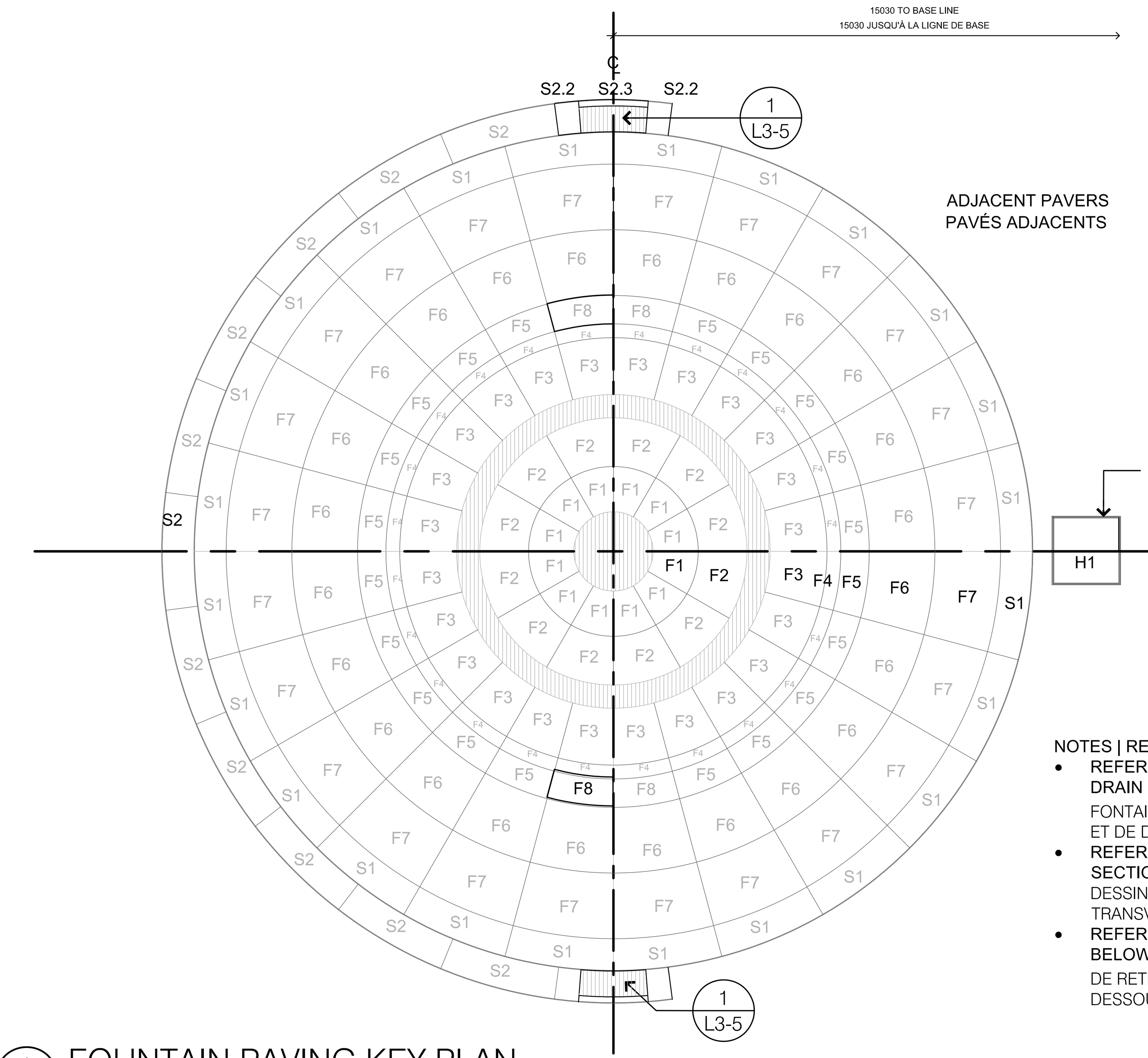
NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

STANDARD GRANITE PAVING MODULES |
MODULES DE PAVAGE STANDARD EN GRANITE

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par: R.D.,D.B.,J.G.,M.L.,P.B
date: 08/08/2012
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: L4-1

15030 TO BASE LINE
15030 JUSQU'À LA LIGNE DE BASE



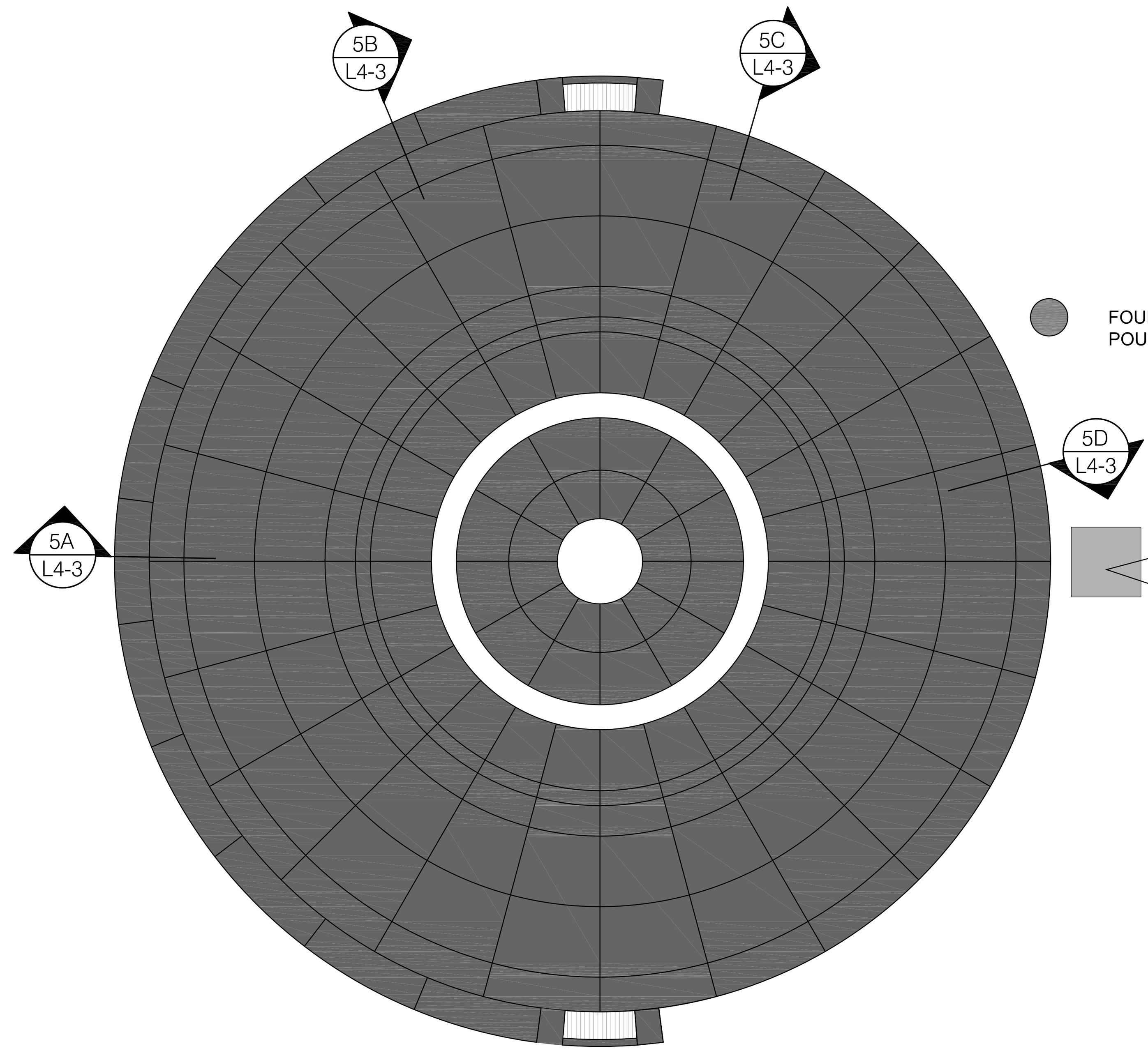
ADJACENT PAVERS
PAVÉS ADJACENTS

BILCO SINGLE LEAF ACESS DOOR (1065mm X 1065mm)
REFER TO STRUCTURAL
PORTE D'ACCÈS « BILCO » ET À SIMPLE BATTANT, DE 1 065 mm
SUR 1 065 mm. SE REPORTER À LA CHARPENTE.

LAYOUT BASELINE
AMÉNAGEMENT LIGNE DE BASE

NOTES | REMARQUES
- REFER TO FOUTAIN DRAWINGS FOR GRATES AND DRAIN DETAILS | SE REPORTER AUX DESSINS DE FONTAINE AFIN DE RETROUVER LES DÉTAILS DE GRILLAGE ET DE DRAIN.
- REFER TO FOUNTAIN DRAWINGS FOR CROSS SECTIONS OF FOUNTAIN DESIGN | SE REPORTER AUX DESSINS DE FONTAINE AFIN DE RETROUVER LES COUPES TRANSVERSALES DE LA CONCEPTION DE LA FONTAINE.
- REFER TO STRUCTURAL DRAWING FOR FOUNDATIONS BELOW. | SE REPORTER AU DESSIN DE CHARPENTE AFIN DE RETROUVER LES DÉTAILS DE FONDATION EN DESSOUS.

1 L4-2 FOUNTAIN PAVING KEY PLAN
PLAN CLÉ - PAVÉS DE FONTAINE
1:75



FOUNTAIN FINISH: 100% GEM 8 | FINI POUR LA FONTAINE : 100% GEM 8

HATCH FINISH: TO MATCH ADJACENT FIELD | FINITION DE LA PORTE DE PANEAU : S'AGENCER AU TERRAIN ADJACENT

40% BUSH-HAMMERED
60% THERMAL

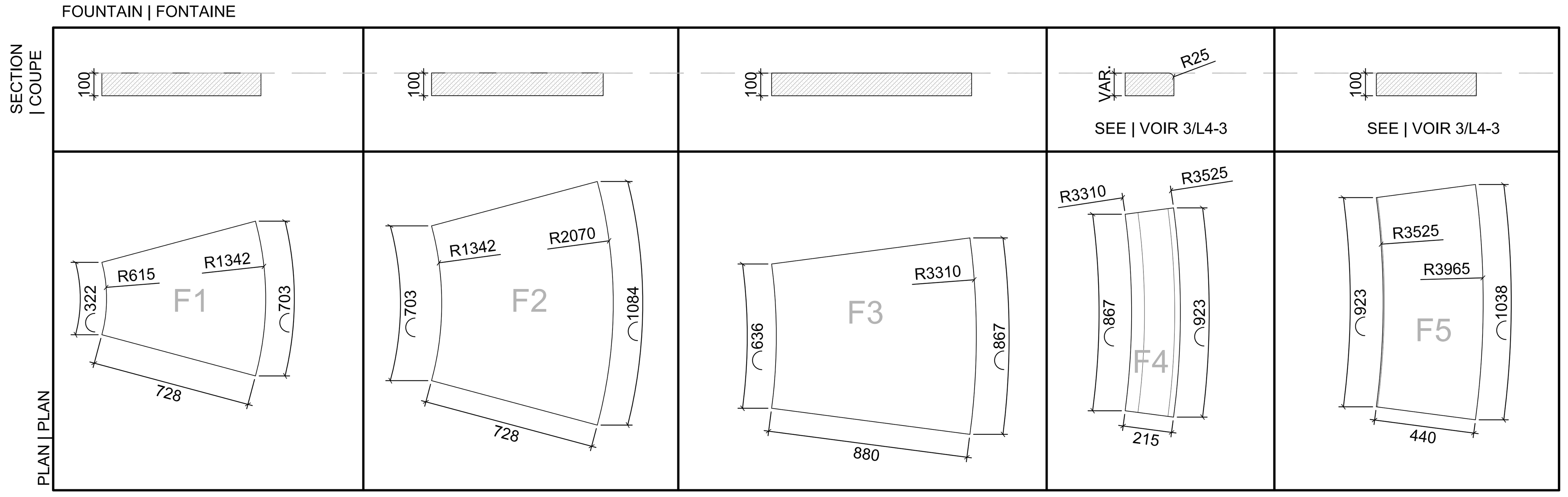
NOTES:
- ALL PIECES TO BE SAW CUT AND FINISHED AS SHOWN
SCIER ET FINIR TOUS LES MORCEAUX EN CONFORMITÉ AVEC LES INDICATIONS.

2 L4-2 FOUNTAIN GRANITE FINISHES PLAN
PLAN DES FINIS EN GRANITE POUR LA FONTAINE
1:75

NOTES:
- SUBMIT SHOP DRAWINGS SHOWING ALL CUTS AND FINISHES.
- DEMSIONS NOTED ARE NOMINAL AND FOR DESIGN PURPOSES ONLY. SHOP DRAWINGS TO REFLECT JOINT SPACING AND TOLERANCES, FOR ADJACENT MATERIALS AS SHOWN IN PLANS
- SUBMIT ALONG WITH STONE SHOP DRAWINGS ALL MANUFACTURER'S DATA FOR PRODUCTS AFFECTING STONE FABRICATION SUCH AS TRAP DOOR, GRATING, PORTS, ETC.

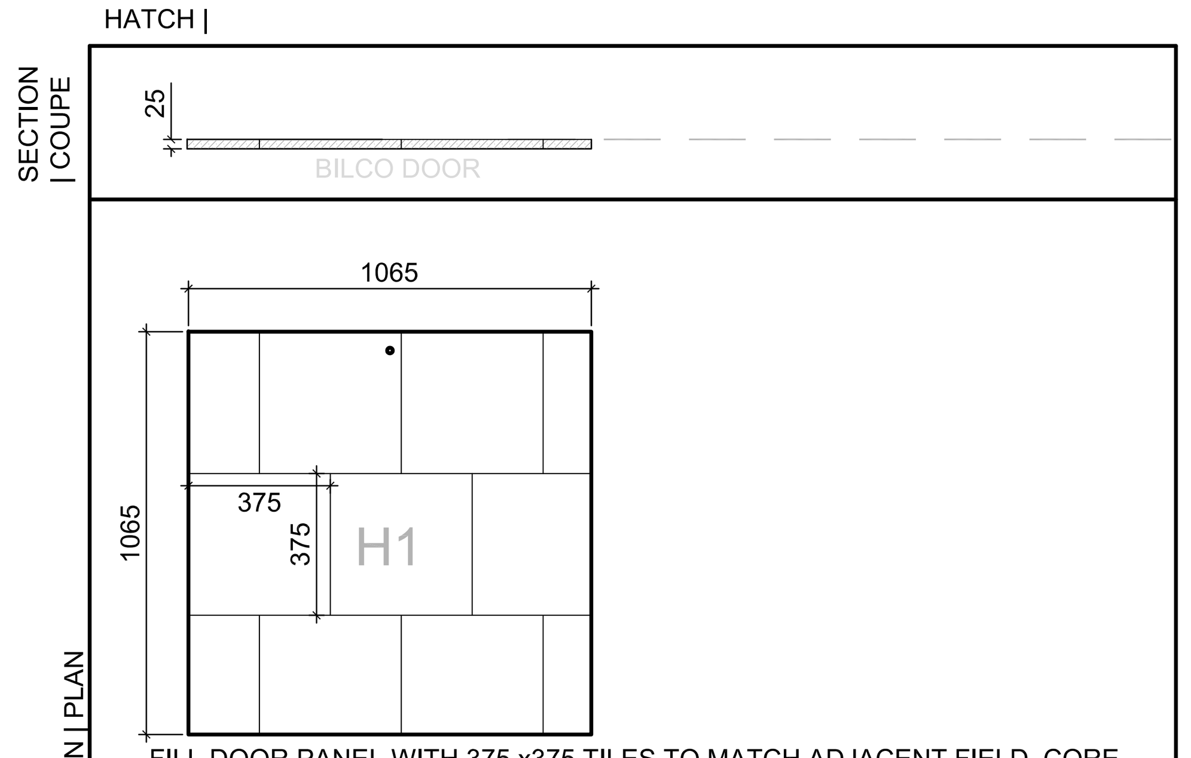
NOTES :
- PRÉSENTER DES DESSINS D'ATELIER MONTRANT TOUS LES TRAVAUX DE COUPAGE ET DE FINITION.
- LES DIMENSIONS ANNOTÉES SONT NOMINALES ET PRÉSENTÉES À DES FINS DE CONCEPTION SEULEMENT. LES DESSINS D'ATELIER DEVRONT PRÉSENTER L'ESPACEMENT DES JOINTS ET LES TOLÉRANCES ET CE, EN RAPPORT AVEC DES MATÉRIAUX ADJACENTS ET SELON LES INDICATIONS DES PLANS.
- À SOUMETTRE CONCURREMMENT AVEC LES DESSINS D'ATELIER DES PIERRES TOUTES LES DONNÉES DU FABRICANT EN RAPPORT AVEC DES PRODUITS AFFECTANT LA FABRICATION DE LA PIERRE, COMME SUIT : PORTE D'ACCÈS, GRILLAGE, PORTES ET AINSI DE SUITE.

FOUNTAIN | FONTAINE



FINISHED GRADE
NIVEAU FINI

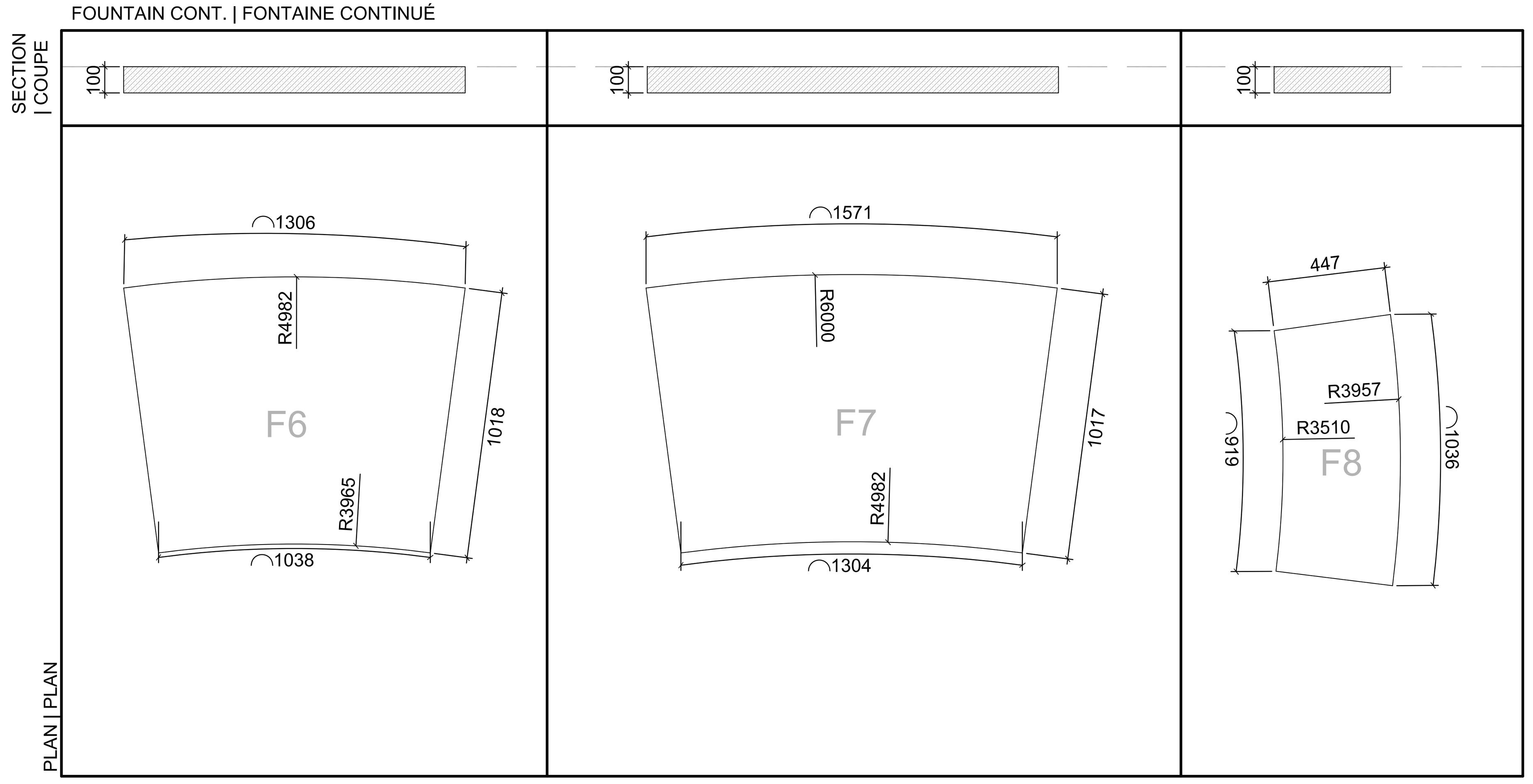
HATCH |



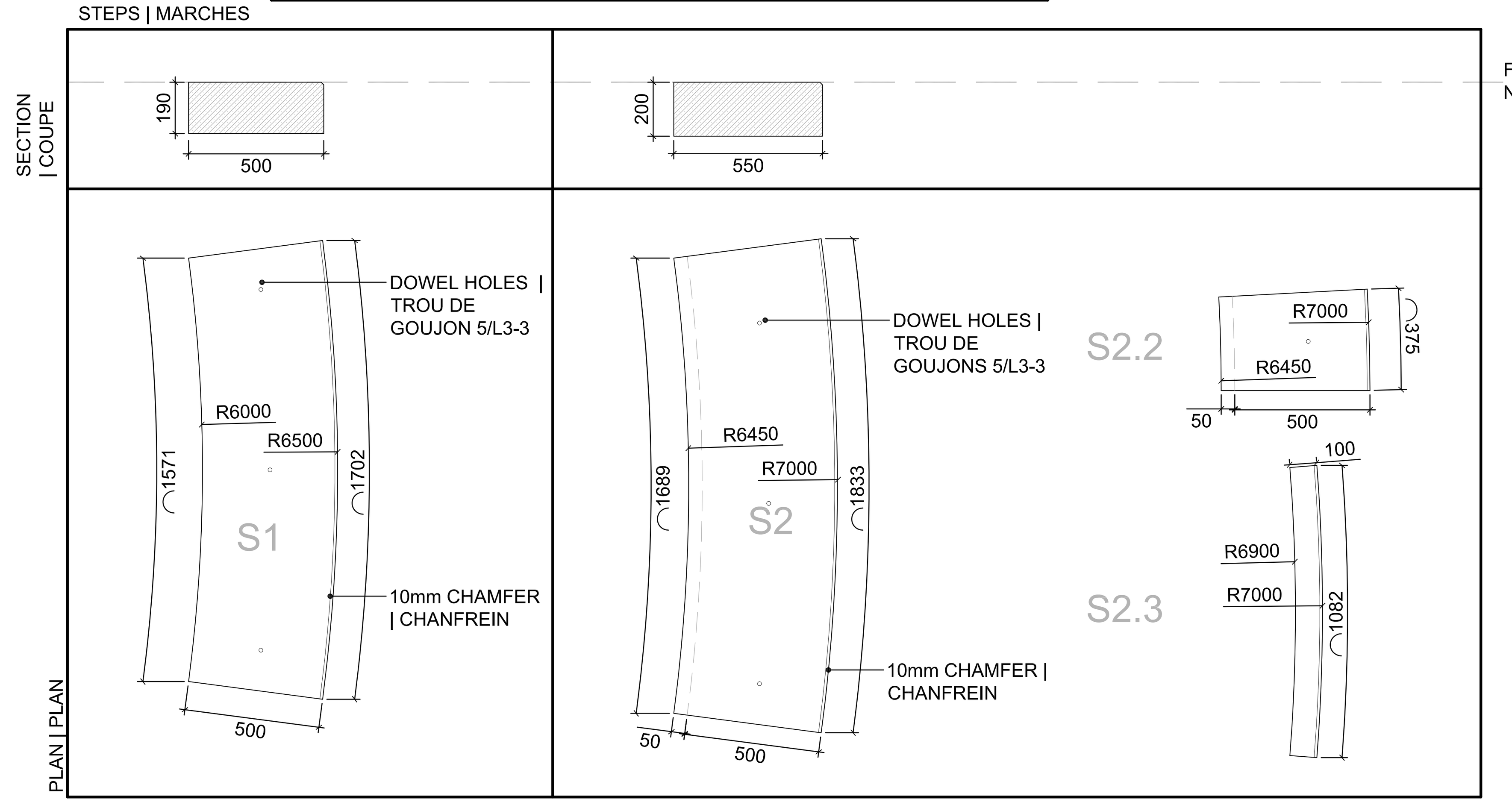
FILL DOOR PANEL WITH 375 x375 TILES TO MATCH ADJACENT FIELD. CORE LATCH HOLE | REMPLIR LA PORTE DU PANNEAU AVEC DES TUILES 375 X 375 POUR S'AGENCER AU TERRAIN. PERCER UN TROU POUR LE LOQUET

FINISHED GRADE
NIVEAU FINI

FOUNTAIN CONT. | FONTAINE CONTINUÉ



STEPS | MARCHES



FINISHED GRADE
NIVEAU FINI

FOUNTAIN GRANITE PAVING SCHEDULE
NOMENCLATURE DES PAVÉS DE FONTAINE EN GRANITE
1:20

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project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

FOUTAIN GRANITE PAVING MODULES | MODULES DE PAVAGE DE FONTAINE EN GRANITE

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
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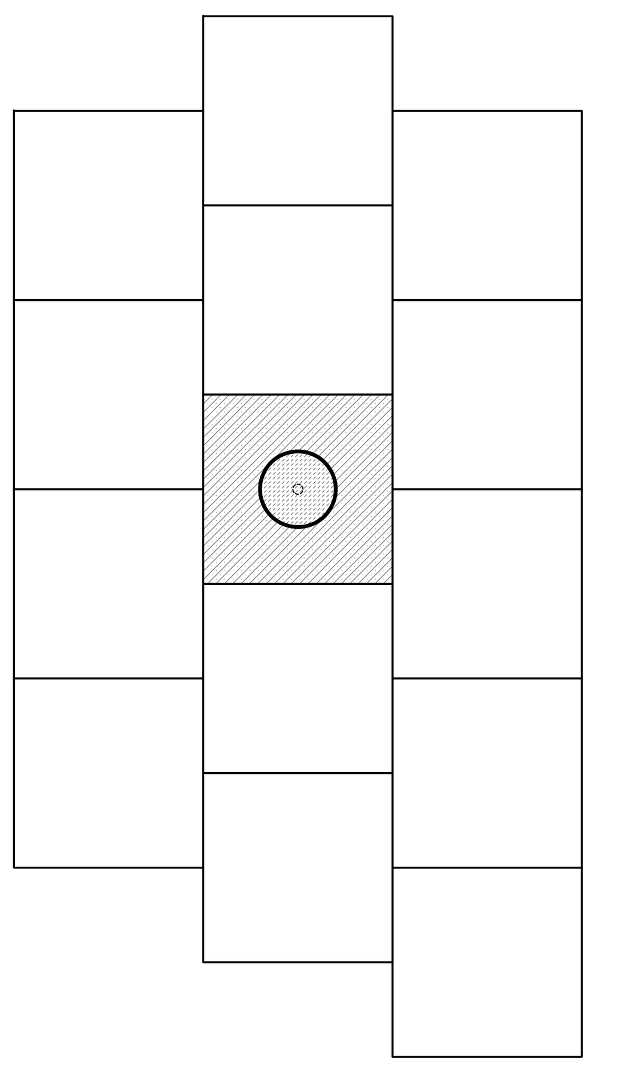
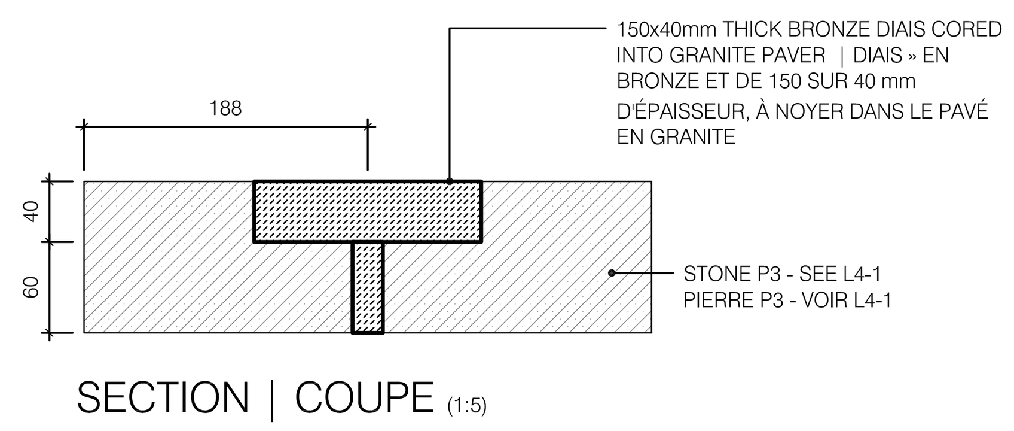
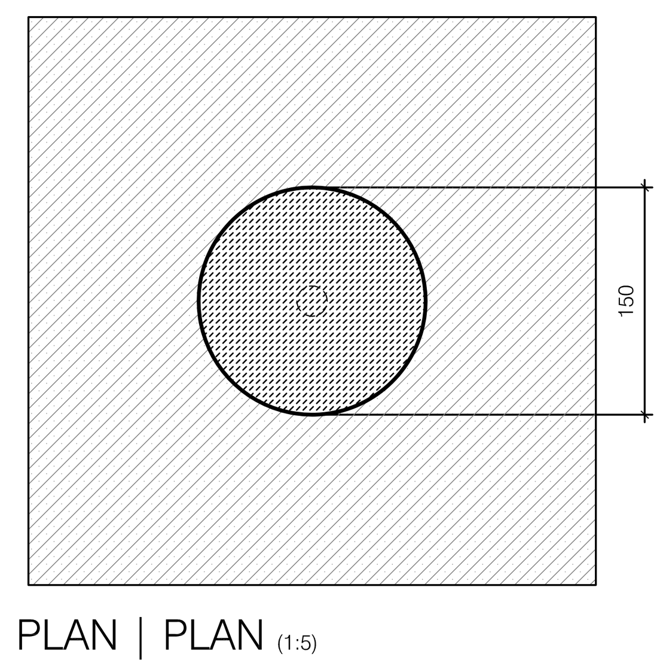
date: 08/08/2012
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / nº du projet de la CCN: DC-2611-110
sheet no. / nº de la feuille: L4-2



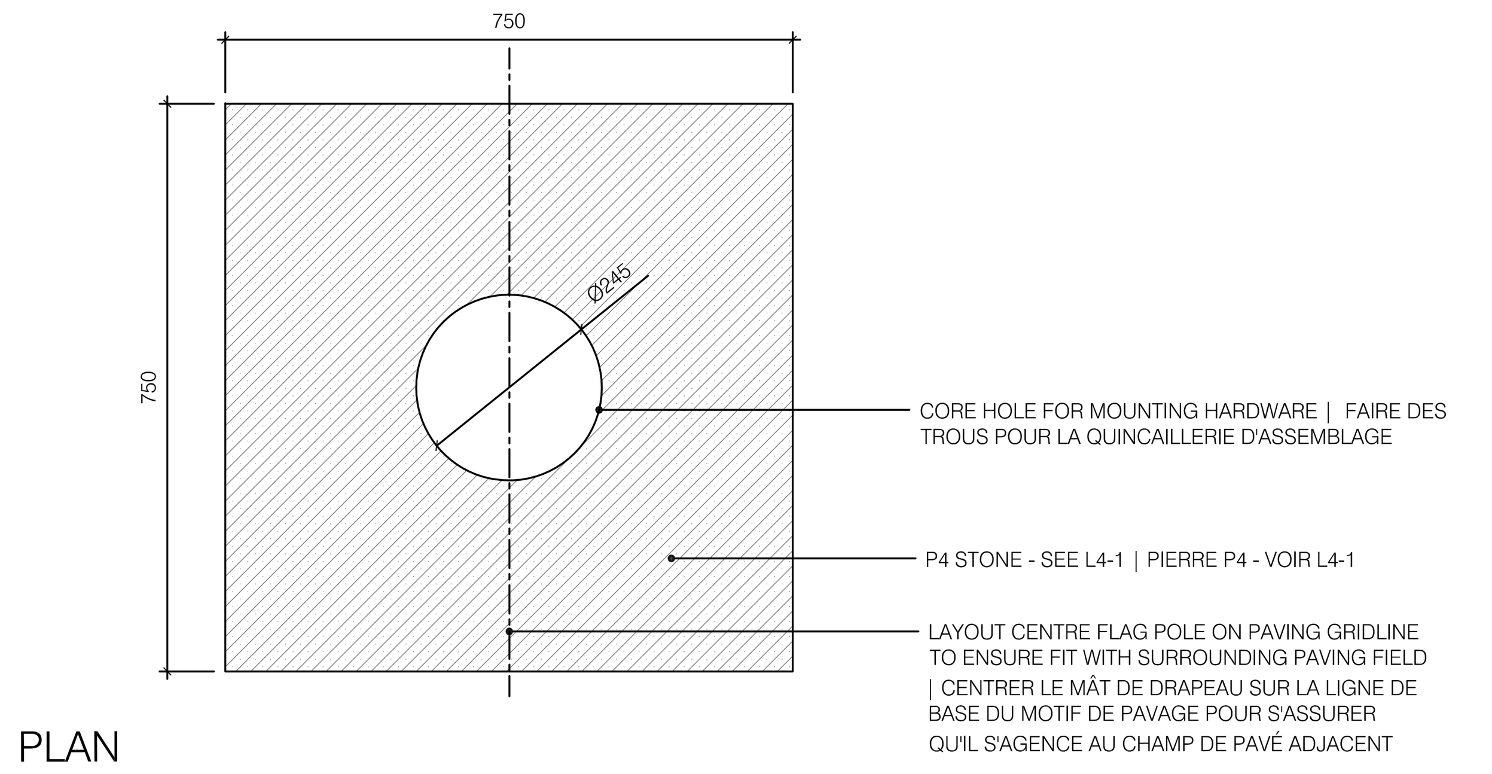


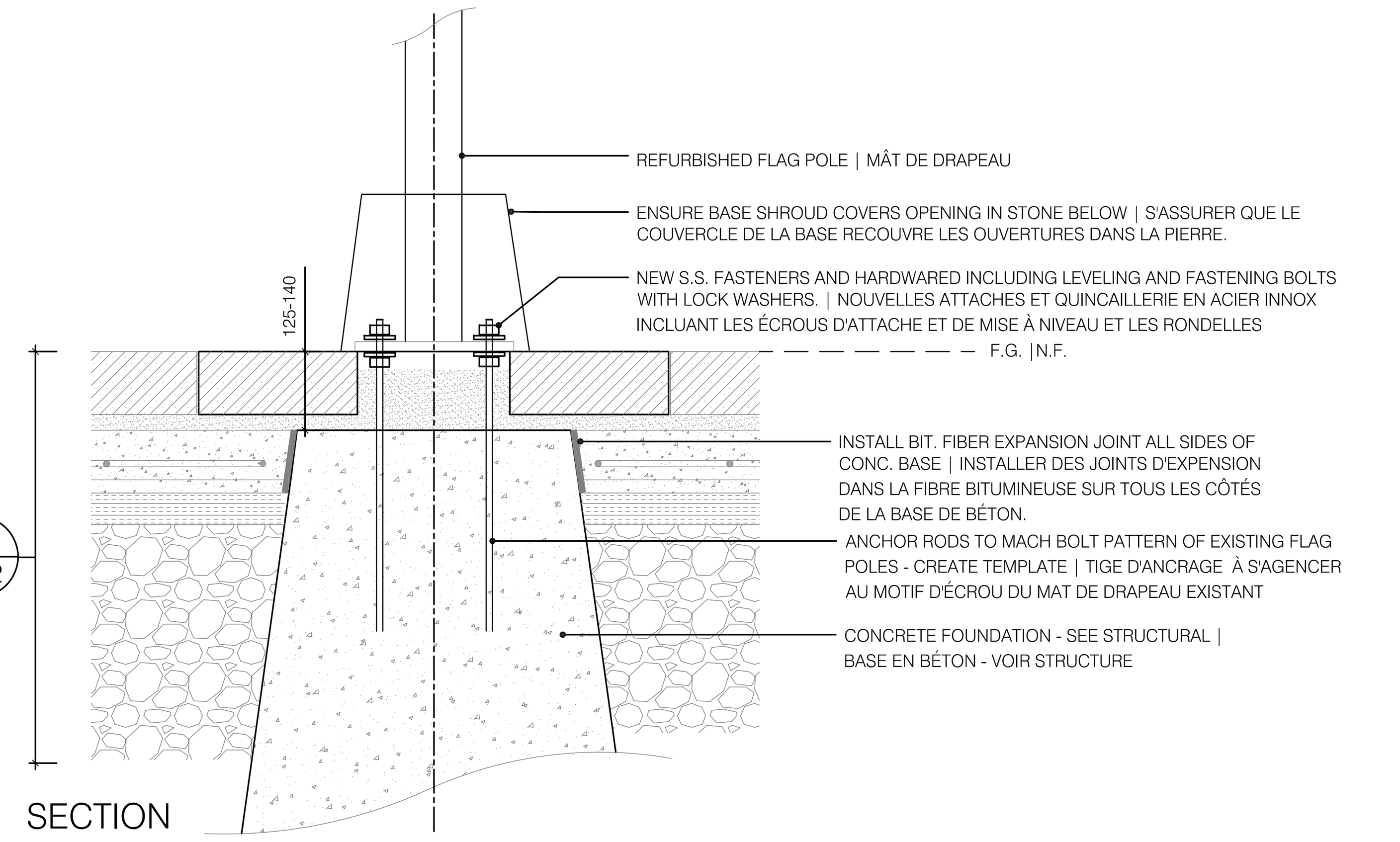


NOTES | REMARQUES :
- **SET WITH A TWO COMPONENT, EXTERIOR GRADE EPOXY|** COLLER EN PLACE PAR L'EMPLOI D'UNE RÉSINE ÉPOXYDIQUE DE CATÉGORIE POUR L'EXTÉRIEUR ET À DEUX COMPOSANTES.
- TAKE PRECISE MEASUREMENTS OF DIAS PRIOR TO FABRICATION OF P3 STONE. REFLECT MEASUREMENTS IN SHOP DRAWINGS | PREND DES MESURES EXACT DE LA DIAIS AVANT DE FABRIQUER LA PIERRE P3. INDIQUÉ LES MESURES EXACTES DANS LES DESSINS D'ATELIER.

1 / L4-3 P3 - DIAS STONE
P3 - PIERRE DU DIAIS

SCALE / ÉCHELLE 1:5

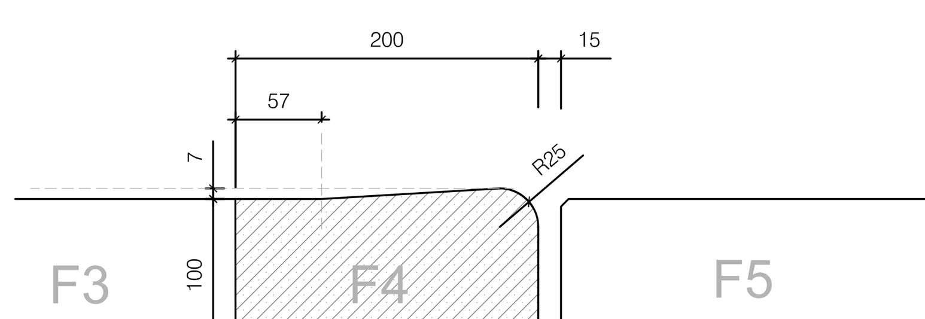




NOTES | REMARQUES
- DISMANTLE AND REFURBISH EXISTING FLAG POLES AS SPECIFIED. / DÉMONTER ET RÉNOVER LE MAT DE DRAPEAU EXISTANT TEL QUE SPÉCIFIÉ
- LAYOUT BASE AT PRECISE LOCATION RELATIVE TO PAVING LAYOUT TO ENSURE P4 STONE IS INSTALLED IN HOMOGENOUS PATTERN WITH ADJACENT PAVING FIELD AS SHOWN. / PLACER LA BASE À L'EMPLACEMENT PRÉCISE RELATIF AU MOTIF DE POSE AFIN DE S'ASSURER QUE LA PIERRE P4 EST INSTALLÉE DE MANIÈRE HOMOGÈNE AVEC LE CHAMPS DE PAVÉ ADJACENT, TEL QUE DÉMONTRÉ

2 / L4-3 P4 -FLAG POLE CAP STONE
P4 - PIERRE POUR LES MATS DES DRAPEAUX

SCALE / ÉCHELLE 1:10

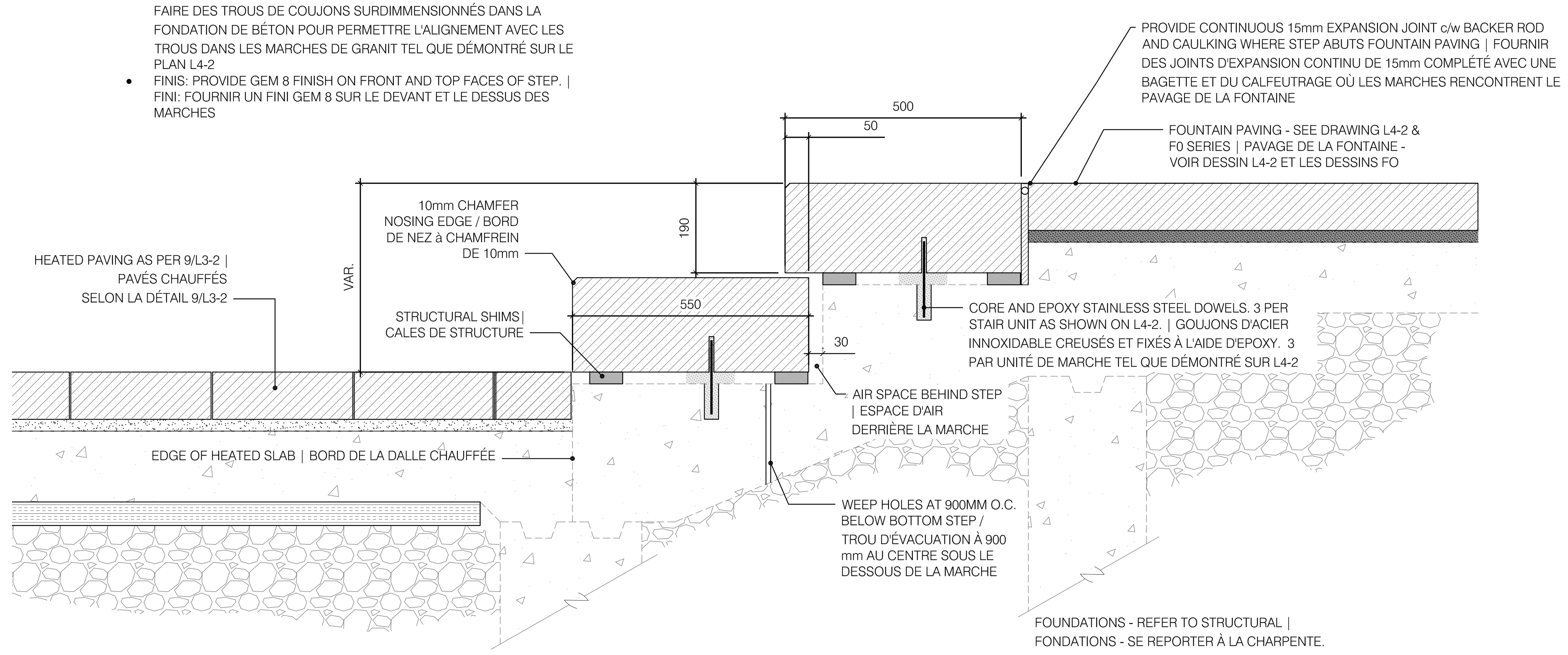


NOTES | REMARQUES:
- ALL VISIBLE FACES OF STONE TO BE FINISHED AS SPECIFIED ON SHEET L4-2 / FINIR TOUTES LES SURFACES VISIBLES TEL QU'INDIQUÉ AU PLAN L4-2
- CHAMFER INSIDE RADIUS OF F5 STONE AT 5X5MM TO SOFTEN JOINT / CRÉER UN CHAMFREIN À L'INTÉRIEUR DU RADIÉ DE LA PIERRE F5 À 5 X 5MM AFIN D'ADOUCIR LE JOINT.
- PROVIDE 15MM DRAINAGE GAP BETWEEN F4 AND F5 STONES. 15MM IS INCLUDED IN NOMINAL DIMENSION OF F4 STONE AS SHOWN ON L4-2 / FOURNIR DES ESPACES DE DRAINAGE DE 15MM ENTRE LES PIERRES F4 ET F5. LE 15MM EST INCLUS DANS LA DIMENSION NOMINALE DE LA PIERRE F4 TEL QUE DÉMONTRÉ SUR L4-2

3 / L4-3 F4 - WEIR STONE PROFILE
F4 - PROFILE DE LA PIERRE QUI RETIENNE L`EAU

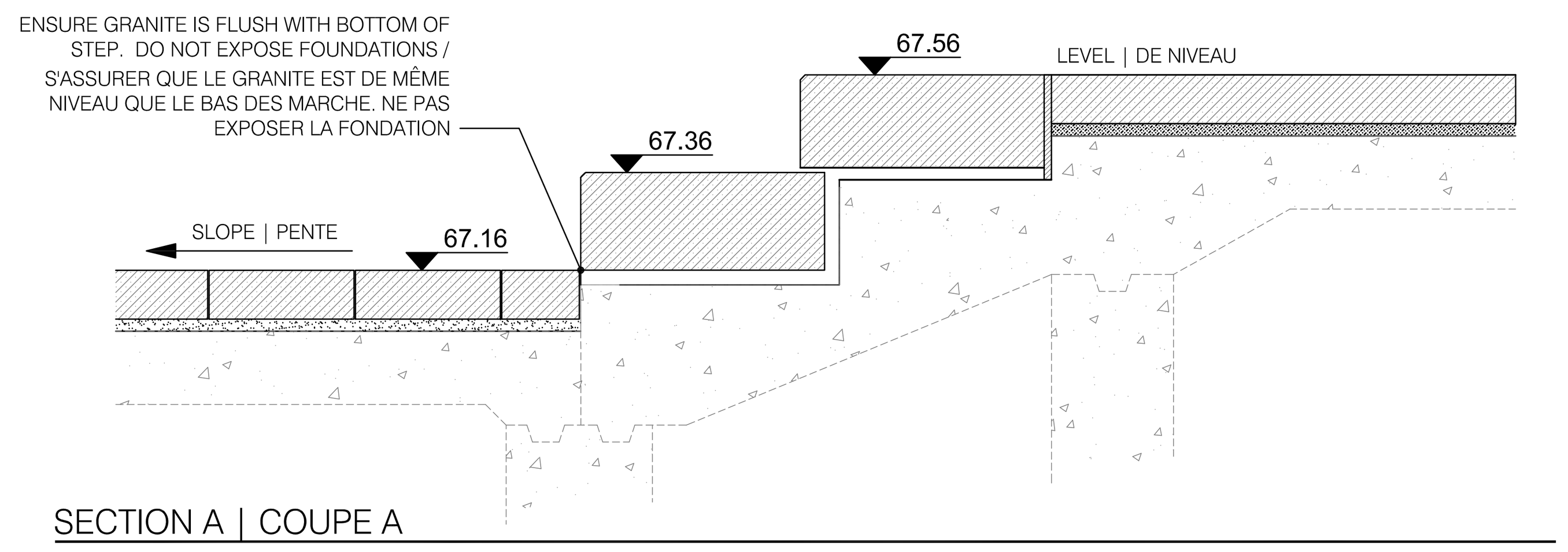
SCALE / ÉCHELLE 1:10

NOTES:
- ENSURE STAIRS FOUNDATIONS ARE LEVEL AND TRUE TO FINISHED GRADES PRIOR TO INSTALLATION OF STONE. | S'ASSURER QUE LA FONDATION DES MARCHES EST DE NIVEAU ET FIDÈLE AUX NIVEAUX FINIS AVANT L'INSTALLATION DES PIERRES
- FINISH ALL EXPOSED FACES OF GRANITE STEPS AS SPECIFIED. |FINIR TOUTES LES FACES EXPOSÉES DES MARCHE DE GRANIT TEL QUE SPÉCIFIÉ.
- PROVIDE 10mm x10mm CHAMFER ON STAIR NOSING | FOURNIR DES CHAMFREIN DE 10mm X 10mm SUR LE NEZ DES MARCHES
- OVERSIZE DOWEL HOLES IN CONCRETE FOUNDATION TO ALLOW ALIGNMENT WITH HOLES IN GRANITE STEPS AS SHOWN ON L4-2 | FAIRE DES TROUS DE COUJONS SURDIMMENSIONNÉS DANS LA FONDATION DE BÉTON POUR PERMETTRE L'ALIGNEMENT AVEC LES TROUS DANS LES MARCHES DE GRANIT TEL QUE DÉMONTRÉ SUR LE PLAN L4-2
- FINIS: PROVIDE GEM 8 FINISH ON FRONT AND TOP FACES OF STEP. | FINI: FOURNIR UN FINI GEM 8 SUR LE DEVANT ET LE DESSUS DES MARCHES

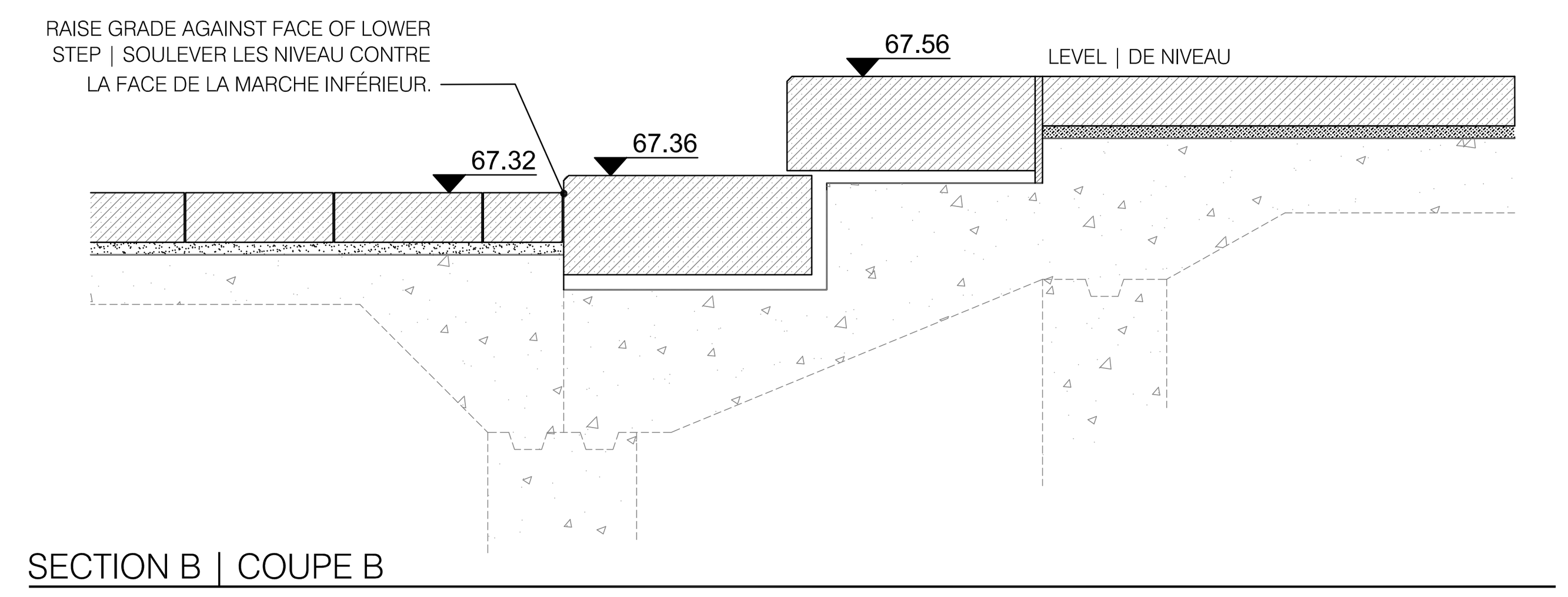


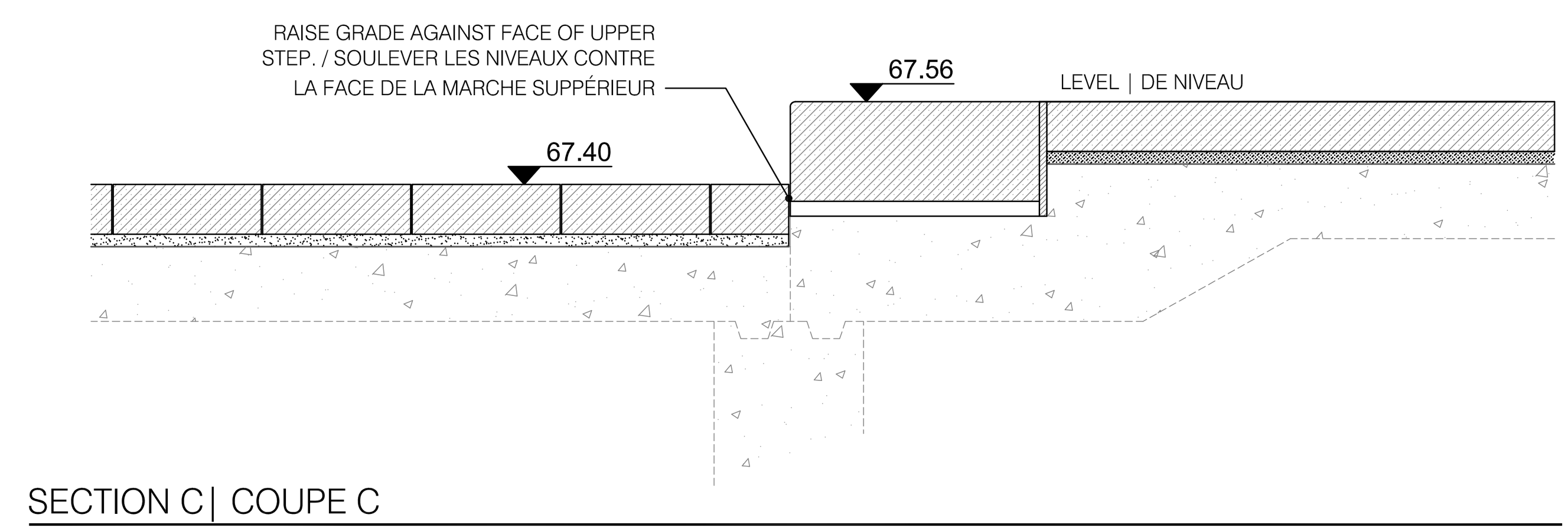
4 / L4-3 TYPICAL GRANITE STAIR DETAIL
DÉTAIL TYPE DE LES MARCHES EN GRANITE

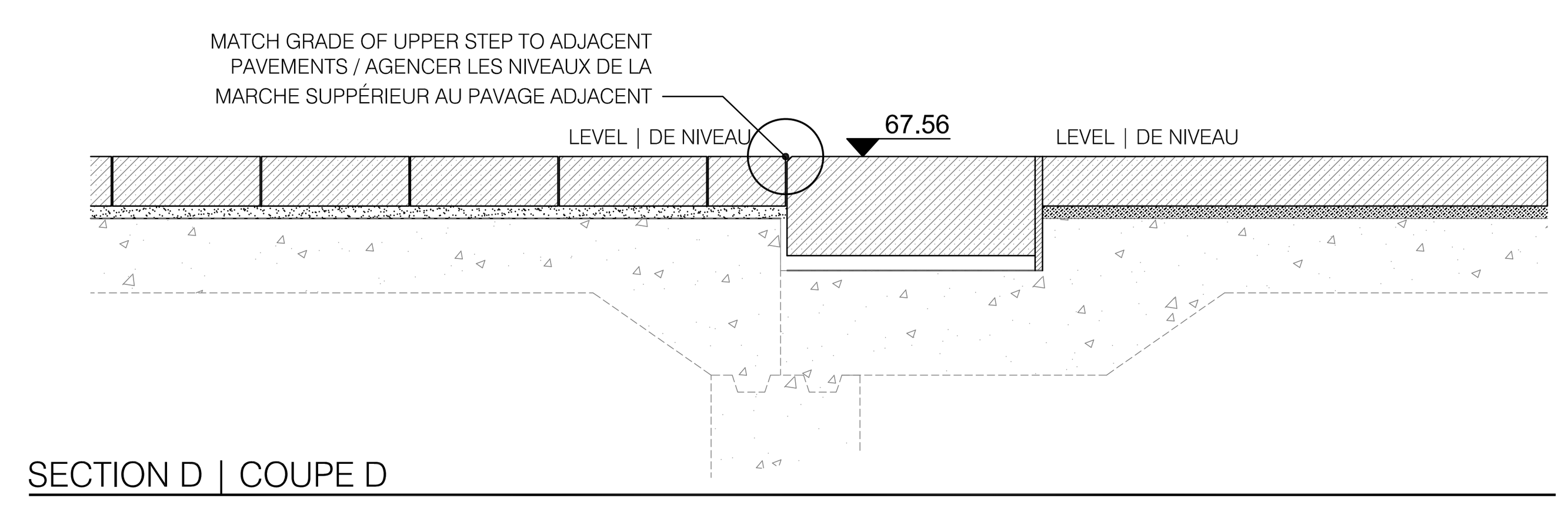
SCALE / ÉCHELLE 1:10

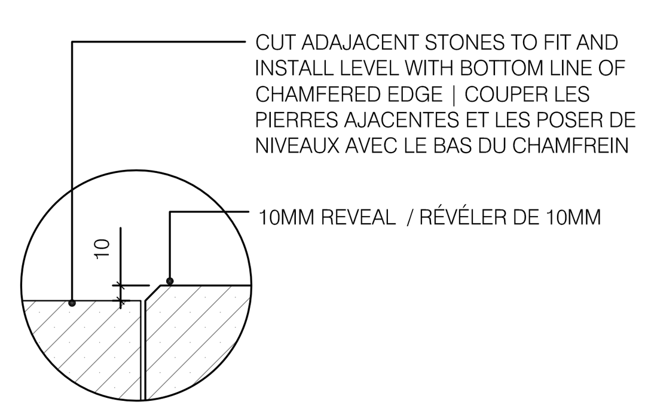


NOTES/ REMARQUES
- REFER TO SECTION REFERENCES ON SHEET L4-2 FOR LOCATIONS ON PLAN | SE RéFéRER à LA SECTION DES RéFéRENCES SUR LA PAGE L4-2 POUR LES EMPLACEMENTS SUR LE PLAN
- STAIR DETAILS TO BE READ IN CONJUCTION WITH STRUCTURAL PLANS | LES DéTAILS DES MARCHE DOIVENT ÊTRE LU EN CONJONCTURE AVEC LES PLANS DE STRUCTURE
- INSTALL STAIRS AS PER TYPICAL DETAIL ABOVE / INSTALLER LES MARCHES SELON LES DÉTAILS TYPE CI-HAUT









5 / L4-3 SECTIONS THROUGH GRANITE STEPS
COUPES ATRAVERS LES MARCHES EN GRANITE

SCALE / ÉCHELLE 1:15

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1. Toutes les conditions et tous les renseignements d'ordre général et se rapportant au chantier ont été compilés à partir des études et plans de l'architecte et de l'Ingénieur.
2. Ne pas se servir du présent dessin pour prélever des mesures à l'échelle.
3. Avant la mise en oeuvre des présents travaux, faire état de toute contradiction retrouvée au représentant de la CCN. Ce représentant n'assumera aucune responsabilité par rapport à des conditions de subsurface inconnues.
4. L'Entrepreneur se doit de vérifier toutes les dimensions sur place et de faire état des contradictions et (ou) des omissions au représentant de la CCN.
5. Remettre à neuf toutes les surfaces et tous les articles endommagés par suite de la réalisation d'activités de construction et ceci, à l'entière satisfaction du représentant de la CCN.
6. L'Entrepreneur se devra de produire l'aménagement des planches de culture, des travaux de surfaçage de type inerte et des ouvrages du genre et ce, à l'approbation du représentant de la CCN et avant la mise en route des travaux d'excavation.
7. Ne pas se servir du présent dessin à des fins de construction tant et aussi longtemps qu'il n'aura pas été signé par l'Architecte en aménagement paysager ou par le représentant de la CCN et ce, comme constituant un dessin de construction.
8. L'exactitude de la position des installations d'utilités publiques ne constitue pas une garantie absolue.
9. Avant d'entreprendre des travaux de creusage, l'on se doit de communiquer individuellement avec les sociétés d'utilités publiques en cause, afin de confirmer l'existence d'installations d'utilité publique et leurs emplacement et orientation.

issued or revised
soumission ou révision

11	FOR TENDER | POUR SOUMISSION	22/04/2016
10	REISSUED FOR 100% REVIEW	21/03/2016
9	REISSUED FOR 100% REVIEW	04/03/2016
8	ISSUED FOR 100% REVIEW	18/02/2016
n°	description	date

project
projet

NCC RESIDENCE FRONT ENTRANCE
ENTRÉE PRINCIPALE - RÉSIDENCE DE LA CCN

drawing
dessin

SPECIALTY STONE DETAILS | DÉTAILS DES PIERRES IMPORTANTES

approved by / approuvé par: D. LASHLEY, C.CROSSAN
designed by / conçu par: D.L.,D.B., J.G., C.C., P.B
drawn by / dessiné par: R.D.,D.B.,J.G.,M.L.,P.B
date: 08/08/2012
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: L4-3

May-03-16 4:49:59 PM \\Nccneta28\remdc-gidc\DesignAndConstruction\LA\CrossanCarole\OR-Rideau Hall Front Entrance\62- Implementation\Dwg_2016\Drawings\NCC - Working Files\NCC-Specs_april14\Dwgs\1.0 Landscape\NCC_15615-1_FrontEntrance_PLANS13_04 FR.dwg

LIST OF DRAWINGS / LISTE DES DESSINS

THE SOURCE OF BASE INFORMATION
LA SOURCE DE RENSEIGNEMENTS FONDAMENTAUX.

BASE INFORMATION FOR THE WATERWORX COMPANY LTD. DRAWINGS WAS TAKEN FROM:
1) ELECTRONIC FILES SUPPLIED BY LASHLEY AND ASSOCIATES LANDSCAPE ARCHITECTS RECEIVED OCTOBER 29TH 2012.

LES RENSEIGNEMENTS DE BASE POUR LES DESSINS DE LA SOCIÉTÉ « WATERWORX COMPANY LTD. » ONT ÉTÉ TIRÉS DE CE QUI SUIT :

1) FICHIERS ÉLECTRONIQUES, TELS QUE FOURNIS PAR LASHLEY AND ASSOCIATES LANDSCAPE ARCHITECTS ET TELS QUE REÇUS LE 29 OCTOBRE 2012.

NOTES

1. WATER FEATURE DRAWINGS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL, LANDSCAPE AND STRUCTURAL DRAWINGS.

2. CONTRACTOR AND ALL SUB-TRADES ARE RESPONSIBLE TO BE FAMILIAR AND COMPLY WITH ALL ITEMS NOTED IN SEPARATE SPECIFICATIONS. FAILURE TO DO SO WILL RESULT IN CONTRACTOR CORRECTING ANY DEFICIENCY AT THEIR OWN EXPENSE.

3. OVERALL LAYOUT DIMENSIONS OF THE WATER FEATURE ARE TO BE AS SHOWN ON ARCHITECTURAL DRAWINGS. ALL DIMENSIONS TO BE FIELD VERIFIED.

4. ALL LABOR AND MATERIALS WILL BE FURNISHED BY THE CONTRACTOR UNLESS OTHERWISE NOTED.

5. SPECIALTY ITEMS FURNISHED BY EQUIPMENT MANUFACTURER ARE INDICATED ON THE PARTS LIST OUTLINED IN THE SPECIFICATION.

6. ALL WATER FEATURE HARDWARE TO BE 316 STAINLESS STEEL UNLESS OTHERWISE NOTED.

7. ACTUAL COLORS AND/OR FINISH MATERIALS SHALL BE SELECTED AND APPROVED BY THE NCC REPRESENTATIVE.

8. POOLS AND ADJACENT CONCRETE WALLS ARE TO BE WATERPROOFED AS REQUIRED BY STRUCTURAL ENGINEER.

9. COORDINATE INSTALLATION OF COMPONENTS WITH WATERPROOFING INSTALLER. INSTALL AS PER WATERPROOFING MANUFACTURER'S RECOMMENDATIONS.

10. MECHANICAL ROOM ENCLOSURE AS PER STRUCTURAL DRAWINGS.

11. CONCRETE WALLS AND CONCRETE FLOORS AND ALL HARDWARE ARE TO BE IN ACCORDANCE WITH THE STRUCTURAL ENGINEER'S REQUIREMENTS.

12. WATER IS TO BE TREATED MANUALLY WITH TESTING AND ADJUSTMENTS TO ENSURE WATER BALANCE AS OUTLINED IN WATER FEATURE OPERATING AND MAINTENANCE MANUALS.

14. FOR PAVING AND PAVER DETAILS SEE LANDSCAPE DRAWINGS.

15. ELECTRICAL CONTRACTOR SHALL CONNECT ALL CIRCUITS FEEDING PUMPS, LIGHTS, CONTROLS, ETC. TO GROUND FAULT INTERRUPTING TYPE CIRCUIT BREAKER.

16. ELECTRICAL CONTRACTOR SHALL BOND WIRE BONDING STRAPS ALL TERMINATION, JUNCTION BOXES, LIGHT FIXTURE HOUSINGS, PUMPS, EQUIPMENT, ETC. AS PER CANADIAN ELECTRICAL CODE (C.E.C.) SECTION 10.

17. FOR ALL ELECTRICAL REQUIREMENTS FOR INSTALLATION OF WATER FEATURE ELECTRICAL SYSTEM, REFER TO ELECTRICAL DRAWINGS.

NOTES

1. LIRE LES DESSINS DES DÉTAILS ET CARACTÉRISTIQUES D'EAU ET CE, CONCURREMMENT AVEC LES DESSINS D'ARCHITECTURE, D'AMÉNAGEMENT PAYSAGER ET DE CHARPENTE.

2. L'ENTREPRENEUR ET TOUS SES SOUS-TRAITANTS DEVRONT SE FAMILIARISER AVEC TOUS LES ARTICLES ANNOTÉS DANS DES DEVIS DISTINCTS; EN OUTRE, ILS DEVRONT SE CONFORMER À TOUTES LES EXIGENCES PERTINENTES DE CES DEVIS. LE FAIT DE NE PAS SE FAMILIARISER DE LA SORTE RENDRA L'ENTREPRENEUR ET SES SOUS-TRAITANTS RESPONSABLES DE CORRIGER TOUTES LES DÉFECTUOSITÉS ET CE, À LEURS PROPRES FRAIS.

3. LES DIMENSIONS D'AMÉNAGEMENT HORS-TOUT DES DÉTAILS ET CARACTÉRISTIQUES D'EAU DEVRONT ÊTRE PRÉSENTÉES DANS LES DESSINS D'ARCHITECTURE. TOUTES LES DIMENSIONS DEVRONT ÊTRE CONTRE-VÉRIFIÉES SUR PLACE.

4. À MOINS D'INDICATIONS CONTRAIRES, LA FOURNITURE DE L'ENSEMBLE DE LA MAIN-D'OEUVRE ET DES MATÉRIAUX DEVRA RELEVER DE L'ENTREPRENEUR.

5. LES ARTICLES DE FABRICATION SPÉCIALE QUI SERONT FOURNIS PAR LE FABRICANT DE L'APPAREILLAGE SONT IDENTIFIÉS DANS LA LISTE DES PIÈCES COMPRISE DANS LE DEVIS.

6. À MOINS D'INDICATIONS CONTRAIRES, TOUTE LA QUINCAILLERIE DES DÉTAILS ET CARACTÉRISTIQUES D'EAU DEVRA ÊTRE EN ACIER INOXYDABLE 316.

7. LES COULEURS ET (OU) MATÉRIAUX DE FINITION ACTUELS DEVRONT ÊTRE CHOISIS ET APPROUVÉS PAR LE REPRÉSENTANT DE LA CCN.

8. LES MURS DE PISCINE ET ADJACENTS EN BÉTON DEVRONT ÊTRE HYDROFUGÉS ET CE, EN CONFORMITÉ AVEC LES EXIGENCES DE L'INGÉNIEUR EN CHARPENTE.

9. COORDONNER LE MONTAGE DES PIÈCES COMPOSANTES AVEC L'INSTALLATEUR DES TRAVAUX D'HYDROFUGEAGE. LE MONTAGE COMME TEL DEVRA ÊTRE CONFORME AUX RECOMMANDATIONS DU FABRICANT DES MATÉRIAUX D'HYDROFUGEAGE.

10. ENCEINTE DU LOCAL DE MÉCANIQUE, SELON LES DESSINS DE CHARPENTE.

11. LES MURS EN BÉTON ET LES PLANCHERS EN BÉTON ET TOUTE LA QUINCAILLERIE DEVRONT ÊTRE CONFORMES AUX EXIGENCES DE L'INGÉNIEUR EN CHARPENTE.

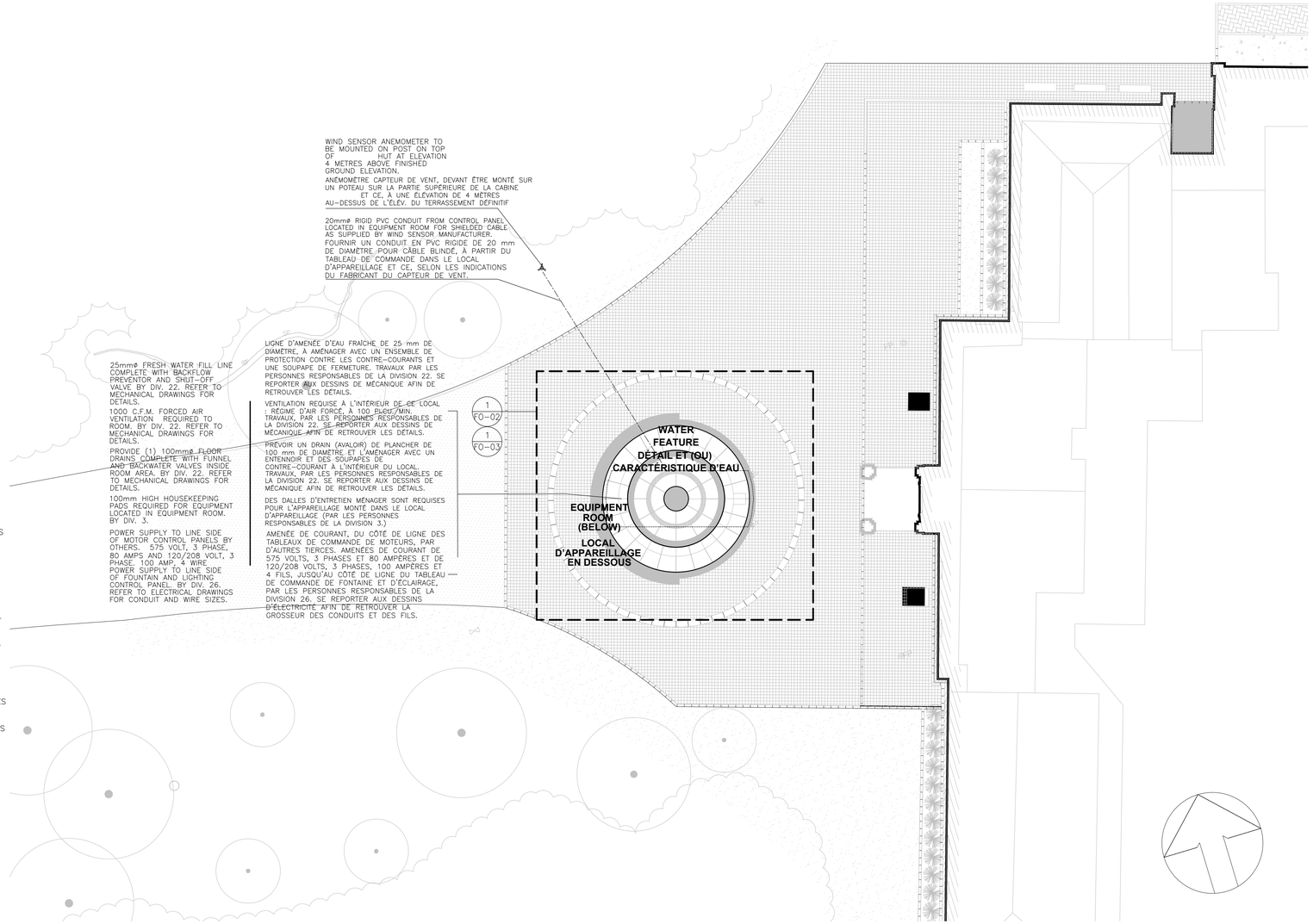
12. L'EAU DEVRA ÊTRE TRAITÉE MANUELLEMENT ET CE, PAR L'APPORT D'ESSAIS ET DE RÉGLAGES PERTINENTS, AFIN D'ASSURER UN ÉQUILIBRE D'EAU CONFORME À CE QUI EST PRÉCISÉ DANS LES MANUELS D'EXPLOITATION ET D'ENTRETIEN DES DÉTAILS ET CARACTÉRISTIQUES D'EAU.

14. VOIR LES DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LES DÉTAILS DE CHAUSSÉE ET DE PAVÉS.

15. L'ENTREPRENEUR EN ÉLECTRICITÉ DEVRA RACCORDER TOUS LES CIRCUITS ALIMENTANT LES POMPES, LES LAMPES, LES COMMANDES ET LES ARTICLES DU GENRE ET CE, EN LES CONNECTANT À DES DISJONCTEURS DE CIRCUIT À CAPACITÉ D'INTERRUPTION DE DÉFAUT DE TERRE.

16. L'ENTREPRENEUR EN ÉLECTRICITÉ DEVRA SE SERVIR DE COURROIES DE LIAISONNEMENT DE FILS POUR RELIER TOUTES LES BORNES, TOUTES LES BOÎTES DE RACCORDEMENT, TOUS LES BOÎTIERS DE LUMINAIRES, TOUTES LES POMPES, L'ENSEMBLE DE L'APPAREILLAGE ET TOUS LES AUTRES ARTICLES DU GENRE ET CE, EN CONFORMITÉ AVEC LA NORME DE LA SECTION 10 DU CODE CANADIEN DE L'ÉLECTRICITÉ.

17. SE REPORTER AUX DESSINS D'ÉLECTRICITÉ AFIN DE RETROUVER TOUTES LES EXIGENCES SE RAPPORTANT AU MONTAGE ÉLECTRIQUE DU SYSTÈME DE COURANT POUR LES CARACTÉRISTIQUES ET DÉTAILS D'EAU.



1 KEY PLAN / PLAN CLÉ
SCALE: 1 : 200
ÉCHELLE : 1 : 200

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Gestion des biens immobiliers; Direction générale du design et de la construction

Design and Construction Division
Division du design et de la construction

director - Daniel Miron - directeur

consultant
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THE WATERWORX CO.
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ONTARIO, CANADA, M4P1E4
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issued or revised
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nº	description	date
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4	100% REVIEW DOCUMENT À 100 %, À FAIRE RÉVISER.	26 FEB. 2013
3	90% REVIEW DOCUMENT À 90 %, À FAIRE RÉVISER.	12 FEB. 2013
2	60% REVIEW DOCUMENT À 60 %, À FAIRE RÉVISER.	14 DEC. 2012
1	30% REVIEW DOCUMENT À 30 %, À FAIRE RÉVISER.	2 NOV. 2012

project
projet

NCC RESIDENCE
WATER FEATURE
INSTALLATION D'EAU - RÉSIDENCE CCN

drawing
dessin

KEY PLAN AND BASIC SERVICES
PLAN CLÉ ET SERVICES FONDAMENTAUX

approved by / approuvé par	LOH
designed by / conçu par	PC
drawn by / dessiné par	JP
date	2 NOV. 2012
scale / échelle	1:200
NCC project no. / nº du projet de la CCN	DC-1110-17
sheet no. / nº de la feuille	FO-01

REFER TO LANDSCAPE DRAWINGS AND SPECIFICATION FOR INFORMATION, DETAILS AND TYPE OF PAVERS REQUIRED FOR THE WATER FEATURE.
SE REPORTER AU DEVIS ET AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LES RENSEIGNEMENTS, LES DÉTAILS ET LE TYPE DE PAVÉS REQUIS ET CE, À L'EMPLACEMENT DE LA COMPOSANTE D'EAU.

PAVERS AT DRAIN CHAMBER TO BE REMOVABLE FOR MAINTENANCE ACCESS TO FITTINGS. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
PAVÉS À L'EMPLACEMENT DE LA CHAMBRE DU DRAIN, DE TYPE ENLEVABLE ET CE, AFIN D'OFFRIR UNE POSSIBILITÉ D'ACCÈS D'ENTRETIEN AUX RACCORDS. SE REPORTER AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LESE DÉTAILS PERTINENTS.

PROVIDE LIFTING HOLES AND STAINLESS STEEL PLUGS FOR REMOVABLE PAVERS. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
PRÉVOIR DES TROUS DE SOULÈVEMENT ET DES BOUCHONS EN ACIER INOXYDABLE, À L'EMPLACEMENT DES PAVÉS ENLEVABLES. SE REPORTER AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LES DÉTAILS PERTINENTS.

GRANITE PAVERS OVER EQUIPMENT CHAMBERS. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
PAVÉS EN GRANITE PAR DESSUS LES CHAMBRES D'APPAREILLAGE. SE REPORTER AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LESE DÉTAILS PERTINENTS.

OUTLINE OF RESERVOIR (BELOW). REFER TO STRUCTURAL DRAWINGS.
DÉLIMITATION DU RÉSERVOIR EN DESSOUS. SE REPORTER AUX DESSINS DE CHARPENTE.

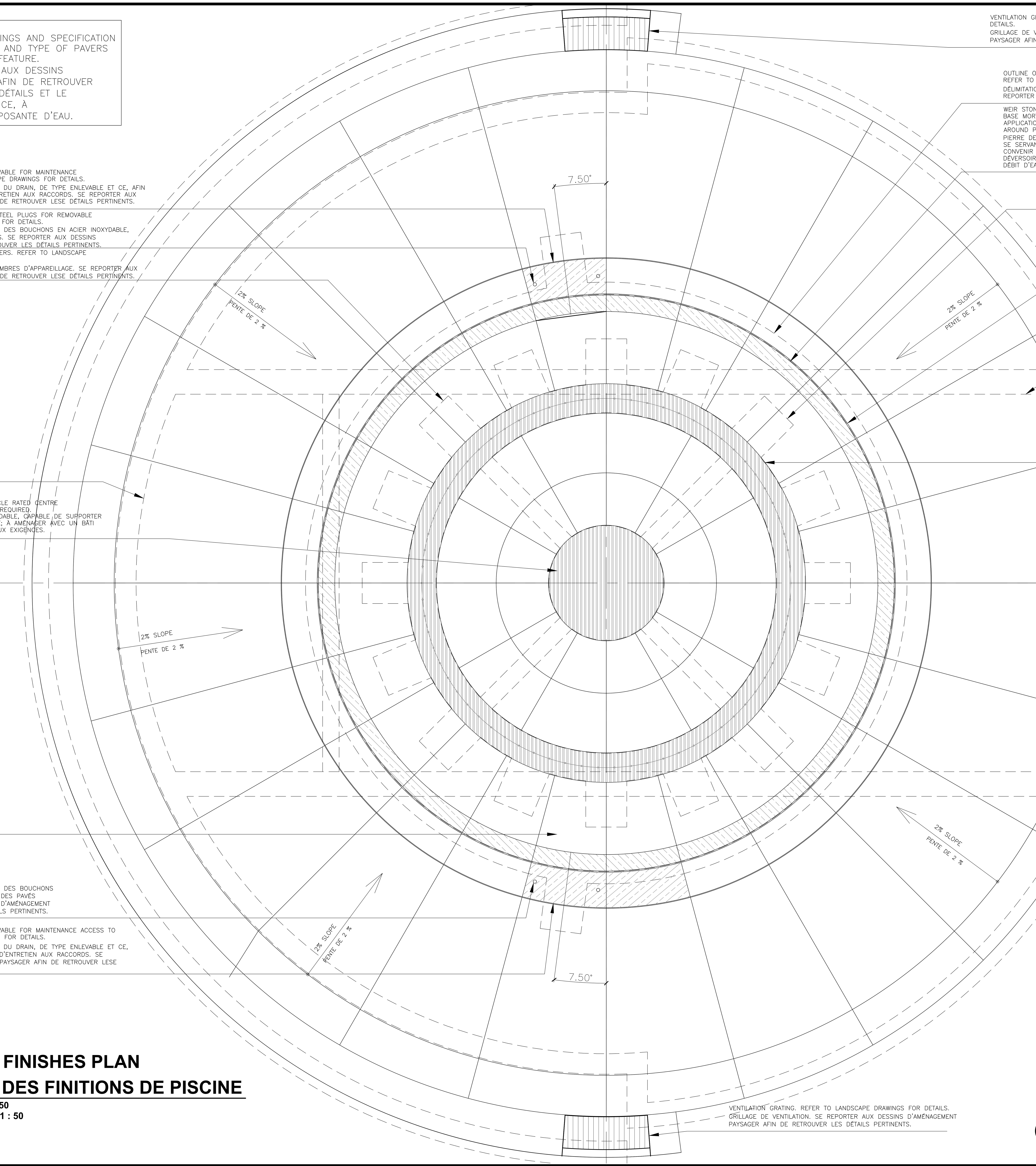
STAINLESS STEEL FIRE TRUCK VEHICLE RATED CENTRE GRATING WITH SUPPORT FRAME AS REQUIRED.
GRILLAGE CENTRAL EN ACIER INOXYDABLE, CAPABLE DE SUPPORTER LE POIDS DE VÉHICULES D'INCENDIE; À AMÉNAGER AVEC UN BÂTI DÈS PLUS SOLIDE ET CONFORME AUX EXIGENCES.

22

GRANITE PAVERS MORTARED IN PLACE WITH EPOXY BASED MORTAR AND GROUT ON WATERPROOFED CONCRETE.
PAVÉS EN GRANITE, IMMOBILISÉS PAR L'EMPLOI DE MORTIER ASSORTI; À DÉPOSER SUR UN MORTIER D'ASSISE ÉPOXYDIQUE, LEQUEL DOIT ÊTRE RÉPANDU SUR DU BÉTON HYDROFUGÉ.

PROVIDE LIFTING HOLES AND STAINLESS STEEL PLUGS FOR REMOVABLE PAVERS. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
PRÉVOIR DES TROUS DE SOULÈVEMENT ET DES BOUCHONS EN ACIER INOXYDABLE, À L'EMPLACEMENT DES PAVÉS ENLEVABLES. SE REPORTER AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LES DÉTAILS PERTINENTS.

PAVERS AT DRAIN CHAMBER TO BE REMOVABLE FOR MAINTENANCE ACCESS TO FITTINGS. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
PAVÉS À L'EMPLACEMENT DE LA CHAMBRE DU DRAIN, DE TYPE ENLEVABLE ET CE, AFIN D'OFFRIR UNE POSSIBILITÉ D'ACCÈS D'ENTRETIEN AUX RACCORDS. SE REPORTER AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LESE DÉTAILS PERTINENTS.



VENTILATION GRATING. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
GRILLAGE DE VENTILATION. SE REPORTER AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LES DÉTAILS PERTINENTS.

OUTLINE OF OUTER TROUGH BELOW GRANITE. REFER TO STRUCTURAL DRAWINGS.
DÉLIMITATION DE L'AUGE EXTERNE EN DESSOUS DU GRANITE. SE REPORTER AUX DESSINS DE CHARPENTE.

WEIR STONE FOR OVERFLOW EFFECT TO BE SEALED WITH EPOXY BASE MORTAR AND GROUT SUITABLE FOR SUBMERGED APPLICATION IN TREATED WATER. WEIR STONE TO BE LEVEL ALL AROUND POOL TO ENSURE EVEN FLOW OF WATER AT EDGE.
PIERRE DE DÉVERSOIR, SERVANT À CRÉER UN EFFET DE TROP-PLEIN; À IMPERMÉABILISER EN SE SERVANT DE MORTIER À BASE ÉPOXYDIQUE ET DE COULIS ASSORTI, LE TOUT DEVANT CONVENIR À UNE APPLICATION D'IMMERSION DANS DE L'EAU TRAITÉE. LA PIERRE DE DÉVERSOIR DEVRA ÊTRE DE NIVEAU TOUT AUTOUR DE LA PISCINE ET CE, AFIN D'ASSURER UN DÉBIT D'EAU UNIFORME LE LONG DE L'OUVRAGE EN BORDURE.

OUTLINE OF RECESSED TROUGH BELOW GRANITE. REFER TO STRUCTURAL DRAWINGS.
DÉLIMITATION DE L'AUGE ENCASTRÉ EN DESSOUS DU GRANITE. SE REPORTER AUX DESSINS DE CHARPENTE.

15mm OVERFLOW SLOT AT WEIR EDGE OF POOL TO ALLOW WATER TO FALL TO RECESSED TROUGH BELOW.
ENCOCHE DE TROP-PLEIN DE 15 mm LE LONG DU BORD DU DÉVERSOIR DE LA PISCINE ET CE, AFIN DE PERMETTRE À L'EAU DE TOMBER JUSQUE DANS L'AUGE ENCASTRÉ EN DESSOUS.

OUTLINE OF EQUIPMENT ROOM (BELOW). REFER TO STRUCTURAL DRAWINGS.
DÉLIMITATION DU LOCAL D'APPAREILLAGE EN DESSOUS. SE REPORTER AUX DESSINS DE CHARPENTE.

REMOVABLE STAINLESS STEEL HENDRICKS TYPE GRATING WITH SUPPORT FRAME RATED FOR FIRE TRUCK LOADING. GRATING TO BE COMPLETE WITH (70) OPENINGS FOR NOZZLES. OPENING TO HAVE COLLARS WELDED TO GRATING WITH NO SHARP EDGES.
GRILLAGE D'IDENTIFICATION 'HENDRICKS', DE TYPE ENLEVABLE ET EN ACIER INOXYDABLE, AVEC BÂTI DE SUPPORT POUVANT SUPPORTER LE POIDS DE CAMIONS D'INCENDIE. AMÉNAGER LE GRANITE AVEC SOIXANTE-DIX (70) OUVERTURES À TUYÈRES. AMÉNAGER LES OUVERTURES AVEC DES COLLIERS SOUDÉS AU GRILLAGE; S'ASSURER QUE CES COLLIERS NE PRÉSENTENT AUCUN REBORD MORDANT NI EN SAILLIE.

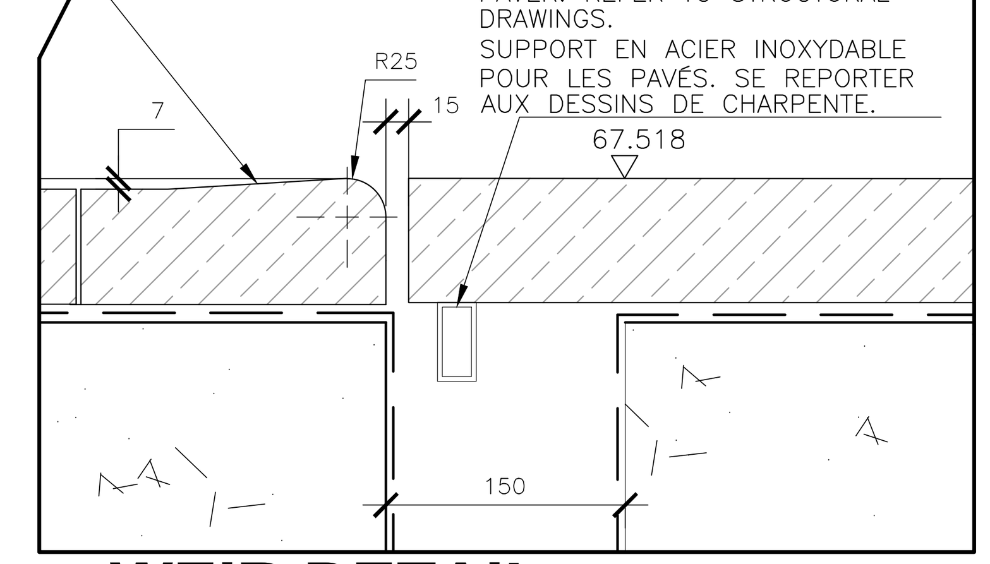
22

POOL FINISHES PLAN
PLAN DES FINITIONS DE PISCINE

1 SCALE: 1 : 50
ÉCHELLE : 1 : 50

WEIR STONE TO BE MORTARED IN PLACE USING EPOXY BASED MORTAR AND GROUT SUITABLE FOR SUBMERGING IN CHEMICALLY TREATED WATER. WEIR TO BE LEVEL ALL AROUND TO ENSURE EVEN FLOW OF WATER ON ALL SIDES OF FEATURE.
PIERRE DE DÉVERSOIR; À IMMOBILISER EN SE SERVANT DE MORTIER À BASE ÉPOXYDIQUE ET DE COULIS ASSORTI, LE TOUT DEVANT CONVENIR À UNE APPLICATION D'IMMERSION DANS DE L'EAU CHIMIQUEMENT TRAITÉE. LE DÉVERSOIR DEVRA ÊTRE DE NIVEAU TOUT AUTOUR ET CE, AFIN D'ASSURER UN DÉBIT D'EAU UNIFORME DE CHACUN DES CÔTÉS DE L'OUVRAGE EN BORDURE.

STAINLESS STEEL SUPPORT FOR PAVER. REFER TO STRUCTURAL DRAWINGS.
SUPPORT EN ACIER INOXYDABLE POUR LES PAVÉS. SE REPORTER AUX DESSINS DE CHARPENTE.



VENTILATION GRATING. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
GRILLAGE DE VENTILATION. SE REPORTER AUX DESSINS D'AMÉNAGEMENT PAYSAGER AFIN DE RETROUVER LES DÉTAILS PERTINENTS.

WEIR DETAIL
DÉTAIL DE DÉVERSOIR

2 SCALE: 1 : 5
ÉCHELLE : 1 : 5

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Gestion des biens immobiliers; Direction générale du design et de la construction

Design and Construction Division
Division du design et de la construction

director - Daniel Miron - directeur

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VERIFY ALL DIMENSIONS.
DO NOT SCALE DRAWINGS.
REPORT ANY DISCREPANCIES, DISCOVERED ERRORS, OR OMISSIONS TO THE FOUNTAIN CONSULTANT BEFORE PROCEEDING.
IT IS ADVISED THAT CONTRACTORS CONTACT THE FOUNTAIN CONSULTANT PRIOR TO CONSTRUCTION TO ENSURE THE USE OF THE LATEST REVISED DRAWINGS.
DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE WATERWORX COMPANY LTD.

VÉRIFIER TOUTES LES DIMENSIONS. NE PAS SE SERVIR DES PRÉSENTS DESSINS POUR PRÉLEVER DES MESURES À L'ÉCHELLE. SIGNALER TOUTE CONTRADICTION, ERREUR OU OMISSION DÉCOUVERTE AU CONSULTANT CHARGÉ DE LA FONTAINE ET CE, AVANT LA MISE EN ROUTE DES TRAVAUX. L'ON RECOMMANDE AUX ENTREPRENEURS DE COMMUNIQUER AVEC LE CONSULTANT SUSMENTIONNÉ AVANT D'ENTREPRENDRE DES TRAVAUX DE CONSTRUCTION ET CE, AFIN DE S'ASSURER D'UTILISER LES DESSINS RÉVISÉS DE LA PLUS RÉCENTE ÉDITION OU PARUTION. LES DESSINS ET LE DEVIS APPARTIENNENT À LA SOCIÉTÉ SUIVANTE : WATERWORX COMPANY LTD.

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4	100% REVIEW DOCUMENT À 100 %, À FAIRE RÉVISER.	26 FEB. 2013
3	90% REVIEW DOCUMENT À 90 %, À FAIRE RÉVISER.	12 FEB. 2013
2	60% REVIEW DOCUMENT À 60 %, À FAIRE RÉVISER.	14 DEC. 2012
1	30% REVIEW DOCUMENT À 30 %, À FAIRE RÉVISER.	2 NOV. 2012

project
projet

NCC RESIDENCE
WATER FEATURE
INSTALLATION D'EAU - RÉSIDENCE CCN

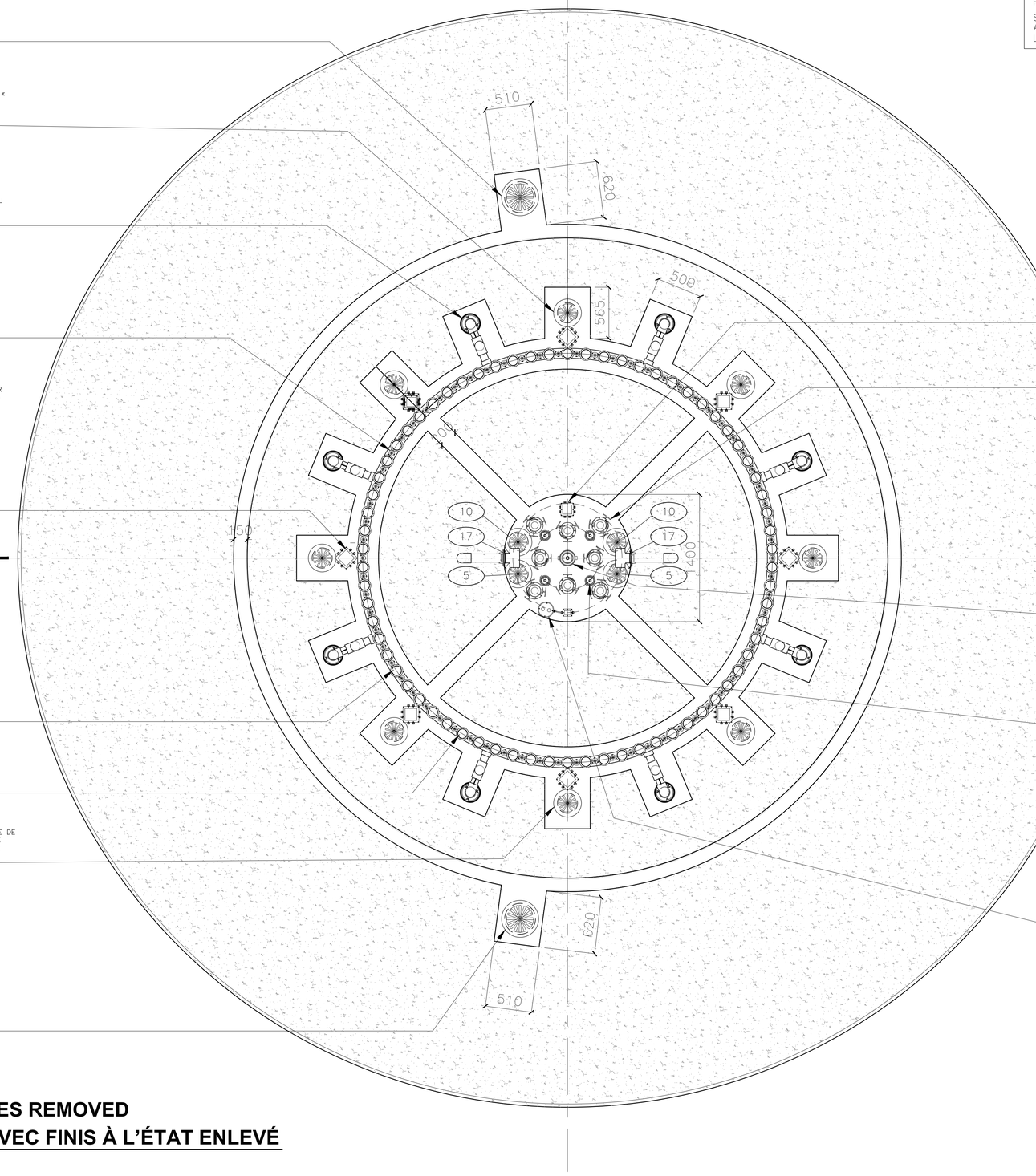
drawing
dessin

POOL FINISHES PLAN
PLAN DES FINITIONS DE PISCINE

approved by / approuvé par	LOH
designed by / conçu par	PC
drawn by / dessiné par	JP
date: 2 NOV. 2012	scale / échelle: 1:50
NCC project no. / n° du projet de la CCN: DC-1110-17	sheet no. / n° de la feuille: FO-02

REFER TO SPECIFICATION FOR SECTION 2.2 FOR EQUIPMENT LIST AND SPECIFICATION.

SE REPORTER À LA SECTION 2.2 DU DEVIS AFIN DE RETROUVER LA LISTE DE L'APPAREILLAGE ET LES SPÉCIFICATIONS.



26 BRONZE POOL WITH ANTI–VORTEX PLATE.
PISCINE EN BRONZE ET PLAQUE « ANTI–VORTEX »

16 BRONZE SUCTION DRAIN WITH BASKET STRAINER AND ANTI–VORTEX PLATE, TYPICAL OF (8) EQUALLY SPACED AROUND TROUGH RECESSES.
DRAIN D'ASPIRATION EN BRONZE, À AMÉNAGER AVEC UN ÉGOUTTOIR EN FORME DE PANIER ET UNE PLAQUE DE TYPE « ANTI–VORTEX ». IL S'AGIT ICI D'UN DÉTAIL TYPIQUE, SE RETROUVANT À 8 ENDROITS; D'ESPACEMENT ÉQUIDISTANT À L'EMPLACEMENT DES OUVRAGES EN RETRAIT.

13 BRONZE POOL PENETRATING FITTING WITH MEMBRANE CLAMP FOR WATERPROOFING. TYPICAL OF (8) EQUALLY SPACED AROUND TROUGH RECESSES.
RACCORD DE PÉNÉTRATION DE PISCINE, EN BRONZE; AMÉNAGER CE RACCORD AVEC UNE AGRAFE DE MEMBRANE POUR AINSI HYDROFUGER LE TOUT; IL S'AGIT ICI D'UN DÉTAIL TYPIQUE, SE RETROUVANT À 8 ENDROITS; D'ESPACEMENT ÉQUIDISTANT À L'EMPLACEMENT DES OUVRAGES EN RETRAIT.

11 BRONZE NOZZLE WITH INTEGRAL SWIVEL AND FLOW STRAIGHTENER, TYPICAL OF (70) EQUALLY SPACED AROUND SPRAY RING.
TUYÈRE EN BRONZE, AVEC ENSEMBLE INTÉGRAL À ROTULE ET ENSEMBLE REDRESSEUR DE DÉBIT, DE TYPE INTÉGRAL AUSSI. DÉTAIL REPRÉSENTATIF, SE RETROUVANT À 70 ENDROITS; D'ESPACEMENT ÉQUIDISTANT AUTOUR DE L'ANNEAU DE PULVÉRISATION.

34 BRONZE SUBMERSIBLE JUNCTION BOX WITH CORD SEALS FOR LIGHT FIXTURES. TYPICAL OF (8) EQUALLY SPACED AROUND RING FOR RING LIGHTS. JUNCTION BOX TO BE MOUNTED ON RED BRASS POOL PENETRATING FITTING WITH MEMBRANE CLAMP FOR WATERPROOFING.
35 BOÎTE DE RACCORDEMENT EN BRONZE, DE TYPE SUBMERSIBLE ET À AMÉNAGER AVEC DES GARNITURES D'ÉTANCHÉITÉ À CORDAGE POUR LES LUMINAIRES. IL S'AGIT ICI D'UN DÉTAIL TYPIQUE, SE RETROUVANT À 8 ENDROITS; À ESPACEMENT ÉQUIDISTANT AUTOUR DE L'ANNEAU ET CE, DANS LE CAS DE LAMPES À ANNEAUX. BOÎTE DE RACCORDEMENT, À MONTER SUR UN RACCORD PÉNÉTRANT DANS LA PISCINE ET EN LAITON ROUGE ET DE TYPE AMÉNAGÉ AVEC UNE AGRAFE DE MEMBRANE POUR RENDRE LE TOUT HYDROFUGE.

1 FO–06

33 BRONZE SUBMERSIBLE LIGHT FIXTURE WITH LED LAMP MOUNTED ON TOP OF MANIFOLD. TYPICAL OF (70) EQUALLY SPACED AROUND SPRAY RING BETWEEN NOZZLES.
LUMINAIRE SUBMERSIBLE EN BRONZE, AVEC LAMPE DIODIQUE, DE MONTAGE SUR LA PARTIE SUPÉRIEURE DU COLLECTEUR. MONTAGE REPRÉSENTATIF DE 70 ENSEMBLES DU GENRE ET DE TYPE ÉGALEMENT ESPACÉ AUTOUR DE L'ANNEAU DE PULVÉRISATION ENTRE LES TUYÈRES.

12 CUSTOM 100mmø SPRAY RING WITH (70) EQUALLY SPACED COUPLINGS FOR NOZZLES.
ANNEAU DE PULVÉRISATION DE 100 mm DE DIAMÈTRE ET DE FABRICATION SUR MESURE, AVEC 70 RACCORDS D'ACCOUPLEMENT, DE TYPE ÉGALEMENT ESPACÉ.

16 BRONZE SUCTION DRAIN WITH BASKET STRAINER AND ANTI–VORTEX PLATE, TYPICAL OF (8) EQUALLY SPACED AROUND TROUGH RECESSES.
DRAIN D'ASPIRATION EN BRONZE, AVEC ÉGOUTTOIR EN FORME DE PANIER ET PLAQUE « ANTI–VORTEX », MONTAGE TYPIQUE, SE RETROUVANT À 8 ENDROITS ET DE TYPE ÉGALEMENT ESPACÉ AUTOUR DES RETRAITS.

26 BRONZE POOL WITH ANTI–VORTEX PLATE.
PISCINE EN BRONZE ET PLAQUE « ANTI–VORTEX »

31 BRONZE SUBMERSIBLE JUNCTION BOX WITH CORD SEALS FOR LIGHT FIXTURES. JUNCTION BOX TO BE MOUNTED ON RED BRASS POOL PENETRATING FITTING WITH MEMBRANE CLAMP FOR WATERPROOFING.
BOÎTE DE RACCORDEMENT EN BRONZE ET DE TYPE SUBMERSIBLE; DE TYPE AMÉNAGÉ AVEC DES GARNITURES D'ÉTANCHÉITÉ À CORDAGE POUR LES LUMINAIRES. MONTER LA BOÎTE DE RACCORDEMENT SUR UN RACCORD DE PÉNÉTRATION DE PISCINE EN LAITON ROUGE; À AMÉNAGER AVEC UNE AGRAFE DE MEMBRANE, POUR AINSI RENDRE LE TOUT PARFAITEMENT HYDROFUGE.

32 BRONZE SUBMERSIBLE LIGHT FIXTURE WITH LED LAMP. TYPICAL OF (8) AROUND CENTRE NOZZLES.
LUMINAIRE SUBMERSIBLE EN BRONZE, AVEC LAMPE DIODIQUE, DE MONTAGE TYPIQUE ET SE RETROUVANT À 8 ENDROITS, TOUT AUTOUR DES TUYÈRES DU CENTRE.

30 BRONZE CENTRE NOZZLE COMPLETE WITH SWIVEL MOUNTED ON BONZE POOL PENETRATING FITTING WITH MEMBRANE CLAMP.
TUYÈRE DU CENTRE EN BRONZE, AVEC ENSEMBLE À ROTULE MONTÉ SUR UN RACCORD DE PÉNÉTRATION DE PISCINE EN BRONZE ET DE TYPE AMÉNAGÉ AVEC UNE AGRAFE DE MEMBRANE.

1 BRONZE NOZZLE COMPLETE WITH SWIVEL MOUNTED ON BONZE POOL PENETRATING FITTING WITH MEMBRANE CLAMP, TYPICAL OF (4) AROUND CENTRE NOZZLE.
2 TUYÈRE EN BRONZE, AVEC ENSEMBLE À ROTULE MONTÉ SUR UN RACCORD DE PÉNÉTRATION DE PISCINE EN BRONZE ET DE TYPE AMÉNAGÉ AVEC UNE AGRAFE DE MEMBRANE. MONTAGE TYPIQUE, SE RETROUVANT À 4 ENDROITS AUTOUR DE LA TUYÈRE DU CENTRE.

6 WATER LEVEL SENSOR COMPLETE WITH BRONZE SUBMERSIBLE JUNCTION BOX WITH CORD SEALS FOR WATER LEVEL SENSOR. JUNCTION BOX TO BE MOUNTED ON RED BRASS POOL PENETRATING FITTING WITH MEMBRANE CLAMP FOR WATERPROOFING.
7 CAPTEUR DE NIVEAU D'EAU, AMÉNAGÉ AVEC UNE BOÎTE DE RACCORDEMENT EN BRONZE ET DE TYPE SUBMERSIBLE; DE TYPE AMÉNAGÉ AVEC DES GARNITURES D'ÉTANCHÉITÉ À CORDAGE POUR LE CAPTEUR DE NIVEAU D'EAU. MONTER LA BOÎTE DE RACCORDEMENT SUR UN RACCORD DE PÉNÉTRATION DE PISCINE EN LAITON ROUGE; À AMÉNAGER AVEC UNE AGRAFE DE MEMBRANE, POUR AINSI RENDRE LE TOUT PARFAITEMENT HYDROFUGE.

39 BRONZE SUBMERSIBLE LIGHT FIXTURE WITH LED LAMP MOUNTED ON TOP OF MANIFOLD. TYPICAL OF (70) EQUALLY SPACED AROUND SPRAY RING BETWEEN NOZZLES.
40 LUMINAIRE SUBMERSIBLE EN BRONZE, AVEC LAMPE DIODIQUE, DE MONTAGE SUR LA PARTIE SUPÉRIEURE DU COLLECTEUR. MONTAGE REPRÉSENTATIF DE 70 ENSEMBLES DU GENRE ET DE TYPE ÉGALEMENT ESPACÉ AUTOUR DE L'ANNEAU DE PULVÉRISATION ENTRE LES TUYÈRES.
41 BRONZE SUBMERSIBLE LIGHT FIXTURE WITH LED LAMP MOUNTED ON TOP OF MANIFOLD. TYPICAL OF (70) EQUALLY SPACED AROUND SPRAY RING BETWEEN NOZZLES.
LUMINAIRE SUBMERSIBLE EN BRONZE, AVEC LAMPE DIODIQUE, DE MONTAGE SUR LA PARTIE SUPÉRIEURE DU COLLECTEUR. MONTAGE REPRÉSENTATIF DE 70 ENSEMBLES DU GENRE ET DE TYPE ÉGALEMENT ESPACÉ AUTOUR DE L'ANNEAU DE PULVÉRISATION ENTRE LES TUYÈRES.

POOL PLAN - FINISHES REMOVED
PLAN DE PISCINE, AVEC FINIS À L'ÉTAT ENLEVÉ

1 **SCALE: 1 : 50**
ÉCHELLE : 1 : 50

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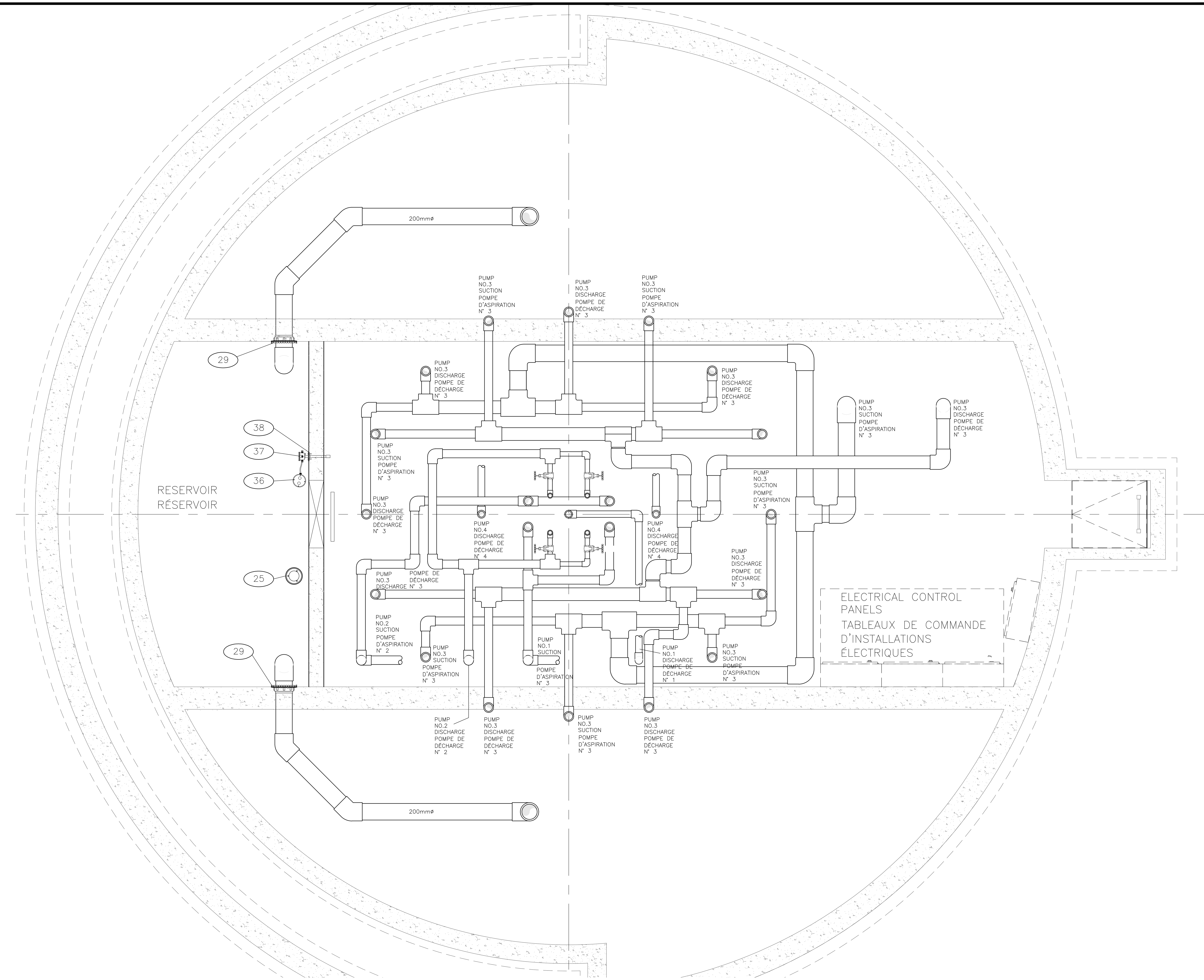
drawing
dessin

POOL PLAN FINISHES REMOVED
PLAN DE PISCINE, AVEC FINIS À L'ÉTAT ENLEVÉ

approved by / approuvé par	LOH
designed by / conçu par	PC
drawn by / dessiné par	JP
date	2 NOV. 2012
scale / échelle	1:50
NCC project no. / nº du projet de la CCN	DC-1110-17
sheet no. / nº de la feuille	FO-03



EQUIPMENT ROOM PLAN - UPPER LEVEL
PLAN DU LOCAL D'APPAREILLAGE, AU NIVEAU SUPÉRIEUR

1

SCALE: 1 : 25
ÉCHELLE : 1 : 25

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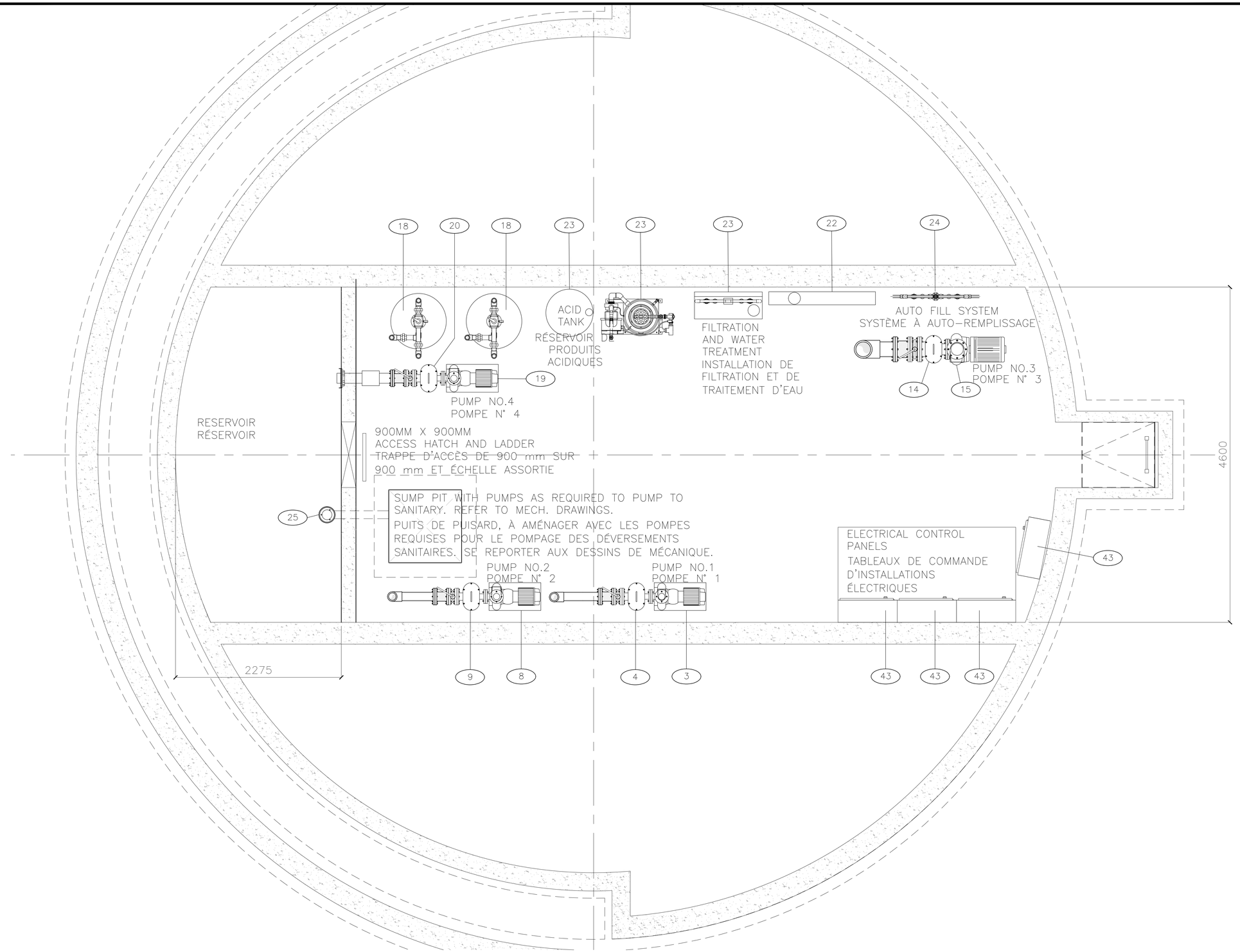
POOL PLAN
PLAN DE LA PISCINE

approved by / approuvé par: LOH
designed by / conçu par: PC
drawn by / dessiné par: JP
date: 2 NOV. 2012
scale / échelle: 1:50
NCC project no. / n° du projet de la CCN: DC-1110-17
sheet no. / n° de la feuille: FO-04



EQUIPMENT ROOM PLAN - LOWER LEVEL
PLAN DU LOCAL D'APPAREILLAGE, AU NIVEAU INFÉRIEUR

1

SCALE: 1 : 25
ÉCHELLE : 1 : 25

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POOL PLAN
PLAN DE LA PISCINE

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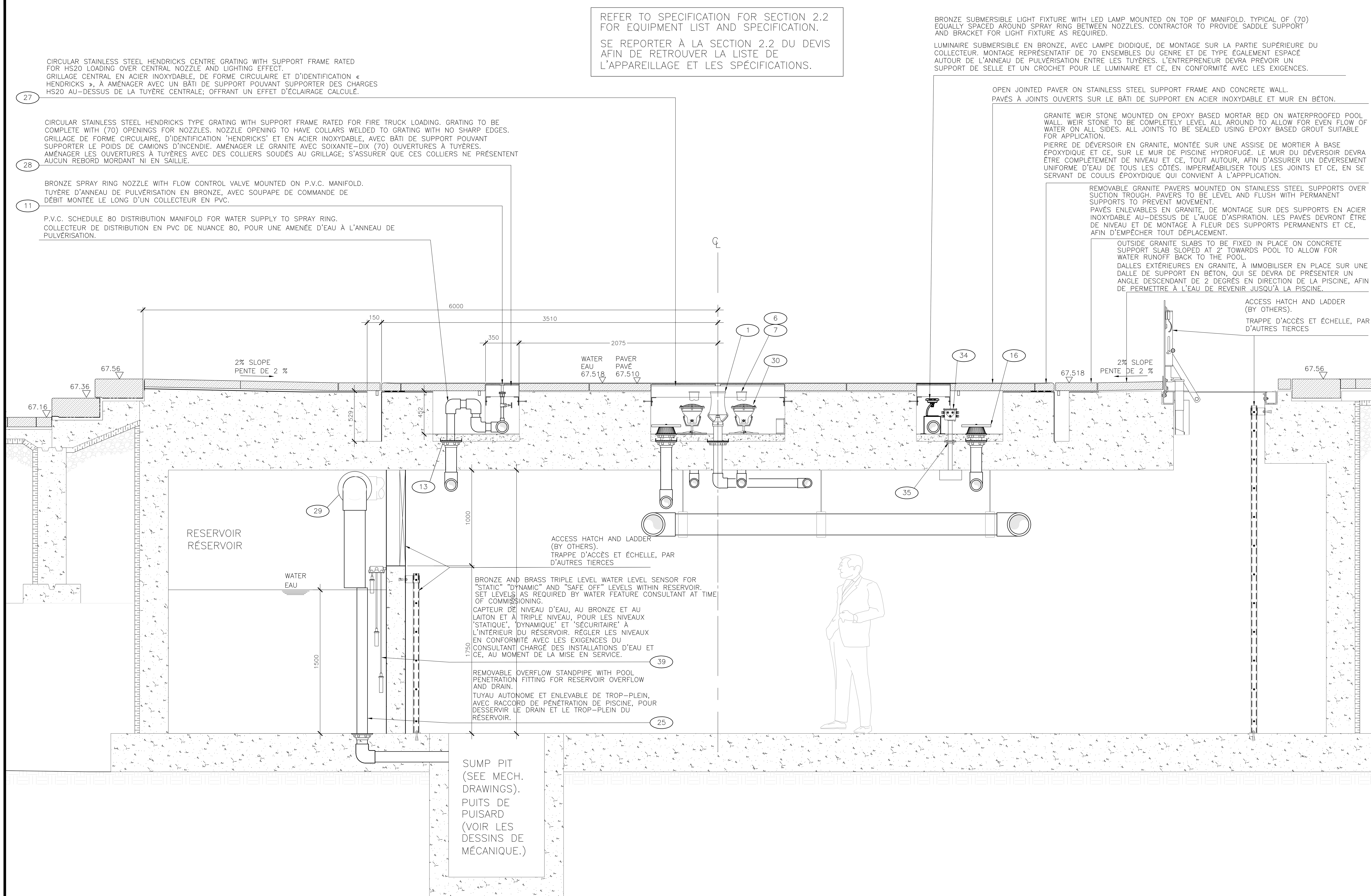
REFER TO SPECIFICATION FOR SECTION 2.2 FOR EQUIPMENT LIST AND SPECIFICATION.
SE REPORTER À LA SECTION 2.2 DU DEVIS AFIN DE RETROUVER LA LISTE DE L'APPAREILLAGE ET LES SPÉCIFICATIONS.
CIRCULAR STAINLESS STEEL HENDRICKS CENTRE GRATING WITH SUPPORT FRAME RATED FOR HS20 LOADING OVER CENTRAL NOZZLE AND LIGHTING EFFECT.
GRILLAGE CENTRAL EN ACIER INOXYDABLE, DE FORME CIRCULAIRE ET D'IDENTIFICATION « HENDRICKS », À AMÉNAGER AVEC UN BÂTI DE SUPPORT POUVANT SUPPORTER DES CHARGES HS20 AU-DESSUS DE LA TUYÈRE CENTRALE; OFFRANT UN EFFET D'ÉCLAIRAGE CALCULÉ.
27
CIRCULAR STAINLESS STEEL HENDRICKS TYPE GRATING WITH SUPPORT FRAME RATED FOR FIRE TRUCK LOADING. GRATING TO BE COMPLETE WITH (70) OPENINGS FOR NOZZLES. NOZZLE OPENING TO HAVE COLLARS WELDED TO GRATING WITH NO SHARP EDGES.
GRILLAGE DE FORME CIRCULAIRE, D'IDENTIFICATION 'HENDRICKS' ET EN ACIER INOXYDABLE, AVEC BÂTI DE SUPPORT POUVANT SUPPORTER LE POIDS DE CAMIONS D'INCENDIE. AMÉNAGER LE GRANITE AVEC SOIXANTE-DIX (70) OUVERTURES À TUYÈRES. AMÉNAGER LES OUVERTURES À TUYÈRES AVEC DES COLLIERS SOUDÉS AU GRILLAGE; S'ASSURER QUE CES COLLIERS NE PRÉSENTENT AUCUN REBORD MORDANT NI EN SAILLIE.
28
BRONZE SPRAY RING NOZZLE WITH FLOW CONTROL VALVE MOUNTED ON P.V.C. MANIFOLD.
TUYÈRE D'ANNEAU DE PULVÉRISATION EN BRONZE, AVEC SOUPAPE DE COMMANDE DE DÉBIT MONTÉE LE LONG D'UN COLLECTEUR EN PVC.
11
P.V.C. SCHEDULE 80 DISTRIBUTION MANIFOLD FOR WATER SUPPLY TO SPRAY RING.
COLLECTEUR DE DISTRIBUTION EN PVC DE NUANCE 80, POUR UNE AMENÉE D'EAU À L'ANNEAU DE PULVÉRISATION.
BRONZE SUBMERSIBLE LIGHT FIXTURE WITH LED LAMP MOUNTED ON TOP OF MANIFOLD. TYPICAL OF (70) EQUALLY SPACED AROUND SPRAY RING BETWEEN NOZZLES. CONTRACTOR TO PROVIDE SADDLE SUPPORT AND BRACKET FOR LIGHT FIXTURE AS REQUIRED.
LUMINAIRE SUBMERSIBLE EN BRONZE, AVEC LAMPE DIODIQUE, DE MONTAGE SUR LA PARTIE SUPÉRIEURE DU COLLECTEUR. MONTAGE REPRÉSENTATIF DE 70 ENSEMBLES DU GENRE ET DE TYPE ÉGALEMENT ESPACÉ AUTOUR DE L'ANNEAU DE PULVÉRISATION ENTRE LES TUYÈRES. L'ENTREPRENEUR DEVRA PRÉVOIR UN SUPPORT DE SELLE ET UN CROCHET POUR LE LUMINAIRE ET CE, EN CONFORMITÉ AVEC LES EXIGENCES.
OPEN JOINTED PAVER ON STAINLESS STEEL SUPPORT FRAME AND CONCRETE WALL.
PAVÉS À JOINTS OUVERTS SUR LE BÂTI DE SUPPORT EN ACIER INOXYDABLE ET MUR EN BÉTON.
GRANITE WEIR STONE MOUNTED ON EPOXY BASED MORTAR BED ON WATERPROOFED POOL WALL. WEIR STONE TO BE COMPLETELY LEVEL ALL AROUND TO ALLOW FOR EVEN FLOW OF WATER ON ALL SIDES. ALL JOINTS TO BE SEALED USING EPOXY BASED GROUT SUITABLE FOR APPLICATION.
PIERRE DE DÉVERSOIR EN GRANITE, MONTÉE SUR UNE ASSISE DE MORTIER À BASE ÉPOXYDIQUE ET CE, SUR LE MUR DE PISCINE HYDROFUGÉ. LE MUR DU DÉVERSOIR DEVRA ÊTRE COMPLÈTEMENT DE NIVEAU ET CE, TOUT AUTOUR, AFIN D'ASSURER UN DÉVERSEMENT UNIFORME D'EAU DE TOUS LES CÔTÉS. IMPERMÉABILISER TOUS LES JOINTS ET CE, EN SE SERVANT DE COULIS ÉPOXYDIQUE QUI CONVIENT À L'APPPLICATION.
REMOVABLE GRANITE PAVERS MOUNTED ON STAINLESS STEEL SUPPORTS OVER SUCTION TROUGH. PAVERS TO BE LEVEL AND FLUSH WITH PERMANENT SUPPORTS TO PREVENT MOVEMENT.
PAVÉS ENLEVABLES EN GRANITE, DE MONTAGE SUR DES SUPPORTS EN ACIER INOXYDABLE AU-DESSUS DE L'AUGE D'ASPIRATION. LES PAVÉS DEVRONT ÊTRE DE NIVEAU ET DE MONTAGE À FLEUR DES SUPPORTS PERMANENTS ET CE, AFIN D'EMPÊCHER TOUT DÉPLACEMENT.
OUTSIDE GRANITE SLABS TO BE FIXED IN PLACE ON CONCRETE SUPPORT SLAB SLOPED AT 2° TOWARDS POOL TO ALLOW FOR WATER RUNOFF BACK TO THE POOL.
DALLES EXTÉRIEURES EN GRANITE, À IMMOBILISER EN PLACE SUR UNE DALLE DE SUPPORT EN BÉTON, QUI SE DEVRA DE PRÉSENTER UN ANGLE DESCENDANT DE 2 DEGRÉS EN DIRECTION DE LA PISCINE, AFIN DE PERMETTRE À L'EAU DE REVENIR JUSQU'À LA PISCINE.
ACCESS HATCH AND LADDER (BY OTHERS).
TRAPPE D'ACCÈS ET ÉCHELLE, PAR D'AUTRES TIERCES
6000
150
3510
350
2075
6
1
7
30
34
16
67.56
67.36
67.16
2% SLOPE
PENTE DE 2 %
WATER EAU 67.518
PAVER PAVÉ 67.510
67.518
2% SLOPE
PENTE DE 2 %
67.56
529
13
35
29
1000
RESERVOIR
RÉSERVOIR
WATER
EAU
ACCESS HATCH AND LADDER (BY OTHERS).
TRAPPE D'ACCÈS ET ÉCHELLE, PAR D'AUTRES TIERCES
BRONZE AND BRASS TRIPLE LEVEL WATER LEVEL SENSOR FOR "STATIC" "DYNAMIC" AND "SAFE OFF" LEVELS WITHIN RESERVOIR. SET LEVELS AS REQUIRED BY WATER FEATURE CONSULTANT AT TIME OF COMMISSIONING.
CAPTEUR DE NIVEAU D'EAU, AU BRONZE ET AU LAITON ET À TRIPLE NIVEAU, POUR LES NIVEAUX 'STATIQUE', 'DYNAMIQUE' ET 'SÉCURITAIRE' À L'INTÉRIEUR DU RÉSERVOIR. RÉGLER LES NIVEAUX EN CONFORMITÉ AVEC LES EXIGENCES DU CONSULTANT CHARGÉ DES INSTALLATIONS D'EAU ET CE, AU MOMENT DE LA MISE EN SERVICE.
39
1750
1500
REMOVABLE OVERFLOW STANDPIPE WITH POOL PENETRATION FITTING FOR RESERVOIR OVERFLOW AND DRAIN.
TUYAU AUTONOME ET ENLEVABLE DE TROP-PLEIN, AVEC RACCORD DE PÉNÉTRATION DE PISCINE, POUR DESSERVIR LE DRAIN ET LE TROP-PLEIN DU RÉSERVOIR.
25
SUMP PIT (SEE MECH. DRAWINGS).
PUITS DE PUISARD (VOIR LES DESSINS DE MÉCANIQUE.)

1 POOL SECTION
COUPE DE PISCINE

SCALE: 1 : 20
ÉCHELLE : 1 : 20

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POOL SECTION
COUPE DE PISCINE

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drawn by / dessiné par: JP
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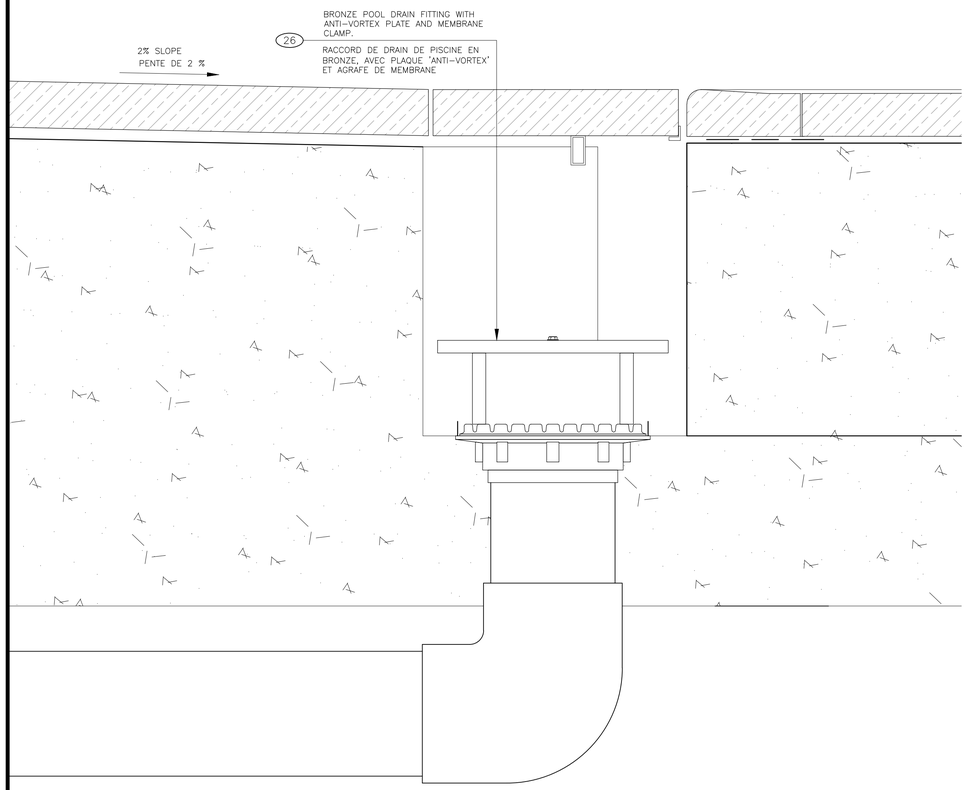
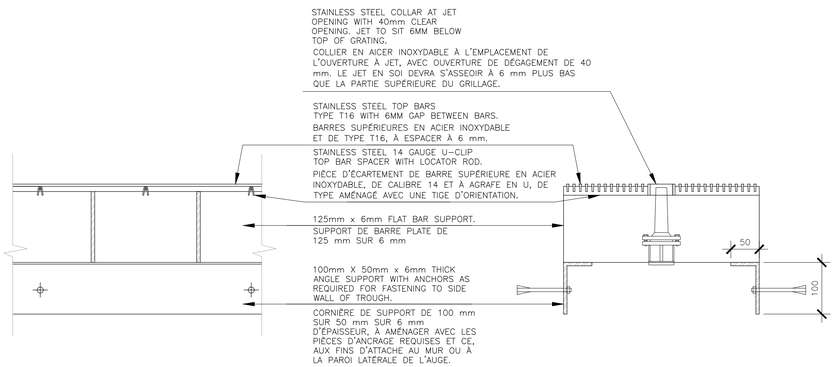


1 SECTION AT DRAIN PIT
COUPE - PUITS DE DRAINAGE

SCALE: 1 :5
ÉCHELLE : 1 : 5



2 GRATING DETAIL
DÉTAIL DE GRILLAGE

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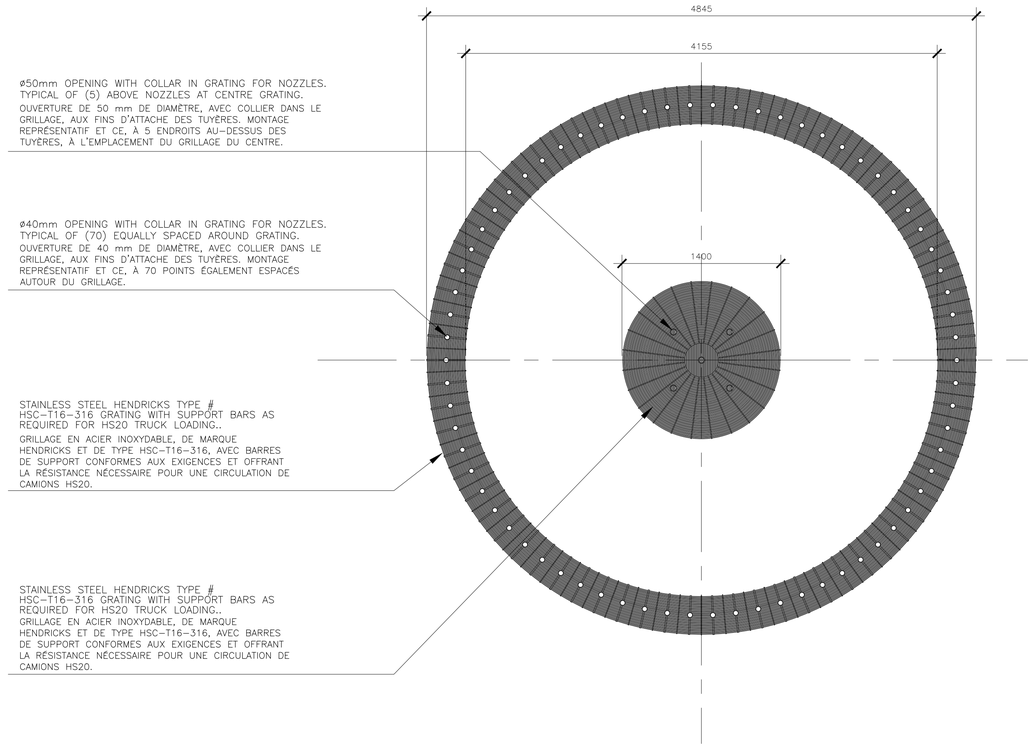
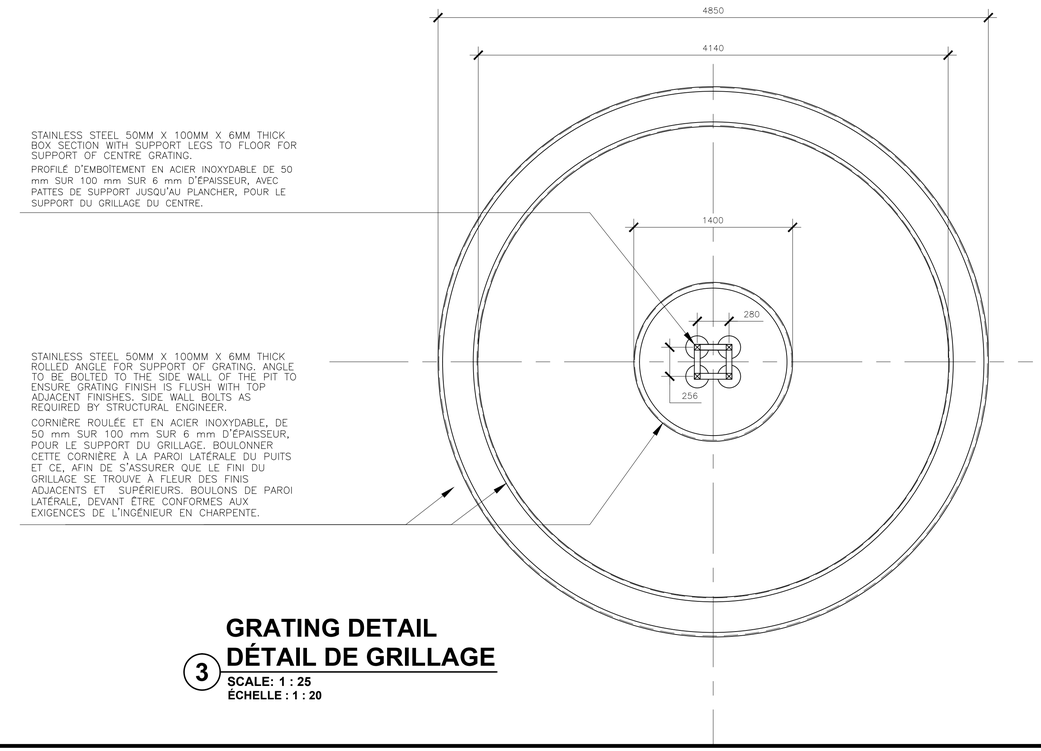
ÉCHELLE : 1 : 5





3 GRATING DETAIL
DÉTAIL DE GRILLAGE

SCALE: 1 : 25
ÉCHELLE : 1 : 20

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Gestion des biens immobiliers; Direction générale du design et de la construction

Design and Construction Division
Division du design et de la construction

director - Daniel Miron - directeur

consultant
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n°	description	date
8	ISSUED FOR TENDER. ÉMISE POUR L'APPEL D'OFFRE.	13 APR. 2016
7	ISSUED FOR CO-ORDINATION. DOCUMENTS DE COORDINATION	16 MAR. 2016
6	ISSUED FOR CO-ORDINATION. DOCUMENTS DE COORDINATION	11 MAR. 2016
5	ISSUED FOR CO-ORDINATION. DOCUMENTS DE COORDINATION	24 FEB. 2016
4	100% REVIEW DOCUMENT À 100 %, À FAIRE RÉVISER.	26 FEB. 2013
3	90% REVIEW DOCUMENT À 90 %, À FAIRE RÉVISER.	12 FEB. 2013
2	60% REVIEW DOCUMENT À 60 %, À FAIRE RÉVISER.	14 DEC. 2012
1	30% REVIEW DOCUMENT À 30 %, À FAIRE RÉVISER.	2 NOV. 2012

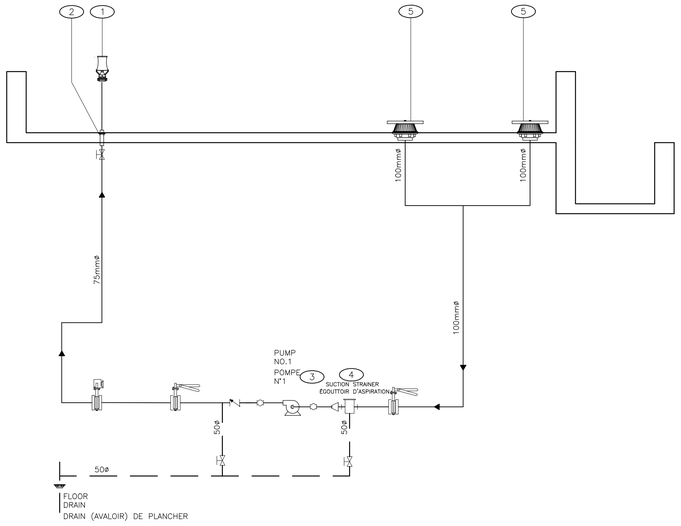
project
projet

NCC RESIDENCE
WATER FEATURE
INSTALLATION D'EAU - RÉSIDENCE CCN

drawing
dessin

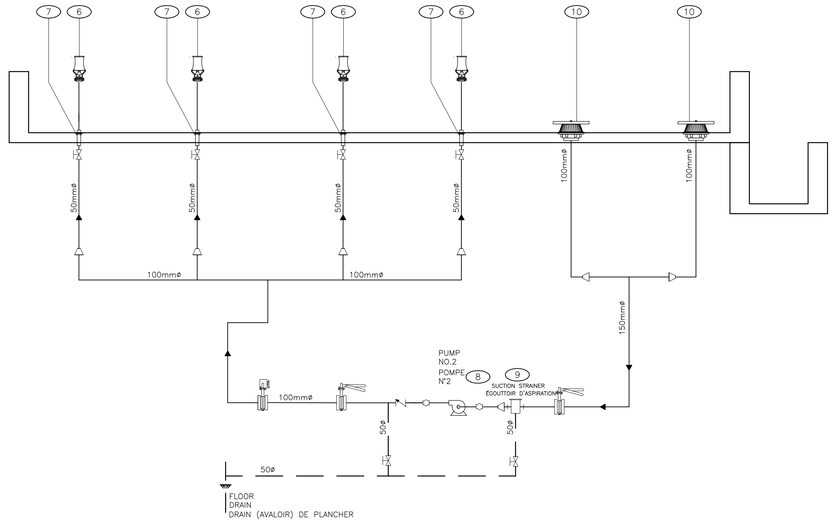
POOL DETAILS
DÉTAILS DE PISCINE

approved by / approuvé par	LOH
designed by / conçu par	PC
drawn by / dessiné par	JP
date	2 NOV. 2012
scale / échelle	1:20
NCC project no. / n° du projet de la CCN	DC-1110-17
sheet no. / n° de la feuille	FO-07



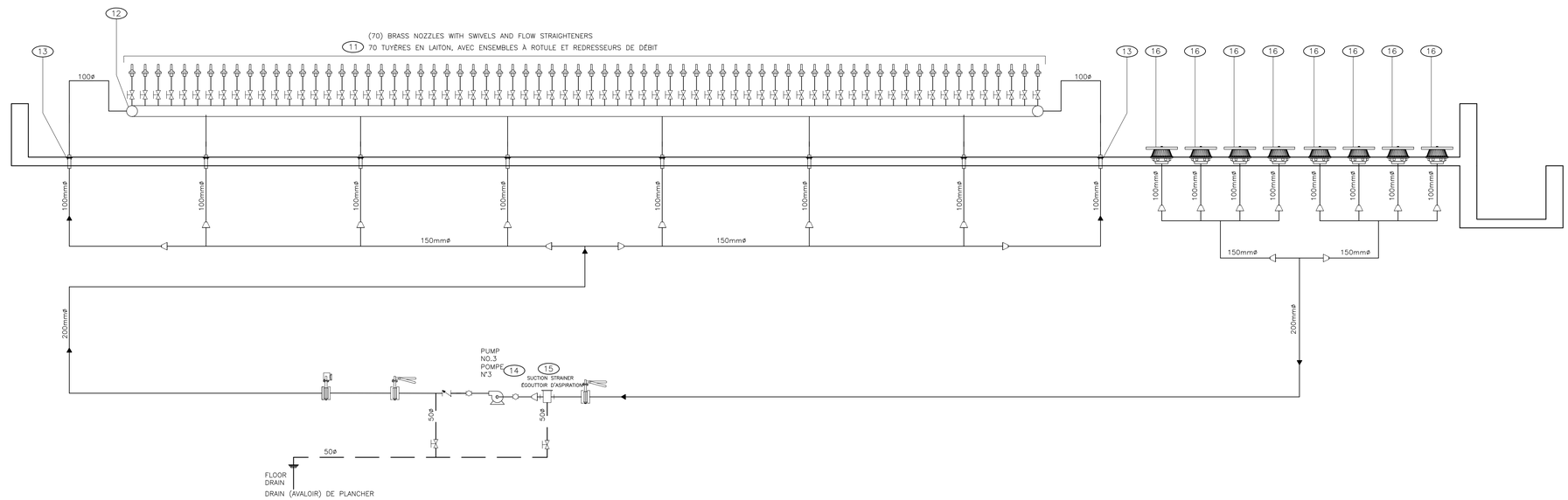
CENTRE NOZZLE SCHEMATIC
REPRÉSENTATION SCHÉMATIQUE DE TUYÈRE CENTRALE

1 **SCALE: N.T.S.**
ÉCHELLE : P. À É.



CENTRE NOZZLE SCHEMATIC
REPRÉSENTATION SCHÉMATIQUE DE TUYÈRE CENTRALE

2 **SCALE: N.T.S.**
ÉCHELLE : P. À É.



SPRAY RING NOZZLE SCHEMATIC
REPRÉSENTATION SCHÉMATIQUE DE TUYÈRE ET ANNEAU DE PULVÉRISATION

3 **SCALE: N.T.S.**
ÉCHELLE : P. À É.

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8	ISSUED FOR TENDER ÉMISE POUR L'APPEL D'OFFRE.	13 APR. 2016
7	ISSUED FOR CO-ORDINATION. DOCUMENT DE COORDINATION	16 MAR. 2016
6	ISSUED FOR CO-ORDINATION. DOCUMENT DE COORDINATION	11 MAR. 2016
5	ISSUED FOR TENDER DOCUMENT D'APPEL D'OFFRE.	31 MAR. 2013
4	100% REVIEW DOCUMENT À 100 %, À FAIRE RÉVISER.	26 FEB. 2013
3	90% REVIEW DOCUMENT À 90 %, À FAIRE RÉVISER.	12 FEB. 2013
2	60% REVIEW DOCUMENT À 60 %, À FAIRE RÉVISER.	14 DEC. 2012
1	30% REVIEW DOCUMENT À 30 %, À FAIRE RÉVISER.	2 NOV. 2012

project
projet

NCC RESIDENCE FRONT ENTRANCE LANDSCAPE REHABILITATION 2016
RÉFECTION DE L'ENTRÉE PRINCIPALE RÉSIDENCE CCN 2016

drawing
dessin

PROCESS FLOW DIAGRAMS

REPRÉSENTATIONS SCHÉMATIQUES DU DÉBIT DE TRAITEMENT

approved by approuvé par	LOH
designed by conçu par	PC
drawn by dessiné par	JP
date	2 NOV. 2012
scale échelle	N.T.S. P.À.É.
NCC project no. n° du projet de la CCN	DC-2611-110
sheet no. n° de la feuille	FO-08

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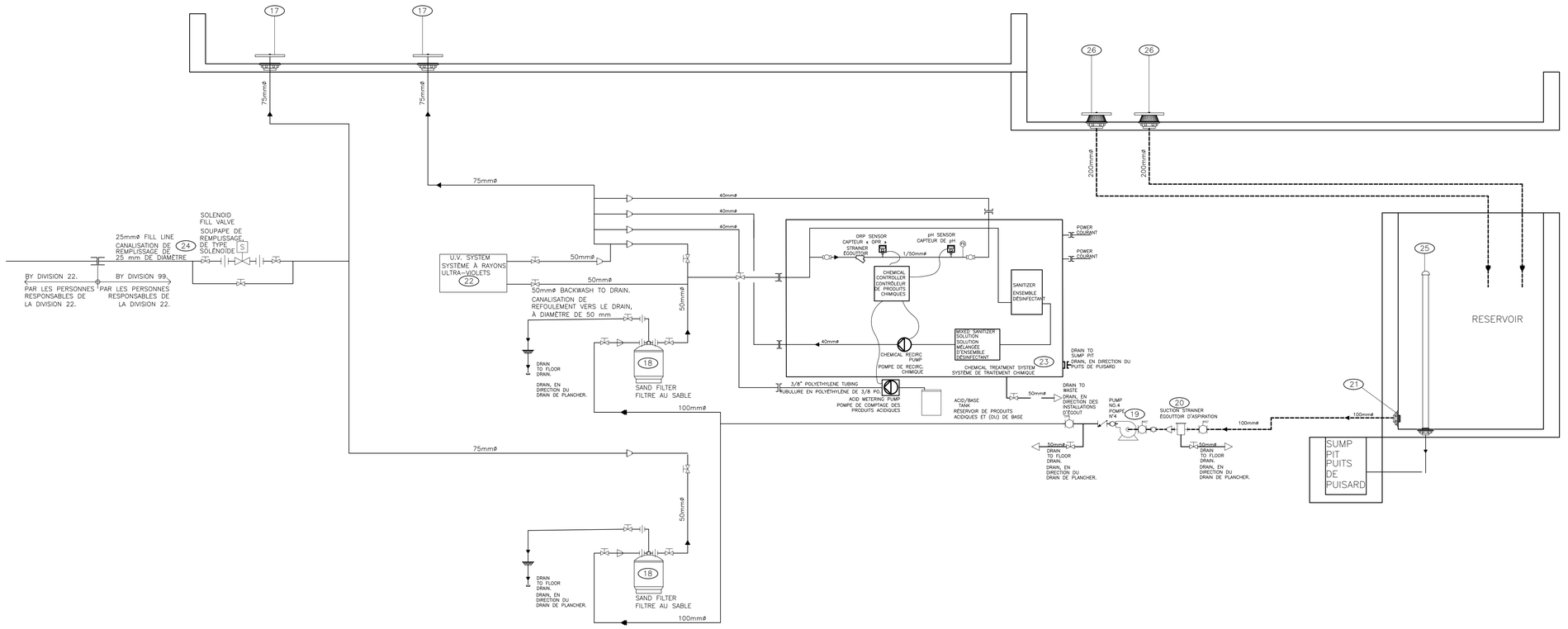

FILTRATION AND WATER TREATMENT SCHEMATIC
REPRÉSENTATION SCHÉMATIQUE DU SYSTÈME SERVANT À FILTRER ET À TRAITER L'EAU

1

SCALE: N.T.S.
ÉCHELLE : P. À É.

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Gestion des biens immobiliers; Direction générale du design et de la construction

Design and Construction Division
Division du design et de la construction

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nº	description	date
8	ISSUED FOR TENDER. ÉMISE POUR L'APPEL D'OFFRE.	13 APR. 2016
7	ISSUED FOR CO-ORDINATION. DOCUMENT DE COORDINATION	16 MAR. 2016
6	ISSUED FOR CO-ORDINATION. DOCUMENT DE COORDINATION	11 MAR. 2016
5	ISSUED FOR TENDER. DOCUMENT D'APPEL D'OFFRE.	31 MAR. 2013
4	100% REVIEW DOCUMENT À 100 %, À FAIRE RÉVISER.	26 FEB. 2013
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2	60% REVIEW DOCUMENT À 60 %, À FAIRE RÉVISER.	14 DEC. 2012
1	30% REVIEW DOCUMENT À 30 %, À FAIRE RÉVISER.	2 NOV. 2012

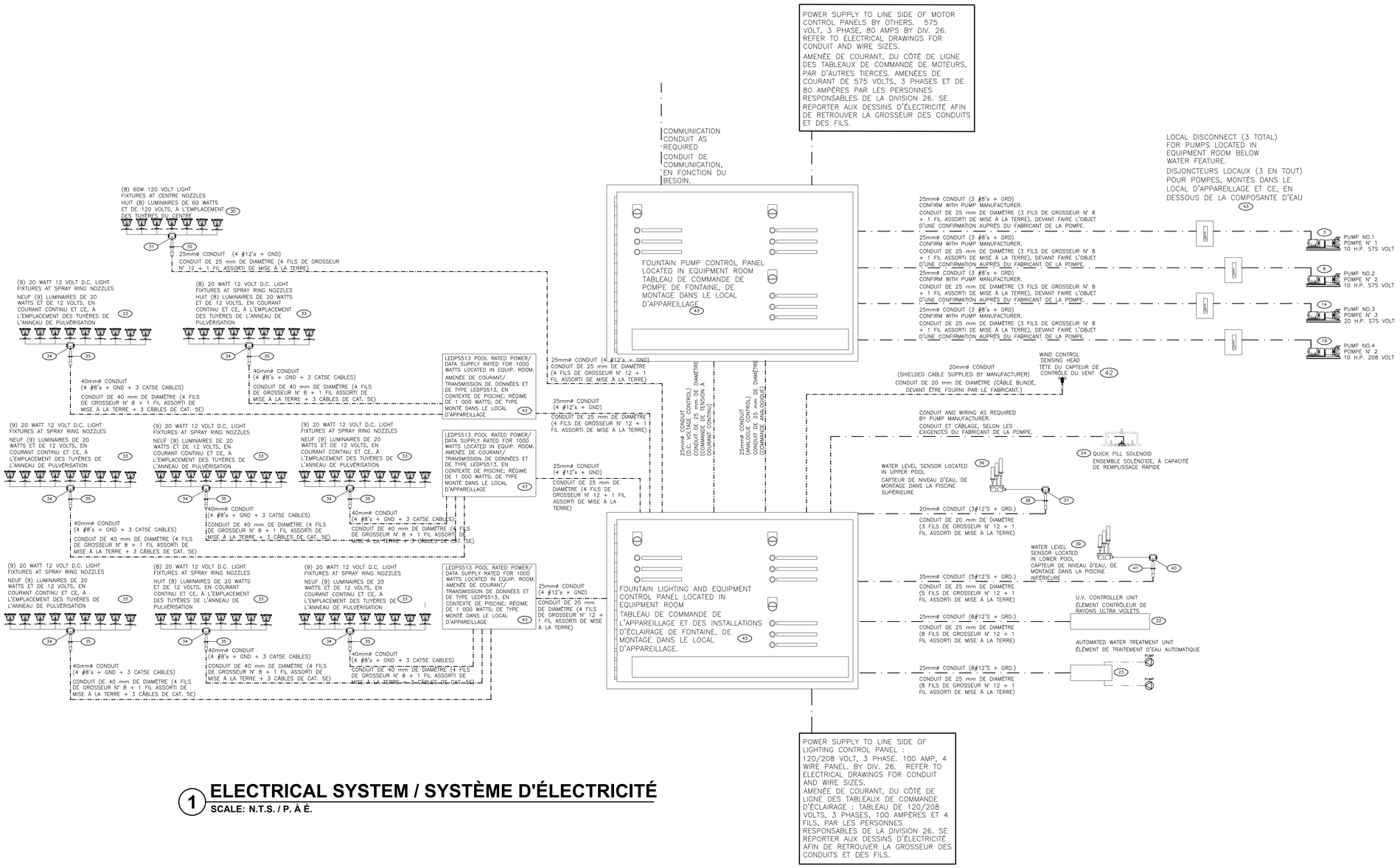
project
projet

NCC RESIDENCE FRONT ENTRANCE LANDSCAPE REHABILITATION 2016
RÉFECTION DE L'ENTRÉE PRINCIPALE RÉSIDENCE CCN 2016

drawing
dessin

PROCESS FLOW DIAGRAMS
REPRÉSENTATIONS SCHÉMATIQUES DU DÉBIT DE TRAITEMENT

approved by / approuvé par	LOH
designed by / conçu par	PC
drawn by / dessiné par	JP
date	2 NOV. 2012
scale / échelle	N.T.S. P. À É.
NCC project no. / nº du projet de la CCN	DC-2611-110
sheet no. / nº de la feuille	FO-09



1 ELECTRICAL SYSTEM / SYSTÈME D'ÉLECTRICITÉ

SCALE: N.T.S. / P. À É.

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Gestion des biens immobiliers; Direction générale du design et de la construction

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nº	description	date
8	ISSUED FOR TENDER. ÉMISE POUR L'APPEL D'OFFRE.	13 APR. 2016
7	ISSUED FOR CO-ORDINATION DOCUMENT DE COORDINATION	16 MAR. 2016
6	ISSUED FOR TENDER DOCUMENT DE SOUMISSION	15 JAN. 2016
5	ISSUED FOR TENDER DOCUMENT DE SOUMISSION	31 MAR. 2013
4	100% REVIEW DOCUMENT À 100 %, À FAIRE RÉVISER.	26 FEB. 2013
3	90% REVIEW DOCUMENT À 90 %, À FAIRE RÉVISER.	12 FEB. 2013
2	60% REVIEW DOCUMENT À 60 %, À FAIRE RÉVISER.	14 DEC. 2012
1	30% REVIEW DOCUMENT À 30 %, À FAIRE RÉVISER.	2 NOV. 2012

project
projet

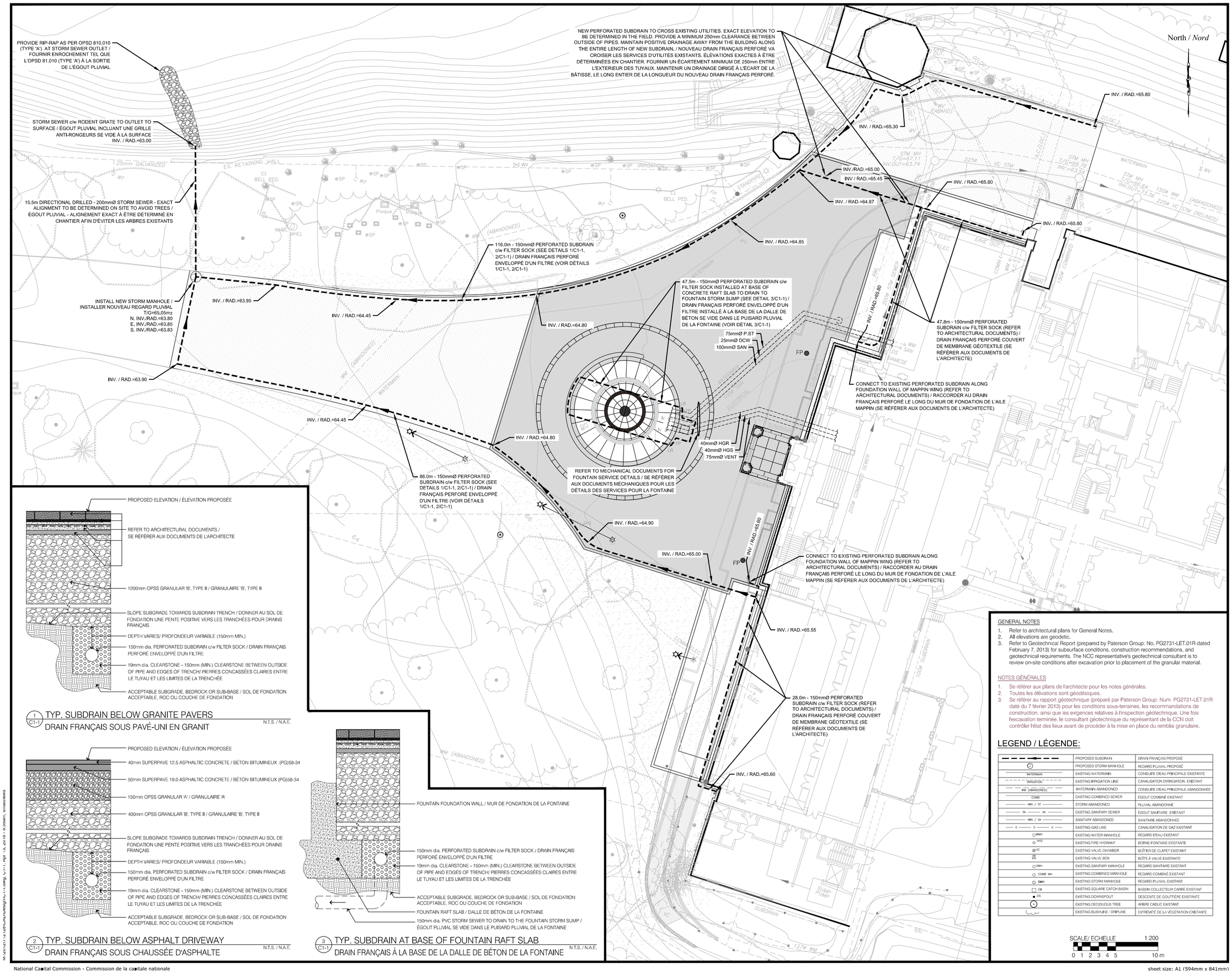
NCC RESIDENCE FRONT ENTRANCE LANDSCAPE REHABILITATION 2016
RÉFECTION DE L'ENTRÉE PRINCIPALE RÉSIDENCE CCN 2016

drawing
dessin

PROCESS FLOW DIAGRAMS

REPRÉSENTATIONS SCHÉMATIQUES DU DÉBIT DE TRAITEMENT

approved by / approuvé par	LOH
designed by / conçu par	PC
drawn by / dessiné par	JP
date	2 NOV. 2012
scale / échelle	N.T.S. P. À É.
NCC project no. / nº du projet de la CCN	DC-2611-110NC
sheet no. / nº de la feuille	FO-10



1 C1-1 TYP. SUBDRAIN BELOW GRANITE PAVERS
DRAIN FRANÇAIS SOUS PAVÉ-UNI EN GRANIT
N.T.S. / N.A.E.

2 C1-1 TYP. SUBDRAIN BELOW ASPHALT DRIVEWAY
DRAIN FRANÇAIS SOUS CHAUSSÉE D'ASPHALTE
N.T.S. / N.A.E.

3 C1-1 TYP. SUBDRAIN AT BASE OF FOUNTAIN RAFT SLAB
DRAIN FRANÇAIS À LA BASE DE LA DALLE DE BÉTON DE LA FONTAINE
N.T.S. / N.A.E.

GENERAL NOTES
1. Refer to architectural plans for General Notes.
2. All elevations are geodetic.
3. Refer to Geotechnical Report (prepared by Paterson Group: No. PG2731-LET.01R dated February 7, 2013) for subsurface conditions, construction recommendations, and geotechnical requirements. The NCC representative's geotechnical consultant is to review on-site conditions after excavation prior to placement of the granular material.

NOTES GÉNÉRALES
1. Se référer aux plans de l'architecte pour les notes générales.
2. Toutes les élévations sont géodésiques.
3. Se référer au rapport géotechnique (préparé par Paterson Group: Num. PG2731-LET.01R daté du 7 février 2013) pour les conditions sous-terraines, les recommandations de construction, ainsi que les exigences relatives à l'inspection géotechnique. Une fois l'excavation terminée, le consultant géotechnique du représentant de la CCN doit contrôler l'état des lieux avant de procéder à la mise en place du remblai granulaire.

LEGEND / LÉGENDE:

	PROPOSED SUBDRAIN	DRAIN FRANÇAIS PROPOSÉ
	PROPOSED STORM MANHOLE	REGARD PLUVIAL PROPOSÉ
WATERMAIN	EXISTING WATERMAIN	CONDUITE D'EAU PRINCIPALE EXISTANTE
IRRIGATION	EXISTING IRRIGATION LINE	CANALISATION D'IRRIGATION EXISTANT
WM (ABANDONED)	WATERMAIN ABANDONED	CONDUITE D'EAU PRINCIPALE ABANDONNÉE
COMB	EXISTING COMBINED SEWER	ÉGOUT COMBINÉ EXISTANT
ABN / ST	STORM ABANDONED	PLUVIAL ABANDONNÉ
SA SA	EXISTING SANITARY SEWER	ÉGOUT SANITAIRE EXISTANT
ABN / SA	SANITARY ABANDONED	SANITAIRE ABANDONNÉE
G G G	EXISTING GAS LINE	CANALISATION DE GAZ EXISTANT
WMH	EXISTING WATER MANHOLE	REGARD D'EAU EXISTANT
HYD	EXISTING FIRE HYDRANT	BORNE-FONTAINE EXISTANTE
VC	EXISTING VALVE CHAMBER	BOÎTIER DE CLAPET EXISTANT
VB	EXISTING VALVE BOX	BOÎTE À VALVE EXISTANTE
SMH	EXISTING SANITARY MANHOLE	REGARD SANITAIRE EXISTANT
COMB MH	EXISTING COMBINED MANHOLE	REGARD COMBINÉ EXISTANT
DMH	EXISTING STORM MANHOLE	REGARD PLUVIAL EXISTANT
CB	EXISTING SQUARE CATCH BASIN	BASSIN COLLECTEUR CARRÉ EXISTANT
DS	EXISTING DOWNSPOUT	DESCENTE DE GOUTTIÈRE EXISTANTE
	EXISTING DECIDUOUS TREE	ARBRE CADUC EXISTANT
	EXISTING BUSHLINE / DRIPLINE	EXTRÉMITÉ DE LA VÉGÉTATION EXISTANTE

SCALE/ ECHELLE 1:200
0 1 2 3 4 5 10 m

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Direction de la gestion de l'immobilier, design et construction

Design and Construction Division
Division design et construction

director - Claude Robert - directeur

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NOVATECH
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Facsimile (613) 254-5867
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émis ou revisé

no.	description	date
8	ISSUED FOR TENDER / ÉMISE POUR L'APPEL D'OFFRE	APR. 13, 2016
7	FOUNTAIN SUBDRAIN DETAIL ADDED	MAR. 31, 2016
6	REVISED PER NCC COMMENTS	MAR. 15, 2016
5	ISSUED FOR TENDER / ÉMISE POUR L'APPEL D'OFFRE	FEB. 19, 2016
4	ISSUED FOR TENDER	MAR. 31/13
3	ISSUED FOR 100% SUBMISSION	FEB. 26/13
2	ISSUED FOR 99% REVIEW	FEB. 11/13
1	ISSUED FOR 66% REVIEW	DEC. 14/12

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projet

NCC RESIDENCE FRONT ENTRANCE LANDSCAPE REHABILITATION 2016 / RÉFECTION DE L'ENTRÉE PRINCIPALE DU RÉSIDENCE CCN 2016

drawing
dessin

SERVICING PLAN / PLAN DES SERVICES

approved by / approuvé par	FST / JLS
designed by / conçu par	SM / FST
drawn by / dessiné par	SM
date	03/31/13
scale / échelle	1:200
NCC project no. / no. du projet de la CCN	DC-2611-110
sheet no. / no. de la feuille	C1-1

GENERAL NOTES AND DETAILS

1) GENERAL INFORMATION

1. THE INFORMATION PRESENTED ON THESE DRAWINGS HAS BEEN DESIGNED AND ANALYZED IN ACCORDANCE WITH THE 2010 NATIONAL BUILDING CODE OF CANADA. CONSTRUCTION IS TO BE PERFORMED IN ACCORDANCE WITH THIS AND ALL OTHER APPLICABLE CODES.

   1.1 CONCRETE STRUCTURE DESIGNED IN ACCORDANCE WITH CSA A23.3

   1.2 STEEL STRUCTURE DESIGNED IN ACCORDANCE WITH CAN/CSA-S16.01

2. CONTRACTOR IS TO VERIFY/COORDINATE ALL DIMENSIONS WITH CIVIL/ARCHITECTURAL/MECHANICAL/ELECTRICAL/LANDSCAPE DRAWINGS PRIOR TO CONSTRUCTION. REPORT INCONSISTENCIES BEFORE PROCEEDING WITH WORK. ANY OPENINGS NOT INDICATED ON STRUCTURAL DRAWINGS ARE TO BE APPROVED BY NCC REPRESENTATIVE IN WRITING PRIOR TO CONSTRUCTION.
3. CADD VERSIONS OF THE STRUCTURAL DRAWINGS SHALL BE MADE AVAILABLE TO THE CONTRACTOR AT A COST OF $50 (PLUS HST) PER DRAWING UPON THE COMPLETION OF A RELEASE FORM INDEMNIFYING THE NCC REPRESENTATIVE FROM ANY ERRORS OR OMISSIONS ASSOCIATED WITH THE CADD FILES.
4. NO FOUNDATION ELEMENTS ARE TO BE CONSTRUCTED UNTIL WRITTEN APPROVAL OF THE BEARING SURFACES AND STRENGTH IS PROVIDED BY A GEOTECHNICAL ENGINEER RETAINED AND PAID FOR BY THE CONTRACTOR THROUGH ON-SITE INVESTIGATION. FAILURE TO COMPLETE THIS WORK COULD RESULT IN THE REMOVAL/REINSTATEMENT OF ANY/ALL FOUNDATION ELEMENTS AT CONTRACTOR'S OWN COST.

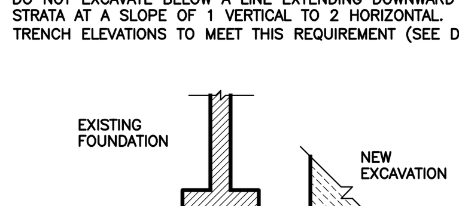
2) FOUNDATIONS

2.1 FOOTINGS:

ALL FOOTINGS TO BEAR ON UNDISTURBED NATIVE MATERIAL WITH MINIMUM ALLOWABLE BEARING STRENGTHS OF 100 kPa.

2.2 PROTECT LATERAL STABILITY OF BEARING STRATA UNLESS NOTED:

DO NOT EXCAVATE BELOW A LINE EXTENDING DOWNWARD FROM ANY BEARING STRATA AT A SLOPE OF 1 VERTICAL TO 2 HORIZONTAL. ADJUST FOOTING AND TRENCH ELEVATIONS TO MEET THIS REQUIREMENT (SEE DIAGRAM).

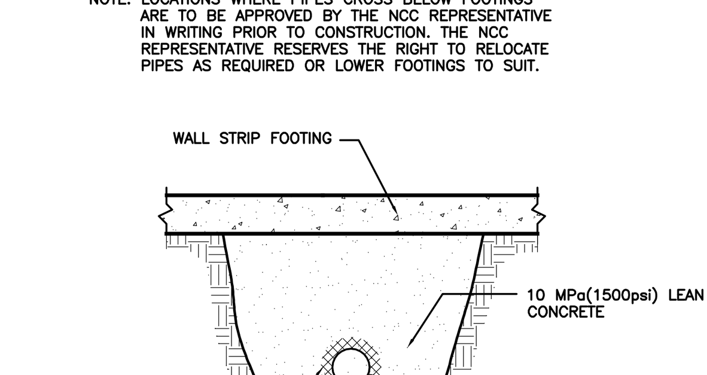


2.3 MINIMUM FROST COVER REQUIREMENTS:

- HEATED BUILDINGS: 1500mm (5'-0")
- UNHEATED BUILDING (SNOW CLEARED): 1800mm (6'-0")

2.4 PIPE CROSING BELOW STRIP FOOTING:

NOTE: LOCATIONS WHERE PIPES CROSS BELOW FOOTINGS ARE TO BE APPROVED BY THE NCC REPRESENTATIVE IN WRITING PRIOR TO CONSTRUCTION. THE NCC REPRESENTATIVE RESERVES THE RIGHT TO RELOCATE PIPES AS REQUIRED OR LOWER FOOTINGS TO SUIT.



3) CONCRETE

3.1 CONCRETE COVER (CLEAR TO REINFORCING):

U/S FOOTINGS (AGAINST SOIL)	75mm (3")
FOOTINGS (SIDES & TOP)	50mm (2")
WALLS & STRUCTURAL SLAB	40mm (1 1/2")

3.2 REINFORCING STEEL

1. SPACING OF BARS SHALL BE APPROXIMATELY UNIFORM WITHIN THE CONCRETE ELEMENTS. DO NOT ELIMINATE OR DISPLACE REINFORCEMENT TO ACCOMMODATE HARDWARE. OBTAIN APPROVAL OF ALL MODIFICATIONS FROM NCC REPRESENTATIVE BEFORE THE PLACING OF CONCRETE.

2. ALL LAPS AND EMBEDMENT OF DOWELS SHALL BE 24 BAR DIAMETERS, BUT NOT LESS THAN 600mm IF NOT SPECIFIED OTHERWISE. WIRE MESH LAPS SHALL BE 150mm MINIMUM.

TYPICAL REBAR REQUIREMENTS:

LAPS: AS ON DRAWINGS

≥ 36 BAR DIA.
≥ 600mm(24")

BAR DESIGNATION:

METRIC:10-15M MEANS 10 BARS, SIZE 15M,

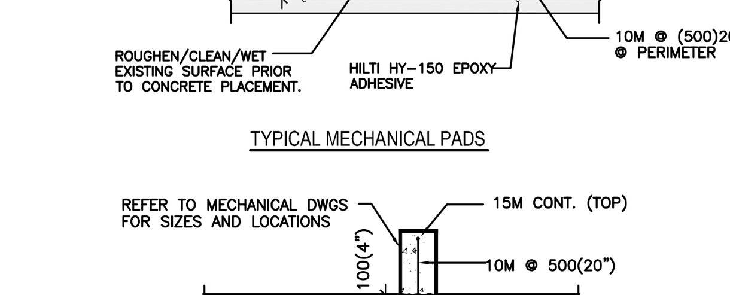
PROVIDE STANDARD HOOKS WHERE TOP BARS TERMINATE AT EDGES.

3. ALL DOWELS TO BE IN LINE WITH THE VERTICAL OF HORIZONTAL STEEL WITHIN THE STRUCTURAL ELEMENT UNLESS OTHERWISE NOTED
4. SUBMIT REINFORCEMENT SHOP DRAWINGS DETAILING ALL REINFORCEMENT IN ACCORDANCE WITH RSIC MANUAL OF STANDARD PRACTICE

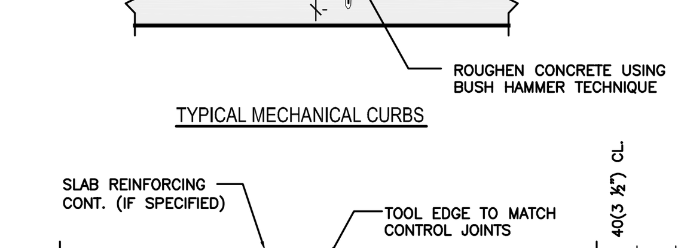
3.3 MINIMUM WALL REINFORCING:

UNLESS OTHERWISE NOTED PROVIDE:

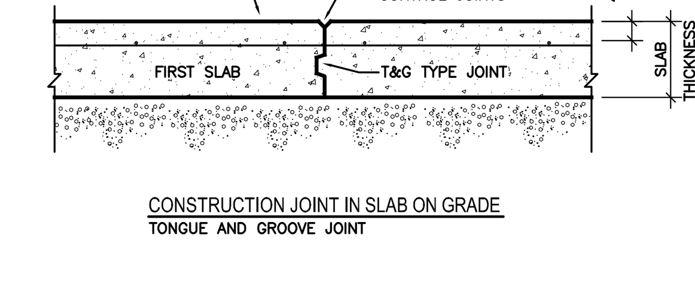
WALL THICKNESS	VERTICAL BARS (.0025Ag)	HORIZONTAL BARS (.0025Ag)	VERTICAL EACH END
150mm(6")	10M @ 250(10")	10M @ 250(10")	1-15M
200mm(8")	15M @ 400(16")	15M @ 400(16")	1-20M
250mm(10")	10M @ 300(12") EF	10M @ 300(12") EF	2-20M
300mm(12")	10M @ 250(10") EF	10M @ 250(10") EF	2-20M
350mm(14")	15M @ 450(18") EF	15M @ 450(18") EF	2-25M
400mm(16")	15M @ 400(16") EF	15M @ 400(16") EF	2-25M



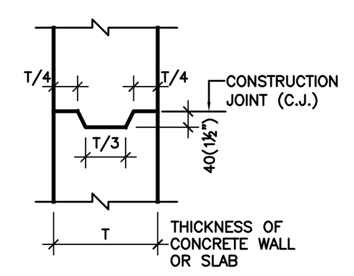
TYPICAL MECHANICAL PADS



TYPICAL MECHANICAL CURBS



CONSTRUCTION JOINT IN SLAB ON GRADE
TONGUE AND GROOVE JOINT



CONSTRUCTION JOINT KEY DETAIL

3.4 CONCRETE MIXES

PROPORTION NORMAL DENSITY CONCRETE IN ACCORDANCE WITH CAN/CSA-A23.1, TO GIVE THE FOLLOWING QUALITY FOR ALL CONCRETE AS INDICATED.

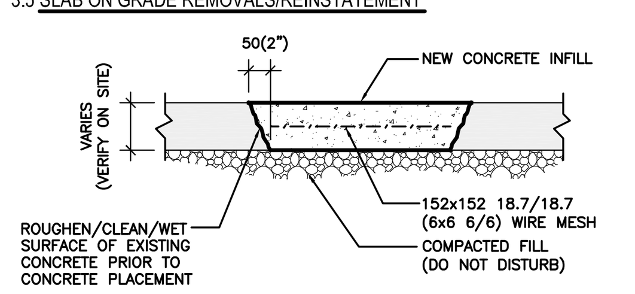
28 DAY LOCATION	STRENGTH	SLUMP	CLASS OF EXPOSURE
SLAB ON GRADE	32 MPa(4700psi)	75mm(3")	C-2
FOUNDATIONS WALLS	25 MPa(3600psi)	75mm(3")	F-2
FOOTINGS	30 MPa(4400psi)	75mm(3")	N
RAFT SLAB	35 MPa(5050psi)	75mm(3")	N
STRUCTURAL SLAB	35 MPa(5050psi)	75mm(3")	C-1

*NOTE: ALL CONCRETE EXPOSED TO EXTERIOR CONDITIONS TO HAVE MINIMUM 6% AIR ENTRAINMENT.

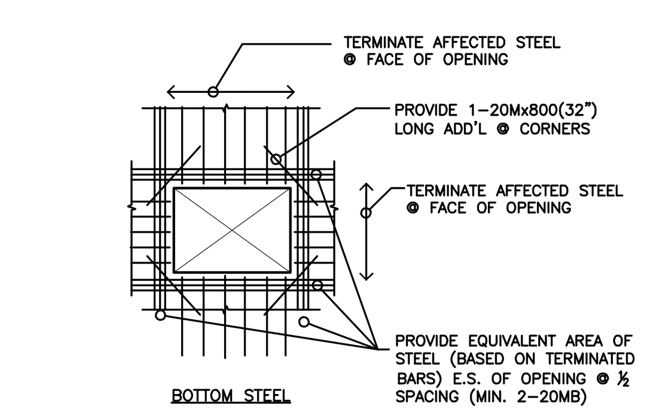
READY-MIXED CONCRETE AND CONCRETE PROPORTIONS SHALL BE IN ACCORDANCE WITH CSA A23.1, CLAUSE 12 AND AS FOLLOWS:

1. IF BLENDED NORMAL PORTLAND CEMENT/CEMENTITIOUS HYDRAULIC SLAG IS USED EXCEPT FOR FLOOR MIXES, SLAG CONTENT SHALL NOT BE MORE THAN 25% OF TOTAL MASS OF CEMENT. TOTAL VOLUME OF CEMENT IN CONCRETE FLOOR MIXES SHALL BE 100% NORMAL PORTLAND CEMENT.
2. PROVIDE CERTIFICATION THAT MIX PROPORTIONS SELECTED WILL PRODUCE CONCRETE OF SPECIFIED QUALITY AND YIELD AND THAT STRENGTH WILL COMPLY WITH CAN/CSA-A23.1-M06.
3. USE OF CALCIUM CHLORIDE NOT PERMITTED.
4. DO NOT CHANGE CONCRETE MIX WITHOUT PRIOR APPROVAL OF THE NCC REPRESENTATIVE SHOULD CHANGE IN MATERIAL SOURCE BE PROPOSED, NEW MIX DESIGN TO BE APPROVED BY NCC REPRESENTATIVE.

3.5 SLAB ON GRADE REMOVALS/REINSTATEMENT



3.6 TYPICAL TRIMMING DETAIL OF OPENING IN SLAB (U/N)



4.0) STEEL

4.1 STRUCTURAL STEEL

STRUCTURAL STEEL SHALL COMPLY WITH CAN3-S16.1-01(06) UNLESS OTHERWISE NOTED.

ITEM	APPLICABLE SPECIFICATION
ROLLED SECTIONS	G40.21M - 350W
HSS (TUBE) SECTIONS	G40.21M - 350W (CLASS H)
CHANNELS, PLATES & ANGLES	G40.21M - 300W
CONNECTION BOLTS ANCHOR	A325 (BEARING TYPE)
BOLTS	A307
STAINLESS STEEL	MIN GRADE 304

1. FIELD AND SHOP CONNECTIONS SHALL BE WELDED OR HIGH TENSILE BOLTED (ASTM STANDARD A325).
2. WELDING SHALL CONFORM TO LATEST CSA SPECIFICATION W59 AND BE UNDERTAKEN BY A FABRICATOR APPROVED BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA SPECIFICATION W47.1.
3. ALL EXPOSED WELDS SHALL BE CONTINUOUS AND BE GROUND SMOOTH.
4. ALL EXTERIOR EXPOSED STRUCTURAL STEEL SHALL BE GALVANIZED OR UNLESS NOTED.
5. STRUCTURAL STEEL MEMBERS SHALL NOT BE SPLICED UNLESS APPROVED BY THE NCC REPRESENTATIVE IN WRITING.
6. WHERE STRUCTURAL STEEL MEMBERS SPECIFIED ON THE STRUCTURAL DRAWINGS ARE UNAVAILABLE TO THE CONTRACTOR, THE STRUCTURAL STEEL CONTRACTOR SHALL PROVIDE MEMBERS HAVING ALL SECTION PROPERTIES EQUAL TO OR BETTER THAN THAT OF THE SPECIFIED MEMBERS AT NO ADDITIONAL COST. CONTACT NCC REPRESENTATIVE FOR ACCEPTANCE OF ANY AND ALL SUBSTITUTIONS.
7. STRUCTURAL STEEL MEMBER DIMENSIONS (HEIGHT AND WIDTH) SHALL BE AS INDICATED AND/OR SPECIFIED. ALTERNATIVE SIZES (WIDTHS AND HEIGHTS) SHALL NOT BE ACCEPTABLE. TYPICAL.
8. GRATING TO BE STAINLESS STEEL AS MANUFACTURED BY HENDRICKS ARCHITECTURAL PRODUCTS CAPABLE OF SUPPORTING MINIMUM H-20 HIGHWAY VEHICULAR LOADING. SUBMIT STAMPED SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION.

5.0) SHOP DRAWINGS

1. SUBMIT SHOP DRAWINGS FOR ALL STRUCTURAL WORK AND ANY WORK AFFECTING THE STRUCTURE TO THE NCC REPRESENTATIVE. OBTAIN NCC REPRESENTATIVE APPROVAL BEFORE PROCEEDING WITH THE FABRICATION.
2. EACH OF THE FOLLOWING SHOP DRAWINGS MUST BEAR THE SIGNATURE AND STAMP OF A QUALIFIED PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE (PLUS OTHER DRAWINGS AS NOTED).
   a) DRAWINGS FOR ANY TEMPORARY WORK.
   b) DRAWINGS FOR ANY STRUCTURAL PARTS DESIGNED BY THE CONTRACTOR'S FORCES.
   c) FORMWORK
   d) CONCRETE REINFORCING STEEL
   e) STRUCTURAL STEEL AND CONNECTIONS.
   f) STEEL GRATING
3. SHOP DRAWINGS MUST BE REVIEWED AND STAMPED REVIEWED BY THE CONTRACTOR BEFORE ISSUING TO THE . NCC REPRESENTATIVE. SHOP DRAWINGS NOT STAMPED BY THE CONTRACTOR WILL BE REJECTED. ANY DELAYS IN THE CONSTRUCTION SCHEDULE DUE TO NONCOMPLIANCE WITH THIS REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. SUBMIT STRUCTURAL STEEL AND CONNECTIONS SHOP DRAWINGS FOR NCC REPRESENTATIVE'S REVIEW BEFORE FABRICATION. ALL SHOP DRAWINGS SHALL BEAR THE SEAL OF A REGISTERED PROFESSIONAL ENGINEER IN THE PROVINCE OF ONTARIO.
5. SHOP DRAWINGS ARE REVIEWED FOR CONFORMANCE WITH THE GENERAL DESIGN CONCEPT. THIS REVIEW DOES NOT IMPLY APPROVAL OF THE DETAILED DESIGN OR QUANTITIES DESCRIBED IN THE SHOP DRAWINGS. THE RESPONSIBILITY FOR THE QUANTITIES AND DETAILED DESIGN OF THE MATERIALS AND COMPONENTS AS REQUIRED TO PROVIDE THE COMPLETE AND SATISFACTORY JOB DESCRIBED IN THE DESIGN DOCUMENTS REMAINS WITH THE CONTRACTOR.

NOTES GÉNÉRALES ET DÉTAILS

1) RENSEIGNEMENTS GÉNÉRAUX

1. LES RENSEIGNEMENTS PRÉSENTÉS DANS CES DESSINS ONT FAIT L'OBJET DE DÉTAILS DE CONCEPTION ET D'ANALYSES CONFORMES AU CODE NATIONAL DU BÂTIMENT DU CANADA (ÉDITION DE 2010). ENTREPRENDRE LA CONSTRUCTION EN CONFORMITÉ AVEC LES PRÉSENTES DONNÉES AINSI QU'AVEC LES EXIGENCES DE TOUS LES AUTRES CODES PERTINENTS.

   1.1 STRUCTURE EN BÉTON, CONÇUE SELON LA NORME CSA A23.3.

   1.2 STRUCTURE EN ACIER, CONÇUE SELON LA NORME CSA-S16.01.

2. L'ENTREPRENEUR SE DEVRA DE VÉRIFIER ET (OU) DE COORDONNER TOUTES LES DIMENSIONS ET CE, EN COMPARANT LE TOUT AVEC LES DESSINS DE GÉNIE CIVIL ET (OU) D'ARCHITECTURE ET (OU) DE MÉCANIQUE ET (OU) D'ÉLECTRICITÉ ET (OU) D'AMÉNAGEMENT PAYSAGER AVANT LA MISE EN ROUTE DES PRÉSENTS TRAVAUX. SIGNALER TOUTE INCONSISTANCE AVANT LA MISE EN ROUTE DES TRAVAUX. LES OUVERTURES NON PRÉSENTÉES DANS LES DESSINS DE CHARPENTE DEVRONT ÊTRE APPROUVÉES PAR LE REPRÉSENTANT DE LA CCN ET CE, PAR ÉCRIT ET AVANT LA MISE EN ROUTE DES TRAVAUX DE CONSTRUCTION.
3. LES VERSIONS CADD DES DESSINS DE CHARPENTE DEVRONT ÊTRE MIS À LA DISPONIBILITÉ DE L'ENTREPRENEUR ET CE, MOYENNANT UN COÛT DE 50 $ (PLUS LA TVH) PAR DESSIN ET À LA CONDITION QU'UN AVIS DE LIBÉRATION SOIT BIEN REMPLI, AFIN D'INDEMNISER LA PERSONNE REPRÉSENTANT LA CCN CONTRE TOUTE ERREUR OU OMISSION SE RATTACHANT D'UNE FAÇON OU D'UNE AUTRE AUX FICHIERS EN VERSION CADD.
4. AUCUN ÉLÉMENT DE FONDATION NE DEVRA ÊTRE CONSTRUIT TANT ET AUSSI LONGTEMPS QU'UNE APPROBATION ÉCRITE DE LA CAPACITÉ PORTANTE ET DES SURFACES D'APPUI N'AURA PAS ÉTÉ ÉMISE PAR UN INGÉNIEUR GÉOTECHNIQUE À L'EMBAUCHE DE L'ENTREPRENEUR ET PAYÉ PAR CE DERNIER, CET INGÉNIEUR DEVANT PROCÉDER À UNE ÉTUDE COMPLÈTE DU SITE. LE FAIT DE NE PAS SE CONFORMER À LA PRÉSENTE EXIGENCE PEUT ENTRAÎNER L'ENLÈVEMENT ET (OU) LE REMONTAGE DE N'IMPORTE QUEL ÉLÉMENT DE FONDATION ET CE, AUX FRAIS DE L'ENTREPRENEUR.

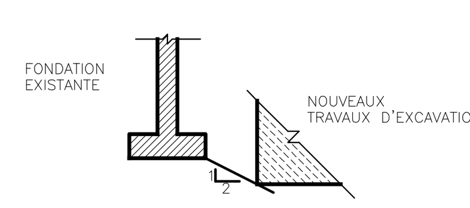
2) FONDATIONS

2.1 EMPATTEMENTS:

LES EMPATTEMENTS DEVRONT ÊTRE ASSISE SUR UN SOL NATIF NON DÉRANGÉ AYANT UNE CAPACITÉ PORTANTE MINIMALE DE 100 kPa.

2.2 À MOINS D'INDICATIONS CONTRAIRES, L'ON SE DEVRA DE PROTÉGER LA STABILITÉ LATÉRALE DES STRATES D'APPUI :

NE PAS CREUSER À DES POINTS PLUS BAS QU'UNE LIGNE SE PROLONGEANT VERS LE BAS ET CE, À PARTIR D'UNE STRATE D'APPUI DONT LA PENTE EST D'UN (1) ÉLÉMENT VERTICAL POUR DEUX (2) ÉLÉMENTS HORIZONTAUX. AJUSTER LES ÉLÉVATIONS DES EMPATTEMENTS ET DES TRANCHÉES DE FAÇON À RESPECTER LA PRÉSENTE EXIGENCE; VOIR LA REPRÉSENTATION SCHÉMATIQUE.



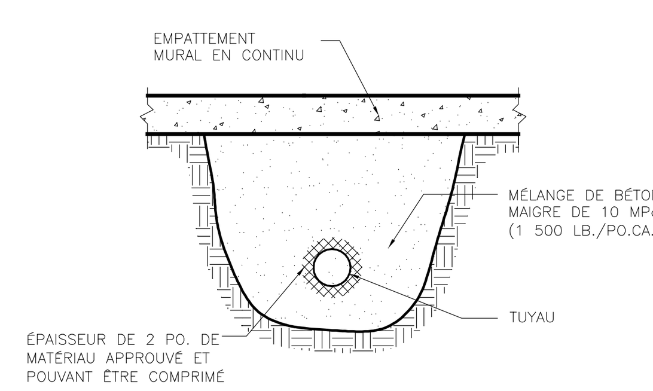
2.3 EXIGENCES DE RECOUVREMENT MINIMUM EN FONCTION DU GEL :

(NOTA. ACCROÎTRE LA PROFONDEUR SI L'INGÉNIEUR ET (OU) LE RAPPORT GÉOTECHNIQUE L'EXIGENT.)

À L'EMPLACEMENT DE BÂTIMENTS CHAUFFÉS : 1 500 mm (5'-0'')
À L'EMPLACEMENT DE BÂTIMENTS NON CHAUFFÉS : 1 800 mm (6'-0'')

2.4 TUYAUX DE CROISEMENT EN DESSOUS D'UN EMPATTEMENT EN CONTINU :

NOTA – LES ENDROITS Où LES TUYAUX TRAVERSENT EN DESSOUS D'EMPATTEMENTS DEVRONT ÊTRE APPROUVÉS PAR LA PERSONNE REPRÉSENTANT LA CCN ET CE, PAR ÉCRIT ET AVANT LA MISE EN ROUTE DES TRAVAUX. LA PERSONNE REPRÉSENTANT LA CCN SE RÉSERVE LE DROIT DE DEMANDER LE DÉPLACEMENT DE TUYAUX ET CE, EN CONFORMITÉ AVEC LES EXIGENCES; ALTERNATIVEMENT, CETTE PERSONNE PEUT EXIGER LE SURBAISSEMENT DE LA PROFONDEUR DES EMPATTEMENTS ET CE, EN FONCTION DU BESOIN.



3) BÉTON

3.1 RECOUVREMENT DE BÉTON : (À L'ÉTAT DÉGAGÉ JUSQU'AUX ARMATURES)

SOUS-FACE DES EMPATTEMENTS (CONTRE LE SOL)	75 mm (3 PO.)
EMPATTEMENTS (PARTIES LATÉRALES ET SUPÉRIEURE)	50 mm (2 PO.)
MURS ET DALLE STRUCTURAL	40 mm (1-1/2 PO.)

3.2 ACIER DE RENFORT

1. L'ESPACEMENT DES BARRES DEVRA ÊTRE APPROXIMATIVEMENT UNIFORME À L'INTÉRIEUR DES ÉLÉMENTS EN BÉTON. NE PAS ÉLIMINER NI DÉPLACER LES ARMATURES POUR ACCOMMODER DE LA QUINCAILLERIE. TOUTES LES MODIFICATIONS DEVRONT ÊTRE APPROUVÉES PAR LA PERSONNE REPRÉSENTANT LA CCN ET CE, AVANT LE COULAGE PROPREMENT DIT DU BÉTON.
2. TOUS LES CHEVAUCHEMENTS ET TOUS LES TRAVAUX DE NOYAGE DE GOUJONS DEVRONT ÊTRE FONDÉS SUR UNE FORMULE DE 24 DIAMÈTRES DE BARRE; ADVENANT QU'IL N'Y AIT AUCUNE SPÉCIFICATION PRÉCISÉE À CE SUJET, LA VALEUR NE DEVRA PAS ÊTRE INFÉRIEURE À 600 mm. LE CHEVAUCHEMENT DU TREILLIS À FIL MÉTALLIQUE DEVRA AU MOINS CORRESPONDRE À 150 mm.

EXIGENCES SE RAPPORTANT À DES BARRES D'ARMATURE TYPIQUES :

CHEVAUCHEMENTS, SELON LES INDICATIONS DES DESSINS

≥ 36 DIAM. DE BARRE
≥ 600 mm(24 PO.)

DÉSIGNATION DES BARRES :

VALEUR MÉTRIQUE : 10-15M = 10 BARRES DE GROSSEUR 15M

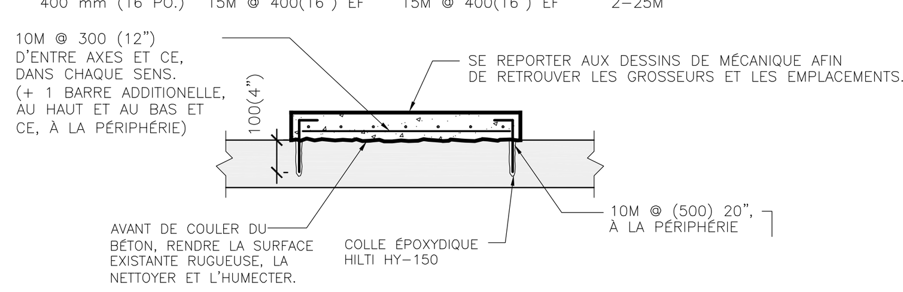
PRÉVOIR DES CROCHETS STANDARD AUX ENDROITS Où LES BARRES SUPÉRIEURES SE TERMINENT LE LONG DE REBORDS.

3. À MOINS D'INDICATIONS CONTRAIRES, ALIGNER TOUS LES GOUJONS AVEC LA PARTIE VERTICALE DE L'ACIER À L'HORIZONTALE À L'INTÉRIEUR DE L'ÉLÉMENT STRUCTUREL.
4. SOUMETTRE DES DESSINS D'ATELIERS DÉTAILLANTS LES ACIER DE RENFORTS SELON LE MANUEL DES NORMES DE PRATIQUE RSIC.

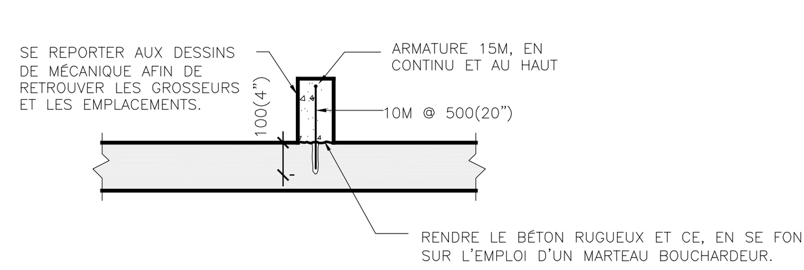
3.3 ARMATURES MURALES MINIMALES :

À MOINS D'INDICATIONS CONTRAIRES, PRÉVOIR CE QUI SUIT :

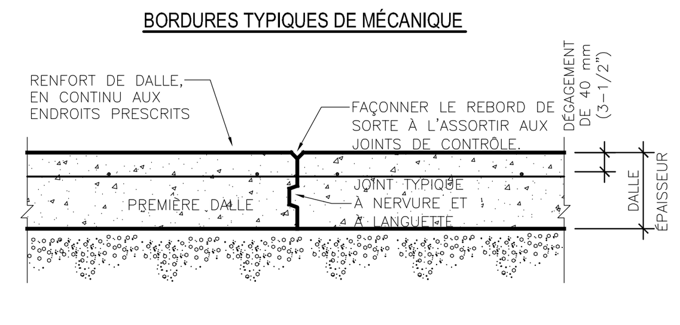
ÉPAISSEUR MURALE	BARRES, À LA VERTICALE (.0025Ag)	BARRES, À L'HORIZONTALE (.0025Ag)	À LA VERTICALE ET À CHAQUE EXTRÉMITÉ
150 mm (6 PO.)	10M @ 250(10")	10M @ 250(10")	1-15M
200 mm (8 PO.)	15M @ 400(16")	15M @ 400(16")	1-20M
250 mm (10 PO.)	10M @ 300(12") EF	10M @ 300(12") EF	2-20M
300 mm (12 PO.)	10M @ 250(10") EF	10M @ 250(10") EF	2-20M
550 mm (14 PO.)	15M @ 450(18") EF	15M @ 450(18") EF	2-25M
400 mm (16 PO.)	15M @ 400(16") EF	15M @ 400(16") EF	2-25M



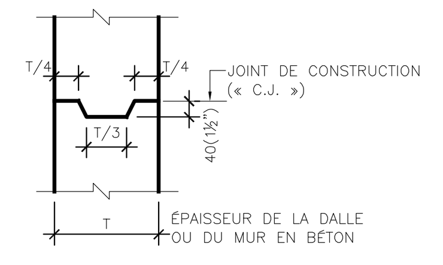
DALLES TYPIQUES DE MÉCANIQUE



BORDURES TYPIQUES DE MÉCANIQUE



JOINT DE CONSTRUCTION DANS UNE DALLE SUR SOL
JOINT À NERVURE ET À LANGUETTE



DÉTAIL CLÉ – JOINT DE CONSTRUCTION

3.4 MÉLANGES À BÉTON

DOSER LE BÉTON À DENSITÉ NORMALE EN CONFORMITÉ AVEC LA NORME CAN/CSA-A23.1 ET CE, AFIN D'OBTENIR LA QUALITÉ CI-APRÈS POUR L'ENSEMBLE DU BÉTON INDIQUÉ.

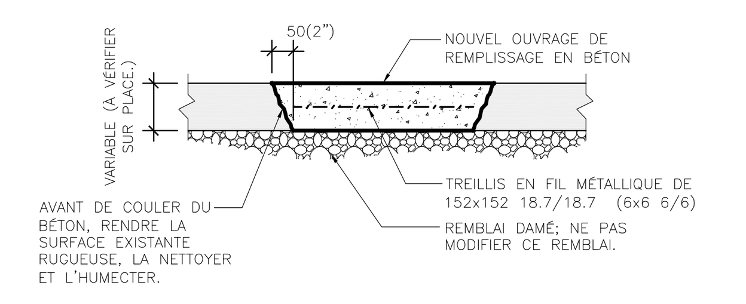
28 JOURS EMPLACEMENT	RÉSISTANCE	AFFAISSEMENT	CLASSE D'EXPOSITION
DALLE SUR SOL	32 MPa(4700psi)	75 mm (3 PO.)	C-2
MURS DE FONDATION	25 MPa(3600psi)	75 mm (3 PO.)	F-2
EMPATTEMENTS	30 MPa(4400psi)	75 mm (3 PO.)	N
RADIER	35 MPa(5050psi)	75 mm (3 PO.)	N
DALLE STUCTURAL	35 MPa(5050psi)	75 mm (3 PO.)	C-1

*NOTA. TOUT LE BÉTON EXPOSÉ À DES CONDITIONS D'EXTÉRIEUR DEVRA PRÉSENTER UN ENTRAÎNEMENT D'AIR D'AU MOINS 6 P. 100.

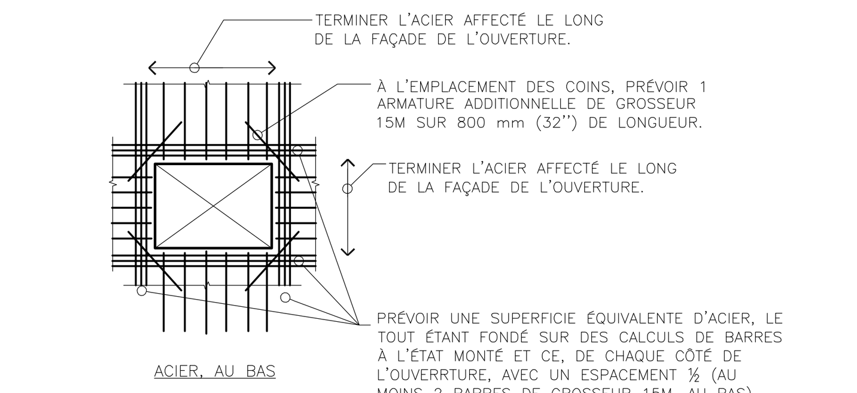
LES DOSAGES DU BÉTON MÉLANGÉ À L'AVANCE ET DU BÉTON SUR PLACE DEVRONT ÊTRE CONFORMES AUX EXIGENCES DE LA CLAUSE 12 DE LA NORME CSA A23.1 ET SELON CE QUI SUIT :

1. EXCEPTION FAITE DE MÉLANGES À PLANCHER, SI L'ON SE PROPOSE D'UTILISER UNE LAITANCE HYDRAULIQUE CIMENTAIRE ET (OU) DU CIMENT PORTLAND À DOSAGE NORMAL, LA CONCENTRATION DE LAITANCE NE DEVRA PAS ÊTRE SUPÉRIEURE À 25 P. 100 DE LA MASSE TOTALE DE CIMENT. DANS LE CAS DES MÉLANGES À PLANCHER EN BÉTON, LE VOLUME TOTAL DE CIMENT DEVRA ÊTRE COMME SUIT : 100 P. 100 DE CIMENT PORTLAND STANDARD.
2. PRODUIRE UN CERTIFICAT ATTESTANT QUE LES DOSAGES DES MÉLANGES CHOISIS PRODUIRONT DU BÉTON AYANT LA QUALITÉ ET LA VALEUR DE FLÉCHISSEMENT PRESCRITES ET QUE LA RÉSISTANCE DU BÉTON SERA CONFORME AUX STIPULATIONS PERTINENTES DE LA NORME CAN/CSA-A23.1-M06.
3. IL SERA INTERDIT D'UTILISER DU CHLORURE DE CALCIUM.
4. NE PAS CHANGER LE MÉLANGE À BÉTON SANS L'APPROBATION ANTÉRIEURE DU REPRÉSENTANT DE LA CCN À CE SUJET. ADVENANT LA PROPOSITION D'UN CHANGEMENT AU NIVEAU DE LA SOURCE DES MATÉRIAUX, LE NOUVEAU DOSAGE DU MÉLANGE DEVRA ALORS ÊTRE APPROUVÉ PAR LE REPRÉSENTANT DE LA CCN.

3.5 TRAVAUX D'ENLÈVEMENT ET (OU) DE REMISE EN ÉTAT DE DALLES SUR SOL



3.6 À MOINS D'INDICATIONS CONTRAIRES, DÉTAIL DE FAÇONNAGE TYPIQUE D'UNE OUVERTURE DANS UNE DALLE



4.0) ACIER

4.1 ACIER DE CONSTRUCTION

À MOINS D'INDICATIONS CONTRAIRES, L'ACIER DE CONSTRUCTION DEVRA ÊTRE CONFORME AUX EXIGENCES PERTINENTES DE LA NORME CAN/CSA-S16-01(06).

ARTICLE	DEVIS PERTINENT
SECTIONS OU PROFILÉS ROULÉS;	G40.21M - 350W
PROFILÉ CREUX EN ACIER (TUBE);	G40.21M - 350W (CLASS H)
PROFILÉ C, CORNIÈRE, PLAQUE	G40.21M - 300W
BOULONS DE RACCORDEMENT;	A325 (DE TYPE PORTEUR)
BOULONS D'ANCRAGE	A307
ACIER INOXIDABLE	NUANCE MINIMALE 304

1. LES CONNEXIONS SUR PLACE ET EN ATELIER DEVRONT ÊTRE SOUDÉES OU AMÉNAGÉES AVEC DES BOULONS DE GRANDE RÉSISTANCE ET CE, SELON LA NORME A325 DE L'ASTM.
2. LES TRAVAUX DE SOUDAGE DEVRONT ÊTRE CONFORMES À LA PLUS RÉCENTE ÉDITION DE LA NORME CSA W59 ET LEUR RÉALISATION DEVRA RELEVER D'UN FABRICANT APPROUVÉ PAR LE BUREAU CANADIEN DE SOUDAGE ET CE, EN CONFORMITÉ AVEC LES EXIGENCES DE LA NORME CSA W47.1.
3. TOUTES LES SOUDURES APPARENTES DEVRONT ÊTRE FAÇONNÉES EN CONTINU ET ÊTRE LISSÉES JUSQU'À L'OBTENTION D'UN FINI LISSE.
4. TOUT L'ACIER STRUCTUREL ET APPARENT À L'EXTÉRIEUR DEVRA ÊTRE GALVANISÉ.
5. NE PAS ÉPISSER LES MEMBRURES EN ACIER DE CONSTRUCTION, SAUF SI LE REPRÉSENTANT DE LA CCN APPROUVE LA CHOSE PAR ÉCRIT.
6. ADVENANT QU'IL S'AVÈRE IMPOSSIBLE POUR L'ENTREPRENEUR D'OBTENIR DES MEMBRURES EN ACIER DE CONSTRUCTION QUI SONT PRESCRITES DANS LES DESSINS DE CHARPENTE, L'ENTREPRENEUR CHARGÉ DE L'ACIER DE CONSTRUCTION SE DEVRA ALORS DE PRÉVOIR DES MEMBRURES AYANT AU MOINS LES MÊMES PROPRIÉTÉS EN COUPE QUE CELLES DES MEMBRURES PRESCRITES ET CE, SANS QUE LA CHOSE N'ENTRAÎNE DES COÛTS ADDITIONNELS. L'ON SE DEVRA DE COMMUNIQUER AVEC LE REPRÉSENTANT DE LA CCN RELATIVEMENT À L'ACCEPTATION DE N'IMPORTE QUEL PRODUIT DE SUBSTITUTION.
8. LES DIMENSIONS (HAUTEUR ET LARGEUR) DES MEMBRURES STRUCTURELLES EN ACIER DEVRONT ÊTRE CONFORMES AUX INDICATIONS ET (OU) AUX STIPULATIONS PERTINENTES DU DEVIS. DES FORMATS ALTERNATIFS (HAUTEUR ET LARGEUR) NE SERONT PAS ACCEPTABLES; IL S'AGIT ICI D'UN DÉTAIL TYPIQUE.
9. LE CAILLEBOTIS DOIT ÊTRE EN ACIER GALVANISÉ TEL QUE FABRIQUÉ PAR HENDRICKS ARCHITECTURAL PRODUCTS, CAPABLE DE SUPPORTER DES CHARGES MINIMAL DE TRAFIC H-20. SOUMETTRE DES DESSINS D'ATELIER SCELLÉ PAR UN INGÉNIEUR ACCRÉDITÉ À PRATIQUER SA PROFESSION EN ONTARIO POUR POUR RÉVISION AVANT DE PROCÉDER À LA FABRICATION.

5.0) DESSINS D'ATELIER

1. PRODUIRE DES DESSINS D'ATELIER POUR TOUS LES TRAVAUX DE CHARPENTE ET TOUS LES TRAVAUX AFFECTANT LA STRUCTURE ET LES PRÉSENTER À LA PERSONNE REPRÉSENTANT LA CCN. LES FAIRE APPROUVER PAR CE REPRÉSENTANT AVANT D'ENTREPRENDRE LA FABRICATION.
2. CHACUN DES DESSINS D'ATELIER DOIT PORTER LE SCEAU ET LA SIGNATURE D'UN INGÉNIEUR QUALIFIÉ ET DÛMENT AUTORISÉ À PRATIQUE DANS LA PROVINCE Où S'EFFECTUENT LES TRAVAUX (ET CE, COMPTE TENU DES AUTRES DESSINS ANNOTÉS).
   a) DESSINS POUR TOUS LES TRAVAUX TEMPORAIRES.
   b) DESSINS POUR TOUTE PARTIE STRUCTURELLE CONÇUE PAR LES PERSONNES REPRÉSENTANT L'ENTREPRENEUR.
   c) TRAVAUX DE COFFRAGE
   d) ARCIER D'ARMATURE
   e) ACIER DE CONSTRUCTION AINSI QUE LES CONNECTIONS.
   f) GRILLE EN ACIER
3. LES DESSINS D'ATELIER DEVRONT ÊTRE PASSÉS EN REVUE ET ESTAMPILLÉS PAR L'ENTREPRENEUR ET CE, AVANT DE LES PRÉSENTER À L'EXAMEN DE LA PERSONNE REPRÉSENTANT LA CCN. LES DESSINS D'ATELIER NON ESTAMPILLÉS PAR L'ENTREPRENEUR SERONT TOUT SIMPLEMENT REJETÉS. TOUT DÉLAI DANS LA CONSTRUCTION QUI POURRAIT ÊTRE PROVOQUÉ PAR LE FAIT DE NE PAS SE CONFORMER À LA PRÉSENTE EXIGENCE DEVRA ÊTRE ASSUMÉ PAR L'ENTREPRENEUR
4. SOUMETTRE DES DESSINS D'ATELIER DE L'ACIER DE CONSTRUCTION À L'EXAMEN DE LA PERSONNE REPRÉSENTANT LA CCN ET CE, AVANT LA FABRICATION PROPREMENT DITE. TOUS LES DESSINS D'ATELIER DEVRONT PORTER LE SCEAU D'UN INGÉNIEUR ACCRÉDITÉ À PRATIQUER SA PROFESSION EN ONTARIO.
5. LA RÉVISION DES DESSINS D'ATELIER EST FONDÉE SUR LE FAIT QUE LE TOUT DOIT ÊTRE CONFORME AUX EXIGENCES DE CONCEPTION GÉNÉRALE. CETTE RÉVISION NE CONSTITUE PAS UNE APPROBATION DE LA CONCEPTION DÉTAILLÉE NI DES QUANTITÉS AVANCÉES DANS LES DESSINS D'ATELIER. LA RESPONSABILITÉ PAR RAPPORT AUX QUANTITÉS ET À LA CONCEPTION DÉTAILLÉE DES MATÉRIAUX ET DES PIÈCES COMPOSANTES QUI S'AVÈRENT NÉCESSAIRES POUR EN ARRIVER À UN OUVRAGE EN TOUT POINT COMPLET ET SATISFAISANT ET CE, EN CONFORMITÉ AVEC LES PRÉCISIONS COMPRISES DANS LES DOCUMENTS DE CONCEPTION, RELÈVENT TOUT SIMPLEMENT DU PRÉSENT ENTREPRENEUR.

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Direction de la gestion de l'immobilier, design et construction

Design and Construction Division
Division design et construction

director - Daniel Miron - directeur

consultant
expert-conseil

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CJE PROJECT No. 12-2234C

issued or revised
émis ou revisé

no.	description	date
2	ISSUED FOR TENDER DOCUMENT POUR SOUMISSION	APR 13, 2016 13 AVRIL 2016
1	ISSUED FOR 100% REVIEW DOCUMENT À 100%, À FAIRE RÉVISER.	MAR 24, 2016 24 MAR. 2016

project
projet
NCC RESIDENCE FRONT ENTRANCE LANDSCAPE REHABILATION 2016
RÉFECTION DE L'ENTRÉE PRINCIPALE DU RÉSIDENCE CCN 2016

drawing
dessin
STRUCTURAL GENERAL NOTES
CHARPENTE - NOTES GÉNÉRALES

approved by / approuvé par: B. WEATHERDON
designed by / conçu par: E. RICHER
drawn by / dessiné par: M. EPPICH
date: 11/02/2012
scale / échelle: AS SHOWN
NCC project no. / no. du projet de la CCN: DC-2611-110
sheet no. / no. de la feuille: S0-1

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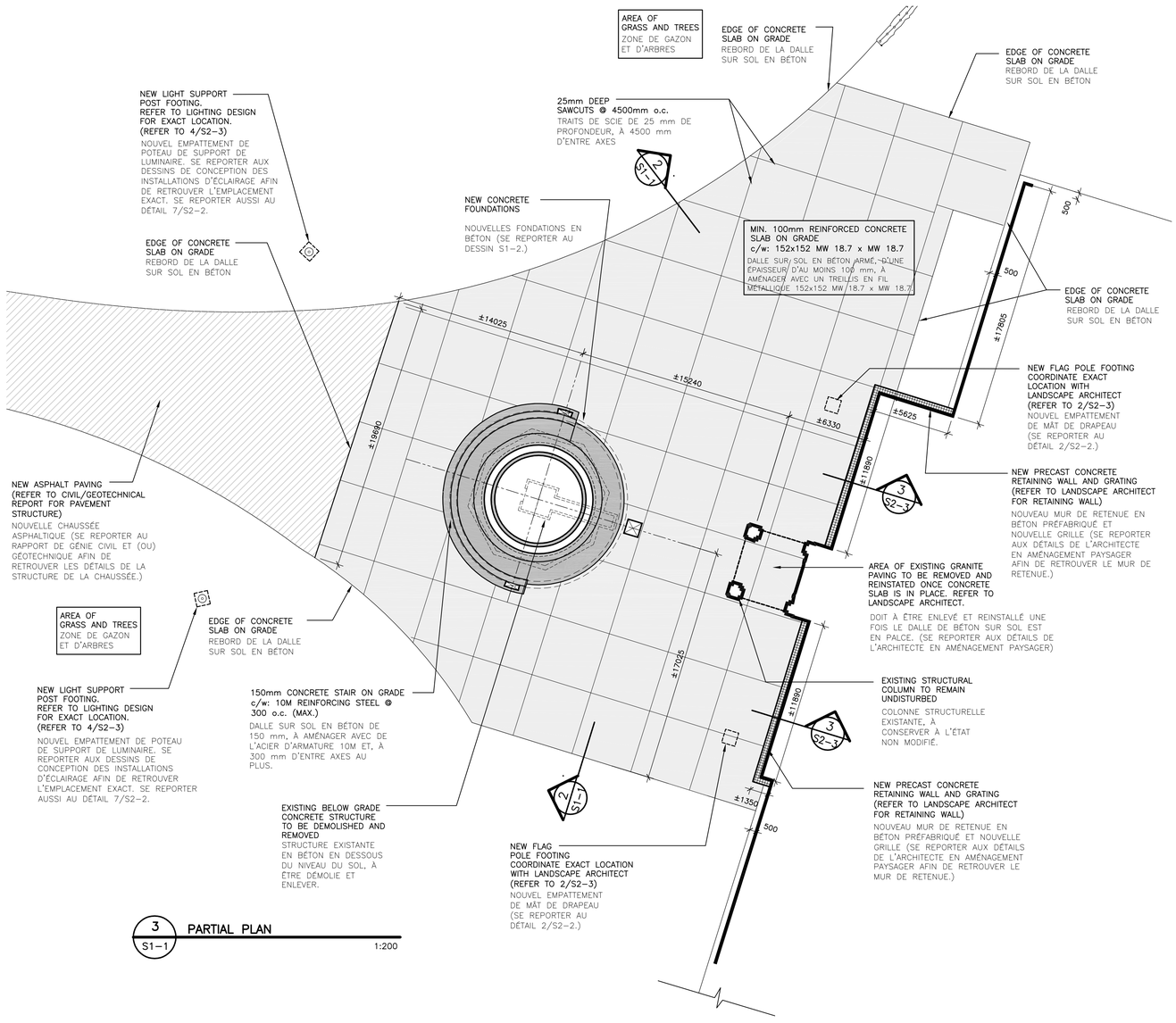
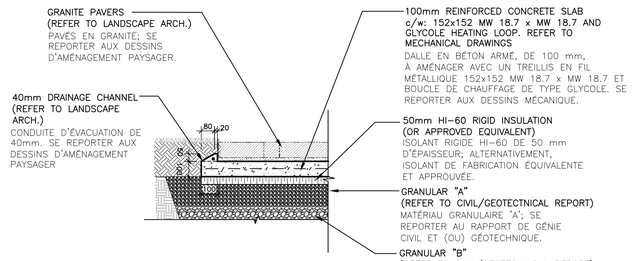
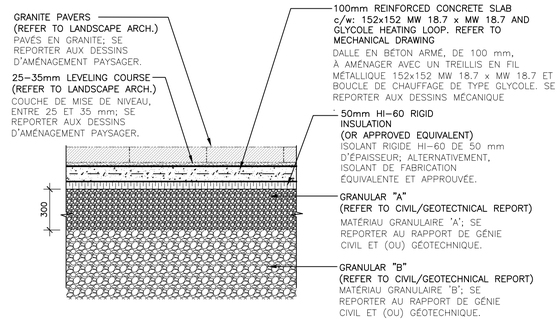


3 S1–1 **PARTIAL PLAN** 1:200



2 S1–1 **SECTION: CONCRETE SLAB EDGE** 1:15
COUPE: REBORT DE DALLE EN BÉTON



1 S1–1 **SECTION: TYPICAL CONCRETE SLAB ASSEMBLY (HEATED AREA)** 1:20
COUPE : ENSEMBLE TYPIQUE DE DALLE EN BÉTON (ZONE CHAUFFÉE)

DRAWINGS NOTES:

1. CONFIRM ALL DIMENSIONS ON SITE AND REPORT ANY DESCREPENCIES TO THE NCC REPRESENTATIVE.
2. CO–ORDINATE ALL DIMENSIONS WITH LANDSCAPE ARCHITECT DRAWINGS.
3. DO NOT SCALE THIS DRAWING.
4. CONCRETE SLAB ON GRADE:
   – REFER TO GENERAL NOTES ON S0–1 FOR CONCRETE MIX SPECIFICATIONS
5. 50mm OF HI–60 RIGID INSULATION TO BE INSTALLED BELOW THE SLAB ON GRADE UNLESS OTHERWISE NOTED.

NOTES DU DESSIN :

1. CONFIRMER TOUTES LES DIMENSIONS SUR PLACE ET FAIRE ÉTAT DES CONTRADICTIONS À LA PERSONNE REPRÉSENTANT LA CCN.
2. TOUTES LES DIMENSIONS DEVRONT FAIRE L'OBJET D'UNE COORDINATION AVEC LES DESSINS DE L'ARCHITECTE EN AMÉNAGEMENT PAYSAGER.
3. NE PAS SE SERVIR DU PRÉSENT DESSIN POUR PRÉLEVER DES MESURES À L'ÉCHELLE.
4. DALLE SUR SOL EN BÉTON :
   – SE REPORTER AUX NOTES GÉNÉRALES DU DESSIN S0–1 AFIN DE RETROUVER LES SPÉCIFICATIONS PORTANT SUR LES MÉLANGES DU BÉTON.
5. ÉPAISSEUR D'ISOLANT RIGIDE HI–60 DE 50 mm; À MOINS D'INDICATIONS CONTRAIRES, À MONTER EN DESSOUS DE LA DALLE SUR SOL.

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Division design et construction

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CLELAND JARDINE ENGINEERING LTD
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(6 1 3) 5 9 1 – 1 5 3 3

CJE PROJECT No. 12-2234C

LICENSED PROFESSIONAL ENGINEER
B. G. WEATHERDON
100128246
PROVINCE OF ONTARIO

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no.	description	date
2	ISSUED FOR TENDER DOCUMENT POUR SOUMISSION	APR 13, 2016 13 AVRIL 2016
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RÉFECTION DE L'ENTRÉE PRINCIPALE DU RÉSIDENCE CCN 2016

drawing
dessin

STRUCTURAL PLAN AND DETAILS
PLAN DES TRAVAUX DE CHARPENTE ET DÉTAILS

approved by approuvé par	B. WEATHERDON		
designed by conçu par	E.RICHER		
drawn by dessiné par	M. EPPICH		
date	11/02/2012	scale échelle	AS SHOWN
NCC project no. no. du projet de la CCN	DC-2611-110	sheet no. no. de la feuille	S1-1

DESIGN LOADS:

FOUNTAIN STRUCTURAL SLAB

DEAD LOAD:

PAVERS	2.50 kPa
800 STRUCTURAL SLAB	20.32 kPa
M&E	0.50 kPa

LIVE LOAD: 12.00 kPa

FOUNTAIN RAFT SLAB:

DEAD LOAD:

450 SLAB 11.43 kPa

LIVE LOAD: 4.80 kPa

CHARGES DE CONCEPTION:

DALLE STRUCTURAL DE LA FONTAINE

CHARGE PERMANENTE:

PAVÉS EN GRANITE	2.50 kPa
DALLE STRUCTURAL 800	20.32 kPa
MÉCHANIQUE ET ÉLECTRIQUE	0.50 kPa

CHARGE VIVE: 12.00 kPa

RADIER DE LA FONTAINE:

CHARGE PERMANENTE:

DALLE 450 11.43 kPa

CHARGE VIVE: 4.80 kPa

FOOTING SCHEDULE
NOMENCLATURE DES EMPATTEMENTS

MARK MARQUE	SIZE GROSSEUR	REINFORCING ARMATURE
F1	300 Dp BASE SLAB DALLE 300 mm DE PROFONDEUR	15M @ 250 EACH WAY EACH FACE 15M, À 250 mm D'ENTRE AXES ET CE, DANS CHAQUE SENS ET SUR LA FACE INFÉRIEUR ET SUPÉRIEUR
F2	600x300 Dp CONT. (CURVED STRIP FOOTING) 600 mm SUR 300 mm DE PROFONDEUR ET EN CONTINU (EMPATTEMENT EN CONTINU ET DE TYPE COURBÉ)	4–15M BOTTOM CONT. c/w: 15M DOWELS @ 300mm o.c. EACH FACE 4 ARMATURES 15M, EN CONTINU ET AU BAS, À AMÉNAGER AVEC DES GOUJONS 15M, À 300 mm D'ENTRE AXES ET CE, DANS CHAQUE FAÇADE.
F3	450 Dp RAFT SLAB RADIER EN BÉTON ARMÉE D'UNE ÉPAISSEUR DE 450	25M @ 250 o.c EACH WAY EACH FACE 25M, À 250 mm D'ENTRE AXES ET CE, DANS CHAQUE SENS ET SUR LA FACE INFÉRIEUR ET SUPÉRIEUR

NOTES:
1. CONCRETE STRENGTH: fc' = 30 MPa
2. QUALIFIED GEOTECHNICAL ENGINEER TO REVIEW ALL BEARING SURFACES PRIOR TO CONCRETE PLACEMENT.

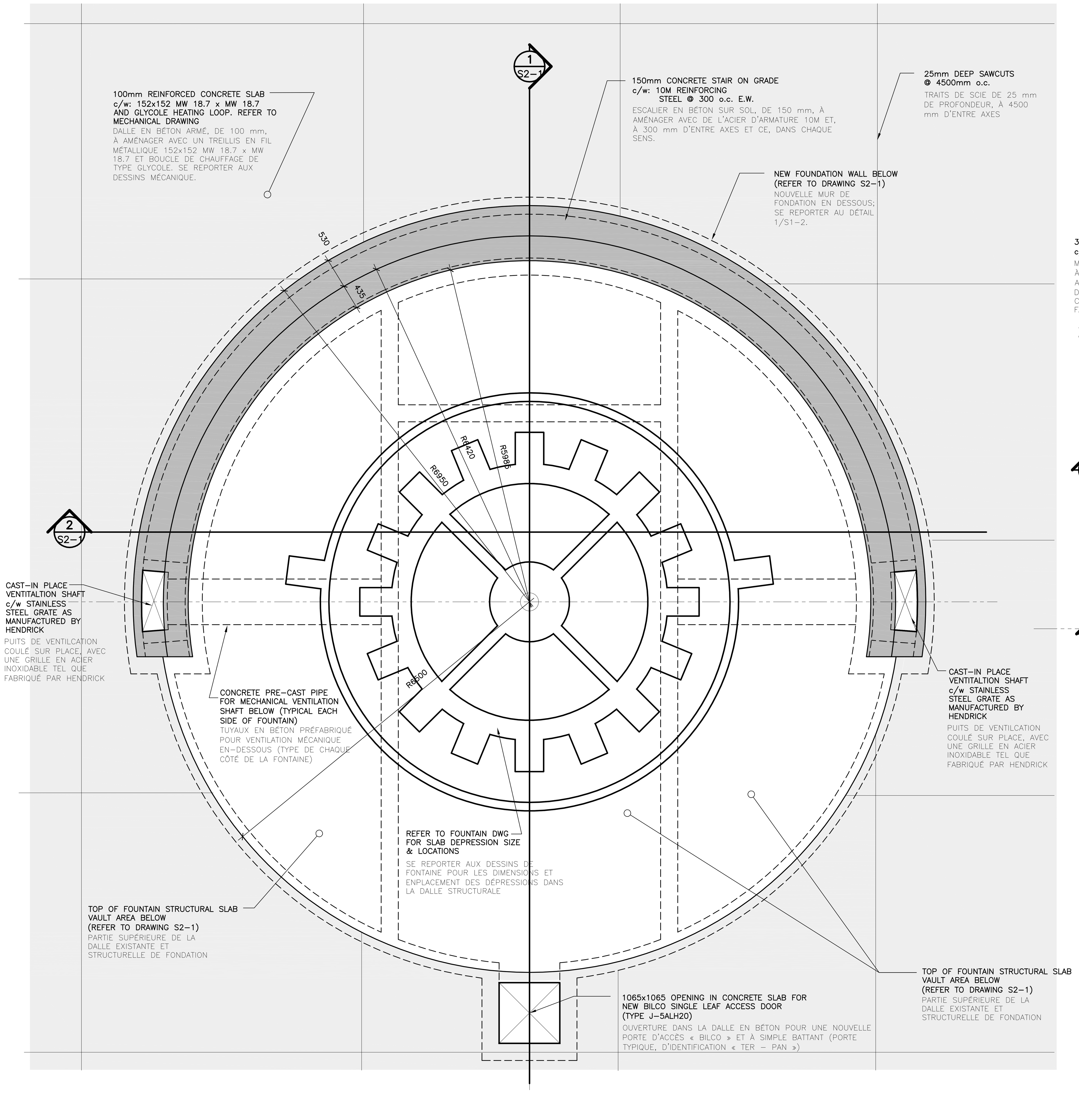
NOTES:
1. RÉSISTANCE DU BÉTON : fc' = 30 MPa
2. UN INGÉNIEUR GÉOTECHNIQUE QUALIFIÉ DEVRA PASSER EN REVUE TOUTES LES SURFACES D'APPUI ET CE, AVANT DE COULER DU BÉTON.

DRAWINGS NOTES:

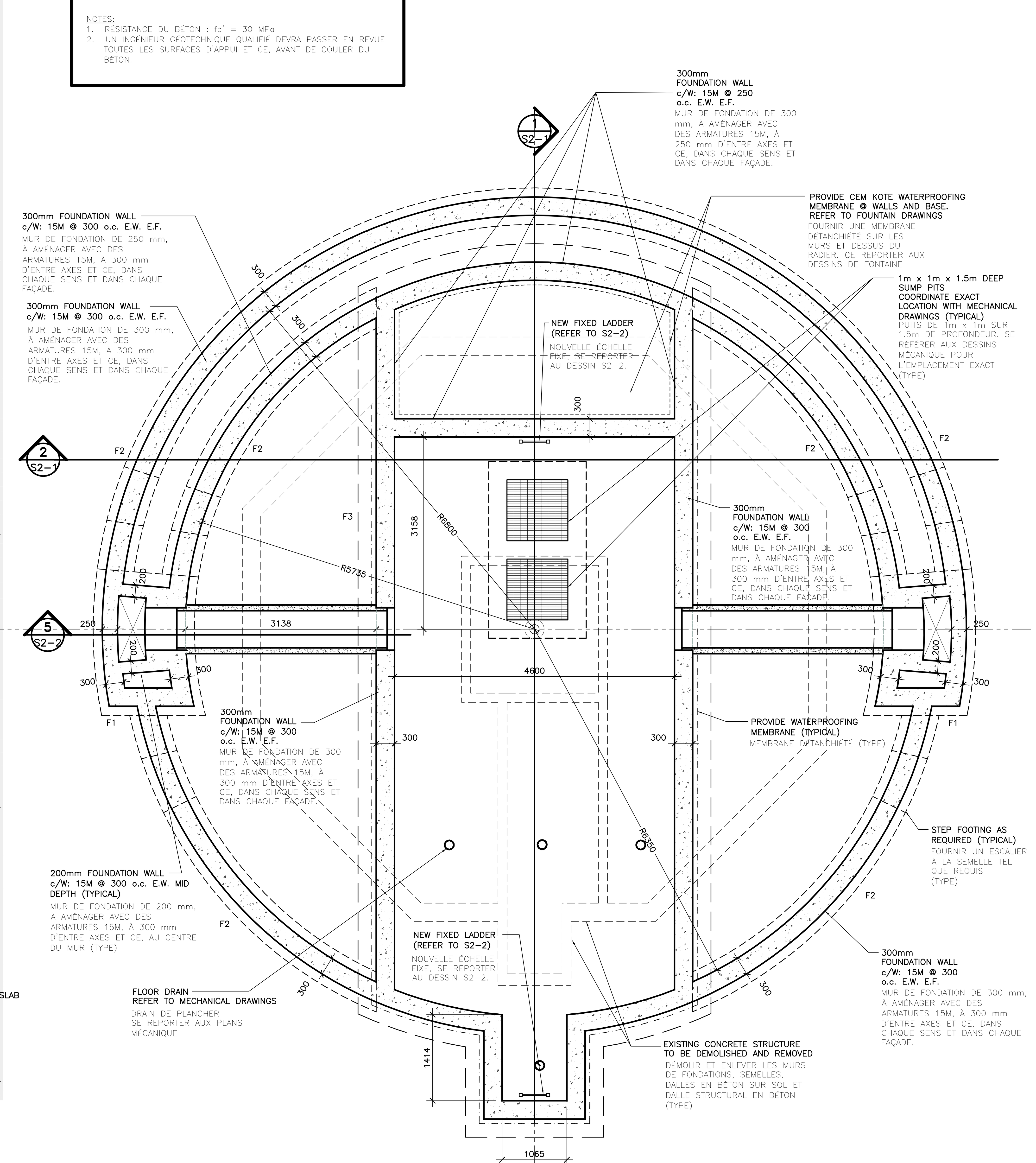
1. CONFIRM ALL DIMENSIONS ON SITE AND REPORT ANY DESCREPENCIES TO THE NCC REPRESENTATIVE.
2. CO-ORDINATE ALL DIMENSIONS WITH LANDSCAPE ARCHITECT DRAWINGS.
3. DO NOT SCALE THIS DRAWING.
4. CONCRETE SLAB ON GRADE:
   -REFER TO GENERAL NOTES ON S0-1 FOR CONCRETE MIX SPECIFICATIONS
5. 50mm OF HI-60 RIGID INSULATION TO BE INSTALLED BELOW THE SLAB ON GRADE UNLESS OTHERWISE NOTED.

NOTES DU DESSIN :

1. CONFIRMER TOUTES LES DIMENSIONS SUR PLACE ET FAIRE ÉTAT DES CONTRADICTIONS À LA PERSONNE REPRÉSENTANT LA CCN.
2. TOUTES LES DIMENSIONS DEVRONT FAIRE L'OBJET D'UNE COORDINATION AVEC LES DESSINS DE L'ARCHITECTE EN AMÉNAGEMENT PAYSAGER.
3. NE PAS SE SERVIR DU PRÉSENT DESSIN POUR PRÉLEVER DES MESURES À L'ÉCHELLE.
4. DALLE SUR SOL EN BÉTON :
   – SE REPORTER AUX NOTES GÉNÉRALES DU DESSIN S0-1 AFIN DE RETROUVER LES SPÉCIFICATIONS PORTANT SUR LES MÉLANGES DU BÉTON.
5. ÉPAISSEUR D'ISOLANT RIGIDE HI-60 DE 50 mm; À MOINS D'INDICATIONS CONTRAIRES, À MONTER EN DESSOUS DE LA DALLE SUR SOL.



2 / S1-2 **PLAN: FOUNTAIN @ TOP OF CONCRETE SLAB** 1:50
PLAN : FONTAINE, À LA HAUTEUR DE LA PARTIE SUPÉRIEURE DE LA DALLE EN BÉTON



1 / S1-2 **PLAN: FOUNTAIN FOUNDATION** 1:50
PLAN : FONDATION DE LA FONTAINE

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FOUNTAIN FOUNDATION PLAN AND FOOTING SCHEDULE
PLAN DE LA FONTAINE ET NOMENCLATURE DES EMPATTEMENTS

approved by / approuvé par	B. WEATHERDON
designed by / conçu par	B. WEATHERDON
drawn by / dessiné par	M. EPPICH
date	11/02/2012
scale / échelle	AS SHOWN
NCC project no. / no. du projet de la CCN	DC-2611-110
sheet no. / no. de la feuille	S1-2

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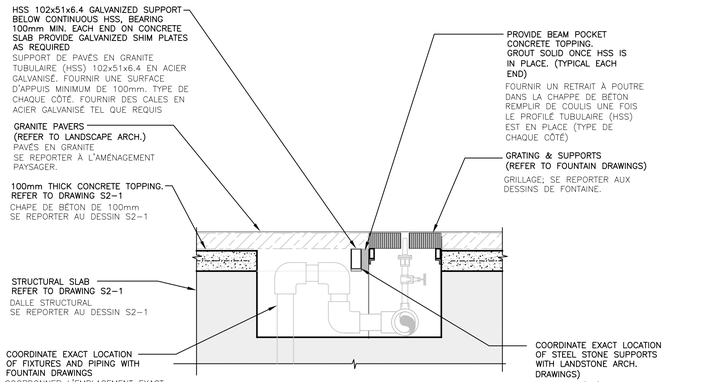
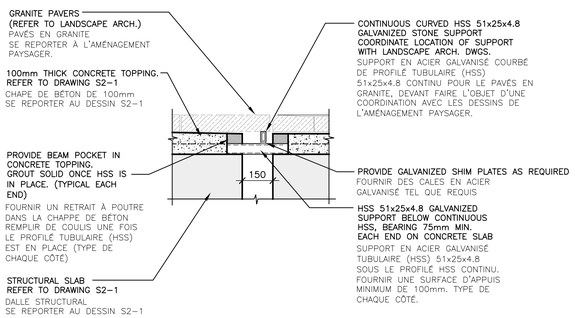
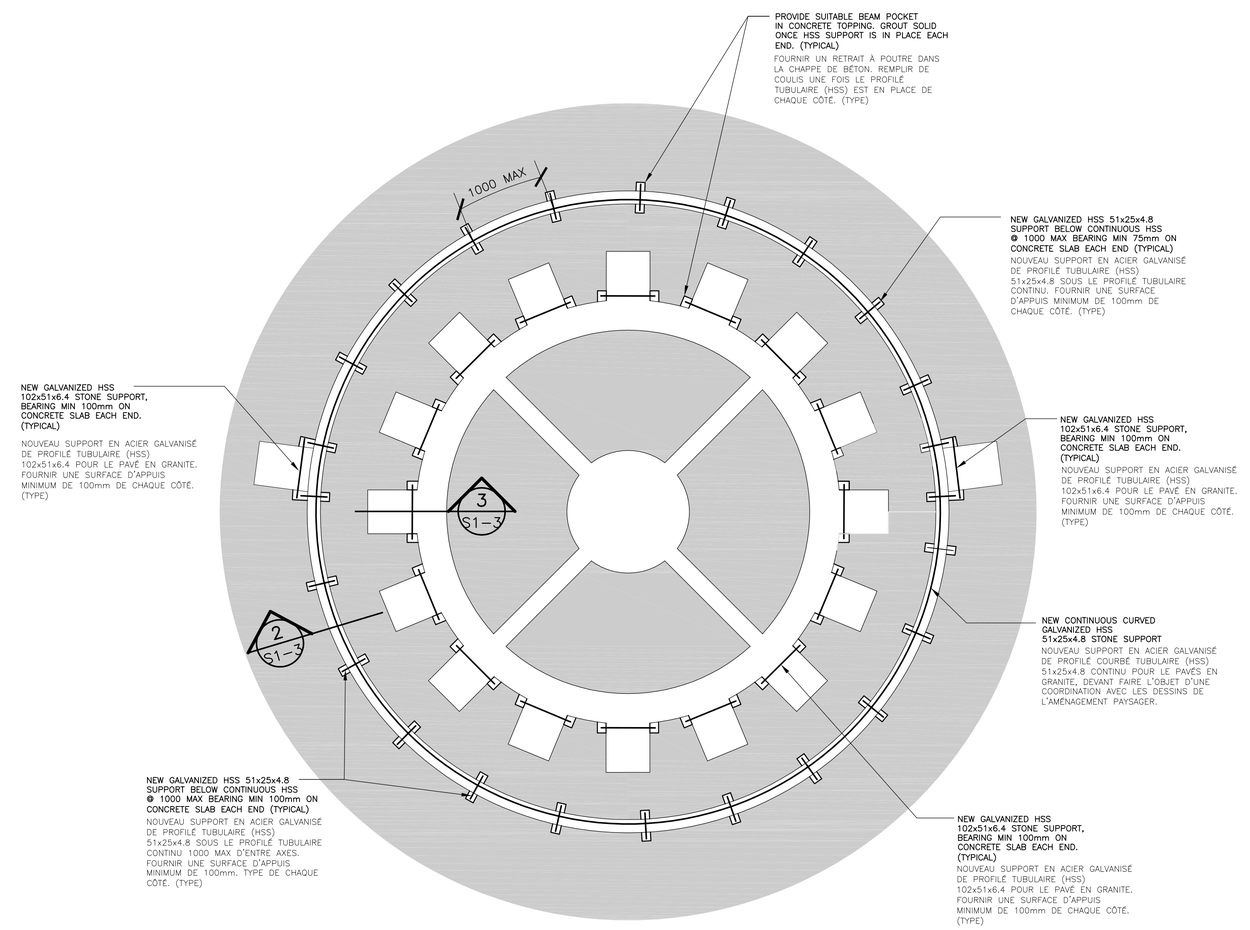


3 / S1–3 **SECTION: STONE SUPPORT**
COUPE : SUPPORT DE PAVÉ EN GRANITE 1:15



2 / S1–3 **SECTION: STONE SUPPORT**
COUPE : SUPPORT DE PAVÉ EN GRANITE 1:15



1 / S1–3 **PARTIAL PLAN: STONE SUPPORTS**
PLAN PARTIEL: SUPPORT DE PAVÉ EN GRANITE 1:35

NOTE:
COORDINATE EXACT LOCATION OF STEEL STONE SUPPORTS WITH LANDSTONE ARCH. DRAWINGS)
COORDONNÉ L'EMPLACEMENT DES SUPPORT DE PAVÉS EN GRANITE AVEC LES DESSINS DE L'AMÉNAGEMENT PAYSAGER

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PARTIAL PLAN: STONE SUPPORTS AND SECTIONS

PLAN PARTIEL: SUPPORT DE PAVÉ EN GRANITE ET SECTIONS

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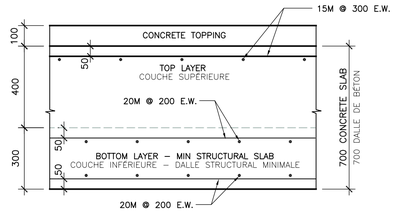
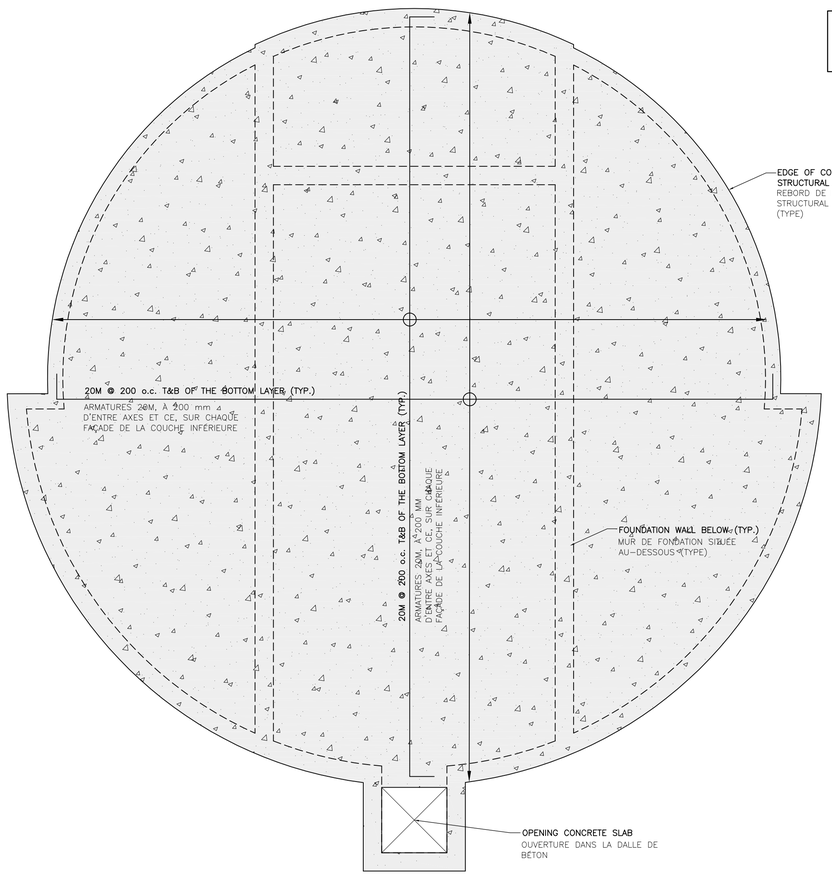
designed by conçu par	E.RICHER
drawn by dessiné par	M. EPPICH
date	11/02/2012
scale échelle	AS SHOWN
NCC project no. no. du projet de la CCN	DC-2611-110
sheet no. no. de la feuille	S1-3

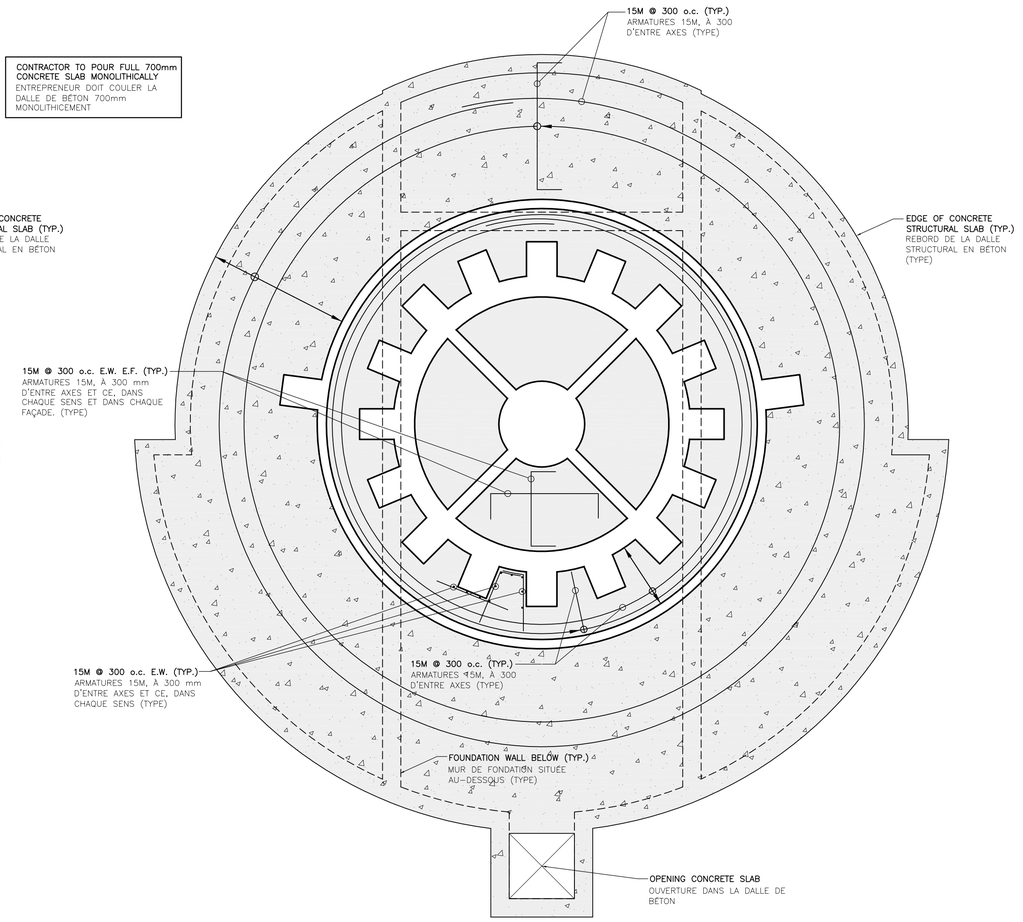


3 / S1–4 **SECTION: TYPICAL FOUNTAIN CONCRETE SLAB**
COUPE : DALLE DE BÉTON TYPIQUE DE FONTAINE 1:15

CONTRACTOR TO POUR FULL 700mm CONCRETE SLAB MONOLITHICALLY
ENTREPRENEUR DOIT COULER LA DALLE DE BÉTON 700mm MONOLITHICEMENT



1 / S1–4 **PLAN DETAIL: REINFORCING STEEL – BOTTOM LAYER**
PLAN DÉTAILLÉ: ACIER D'ARMATURE – NIVEAU INFÉRIEUR 1:50



2 / S1–4 **PLAN DETAIL: REINFORCING STEEL – TOP LAYER**
PLAN DÉTAILLÉ: ACIER D'ARMATURE – NIVEAU SUPÉRIEUR 1:50

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RÉFECTION DE L'ENTRÉE PRINCIPALE DU RÉSIDENCE CCN 2016

FOUNDATION SLAB REINFORCING STEEL

DALLE DE LA FONTAINE ACIER D'ARMATURE

approved by approuvé par	B. WEATHERDON
designed by conçu par	E.RICHER
drawn by dessiné par	M. EPPICH
date	11/02/2012
scale échelle	AS SHOWN
NCC project no. no. du projet de la CCN	DC-2611-110
sheet no. no. de la feuille	S1-4

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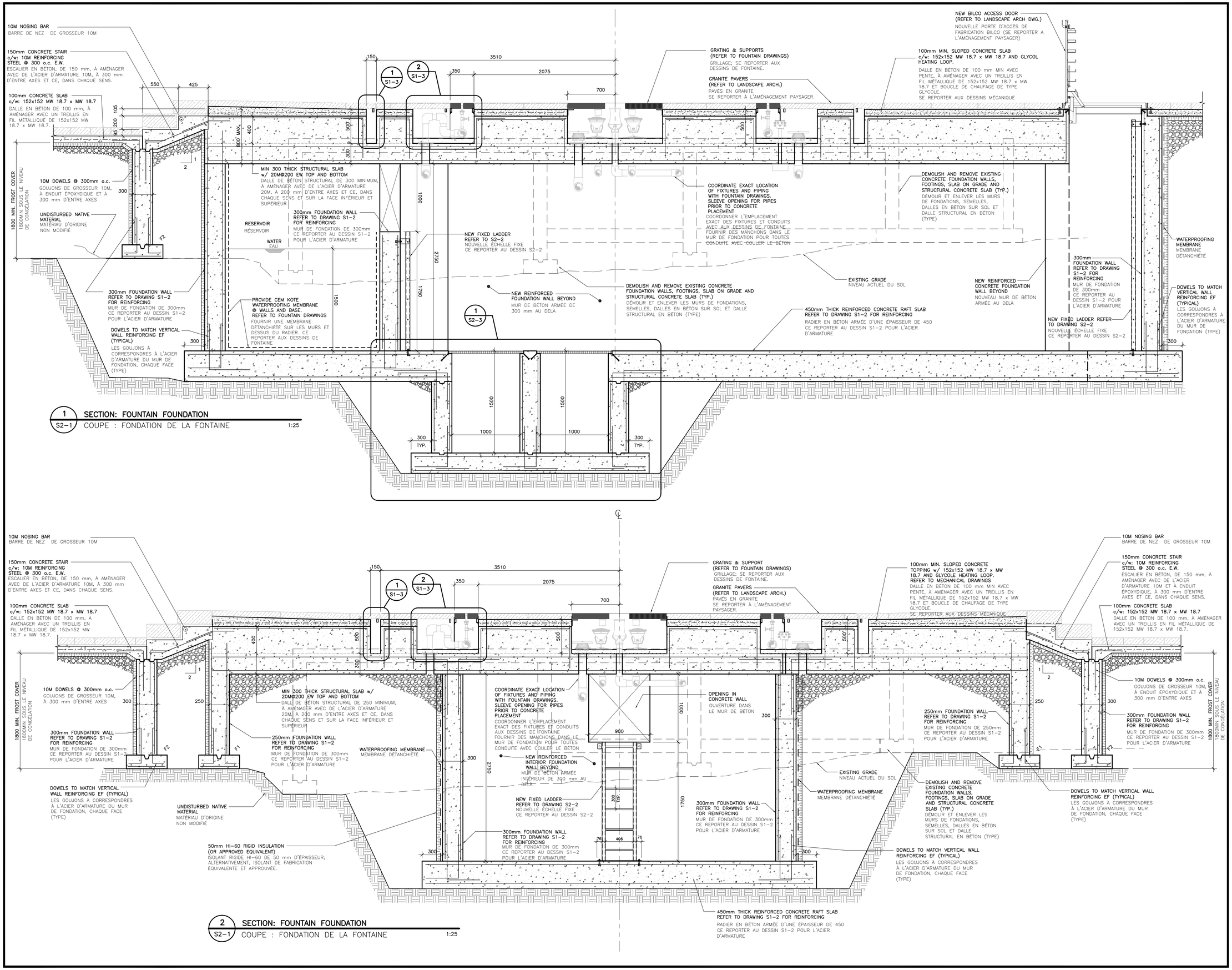

1 / S2-1 SECTION: FOUNTAIN FOUNDATION
COUPE : FONDATION DE LA FONTAINE 1:25

2 / S2-1 SECTION: FOUNTAIN FOUNDATION
COUPE : FONDATION DE LA FONTAINE 1:25

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RÉFECTION DE L'ENTRÉE PRINCIPALE DU RÉSIDENCE CCN 2016

drawing
dessin

FOUNTAIN SECTIONS AND DETAILS
COUPES DE LA FONTAINE ET DÉTAILS

approved by approuvé par	B. WEATHERDON
designed by conçu par	E.RICHER
drawn by dessiné par	M. EPPICH
date	11/02/2012
scale échelle	1:200
NCC project no. no. du projet de la CCN	DC-2611-110
sheet no. no. de la feuille	S2-1

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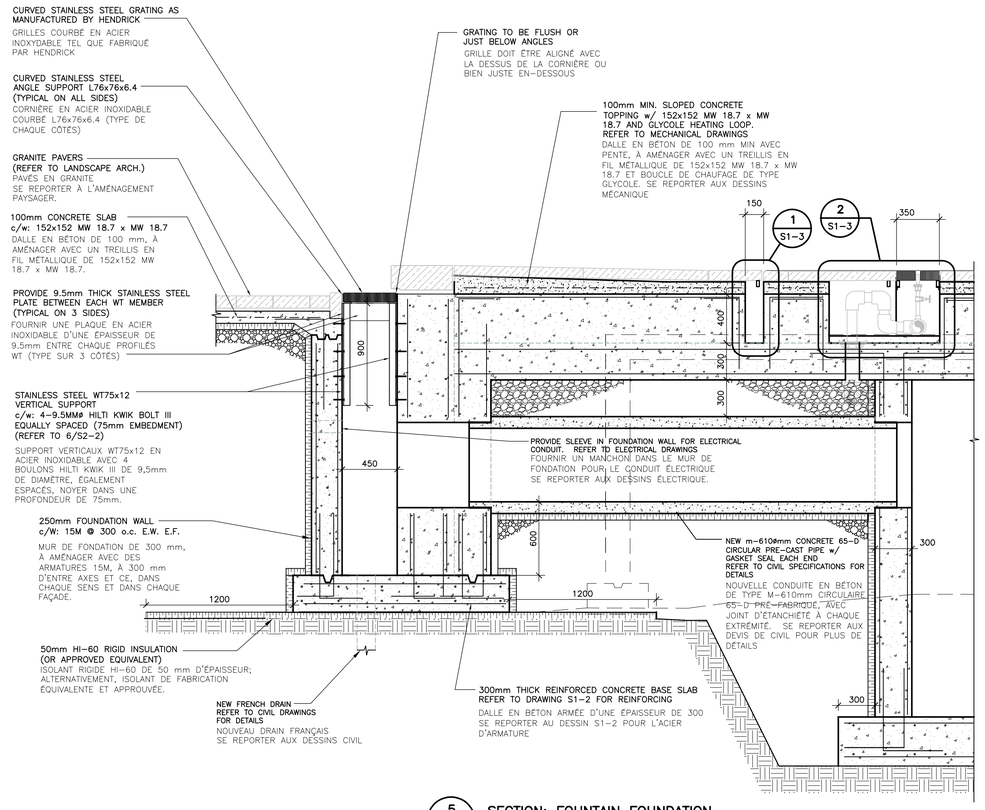
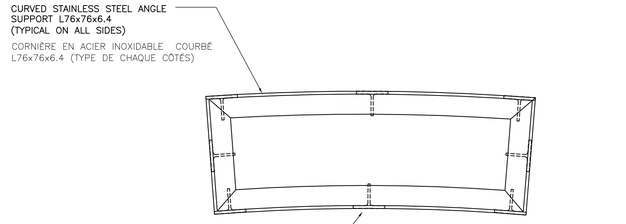
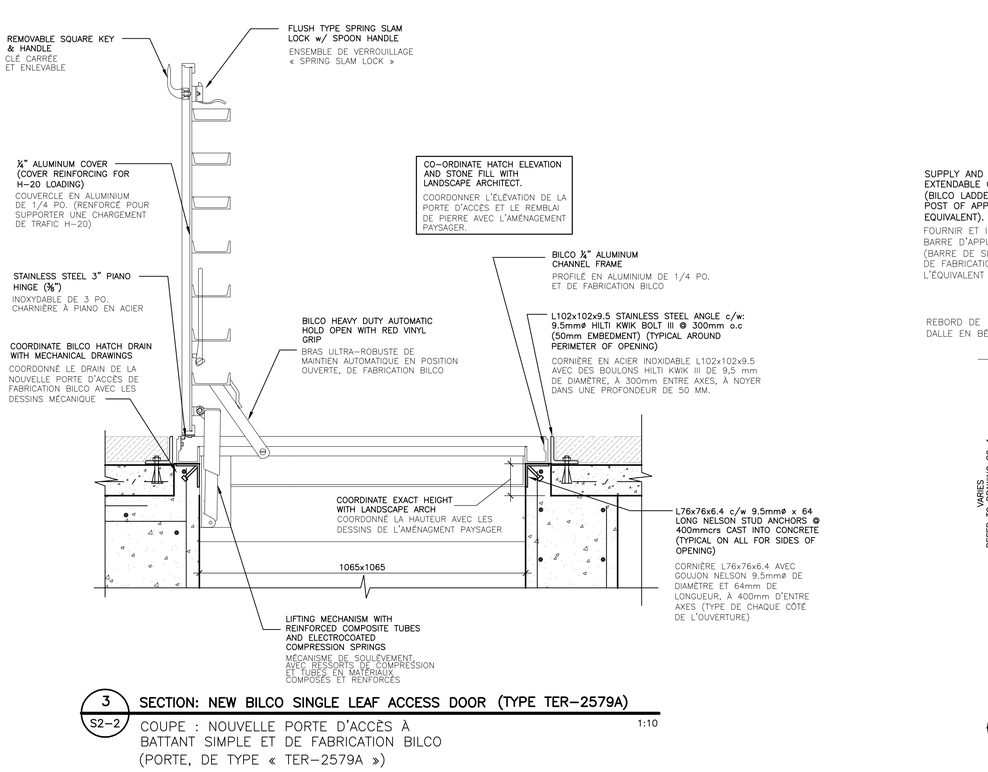


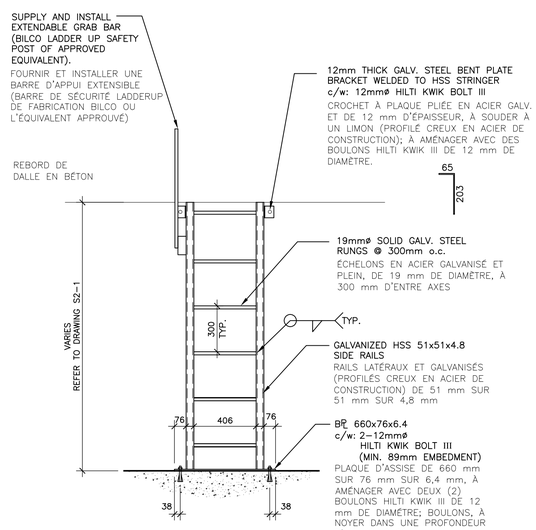
5 S2–2 SECTION: FOUNTAIN FOUNDATION
COUPE : FONDATION DE LA FONTAINE 1:25



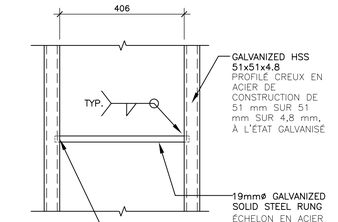
6 S2–2 DETAIL: VENT SHAFT GRATING FRAMING SUPPORT
DÉTAIL : SUPPORT DU GRILLAGE POUR PUIS DE VENTILATION 1:10



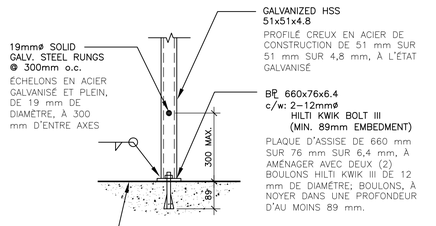
3 S2–2 SECTION: NEW BILCO SINGLE LEAF ACCESS DOOR (TYPE TER–2579A)
COUPE : NOUVELLE PORTE D'ACCÈS À BATTANT SIMPLE ET DE FABRICATION BILCO (PORTE, DE TYPE « TER–2579A ») 1:10



2 S2–2 ELEVATION: NEW LADDER
ÉLÉVATION : NOUVELLE ÉCHELLE 1:20



4 S2–2 DETAIL: TYP. CLIMBING RUNG
DÉTAIL : ÉCHELON TYPIQUE DE GRIMPAGE OU DE MONTAGE 1:10



1 S2–2 DETAIL: BASE ANCHORAGE OF LADDER
DÉTAIL : OUVRAGE D'ANCRAGE DE LA PARTIE INFÉRIEURE DE L'ÉCHELLE 1:10

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RÉFECTION DE L'ENTRÉE PRINCIPALE DU RÉSIDENCE CCN 2016

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dessin
SECTIONS AND DETAILS
COUPES ET DÉTAILS

approved by / approuvé par	B. WEATHERDON
designed by / conçu par	E.RICHER
drawn by / dessiné par	M. EPPICH
date	11/02/2012
scale / échelle	1:200
NCC project no. / no. du projet de la CCN	DC-2611-110
sheet no. / no. de la feuille	S2-2

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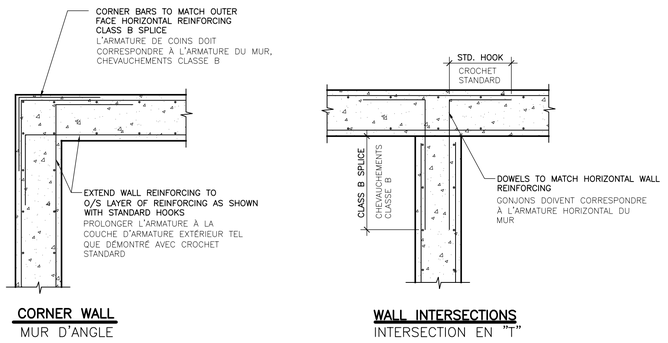
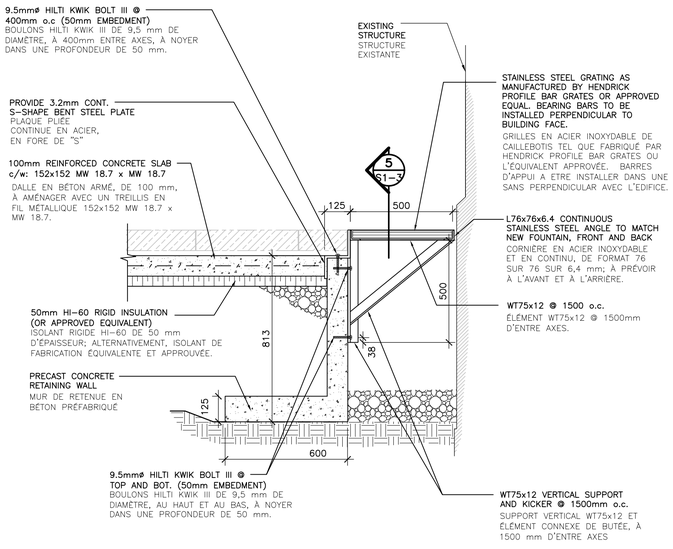


CORNER WALL
MUR D'ANGLE

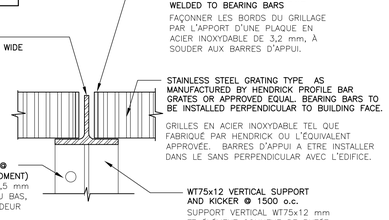
WALL INTERSECTIONS
INTERSECTION EN "T"

6 / S2–3 TYPICAL DETAIL: WALL REINFORCING
DÉTAILS TYPES: ARMATURE DE MUR 1:20

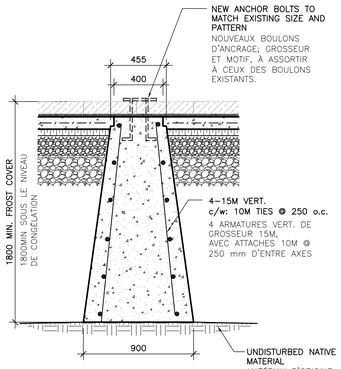


3 / S2–3 SECTION: BRACKET @ BUILDING PERIMETER
COUPE : CROCHET À LA PÉRIPHÉRIE DU BÂTIMENT 1:15

GRATING TO BE FLUSH OR JUST BELOW WT MEMBER
GRILLE DOIT ÊTRE ALIGNÉ AVEC LE DESSUS DU PROFILÉ OU BIEN JUSTE EN–DESSOUS

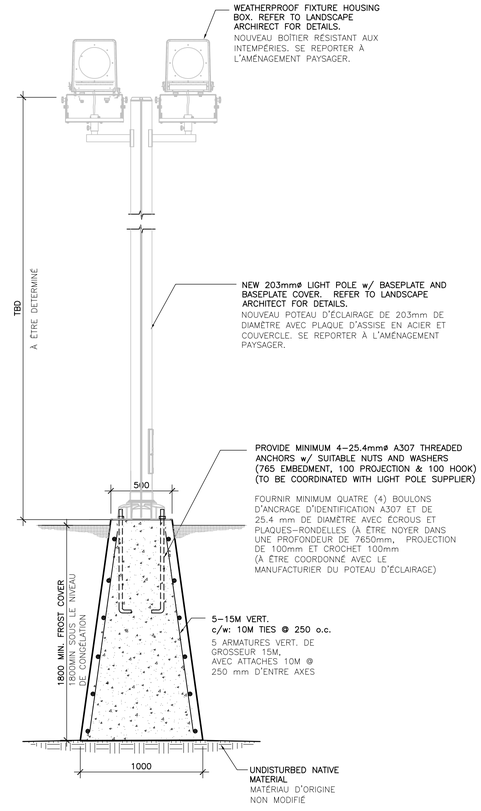


5 / S2–3 SECTION: STEEL BRACKET @ GRATING
COUPE : CROCHET EN ACIER À L'EMPLACEMENT DU GRILLAGE 1:5

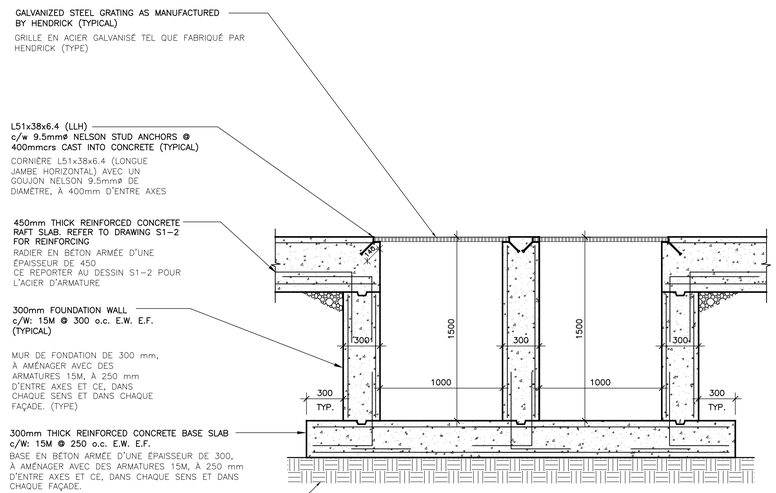


2 / S2–3 SECTION: FLAG POLE FOOTING
COUPE : EMPATTEMENT DE MÂT DE DRAPEAU 1:25

COORDINATE SUPPORT POST DIMENSIONS WITH LIGHTING DESIGN DRAWINGS
DIMENSIONS DU POTEAU DE SUPPORT, DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC LES DESSINS DE CONCEPTION DES INSTALLATIONS D'ÉCLAIRAGE.



4 / S2–3 SECTION: LIGHT SUPPORT POST AND FOOTING
COUPE : EMPATTEMENT DU POTEAU D'ÉCLAIRAGE 1:25



1 / S2–3 SECTION: SUMP PIT
COUPE : PUIS 1:25

DESIGN LOADS:		CHARGES DE CONCEPTION:	
PRECAST CONCRETE RETAINING WALL		MUR DE RETENUE EN BÉTON PRÉFABRIQUÉ	
SURCHARGE DEAD LOAD:		SURCHARGE PERMANENTE:	
SLAB ON GRADE & PAVERS 825mm COMPACTED ENGINEERED FILL	5.00 kPa (TO BE CONFIRMED WITH CIVL)	DALLE EN BÉTON ET PAVÉS EN GRANITE REMBLAI GRANULAIRE COMPACTÉ	2.50 kPa (À ÉTRE CONFIMÉ AVEC CIVIL)
SURCHARGE LIVE LOAD:	12.00 kPa	SURCHARGE VIVE:	12.00 kPa
STEEL GRATING:		GRILLE EN ACIER:	
DEAD LOAD:		CHARGE PERMANENTE:	
STRUCTURE & GRATING	0.25 kPa	STRUCTURE ET GRILLE	0.25 kPa
LIVE LOAD:	4.80 kPa	CHARGE VIVE:	4.80 kPa

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Direction de la gestion de l'immobilier, design et construction

Design and Construction Division
Division design et construction

director - Daniel Miron - directeur

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LICENSED PROFESSIONAL ENGINEER
B. G. WEATHERDON
100128246
PROVINCE OF ONTARIO

CJE PROJECT No. 12-2234C

issued or revised
émis ou revisé

no.	description	date
2	ISSUED FOR TENDER DOCUMENT POUR SOUMISSION	APR 13, 2016 13 AVRIL 2016
1	ISSUED FOR 100% REVIEW DOCUMENT À 100%, À FAIRE RÉVISER.	MAR 24, 2016 24 MAR. 2016

project
projet
NCC RESIDENCE FRONT ENTRANCE LANDSCAPE REHABILATION 2016
RÉFECTION DE L'ENTRÉE PRINCIPALE DU RÉSIDENCE CCN 2016

drawing
dessin
SECTIONS AND DETAILS
COUPES ET DÉTAILS

approved by approuvé par	B. WEATHERDON
designed by conçu par	E.RICHER
drawn by dessiné par	M. EPPICH
date 11/02/2012	scale échelle 1:200
NCC project no. no. du projet de la CCN	sheet no. no. de la feuille
DC-2611-110	S2-3

NCC RESIDENCE FRONT ENTERANCE FORECOURT / COUR AVANT DE L'ENTRÉE PRINCIPALE D'UNE R£SIDENCE DE LA CCN
MECHANICAL / TRAVAUX DE MÉCANIQUE

DRAWING LIST

SYMBOL	DESCRIPTION
M1	MECHANICAL LEGENDS, DRAWING LIST, SCHEDULES AND SITE PLAN
M2	MECHANICAL – DETAILS
M3	MECHANICAL – PLUMBING & UTILITIES DEMOLITION – FOUNTAIN ROOM
M4	MECHANICAL – PLUMBING & UTILITIES NEW WORK – FOUNTAIN ROOM
M5	MECHANICAL – BASEMENT & KEY PLAN – NEW WORK
M6	MECHANICAL – HVAC DEMOLITION & NEW WORK – FOUNTAIN ROOM

LISTE DES DESSINS

SYMBOLE	DESCRIPTION
M1	TRAVAUX DE MÉCANIQUE – LÉGENDES, LISTES DES DESSINS, NOMENCLATURES ET PLAN D'IMPLANTATION
M2	TRAVAUX DE MÉCANIQUE – DÉTAILS
M3	TRAVAUX DE MÉCANIQUE – INSTALLATIONS DE PLOMBERIE ET SERVICES – OUVRAGES DE DÉMOLITION – LOCAL DE LA FONTAINE
M4	TRAVAUX DE MÉCANIQUE – INSTALLATIONS DE PLOMBERIE ET SERVICES – NOUVEAUX TRAVAUX – LOCAL DE LA FONTAINE
M5	TRAVAUX DE MÉCANIQUE, AU SOUS-SOL – PLAN CLÉ – NOUVEAUX TRAVAUX
M6	TRAVAUX DE MÉCANIQUE – INSTALLATIONS DE CVAC – OUVRAGES DE DÉMOLITION ET NOUVEAUX TRAVAUX – LOCAL DE LA FONTAINE

LINETYPE LEGEND

SYMBOL	DESCRIPTION
– – – – – –	EXISTING TO BE REMOVED OR RELOCATED
————	EXISTING TO REMAIN
————	NEW WORK

LEGENDE DES TYPES DE LIGNES

SYMBOLE	DESCRIPTION
– – – – – –	ARTICLE EXISTANT, À ENLEVER OU À DÉPLACER.
————	ARTICLE EXISTANT, À CONSERVER.
————	NOUVEAUX TRAVAUX

UTILITIY/PLUMBING LEGEND

SYMBOL	DESCRIPTION
– – – – – – –	BELOW SLAB PIPING
——SAN——	SANITARY
——DCW——	DOMESTIC COLD WATER
——HGR——	HEATING GLYCOL RETURN
——HGS——	HEATING GLYCOL SUPPLY
—⊖	PIPING DOWN
—○	PIPING UP
—⊣CO	CLEAN OUT
C	CAP
FD1	FLOOR DRAIN TYPE-1
	3 WAY CONTROL VALVES
	2 WAY CONTROL VALVES
	STRAINER
	CHECK VALVE
	DRAIN VALVE C/W CAP & CHAIN
	BACK FLOW PREVENTER (TYPE)
	ISOLATION VALVES
	PUMP (P)
HB	HOSE BIBB
RET	RETURN DRAIN
OF	OVERFLOW DRAIN
AAV	AUTOMATIC AIR VENT
	CIRCUIT BALANCING VALVE (CBV)
	UNION
	THERMOMETER
PG	PRESSURE GAUGE

LEGENDE – PLOMBERIE/SERVICES

SYMBOLE	DESCRIPTION
– – – – – – –	TUYAUTERIE EN DESSOUS DE LA DALLE
——SAN——	CANALISATION SANITAIRE
——DCW——	EAU FROIDE DOMESTIQUE
——HGR——	RETOUR DE GLYCOL DE CHAUFFAGE
——HGS——	AMENÉE DE GLYCOL DE CHAUFFAGE
—⊖	TUYAUTERIE, VERS LE BAS
—○	TUYAUTERIE, VERS LE HAUT
—⊣CO	REGARD
C	CAPUCHON
FD1	DRAIN OU AVALOIR AU PLANCHER
	SOUPAPE DE COMMANDE À 3 VOIES
	SOUPAPE DE COMMANDE À 2 VOIES
	ÉGOUTTOIRE
	SOUPAPE DE RETENUE
	SOUPAPE DE DRAINAGE, À AMÉNAGER AVEC UNE CHAÎNE ET UN CAPUCHON ASSORTIS.
	SUPPRESSEUR DE CONTRE-COURANT (TYPE)
	SOUPAPES DE SECTIONNEMENT
	POMPE (P)
HB	RACCORD DE BOYAU
RET	DRAIN DE RETOUR
OF	DRAIN DE DÉBORDEMENT
AAV	PURGEUR D'AIR AUTOMATIQUE
	SOUPAPE D'ÉQUILIBRAGE DE CIRCUIT
	UNION
	THERMOMÈTRE
PG	MANOMÈTRE À CONTACT

HVAC/CONTROLS LEGEND

SYMBOL	DESCRIPTION
	DUCTWORK
SG	SUPPLY GRILLE
RG	RETURN GRILLE
SF	SUPPLY FAN
EF	EXHAUST FAN
UH	UNIT HEATER
S	SPEED CONTROLLER
	LOW VOLTAGE CONTROL WIRING
T	TEMPERATURE SENSOR
FS	FREEZE STAT

LÉGENDE – CVAC/COMMANDES

SYMBOLE	DESCRIPTION
	CONDUITS
SG	GRILLE D'ALIMENTATION
RG	GRILLE DE RETOUR
SF	VENTILATEUR D'ALIMENTATION
EF	VENTILATEUR D'EXTRACTION
UH	AÉROTHERME
S	CONTROLLEUR DE VITESSE
	CÂBLAGE DE CONTRÔLE A BAS VOLTAGE
T	CAPTEUR DE TEMPÉRATURE
FS	THERMOSTAT DE CONGÉLATION

HEAT EXCHANGER SCHEDULE

UNIT NO.	FUNCTION	CAPACITY (kW)	TYPE	PRIMARY PASS					SECONDARY PASS					BASIS OF DESIGN MAKE/MODEL	NOMINAL SIZE (mmH X mmL X mmW)
				INLET TEMP (°C)	OUTLET TEMP (°C)	FLOW	FLUID TYPE	MAX. PRESSURE DROP (KPa)	INLET TEMP (°C)	OUTLET TEMP (°C)	FLOW	FLUID TYPE	MAX. PRESSURE DROP (KPa)		
HX-1	SNOW MELTING	674	PLATE & FRAME	48.9	35	11.7 L/s	WATER	42.7	32.2	46.1	12.9L/s	50% PROP-GLYCOL	53.1	AICOO ALLIANCE AT470X-IG1-155/98	1752 X 1033 X 480

NOTES:
1. FOR DETAILS REFER TO SPECIFICATIONS.
2. PROVIDE 100mm HIGH HOUSE KEEPING PAD.

NOMENCLATURES DES ÉCHANGEURS DE CHALEUR

ÉLÉMENT N°	FONCTION	CAPACITÉ (kW)	TYPE	ENSEMBLE DE DÉRIVATION DU PRIMAIRE					ENSEMBLE DE DÉRIVATION DU SECONDAIRE					DONNÉES DE BASE PAR RAPPORT À LA CONCEPTION MARQUE ET (OU) MODÈLE	DIMENSIONS NOMINALES (mmH X mmL X mmLARG.)
				TEMP D'ENTRÉE (°C)	TEMP DE SORTIE (°C)	ÉCOULEMENT	TYPE DE FLUIDE	CHUTE DE PRESSION MAX. (KPa)	TEMP D'ENTRÉE (°C)	TEMP DE SORTIE (°C)	DÉBIT	TYPE DE LIQUIDE	CHUTE DE PRESSION MAX. (KPa)		
HX-1	FONTE DE NEIGE	674	PLATE & FRAME	48.9	35	11.7 L/s	EAU	42.7	32.2	46.1	12.9L/s	50% PROP-GLYCOL	53.1	AICOO ALLIANCE AT470X-IG1-155/98	1752 X 1033 X 480

NOTES : 1. SE REPORTER AU DEVIS AFIN DE RETROUVER LES DÉTAILS PERTINENTS.

SUMP PUMP SCHEDULE

UNIT NO.	LOCATION	FUNCTION	TYPE	PUMP DATA				ELECTRICAL DATA		BASIS OF DESIGN MAKE/MODEL	REMARKS
				DESIGN FLOW (L/s)	DESIGN HEAD (KPA)	RPM	MIN. EFF. (% EFF)	HP	V/PH/Hz		
SP1 & SP2	FOUNTAIN MECH. ROOM	SANITARY PUMP & STORM PUMP	SUBMERSIBLE DUPLEX	4.73	75	1750	–	0.75	575/3/60	ITT 2EC0737	C/W DUPLEX PUMP CONTROLLER PANEL (C/W TRANSFORMER), ASSOCIATED ACCESSORIES. CONTROLLER TO BE CONNECTED TO BAS

NOTES:
1. FOR DETAILS REFER TO SPECIFICATIONS.
2. MAX BHP SHALL BE LESS THAN MOTOR HP.

NOMENCLATURES DES POMPES DE PUISARD

ÉLÉMENT N°	EMPLACEMENT	FONCTION	TYPE	DONNÉES DE POMPE				DONNÉES ÉLECTRIQUES		DONNÉES DE BASE PAR RAPPORT À LA CONCEPTION MARQUE ET (OU) MODÈLE	REMARQUES
				DÉBIT DE CONCEPTION (L/s)	PRESSION DE CONCEPTION (KPA)	RPM	EFF. MIN. (% EFF)	HP	V/PH/Hz		
SP1	CHAMBRE MÉC. DE LA FONTAINE	POMPE SANITAIRE	SUBMERSIBLE DUPLEX	4.73	75	1750	–	0.75	575/3/60	ITT 2EC0737	POMPE DUPLEX ET SUBMERSIBLE, AVEC TABLEAU DE CONTRÔLEUR DE POMPE DUPLEX (AVEC TRANSFORMATEUR) ET ACCESSOIRES CONNEXES. RACCORDER LE CONTRÔLEUR AU SYSTÈME D'AUTOMATISATION DU BÂTIMENT.

NOTES:
1. SE REPORTER AU DEVIS AFIN DE RETROUVER LES DÉTAILS PERTINENTS.
2. LA VALEUR BHP MAXIMALE DEVRA ÊTRE INFÉRIEURE AU RÉGIME DU MOTEUR EN hp.

FAN SCHEDULE

UNIT NO.	LOCATION	FUNCTION (TRANSFER/EXHAUST/ MAKE-UP)	FAN DATA					ELECTRICAL DATA		BASIS OF DESIGN MAKE/MODEL	REMARKS
			TYPE	DRIVE (BELT/DIRECT)	AIR FLOW (L/S)	EXTERNAL STATIC PRESSURE (Pa)	FAN SPEED (RPM)	MOTOR (HP/WATTS)	V/PH/Hz		
SF-1	FOUNTAIN MECH. ROOM	SUPPLY	CABINET	DIRECT	471	225	1274	1/2HP	120/1/60	COOK 120SQN17DEC	ECM MOTOR
EF-1	FOUNTAIN MECH. ROOM	EXHAUST	CABINET	DIRECT	471	100	1274	1/2HP	120/1/60	COOK 120SQN17DEC	ECM MOTOR

NOTES: 1. FOR DETAILS REFER TO SPECIFICATIONS.

NOMENCLATURE DES VENTILATEURS

ÉLÉMENT N°	EMPLACEMENT	FONCTION (TRANSFERT/ EXTRACTION/ ALIMENTATION)	DONNÉES DE VENTILATEURS					DONNÉES ÉLECTRIQUES		DONNÉES DE BASE PAR RAPPORT À LA CONCEPTION MARQUE ET (OU) MODÈLE	REMARQUES
			TYPE	ENTRAINEMENT (COURROIE/DIRECT)	DÉBIT D'AIR (L/S)	PRESSION STATIQUE EXTERNE (Pa)	VITESSE DU VENTILATEUR (RPM)	MOTEUR (HP/WATTS)	V/PH/Hz		
SF-1	LOCAL DE MÉCANIQUE – FONTAINE	ALIMENTATION	ARMOIRE	DIRECT	471	225	1274	1/2HP	120/1/60	COOK 120SQN17DEC	ECM MOTOR
EF-1	LOCAL DE MÉCANIQUE – FONTAINE	EXTRACTION	ARMOIRE	DIRECT	471	100	1274	1/2HP	120/1/60	COOK 120SQN17DEC	ECM MOTOR

NOTES : 1. SE REPORTER AU DEVIS AFIN DE RETROUVER LES DÉTAILS PERTINENTS.

PUMP SCHEDULE

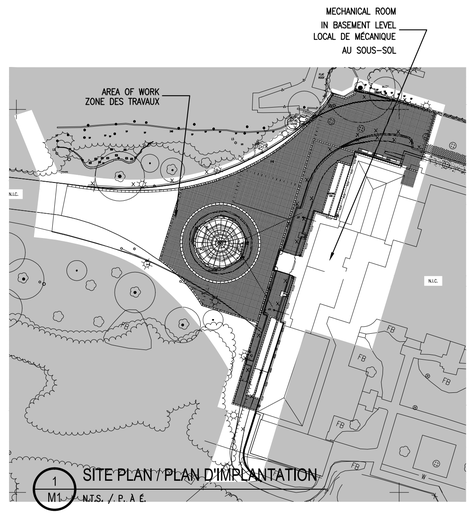
UNIT NO.	LOCATION	FUNCTION	TYPE	PUMP DATA			ELECTRICAL DATA		BASIS OF DESIGN MAKE/MODEL	REMARKS
				DESIGN FLOW (L/s)	DESIGN HEAD (kPa)	RPM	HP	V/PH/Hz		
P1	MECHANICAL ROOM	HEAT EXCHANGER	INLINE CENTRIFUGAL	11.7	83.69	1750	2.0	575/3/60	BELL & GOSSETT 3x3x7C SERIES E-80SC	C/W VFD
P2	MECHANICAL ROOM	ZONE 1	WET ROTOR	9.14	164	3470	4.2	575/3/60	WILO TOP-S 3x70	
P3	MECHANICAL ROOM	ZONE 2	WET ROTOR	2.59	164	3050	2	575/3/60	WILO TOP-S 1.5x70	
P4	MECHANICAL ROOM	ZONE 3	WET ROTOR	0.25	120	4600	0.6	208/1/60	WILO STRATOS 1.5x3	
P5	MECHANICAL ROOM	GLYCOL COIL	WET ROTOR	0.44	83.69	2700	0.16	120/1/60	WILO STAR S 33 FC	

1. MAX BHP SHALL BE LESS THAN MOTOR HP.
2. BASIS OF DESIGN FOR PUMPS: ITT BELL & GOSSETT
3. PROVIDE 100MM HIGH HOUSEKEEPING PADS FOR ALL FLOOR MOUNTED PUMPS.

NOMENCLATURE DES POMPES

ÉLÉMENT N°	EMPLACEMENT	FONCTION	TYPE	DONNÉES DE POMPES			DONNÉES ÉLECTRIQUES		DONNÉES DE BASE PAR RAPPORT À LA CONCEPTION MARQUE ET (OU) MODÈLE	
				DÉBIT DE CONCEPTION (L/s)	PRESSION DE CONCEPTION (kPa)	RPM	HP	V/PH/Hz		
P1	LOCAL DE MÉCANIQUE	HEAT EXCHANGER	CIRCULATEUR EN LIGNE	11.7	83.69	1750	2.0	575/3/60	BELL & GOSSETT 3x3x7C SERIE E-80SC	C/W VFD
P2	LOCAL DE MÉCANIQUE	ZONE 1	CIRCULATEUR EN LIGNE	9.14	164	3470	4.2	575/3/60	WILO TOP-S 3x70	
P3	LOCAL DE MÉCANIQUE	ZONE 2	CIRCULATEUR EN LIGNE	2.59	164	3050	2	575/3/60	WILO TOP-S 1.5x70	
P4	LOCAL DE MÉCANIQUE	ZONE 3	CIRCULATEUR EN LIGNE	0.25	120	4600	0.6	208/1/60	WILO STRATOS 1.5x3	
P5	LOCAL DE MÉCANIQUE	CIRCULATEUR DE GLYCOL	CIRCULATEUR EN LIGNE	0.44	83.69	2700	0.16	120/1/60	WILO STAR S 33 FC	

1. LA VALEUR BHP MAXIMALE DEVRA ÊTRE INFÉRIEURE AU RÉGIME DU MOTEUR EN hp.
2. DONNÉES DE BASE POUR LA CONCEPTION DES POMPES : ITT BELL & GOSSETT
3. PRÉVOIR UNE DALLE D'ENTRETIEN MÉNAGER DE 100 mm, À L'EMPLACEMENT DE TOUTES LES POMPES DE MONTAGE AU PLANCHER.



1 M1 SITE PLAN / PLAN D'IMPLANTATION N.T.S. / P. À É.

NCC CCN
Canada

Real Estate Management, Design and Construction Branch
Direction de la gestion de l'immobilier, design et construction

Design and Construction Division
Division design et construction

director - Claude Robert - directeur

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issued or revised
soumission ou révision

no.	description	date
7	ISSUED FOR TENDER DOCUMENT DE SOUMISSION	13-04-2016
6	ISSUED FOR REVIEW DOCUMENT, À FAIRE RÉVISER.	21-03-2016
5	ISSUED FOR 90% REVIEW DOCUMENT À 90%, À FAIRE RÉVISER.	19-02-2016
4	ISSUED FOR TENDER DOCUMENT DE SOUMISSION	04-04-2013
3	100% CLIENT REVIEW DOCUMENT À 100 %, À SOUMETTRE À L'EXAMEN DU CLIENT.	27-02-2013
2	90% CLIENT REVIEW DOCUMENT À 90 %, À SOUMETTRE À L'EXAMEN DU CLIENT.	13-02-2013
1	30% CLIENT REVIEW DOCUMENT À 30 %, À SOUMETTRE À L'EXAMEN DU CLIENT.	14-12-2012

project
projet

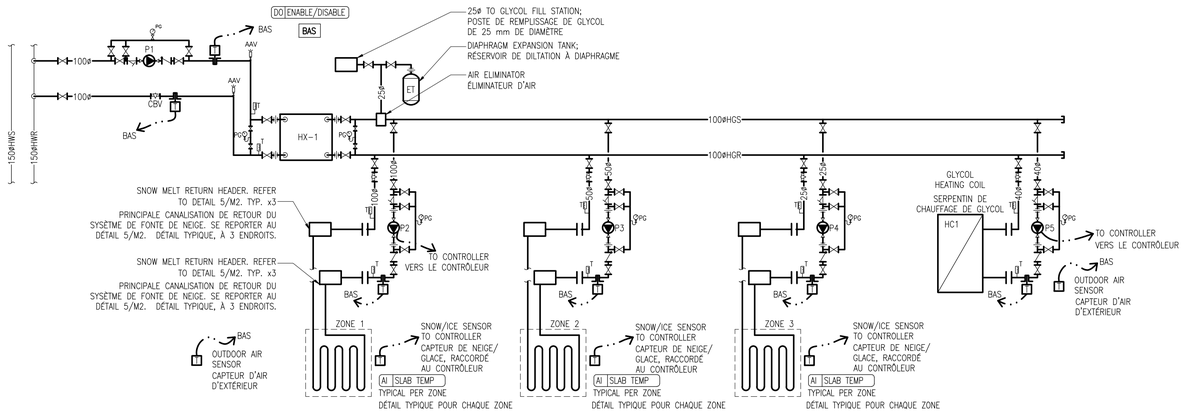
NCC RESIDENCE
FRONT ENTRANCE LANDSCAPE REHABILITATION 2016

REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE RÉSIDENCE CCN - 2016

drawing
dessin
MECHANICAL LEGENDS, DRAWING LIST, SCHEDULE AND SITE PLAN

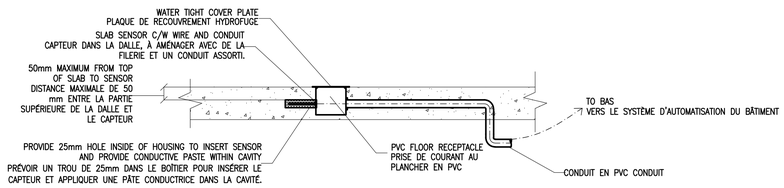
TRAVAUX DE MÉCANIQUE - LÉGENDES, LISTE DES DESSINS, NOMENCLATURE ET PLAN D'IMPLANTATION

approved by / approuvé par: A.BOGDANOWICZ
designed by / conçu par: M.SARASIN
drawn by / dessiné par: S.VALLIER
date: 26/11/2012
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: M1



1 / M2 SNOW MELT ZONE DETAIL
DÉTAIL - ZONE DU SYSTÈME DE FONTE DE NEIGE

NTS



4 / M2 SLAB SENSOR DETAIL
DÉTAIL - CAPTEUR DANS LA DALLE

N.T.S. / P. À É.

EXPANSION TANK SCHEDULE

UNIT NO.	LOCATION	FUNCTION	TYPE (DIAPHRAGM/BLADDER)	PRECHARGE PRESSURE (kPA)	OPERATING PRESSURE		OPERATING TEMPERATURE		TANK VOLUME (L)	ACCEPTANCE VOLUME (L)	ORIENTATION (HORIZONTAL/ VERTICAL)	BASIS OF DESIGN MAKE/MODEL	REMARKS
					MIN (kPA)	MAX (kPA)	MINIMUM (°C)	MAXIMUM (°C)					
ET	MECH. ROOM	SNOW MELT SYSTEM	DIAPHRAGM	82	82	861	4.4	71.1	416.4	128.7	VERTICAL	AMTROL EXTROL AX-200V	ASME

NOTES:
1. FOR DETAILS REFER TO SPECIFICATIONS.
2. MANUFACTURER NAME & MODEL NUMBER REPRESENT ACCEPTABLE QUALITY STANDARD ONLY. ALTERNATIVE MATERIALS MAY BE APPROVED AFTER REVIEW OF TECHNICAL INFORMATION BY ENGINEER PRIOR TO TENDER CLOSING.

NOMENCLATURE DES RÉSERVOIRS DE DILATATION

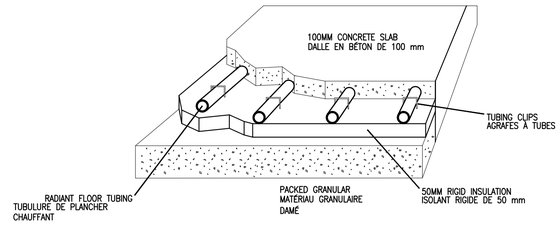
ÉLÉM. N°	EMPLACEMENT	FONCTION	TYPE (DIAPHRAGME/ SAC GONFLABLE)	PRESSION DE PRÉCHARGE (kPA)	PRESSION D'EXPLOITATION		TEMPÉRATURE D'EXPLOITATION		VOLUME DU RÉSERVOIR (L)	VOLUME D'ACCEPTATION (L)	ORIENTATION (HORIZONTALE/ VERTICALE)	DONNÉES DE BASE PAR RAPPORT À LA CONCEPTION MARQUE/MODÈLE	REMARQUES
					MIN (kPA)	MAX (kPA)	MINIMUM (°C)	MAXIMUM (°C)					
ET	LOCAL DE MÉC.	SYSTÈME DE FONTE DE NEIGE	DIAPHRAGME	82	82	861	4.4	71.1	416.4	128.7	VERTICALE	AMTROL EXTROL AX-200V	ASME

NOTES :
1. SE REPORTER AU DEVIS AFIN DE RETROUVER LES DÉTAILS PERTINENTS.
2. LA MARQUE ET LE NUMÉRO DE MODÈLE DU FABRICANT REPRÉSENTENT LA QUALITÉ REQUISE SEULEMENT. TOUT AUTRE PRODUIT POURRA ÊTRE APPROUVÉ UNE FOIS QUE LES RENSEIGNEMENTS TECHNIQUES À SON SUJET AURONT ÉTÉ VÉRIFIÉS ET ACCEPTÉS PAR L'INGÉNIEUR.

HEATING COIL SCHEDULE

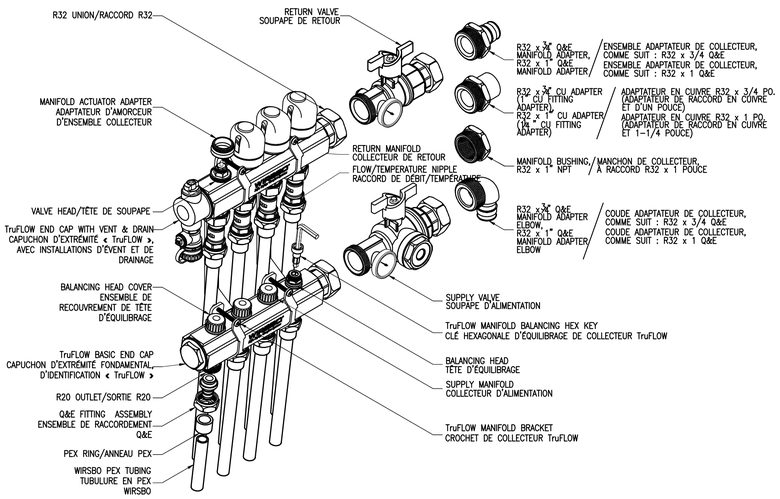
UNIT NO.	LOCATION	AIRSIDE						FLUIDSIDE					BASIS OF DESIGN	REMARKS
		TOTAL CAPACITY (KW)	AIR FLOW (L/S)	AIR VELOCITY (M/S)	EAT (°C)	LAT (°C)	MAX. PRESSURE DROP (PA)	FLUID TYPE	FLUID FLOW (L/S)	EWT (°C)	LWT (°C)	MAX PRESSURE DROP (KPA)		
HC1	FOUNTAIN VAULT	22.3	471	4.06	-28	10	62	50%PROP. GLY	0.44	46.1	35	12	–	–

NOTES:
1. FOR DETAILS REFER TO SPECIFICATIONS.
2. COILS SHALL HAVE ACCESS DOOR FOR CLEANING & INSPECTION.
3. MAX COIL AIR VELOCITY SHALL BE 2.5m/s (500fpm).
4. COILS SHALL BE FLANGE TYPE.



3 / M2 RADIANT FLOOR HEATING SLAB INSTALLATION DETAIL
DÉTAIL - MONTAGE DE DALLE DE PLANCHER CHAUFFANT

N.T.S. / P.A É.



5 / M2 SNOW MELT MANIFOLD DETAIL
DÉTAIL - COLLECTEUR DU SYSTÈME DE FONTE DE NEIGE

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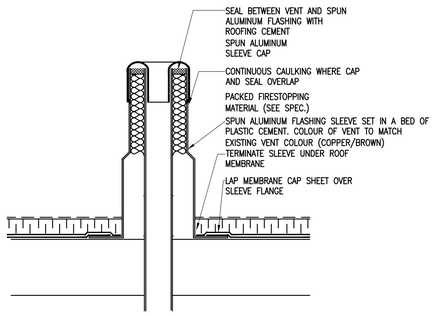

6 / M2 ROOF VENT

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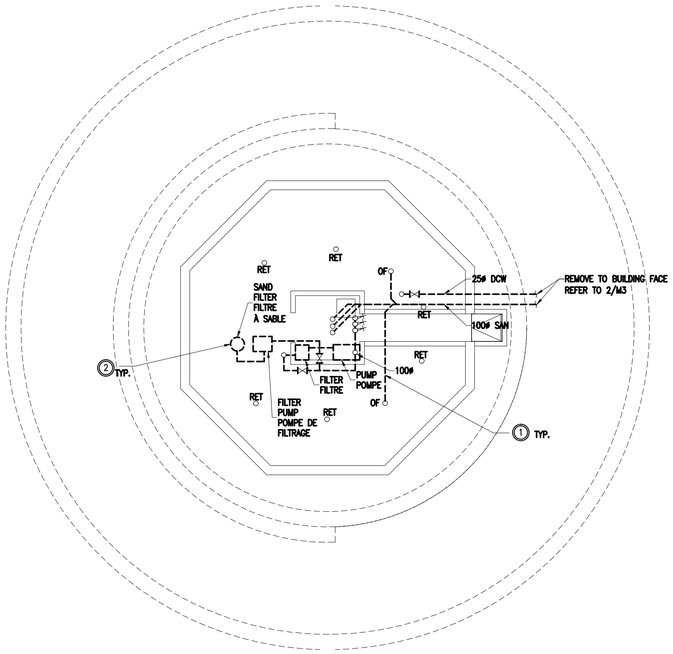
MECHANICAL DETAILS

TRAVAUX DE MÉCANIQUE - DÉTAILS

approved by / approuvé par: A.BOGDANOWICZ
designed by / conçu par: M.SARASIN
drawn by / dessiné par: S.VALLIER
date: 26/11/2012
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: M2



1 M3 — PLUMBING & UTILITIES - DEMOLITION WORK - BASEMENT LEVEL
INSTALLATIONS DE PLOMBERIE ET SERVICES - OUVRAGES DE DÉMOLITION, AU SOUS-SOL

1:100

DESCRIPTION OF WORK – DEMOLITION:

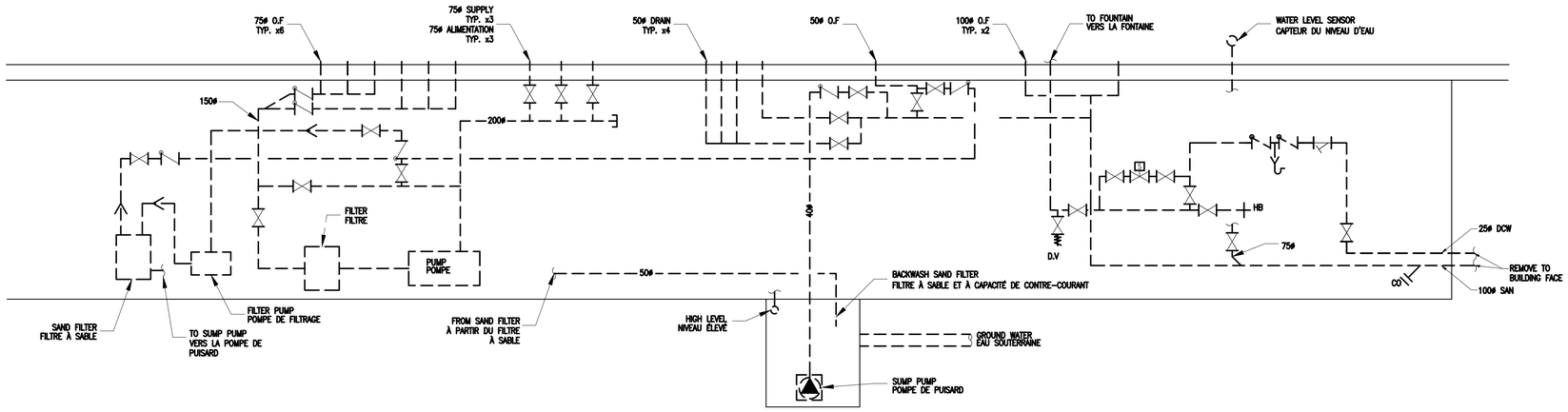
1. REMOVE EXISTING SAN AND DCW PIPING C/W ALL ASSOCIATED CONNECTIONS AS INDICATED.
2. REMOVE EXISTING PUMPS AND FILTERS C/W ALL ASSOCIATED PIPING, VALVES AND ACCESSORIES.

DESCRIPTION DES TRAVAUX – OUVRAGE DE DÉMOLITION :

1. ENLEVER LA TUYAUTERIE SANITAIRE ET D'EAU FROIDE DOMESTIQUE, Y COMPRIS TOUTES LES CONNEXIONS CONNEXES ET CE, SELON LES INDICATIONS.
2. ENLEVER LES POMPES ET LES FILTRES EXISTANTS ET CE, Y COMPRIS TOUTE LA TUYAUTERIE, TOUTES LES SOUPAPES ET TOUS LES ACCESSOIRES CONNEXES.

2 M3 — KEY PLAN - PLUMBING NEW WORK
PLAN CLÉ - INSTALLATIONS DE PLOMBERIE - NOUVEAUX TRAVAUX

1:500



3 M3 — PLUMBING - DEMOLITION - SCHEMATIC
INSTALLATIONS DE PLOMBERIE - OUVRAGES DE DÉMOLITION - REPRÉSENTATION SCHÉMATIQUE

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MECHANICAL
PLUMBING & UTILITIES
DEMOLITION FOUNTAIN ROOM

TRAVAUX DE MÉCANIQUE -
INSTALLATIONS DE PLOMBERIE ET SERVICES -
OUVRAGES DE DÉMOLITION - LOCAL DE LA FONTAINE

approved by / approuvé par	A.BOGDANOWICZ
designed by / conçu par	M.SARASIN
drawn by / dessiné par	S.VALLIER
date	26/11/2012
scale / échelle	AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN	DC-2611-110
sheet no. / n° de la feuille	M3

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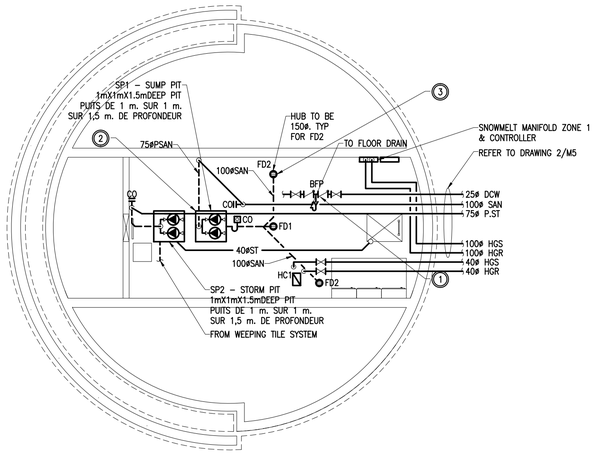


1 M4 PLUMBING & UTILITIES - NEW WORK - FOUNTAIN ROOM
INSTALLATIONS DE PLOMBERIE ET SERVICES - NOUVEAUX TRAVAUX - LOCAL DE LA FONTAINE

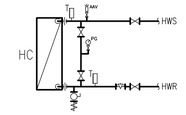
1:100

DESCRIPTION OF WORK – NEW WORK:

1. PROVIDE NEW DCW PIPING C/W BACKFLOW PREVENTER (REDUCED PRESSURE) AS INDICATED.
2. PROVIDE NEW DUPLEX SUMP (SP1 & SP2) PUMPS C/W PIPING, CONTROLS AND ACCESSORIES AS INDICATED.
3. PROVIDE NEW FLOOR DRAINS C/W PIPING AS INDICATED. PROVIDE 150mm HUB DRAINS FOR ALL DRAIN CONNECTIONS.
4. PROVIDE NEW HEATING COIL C/W PIPING, CONTROLS AND ACCESSORIES AS INDICATED.

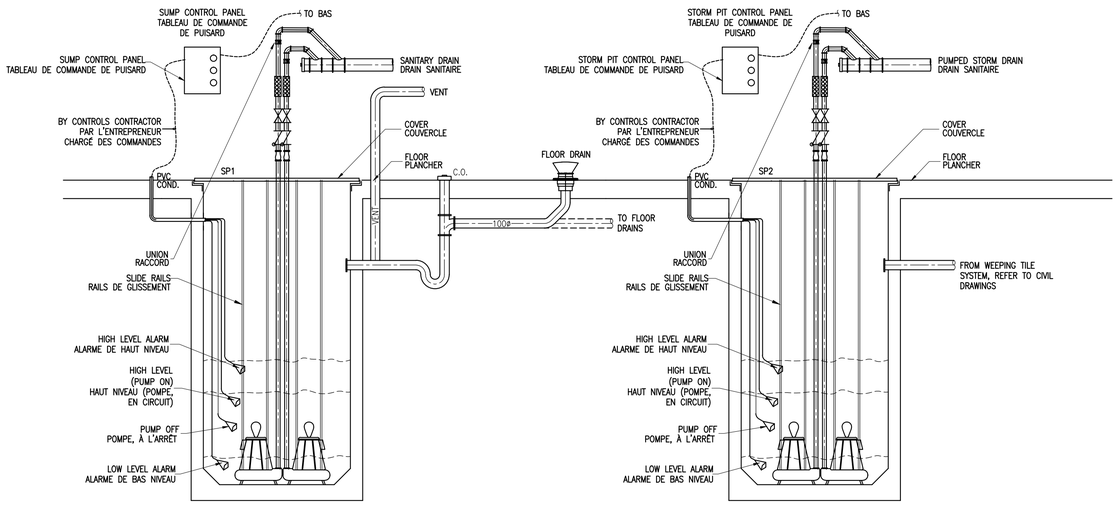
DESCRIPTION DES TRAVAUX – NOUVEAUX TRAVAUX:

1. PRÉVOIR DE LA NOUVELLE TUYAUTERIE D'EAU FROIDE DOMESTIQUE; À AMÉNAGER AVEC UN SUPPRESSEUR DE CONTRE-COURANT ET CE, SELON LES INDICATIONS.
2. PRÉVOIR UNE NOUVELLE POMPE DUPLEX DE PUISARD (SP1); À AMÉNAGER AVEC DE LA TUYAUTERIE, DES COMMANDES ET LES ACCESSOIRES REQUIS ET CE, SELON LES INDICATIONS.
3. PRÉVOIR UN NOUVEAU DRAIN (AVALOIR) DE PLANCHER; À AMÉNAGER AVEC LA TUYAUTERIE PERTINENTE ET CE, SELON LES INDICATIONS.
4.



2 M4 GLYCOL COIL DETAIL
DÉTAIL - SERPENTIN DE GLYCOL

N.T.S / P. À É.



3 M4 SUMP/STORM PIT DETAIL
DÉTAIL - POMPE DE PUISARD

1:100

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MECHANICAL
PLUMBING & UTILITIES
NEW WORK - FOUNTAIN ROOM

TRAVAUX DE MÉCANIQUE - INSTALLATIONS DE PLOMBERIE ET SERVICES - NOUVEAUX TRAVAUX - LOCAL DE LA FONTAINE

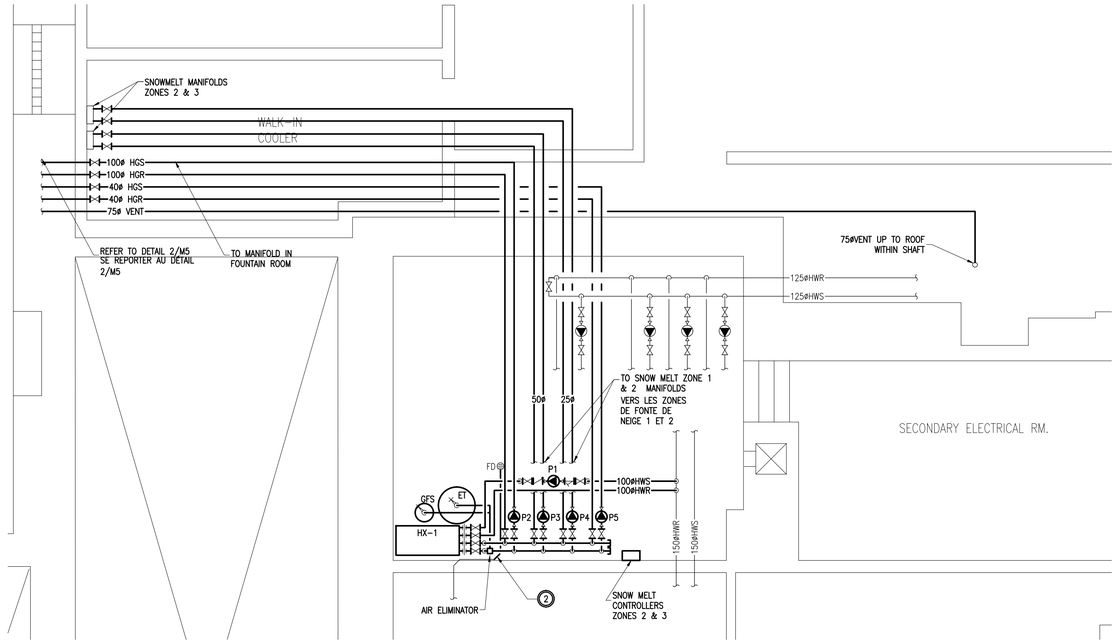
approved by approuvé par	A.BOGDANOWICZ
designed by conçu par	M.SARASIN
drawn by dessiné par	S.VALLIER
date	26/11/2012
scale échelle	AS NOTED SELON LES IND.
NCC project no. n° du projet de la CCN	DC-2611-110
sheet no. n° de la feuille	M4

DESCRIPTION OF WORK – NEW WORK:

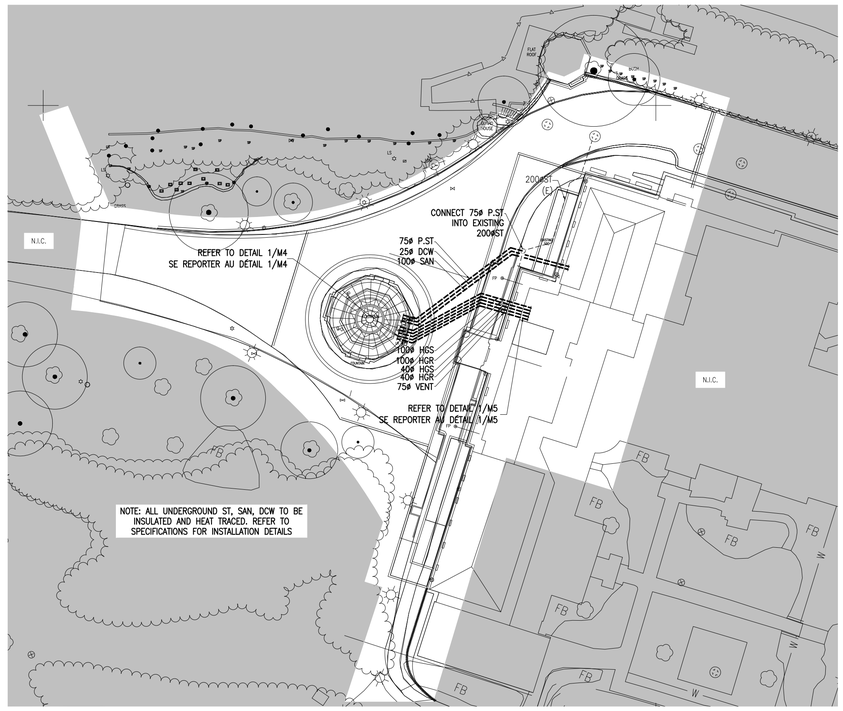
1. PROVIDE NEW SNOW MELTING SYSTEM C/W HEAT EXCHANGER, PIPING, CONTROLS AND ACCESSORIES AS INDICATED.
2. REMOVE EXISTING 25ø DRAIN PIPE TO WALL AND PROVIDE NEW PIPE ALONG FLOOR TO EXISTING FLOOR DRAIN.
3. NEW UNDERGROUND P.ST, DCW, AND SAN TO BE INSULATED AND HEAT TRACED. REFER TO SPECIFICATION FOR MATERIAL SELECTION. NEW UNDERGROUND HGS & HGR TO BE FLEXIBLE PRE-INSULATED PIPE SYSTEM. REFER TO SPECIFICATION FOR MATERIAL SELECTION.
4. INSTALL NEW UNDERGROUND DCW & SAN 1800mm BELOW GRADE.

DESCRIPTION DES TRAVAUX – NOUVEAUX TRAVAUX:

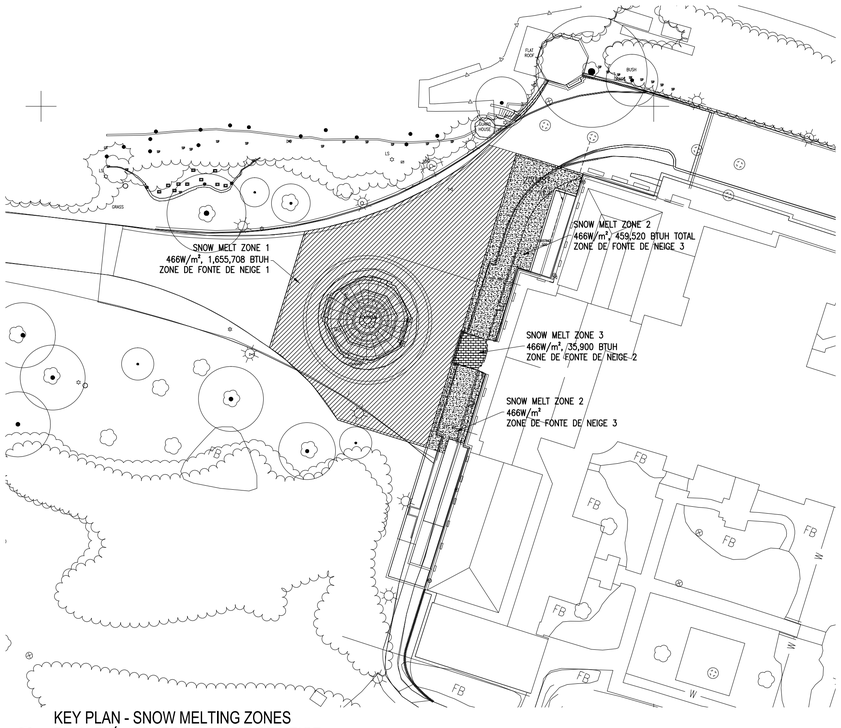
1. PRÉVOIR UN NOUVEAU SYSTÈME DE FONTE DE NEIGE, À AMÉNAGER AVEC UN ÉCHANGEUR DE CHALEUR, DE LA TUYAUTERIE, DES COMMANDES ET DES ACCESSOIRES ET CE, SELON LES INDICATIONS.



1 / M5 PLUMBING - NEW WORK - BASEMENT MECHANICAL ROOM
INSTALLATIONS DE PLOMBERIE - NOUVEAUX TRAVAUX - LOCAL DE MÉCANIQUE, AU SOUS-SOL
1:100



2 / M5 KEY PLAN - PLUMBING NEW WORK
PLAN CLÉ - INSTALLATIONS DE PLOMBERIE - NOUVEAUX TRAVAUX
1:500



3 / M5 KEY PLAN - SNOW MELTING ZONES
PLAN CLÉ - ZONES DE FONTE DE NEIGE
1:500

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MECHANICAL
BASEMENT & KEY PLAN
NEW WORK

TRAVAUX DE MÉCANIQUE, AU SOUS-SOL - PLAN CLÉ - NOUVEAUX TRAVAUX

approved by approuvé par	A.BOGDANOWICZ
designed by conçu par	M.SARASIN
drawn by dessiné par	S.VALLIER
date	26/11/2012
scale échelle	AS NOTED SELON LES IND.
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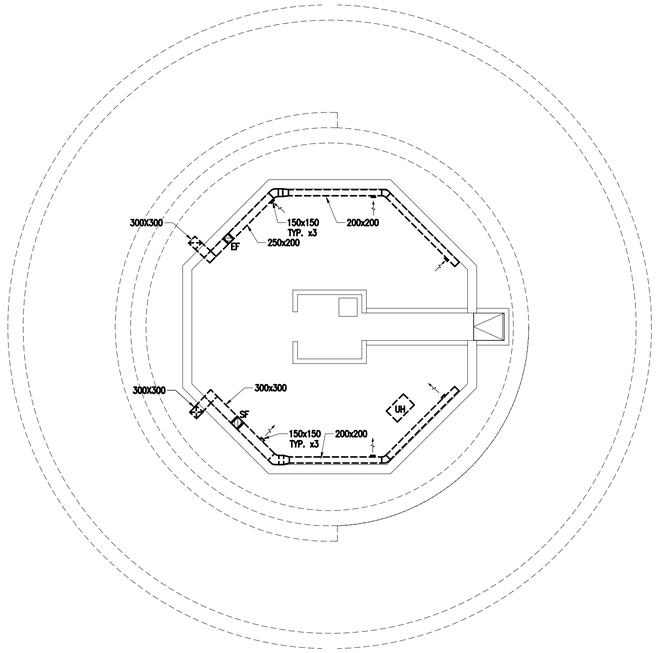
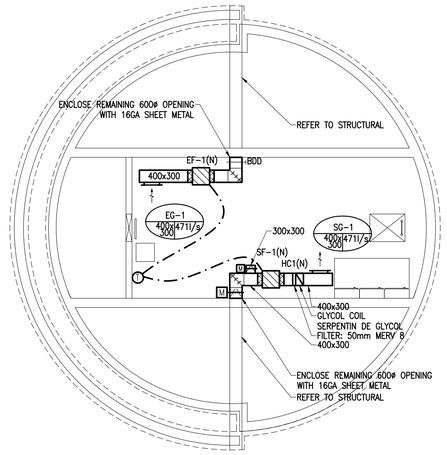
sheet no. n° de la feuille	M5



1 M6 HVAC - DEMOLITION WORK - FOUNTAIN ROOM
INSTALLATIONS DE CVAC - OUVRAGES DE DÉMOLITION - LOCAL DE FONTAINE

1:100



2 M6 HVAC - NEW WORK WORK - FOUNTAIN ROOM
INSTALLATIONS DE CVAC - NOUVEAUX TRAVAUX - LOCAL DE FONTAINE

1:100

DESCRIPTION OF WORK – DEMOLITION:

1. REMOVE EXISTING SUPPLY FAN & EXHAUST FAN C/W ASSOCIATED DUCTWORK, CONTROLS, GRILLES AND ALL ACCESSORIES.
2. REMOVE EXISTING UNIT HEATER AS INDICATED.

DESCRIPTION DES TRAVAUX – OUVRAGES DE DÉMOLITION:

1. ENLEVER LE VENTILATEUR D'ALIMENTATION ET LE VENTILATEUR D'EXTRACTION EXISTANTS, Y COMPRIS LES CONDUITS, LES COMMANDES ET LES GRILLES CONNEXES ET TOUS LES ACCESSOIRES.
2. ENLEVER L'AÉROTHERME EXISTANT ET CE, SELON LES INDICATIONS.

DESCRIPTION OF WORK – NEW WORK:

1. PROVIDE NEW SUPPLY AND EXHAUST FAN COMPLETE WITH DUCTWORK, GRILLES, CONTROLS AND ACCESSORIES AS INDICATED.

DESCRIPTION DES TRAVAUX – NOUVEAUX TRAVAUX :

1. PRÉVOIR UN NOUVEAU VENTILATEUR D'ALIMENTATION ET UN NOUVEAU VENTILATEUR D'EXTRACTION, À AMÉNAGER AVEC DES CONDUITS, DES GRILLES, DES COMMANDES ET DES ACCESSOIRES ET CE, SELON LES INDICATIONS.

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MECHANICAL - HVAC
DEMOLITION AND NEW WORK
FOUNTAIN ROOM

TRAVAUX DE MÉCANIQUE - INSTALLATIONS DE CVAC - OUVRAGES DE DÉMOLITION - LOCAL DE FONTAINE

approved by approuvé par	A.BOGDANOWICZ
designed by conçu par	M.SARASIN
drawn by dessiné par	S.VALLIER
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RÉHABILITATION DU PAYSAGISME À L'ENTRÉE PRINCIPALE R£SIDENCE CCN 2016

ELECTRICAL - TRAVAUX D'ÉLECTRICITÉ

LÉGENDE D'ÉCLAIRAGE
LIGHTING LEGEND

DESCRIPTION	SYMBOL SYMBOLE	DESCRIPTION
CONSERVER LE LUMINAIRE EXISTANT.	E	EXISTING LIGHT FIXTURE TO REMAIN
LUMINAIRE EXISTANT, À DÉCONNECTER ET À ENLEVER OU À DÉPLACER, AFIN DE TENIR COMPTE DU NOUVEL AMÉNAGEMENT.		EXISTING LIGHT FIXTURE TO BE DISCONNECTED AND REMOVED OR RELOCATED TO SUIT NEW LAYOUT.
LUMINAIRE, DE MONTAGE AU PLAFOND; TYPE, SELON LES INDICATIONS.	④	CEILING MOUNTED LIGHT FIXTURE – TYPE AS SHOWN
LUMINAIRE, DE MONTAGE SUR LE TOIT; TYPE, SELON LES INDICATIONS.	④	ROOF MOUNTED LIGHT FIXTURE – TYPE AS SHOWN
LUMINAIRE DE MONTAGE SUR POTEAU, À L'EXTÉRIEUR; DE TYPE CONFORME AUX INDICATIONS	Ⓔ	EXTERIOR POLE MOUNTED LIGHT FIXTURE – TYPE AS SHOWN
INTERRUPTEUR DE MONTAGE MURAL; HAUTEUR DE MONTAGE, À 1 200 mm AU–DESSUS DU PLANCHER FINI	$	WALL MOUNTED SWITCH – M.H. 1200mm A.F.F.
INTERRUPTEUR DE MONTAGE MURAL ET DE TYPE ÉTANCHE AUX INTEMPÉRIES; HAUTEUR DE MONTAGE, À 1 200 mm AU–DESSUS DU PLANCHER FINI	$WP	WALL MOUNTED WEATHER–PROTECTED SWITCH – M.H. 1200mm A.F.F.
PRINCIPAL INTERRUPTEUR SOUS BASSE TENSION	$MLV	MASTER LOW VOLTAGE SWITCH
CONTACTEUR D'ÉCLAIRAGE	C	LIGHTING CONTACTOR
ÉLÉMENT À BATTERIE(S) EN CAS D'URGENCE, À AMÉNAGER AVEC DES TÊTES D'ÉCLAIRAGE ASSORTIES		EMERGENCY BATTERY UNIT C/W LIGHTING HEADS
TÊTE DOUBLE D'ÉCLAIRAGE EN CAS D'URGENCE, DE TYPE TÉLÉCOMMANDÉ ET DE MONTAGE AU PLAFOND		REMOTE EMERGENCY LIGHTING DUAL HEAD – CEILING MOUNTED
	DLC	DIGITAL LIGHTING CONTROLLER

LÉGENDE – INSTALLATIONS DE COURANT
POWER LEGEND

DESCRIPTION	SYMBOL SYMBOLE	DESCRIPTION
PRISE DE COURANT DUPLEX, DE MONTAGE MURAL ET DE 15 AMPÈRES ET 120 VOLTS (5–15R)		15A, 120V WALL MOUNTED DUPLEX RECEPTACLE (5–15R)
PRISE DE COURANT DUPLEX ET DISTINCTE (5–15R)		DEDICATED DUPLEX RECEPTACLE (5–15R)
PRISE DE COURANT À CAPACITÉ DE DÉFAUT DE TERRE (5–15R)	GFI	GROUND FAULT INTERRUPTING RECEPTACLE (5–15R)
PRISE DE COURANT SPÉCIALE ET DE TYPE CONFORME AUX INDICATIONS		SPECIAL RECEPTACLE – TYPE AS INDICATED
PRISE DE COURANT 5–20R		5–20R RECEPTACLE
BOÎTE DE TIRAGE	PB	PULL BOX
BOÎTE DE RACCORDEMENT DE 120 VOLTS ET DE 250 mm SUR 250 mm SUR 150 mm, À MOINS D'INDICATIONS CONTRAIRES.	J	120V JUNCTION BOX, 250x250x150mm UNLESS NOTED OTHERWISE
DISJONCTEUR		DISCONNECT SWITCH
DÉMARREUR DE MOTEUR MAGNÉTIQUE		MAGNETIC MOTOR STARTER
DÉMARREUR DE MOTEUR MAGNÉTIQUE ET COMBINÉ		COMBINATION MAGNETIC MOTOR STARTER
DÉMARREUR DE MOTEUR MANUEL – DE TYPE HOMOLOGUÉ PAR LA CSA COMME SERVANT DE DÉCONNECTEUR; IL DOIT ÊTRE POSSIBLE DE VERROUILLER CE DÉMARREUR EN POSITION D'ARRÊT.		MANUAL MOTOR STARTER – CSA CERTIFIED AS A DISCONNECTING MEANS AND LOCKABLE IN THE "OFF" POSITION.
TRANSFORMATEUR		TRANSFORMER
INTERRUPTEUR DE VITESSE, DEVANT ÊTRE FOURNI PAR LES RESPONSABLES DE LA DIVISION 15 ET INSTALLÉ ET CÂBLÉ PAR LES RESPONSABLES DE LA DIVISION 16.	SS	SPEED SWITCH SUPPLIED BY DIV. 15, INSTALLED & WIRED BY DIV. 16
MOTEUR ÉLECTRIQUE MONOPHASÉ		SINGLE PHASE ELECTRIC MOTOR
MOTEUR ÉLECTRIQUE À TROIS PHASES – FORCE MOTRICE EN hp, SELON LES INDICATIONS	5	THREE PHASE ELECTRIC MOTOR – HORSEPOWER AS SHOWN
TABLEAU DE MONTAGE EN SURFACE		SURFACE MOUNTED PANEL
CONDUIT FLEXIBLE		FLEXIBLE CONDUIT
CONNEXION, DE CÂBLAGE EN DIRECTE	+	HARD WIRE CONNECTION
LONGUEUR RÉSULTANTE DE CONDUIT, À AMÉNAGER AVEC UN MANCHON ASSORTI.	E	CONDUIT STUB C/W BUSHING
POTEAU D'IDENTIFICATION « SMARTPOLE »		SMARTPOLE
	VSD	VARIABLE SPEED DRIVE

LÉGENDE DES ABRÉVIATIONS
ABBREVIATION LEGEND

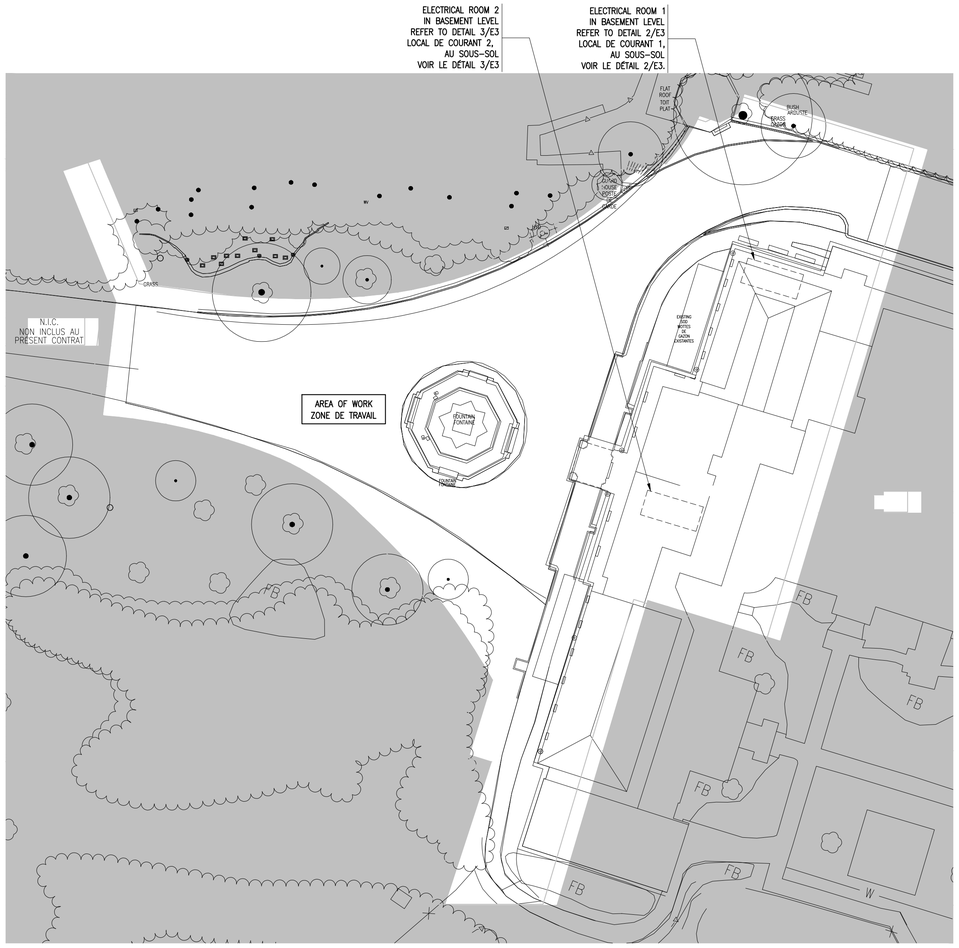
ABRÉVIATION	SYMBOL SYMBOLE	ABBREVIATION
DE MONTAGE AU PLAFOND	C	CEILING MOUNTED
CAPACITÉ D'INTERRUPTION DE DÉFAUT DE TERRE, DE TYPE RÉGLÉ À 5 Ma	GFI	GROUND FAULT INTERRUPTING, 5 mA
MISE À LA TERRE OU SOL	GND	GROUND
DE TYPE ÉTANCHE AUX INTEMPÉRIES (IP66/NEMA 4)	WP	WEATHERPROOF (IP66/NEMA 4)
À AMÉNAGER AVEC	C/W	COMPLETE WITH
DÉCHARGE À GRANDE DENSITÉ	HID	HIGH INTENSITY DISCHARGE

LÉGENDE DES TYPES DE LIGNES
LINETYPE LEGEND

DESCRIPTION	LINETYPE TYPE DE LIGNE	DESCRIPTION
NOUVEAUX TRAVAUX	———	NEW WORK
OUVRAGES DE DÉMOLITION	– – – – –	DEMOLITION WORK
EXISTANT	———	EXISTING
SERVICE ENFOUI	—— · —— · ——	BURIED SERVICE
LIGNES DE QUADRILLAGE D'ARCHITECTURE	—— – ——	ARCHITECTURAL GRID LINES

LISTE DES DESSINS
DRAWING LIST

DESCRIPTION	DWG # DESSIN N°	DESCRIPTION
TRAVAUX D'ÉLECTRICITÉ – LÉGENDES, LISTE DES DESSINS ET PLAN D'IMPLANTATION	E1	ELECTRICAL LEGENDS, DRAWING LIST AND SITE PLAN
NOMENCLATURE DES LUMINAIRES ET DÉTAILS DE DESSIN	E2	LIGHTING FIXTURE SCHEDULE AND DRAWING DETAILS
TRAVAUX D'ÉLECTRICITÉ – INSTALLATIONS DE COURANT ET SYSTÈMES – OUVRAGES DE DÉMOLITION ET NOUVEAUX TRAVAUX, AU NIVEAU DU SOUS–SOL	E3	ELECTRICAL POWER AND SYSTEMS DEMOLITION AND NEW WORK BASEMENT LEVEL
	E4	ELECTRICAL LIGHTING LEVEL 00, 01 AND 02
TRAVAUX D'ÉLECTRICITÉ – INSTALLATIONS DE COURANT ET SYSTÈMES – OUVRAGES DE DÉMOLITION ET NOUVEAUX TRAVAUX, EN DESSOUS DE LA FONTAINE	E5	ELECTRICAL POWER AND SYSTEMS DEMOLITION AND NEW WORK BELOW FOUNTAIN
TRAVAUX D'ÉLECTRICITÉ – INSTALLATIONS D'ÉCLAIRAGE – NOUVEAUX TRAVAUX, EN DESSOUS DE LA FONTAINE ET NOMENCLATURES DES TABLEAUX	E6	ELECTRICAL LIGHTING NEW WORK BELOW FOUNTAIN AND PANEL SCHEDULES
TRAVAUX D'ÉLECTRICITÉ – INSTALLATIONS DE COURANT ET SYSTÈMES – OUVRAGES DE DÉMOLITION – PLAN D'IMPLANTATION	E7	ELECTRICAL POWER AND SYSTEMS DEMOLITION WORK SITE PLAN
TRAVAUX D'ÉLECTRICITÉ – INSTALLATIONS DE COURANT ET SYSTÈMES – NOUVEAUX TRAVAUX – PLAN D'IMPLANTATION	E8	ELECTRICAL POWER AND SYSTEMS NEW WORK SITE PLAN
TRAVAUX D'ÉLECTRICITÉ – INSTALLATIONS D'ÉCLAIRAGE – OUVRAGES DE DÉMOLITION – PLAN D'IMPLANTATION	E9	ELECTRICAL LIGHTING DEMOLITION WORK SITE PLAN
TRAVAUX D'ÉLECTRICITÉ – INSTALLATIONS D'ÉCLAIRAGE – NOUVEAUX TRAVAUX – PLAN D'IMPLANTATION	E10	ELECTRICAL LIGHTING NEW WORK SITE PLAN
ÉLÉVATION – INSTALLATIONS D'ÉCLAIRAGE DE LA FAÇADE DU BÂTIMENT	E11	ELECTRICAL BUILDING FACADE LIGHTING ELEVATION



1 / E1 SITE PLAN
PLAN D'IMPLANTATION
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Direction de la gestion de l'immobilier, design et construction
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7	ISSUED FOR TENDER DOCUMENT DE SOUMISSION	13-04-2016
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2	90% CLIENT REVIEW DOCUMENT À 90 %, À SOUMETTRE À L'EXAMEN DU CLIENT.	13-02-2013
1	30% CLIENT REVIEW DOCUMENT À 30 %, À SOUMETTRE À L'EXAMEN DU CLIENT.	14-12-2012

project
projet

NCC RESIDENCE
FRONT ENTRANCE LANDSCAPE
REHABILITATION 2016

REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE RÉSIDENCE CCNL - 2016

drawing
dessin

ELECTRICAL LEGENDS,
DRAWING LIST AND SITE PLAN

TRAVAUX D'ÉLECTRICITÉ -
LÉGENDES, LISTE DES DESSINS ET PLAN D'IMPLANTATION

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
date	26/11/2012
scale échelle	AS NOTED SELON LES IND.
NCC project no. n° du projet de la CCN	DC-2611-110
sheet no. n° de la feuille	E1

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NOMENCLATURE DES LUMINAIRES

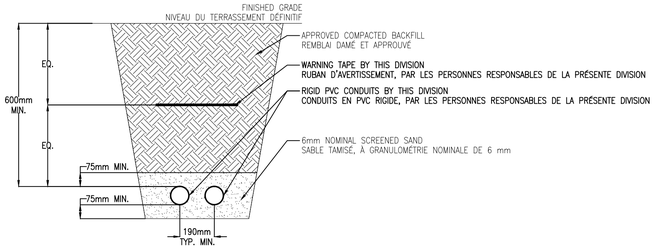
TYPE	DESCRIPTION	NUMÉRO DE CATALOGUE	LAMPES PAR LUMINAIRE QTÉ	TYPE	WATTS	COULEUR	TENSION	MONTAGE	REMARQUES
1	LUMINAIRE EXISTANT À INCANDESCENCE ET DE TYPE ÉTANCHE		1	INC	–	–	120V	EN SURFACE	À AMÉNAGER AVEC UN BOÎTIER ÉTANCHE AUX INTEMPÉRIES ET UNE CAGE DE PROTECTION;
	AUX INTEMPÉRIES							EN BÉTON	ARTICLE EXISTANT, À CONSERVER.
2	LUMINAIRE EXISTANT D'ESCALIER, DE MONTAGE ENCASTRÉ		1	INC	–	–	120V	ENCASTRÉ	ARTICLE EXISTANT, À ENLEVER.
	–							EN BÉTON	–
3	PROJECTEURS EXISTANTS À INCANDESCENCE ET D'ORIENTATION		1	PAR	–	–	120V	EN SURFACE	À AMÉNAGER AVEC UN BOÎTIER ÉTANCHE AUX INTEMPÉRIES; ARTICLE EXISTANT, À ENLEVER.
	VERS LE HAUT							EN BÉTON	–
4	LUMINAIRE EXISTANT DE FONTAINE ET DE TYPE ÉTANCHE AUX INTEMPÉRIES		1	–	–	–	120V	SUBMERGÉ	ARTICLE EXISTANT, À ENLEVER.
	–							FONTAINE	–
5	LUMINAIRE EXISTANT DE FONTAINE ET DE TYPE ÉTANCHE AUX INTEMPÉRIES		1	–	–	–	120V	SUBMERGÉ	ARTICLE EXISTANT, À ENLEVER.
	–							FONTAINE	–
6	POTEAU EXISTANT D'ÉCLAIRAGE		1	–	–	–	120V	SUR POTEAU	ARTICLE EXISTANT, À CONSERVER OU À DÉPLACER.
	–								–
L1	NOUVEAU LUMINAIRE LINÉAIRE ET DIODIQUE,	LUMENPULSE LOG-RO-120-XX-2700K-	–	LED	8.5W/FT	2700K	120V	EN SURFACE	À AMÉNAGER AVEC CE QUI SUIT : CÂBLES PRÉ-CÂBLÉS D'INSTALLATION CONDUCTRICE ET D'ENSEMBLES
	À MONTER AU NIVEAU DU SOL	30x60-UMAS-RAL#-DIM							CAVALIERS; DES LONGUEURS REQUISES ET CE, AFIN DE PRODUIRE UNE INSTALLATION TOUT À FAIT COMPLÈTE.
L2	NOUVEAU LUMINAIRE DE PROJECTION, DE MONTAGE SUR POTEAU ET À	ETC : SOURCE :- QUATRE, À 50 DEGRÉS ET	1	HID	150W	3000K	120V	SUR POTEAU	À AMÉNAGER AVEC UN EMBOÎTEMENT HYDROFUGE TEMPEST THUNDER 6600 ET UN POTEAU À TROUSSE D'ÉTRIER TEMPEST XYZ.
	DÉCHARGE À HAUTE INTENSITÉ, AVEC CE QUI SUIT : ENSEMBLES OPTIQUES	DE COULEUR NOIRE, AVEC ENSEMBLE							QUINCAILLERIE DE MONTAGE POUR CROCHET DE MONTAGE. AMÉNAGER CHAQUE LUMINAIRE AVEC UNE TROUSSE D'ISOLATION THERMIQUE, DE MARQUE TEMPEST.
	DÈS PLUS PRÉCIS, INSTALLATION DE MIRE, ENSEMBLES OBTURATEURS	PORTEUR 400PH-B GOBO ET SOCLE DE							AMÉNAGER LE LUMINAIRE AVEC DES FILTRES RÉGLABLES, DE FABRICATION ROSCO DICHROIC ET DE L'INTENSITÉ SUIVANTE : ENTRE 3 000 K ET 2 700 K.
	ET ENSEMBLES DE RETENUE	COULEUR 400CF							
L2 POLE	LUMINAIRE DE TYPE 2, DEVANT ÊTRE MONTÉ SUR UN POTEAU	ENSEMBLE « LF08-20FT », AVEC							BRAS DE FABRICATION SUR MESURE PM-CF68 ET DE LONGUEUR SUR MESURE DE 336 mm, AVEC
	« LUMCA SMART POLE ».	SOCLE WB-18							TENON VERTICAL DE FABRICATION SUR MESURE ET DE 22 mm DE DIAMÈTRE EXTÉRIEUR, AFIN D'ACCOMMODER LE CROCHET DE MONTAGE DE L'EMBOÎTEMENT THUNDER.
									SE REPORTER AUX DESSINS DU CONSULTANT EN ÉCLAIRAGE AFIN DE RETROUVER DES RENSEIGNEMENTS ADDITIONNELS À CE SUJET.
L3	CHANDELLIER DE PORTIQUE, DEVANT ÊTRE ENLEVÉ, RÉTABLI, AMÉNAGÉ AVEC	SPÉCIFICATIONS SUR LES LAMPES : LAMPE					120V	CHAÎNE	LUMINAIRE À CAPACITÉ DE GRADUATION. À RÉNOVER ET À RECONNECTER UNE FOIS LES TRAVAUX
	DE NOUVELLES LAMPES ET REMONTÉ.	DIODIQUE R20 ET DE MARQUE PHILIPS	10		9.5W	2700K		SUSPENDU	DE RÉFECTION TERMINÉS.
	–	LAMPE DIODIQUE SORAA ET D'INTENSITÉ PAR 20	10		11W	2700K			–
	–	FILAMENT TRANSPARENT, COMME SUIT : « G25 OLED FAUX EDISON »	10		4W	2700K			LAMPE D'IDENTIFICATION SATCO S9254 OU DE FABRICATION ÉQUIVALENTE ET APPROUVÉE.
L4	NOUVEL ENSEMBLE ILLUMINATEUR « GRAZE », D'ORIENTATION LINÉAIRE ET	LUMENPULSE LOGH-RO-120-XX-2700K-	–	LED	8.5W/FT	2700K	120V	EN SURFACE	À AMÉNAGER AVEC CE QUI SUIT : CÂBLES PRÉ-CÂBLÉS D'INSTALLATION CONDUCTRICE ET D'ENSEMBLES
	D'ÉCLAIRAGE DIODIQUE, LE LONG DU REBORD DE FAÇADE,	10x60-UMAS-RAL#-DIM							CAVALIERS; DES LONGUEURS REQUISES ET CE, AFIN DE PRODUIRE UNE INSTALLATION TOUT
	AU TROISIÈME ÉTAGE								À FAIT COMPLÈTE.
L5	NOUVEL ENSEMBLE ILLUMINATEUR « GRAZE », D'ORIENTATION LINÉAIRE ET	LUMENPULSE LOGH-RO-120-XX-2700K-	–	LED	8.5W/FT	2700K	120V	EN SURFACE	À AMÉNAGER AVEC CE QUI SUIT : CÂBLES PRÉ-CÂBLÉS D'INSTALLATION CONDUCTRICE ET D'ENSEMBLES
	D'ÉCLAIRAGE DIODIQUE, À MÊME LA PARTIE SUPÉRIEURE DU PORTIQUE	10x60-UMAS-RAL#-DIM							CAVALIERS; DES LONGUEURS REQUISES ET CE, AFIN DE PRODUIRE UNE INSTALLATION TOUT À FAIT COMPLÈTE.
L6	NOUVEL ENSEMBLE ILLUMINATEUR « GRAZE », D'ORIENTATION LINÉAIRE ET	LUMENPULSE LOGH-HO-120-XX-2700K-	–	LED	15.25W /FT	2700K	120V	EN SURFACE	À AMÉNAGER AVEC CE QUI SUIT : CÂBLES PRÉ-CÂBLÉS D'INSTALLATION CONDUCTRICE ET D'ENSEMBLES
	D'ÉCLAIRAGE DIODIQUE, À L'EMPLACEMENT DES COLONNES DE	10x10-UMAS-RAL#-DIM							CAVALIERS; DES LONGUEURS REQUISES ET CE, AFIN DE PRODUIRE UNE INSTALLATION TOUT À FAIT COMPLÈTE.
	FAÇADE À L'ÉTAGE								
L7	NOUVEAUX LUMINAIRES PROJECTEURS DE DRAPEAUX ET D'ÉCLAIRAGE	LUMENPULSE LBM-120-27K-NF-	–	LED	28W	2700K	120V	EN SURFACE	À AMÉNAGER AVEC CE QUI SUIT : CÂBLES PRÉ-CÂBLÉS D'INSTALLATION CONDUCTRICE ET D'ENSEMBLES
	DIODIQUE, AU NIVEAU DU TOIT DU BÂTIMENT.	RAL#-NO-SY							CAVALIERS; DES LONGUEURS REQUISES ET CE, AFIN DE PRODUIRE UNE INSTALLATION TOUT À FAIT COMPLÈTE.

NOTES :
1. ORIENTATION DES LUMINAIRES RÉGLABLES, DEVANT FAIRE L'OBJET D'UNE COORDINATIONA VEC LE REPRÉSENTANT DE LA CCN.

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	CATALOG NUMBER	LAMPS PER FIXTURE QTY	TYPE	WATTS	COLOUR	VOLT	MOUNTING	REMARKS
1	EXISTING INCANDESCENT WEATHERPROOF FIXTURE		1	INC	–	–	120V	SURFACE	C/W WEATHERPROOF HOUSING AND PROTECTIVE CAGE; EXISTING TO REMAIN
	–							CONCRETE	–
2	EXISTING RECESSED STAIR FIXTURE		1	INC	–	–	120V	RECESSED	EXISTING TO BE REMOVED
	–							CONCRETE	–
3	EXISTING INCANDESCENT UPLIGHTS		1	PAR	–	–	120V	SURFACE	C/W WEATHERPROOF HOUSING; EXISTING TO BE REMOVED
	–							CONCRETE	–
4	EXISTING WATERTIGHT FOUNTAIN FIXTURE		1	–	–	–	120V	SUBMERGED	EXISTING TO BE REMOVED
	–							FOUNTAIN	–
5	EXISTING WATERTIGHT FOUNTAIN FIXTURE		1	–	–	–	120V	SUBMERGED	EXISTING TO BE REMOVED
	–							FOUNTAIN	–
6	EXISTING LIGHT STANDARD		1	–	–	–	120V	POLE	EXISTING TO REMAIN OR TO BE RELOCATED
	–							MOUNTED	–
L1	NEW LINEAR LED FLOOD FIXTURE,	LUMENPULSE LOG-RO-120-XX-2700K-	–	LED	8.5W/FT	2700K	120V	SURFACE	C/W PRE-WIRED LEADER AND JUMPER CABLES, LENGTHS AS REQUIRED FOR COMPLETE
	MOUNTED AT GROUND LEVEL	30x60-UMAS-RAL#-DIM						MOUNTED	INSTALLATION.
L2	NEW POLE MOUNTED HID PROJECTION FIXTURE WITH	ETC SOURCE FOUR 50DEGREE BLACK	1	HID	150W	3000K	120V	POLE	C/W TEMPEST THUNDER 6600 WEATHERPROOF ENCLOSURE AND TEMPEST XYZ YOKE KIT
	PRECISION OPTICS, FOCUSING, SHUTTERS AND HOLDERS	C/W 400PH-B GOBO HOLDER AND						MOUNTED	POLE MOUNTING BRACKET MOUNTING HARDWARE. EACH FIXTURE C/W TEMPEST THERMAL
	–	400CF COLOUR FRAME							INSULATION KIT. FIXTURE SHALL BE C/W ROSCO DICHROIC 3000K TO 2700K
									ADJUSTABLE FILTERS.
L2 POLE	TYPE L2 SHALL BE MOUNTED ON A LUMCA SMART POLE	LF08-20FT C/W WB-18 BASE							CUSTOM ARMS PM-CF68-CUSTOM 336mm LONG C/W CUSTOM 22mm O.D. VERTICAL
									TENON TO ACCOMMODATE THUNDER ENCLOSURE MOUNTING BRACKET.
									REFER TO LIGHTING CONSULTANT DRAWINGS FOR FURTHER INFORMATION.
L3	PORTICO CHANDELIER TO BE REMOVED, REFURBISHED,	LAMP SPECIFICATIONS:					120V	CHAIN	DIMABLE FIXTURE. RE-INSTATE AND RE-CONNECT FIXTURE FOLLOWING REFURBISHMENT.
	RELAMPED AND REINSTATED.	PHILIPS LAMP – R20 LED	10		9.5W	2700K		SUSPENDED	–
	–	SORAA LAMP – PAR20 LED	10		11W	2700K			–
	–	G25 OLED FAUX EDISON FILAMENT, CLEAR	10		4W	2700K			SATCO S9254 LAMP OR APPROVED EQUAL
L4	NEW LINEAR LED GRAZE ILLUMINATOR	LUMENPULSE LOGH-RO-120-XX-2700K-	–	LED	8.5W/FT	2700K	120V	SURFACE	C/W PRE-WIRED LEADER AND JUMPER CABLES, LENGTHS AS REQUIRED FOR COMPLETE
	THIRD FLOOR FACADE LEDGE	10x60-UMAS-RAL#-DIM						MOUNTED	INSTALLATION.
L5	NEW LINEAR LED GRAZE ILLUMINATOR	LUMENPULSE LOGH-RO-120-XX-2700K-	–	LED	8.5W/FT	2700K	120V	SURFACE	C/W PRE-WIRED LEADER AND JUMPER CABLES, LENGTHS AS REQUIRED FOR COMPLETE
	TOP OF PORTICO	10x60-UMAS-RAL#-DIM						MOUNTED	INSTALLATION.
L6	NEW LINEAR LED GRAZE ILLUMINATOR	LUMENPULSE LOGH-HO-120-XX-2700K-	–	LED	15.25W /FT	2700K	120V	SURFACE	C/W PRE-WIRED LEADER AND JUMPER CABLES, LENGTHS AS REQUIRED FOR COMPLETE
	FIRST FLOOR FACADE COLUMNS	10x10-UMAS-RAL#-DIM						MOUNTED	INSTALLATION.
L7	NEW LED FLAG SPOT FIXTURES	LUMENPULSE LBM-120-27K-NF-	–	LED	28W	2700K	120V	SURFACE	C/W PRE-WIRED LEADER AND JUMPER CABLES, LENGTHS AS REQUIRED FOR COMPLETE
	BUILDING ROOF	RAL#-NO-SY						MOUNTED	INSTALLATION.
L8	NEW 1220mm VAPOUR-TIGHT LED FIXTURE	COOPER METALUX VAPORTITE LED	–	LED	82W	4000K	120V	SURFACE	–
	–	4VT2-L4D-8-DR-UNV-L840-CD1-WL						MOUNTED	–

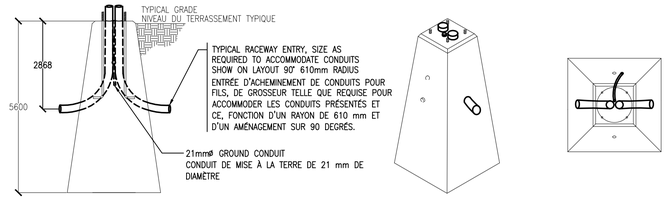
NOTES:
1. COORDINATE AIMING OF ADJUSTABLE FIXTURES WITH NCC REPRESENTATIVE.



NOTE: 1. INSTALL IN ACCORDANCE WITH OESC LATEST EDITION.
2. DETAIL INDICATES TYPICAL INSTALLATION ONLY.
3. ALL EXCAVATION, BACKFILL AND COMPACTION BY DIVISION 31/32.
4. ACTUAL SIZE AND NUMBER OF CONDUITS AS INDICATED ON DRAWINGS. COORDINATE FINAL EARTHWORK DIMENSIONS WITH DIVISION 31/32.
5. IF 600mm DEPTH CANNOT BE ACHIEVED THEN COVER CONDUITS WITH 50mm THICK CONCRETE ALONG THE DUCT RUN AND 100mm PAST DUCTS.

NOTE :1. À INSTALLER EN CONFORMITÉ AVEC LES NORMES PERTINENTES DE L'OESC ET CE, SELON LA PLUS RÉCENTE ÉDITION.
2. LE DÉTAIL PRÉSENTE UNE INSTALLATION REPRÉSENTATIVE SEULEMENT.
3. TOUS LES TRAVAUX D'EXCAVATION, DE REBLAYAGE APRÈS EXCAVATION ET DE DAMAGE, PAR LES PERSONNES RESPONSABLES DE LA DIVISION 31 ET (OU) DE LA DIVISION 32.
4. GROSSEUR ACTUELLE DES CONDUITS ET NOMBRE DE CONDUITS, SELON LES INDICATIONS DES DESSINS. DIMENSIONS DÉFINITIVES DES TRAVAUX TERREUX, DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC LES PERSONNES RESPONSABLES DES DIVISIONS 31 ET (OU) 32.
5. S'IL S'AVÈRE IMPOSSIBLE D'ATTEINDRE UNE PROFONDEUR DE 600 mm, IL FAUDRA ALORS RECOUVRIR LES CONDUITS DE BÉTON DE 50 mm D'ÉPAISSEUR ET CE, LE LONG DE LA LONGUEUR DES CONDUITS ET DANS UNE DISTANCE DE 100 mm AU DELÀ DES CONDUITS.

1 / E2 TYPICAL BURIED CONDUIT DETAIL
DÉTAIL TYPIQUE - CONDUIT ENFOUI
N.T.S. / P. À É.



NOTE: 1. INSTALL IN ACCORDANCE WITH OESC LATEST EDITION.
2. DETAIL INDICATES TYPICAL INSTALLATION ONLY, CONTRACTOR TO CONFIRM BOLT PATTERN OF LIGHT STANDARD WITH MANUFACTURER.
3. ALL EXCAVATION, BACKFILL AND COMPACTION BY DIVISION 31/32.
4. ACTUAL SIZE AND NUMBER OF CONDUITS AS INDICATED ON DRAWINGS. COORDINATE FINAL EARTHWORK DIMENSIONS WITH DIVISION 31/32.
5. LIGHT STANDARD BASE PROVIDED BY DIVISION 03.

NOTE: 1. À INSTALLER EN CONFORMITÉ AVEC LES NORMES PERTINENTES DE L'OESC ET CE, SELON LA PLUS RÉCENTE ÉDITION.
2. LE DÉTAIL PRÉSENTE UNE INSTALLATION REPRÉSENTATIVE SEULEMENT.
3. TOUS LES TRAVAUX D'EXCAVATION, DE REBLAYAGE APRÈS EXCAVATION ET DE DAMAGE, PAR LES PERSONNES RESPONSABLES DE LA DIVISION 31 ET (OU) DE LA DIVISION 32.
4. GROSSEUR ACTUELLE DES CONDUITS ET NOMBRE DE CONDUITS, SELON LES INDICATIONS DES DESSINS. DIMENSIONS DÉFINITIVES DES TRAVAUX TERREUX, DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC LES PERSONNES RESPONSABLES DES DIVISIONS 31 ET (OU) 32.
5. SOCLE DE POTEAU D'ÉCLAIRAGE, DEVANT ÊTRE PRÉVU PAR LES PERSONNES RESPONSABLES DE LA DIVISION 03.

2 / E2 LIGHT STANDARD CONDUIT ENTRY DETAIL
DÉTAIL - ENTRÉE DE CONDUIT DE POTEAU D'ÉCLAIRAGE
N.T.S. / P. À É.

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Real Estate Management, Design and Construction Branch
Direction de la gestion de l'immobilier, design et construction

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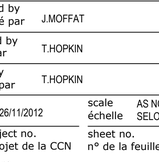

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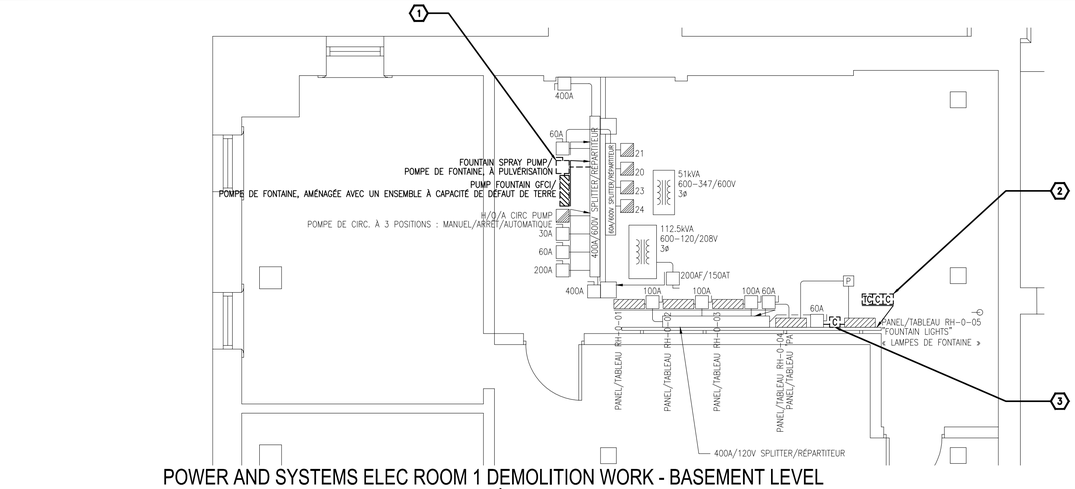
REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE RÉSIDENCE CCN - 2016

drawing
dessin

LIGHTING FIXTURE SCHEDULE AND DRAWING DETAIL

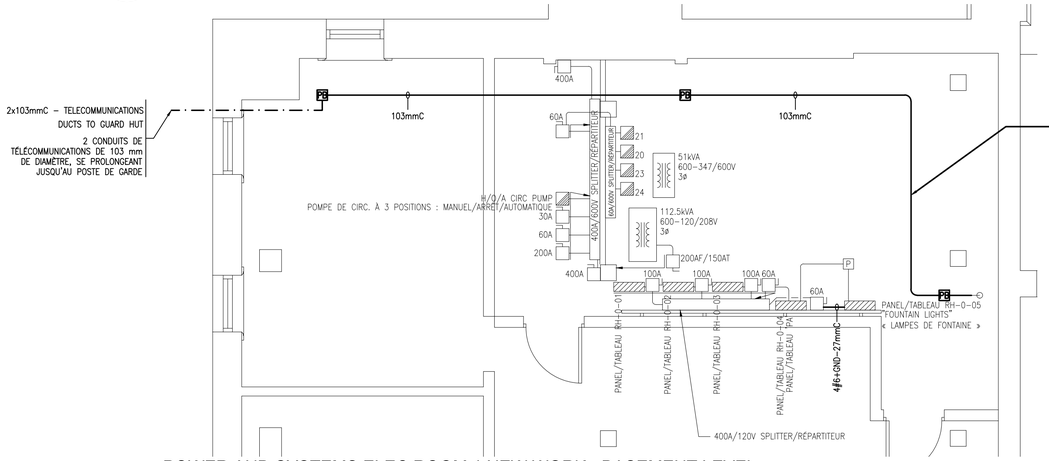
NOMENCLATURE DES LUMINAIRES ET DÉTAILS DE DESSIN

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
date 26/11/2012	scale échelle AS NOTED SELON LES IND.
NCC project no. n° du projet de la CCN	sheet no. n° de la feuille
DC-2611-110	E2



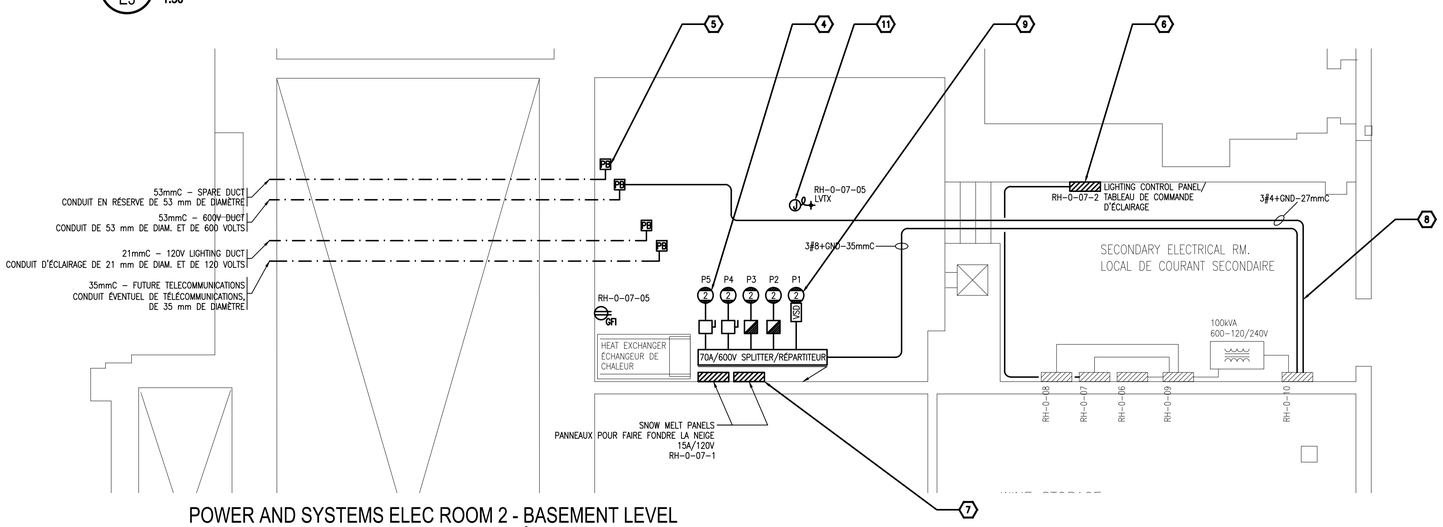
POWER AND SYSTEMS ELEC ROOM 1 DEMOLITION WORK - BASEMENT LEVEL
INSTALLATIONS DE COURANT ET SYSTÈMES - LOCAL DE COURANT 1 -
OUVRAGES DE DÉMOLITION, AU NIVEAU DU SOUS-SOL

1 / E3 — 1:50



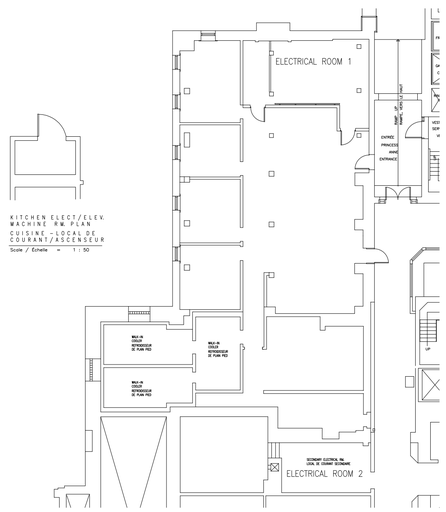
POWER AND SYSTEMS ELEC ROOM 1 NEW WORK - BASEMENT LEVEL
INSTALLATIONS DE COURANT ET SYSTÈMES - LOCAL DE COURANT 1 -
NOUVEAUX TRAVAUX, AU NIVEAU DU SOUS-SOL

2 / E3 — 1:50



POWER AND SYSTEMS ELEC ROOM 2 - BASEMENT LEVEL
INSTALLATIONS DE COURANT ET SYSTÈMES -
LOCAL DE COURANT 2, AU NIVEAU DU SOUS-SOL

3 / E3 — 1:50



BASEMENT LEVEL PART PLAN FOR REFERENCE
PLAN PARTIEL AU NIVEAU DU SOUS-SOL, À DES FINS DE RENVOI

4 / E3 — 1:200

NOTES DU DESSIN
DRAWING NOTES

1. DÉCONNECTER ET ENLEVER L'ÉLÉMENT DE COMMANDE DE POMPE À CAPACITÉ DE DÉFAUT DE TERRE ET LE DISJONCTEUR DE LA POMPE DE FONTAINE À PULVÉRISATION. ENLEVER LE CÂBLAGE ET LE CONDUIT ET CE, EN REVENANT JUSQU'À LA SOURCE ET EN RENDANT LE TOUT PARFAITEMENT SÉCURITAIRE.

2. DÉCONNECTER ET ENLEVER LA MINUTERIE ET LES CONTACTEURS D'ÉCLAIRAGE CONNEXES ET CE, À L'EMPLACEMENT DE LA FONTAINE EXISTANTE.

3. DÉCONNECTER ET ENLEVER LE CONTACTEUR ET L'ENSEMBLE ALIMENTEUR DU TABLEAU RH-0-05 ET CE, EN REVENANT JUSQU'AU DISJONCTEUR. PRÉVOIR UN NOUVEL ENSEMBLE ALIMENTEUR À L'EMPLACEMENT DU TABLEAU RH-0-05 ET CE, SELON LES INDICATIONS DU DÉTAIL DES NOUVEAUX TRAVAUX 2/E3.

4. DÉTAIL TYPIQUE :
NOUVELLES POMPES DE CHAUFFAGE POUR FAIRE FONDRE LA NEIGE, DEVANT ÊTRE FOURNIES ET MONTÉES PAR LES PERSONNES RESPONSABLES DE LA DIVISION 23; À AMÉNAGER AVEC UN CONTRÔLEUR DE DISPOSITIF À VITESSE VARIABLE. PRÉVOIR UN NOUVEAU RÉPARTITEUR DE 70 AMPÈRES OU 600 VOLTS; À AMÉNAGER AVEC UN CIRCUIT DE 30 AMPÈRES, 600 VOLTS ET 3 PHASES ET UN DISJONCTEUR CONNEXE ET ASSORTI ET CE, À PARTIR DU TABLEAU RH-0-10 DANS LE LOCAL ADJACENT. PROLONGER LE CÂBLAGE JUSQU'À CHAQUE POMPE RESPECTIVE ET CE, À PARTIR DU RÉPARTITEUR.

5. DÉTAIL TYPIQUE :
MÉNAGER DE NOUVELLES PÉNÉTRATIONS DANS LA PARTIE EXTÉRIEURE DU BÂTIMENT ET CE, AFIN D'ACCOMMODER DE NOUVEAUX CONDUITS ENFOUIES ET À PARTIR DU PUITS DE LA FONTAINE ET DE LUMINAIRES D'EXTÉRIEUR. PRÉVOIR UN NOUVEL ENSEMBLE « LB » DANS LA NOUVELLE BOÎTE DE TIRAGE ET CE, POUR CHAQUE PÉNÉTRATION. FORER DES TROUS DE 3 mm DE DIAMÈTRE DANS LES « LB » ET CE, AUX FINS DE DRAINAGE DES CONDUITS. SCANNER ET CAROTTER LE TOUT POUR LES NOUVELLES PÉNÉTRATIONS. SE SERVIR DE COULIS POUR REMPLIR LES JEUX.

6. PRÉVOIR UN NOUVEAU SYSTÈME DE COMMANDE D'ÉCLAIRAGE POUR LE NOUVEAU SYSTÈME DE COMMANDE D'ÉCLAIRAGE DE FAÇADE D'EXTÉRIEUR; DE FABRICATION ÉQUIVALENTE À CE QUI SUIT : SYSTÈME DE GESTION D'ÉCLAIRAGE « DLM » ET DE FABRICATION WATTSTOPPER, À AMÉNAGER AVEC UN CONTRÔLEUR DE ZONE DE TYPE NUMÉRIQUE ET DU MODÈLE LMZC-301 ET CE, POUR AUTOMATISER LE SYSTÈME D'ÉCLAIRAGE. LE SYSTÈME DEVRA OFFRIR DU COURANT DE CLASSE 2 AUX INTERRUPTEURS ET AUX CONTRÔLEURS DE LUMINAIRESDE MONTAGE SUR PLACE; EN OUTRE, IL DEVRA ÊTRE AMÉNAGÉ AVEC UNE MINUTERIE ASTRONOMIQUE ENCASTRÉE ET CE, AUX FINS DE PROGRAMMATION DU SYSTÈME. PRÉVOIR UN NOUVEAU CIRCUIT DE 120 VOLTS ET 15 AMPÈRES POUR ALIMENTER LE CONTRÔLE DE ZONE NUMÉRIQUE ET DE TYPE « DLM ».

7. DÉTAIL TYPIQUE, À 3 ENDROITS :
NOUVEAUX PANNEAUX POUR FAIRE FONDRE LA NEIGE, DEVANT ÊTRE FOURNIS ET MONTÉS PAR LES PERSONNES RESPONSABLES DE LA DIVISION 23. PRÉVOIR UN CIRCUIT DE 15 AMPÈRES ET (OU) DE 120 VOLTS, À AMÉNAGER AVEC UN NOUVEAU DISJONCTEUR ET CE, ENTRE LE TABLEAU RH-0-07 ET CHAQUE PANNEAU.

8. L'ENTREPRENEUR RESPONSABLE DE LA FONTAINE DEVRA MONTER UN NOUVEAU TABLEAU DE COMMANDE DE POMPE DE FONTAINE ET CE, DANS LE PUITS DE LA FONTAINE. PRÉVOIR UN NOUVEAU CIRCUIT DE 80 AMPÈRES, 600 VOLTS, 3 PHASES ET 3 FILS ET L'AMÉNAGER AVEC UN NOUVEAU DISJONCTEUR DANS LE TABLEAU RH-0-10, AVEC UN PROLONGEMENT JUSQU'AU TABLEAU DANS LE PUITS DE LA FONTAINE. SE REPORTER AU DESSIN E4 AFIN DE RETROUVER LES DÉTAILS.

9. NOUVELLE POMPE DE CHAUFFAGE POUR FAIRE FONDRE LA NEIGE, DEVANT ÊTRE FOURNIE ET MONTÉE PAR LES PERSONNES RESPONSABLES DE LA DIVISION 23; À AMÉNAGER AVEC UN CONTRÔLEUR DE DISPOSITIF À VITESSE VARIABLE. PRÉVOIR UN NOUVEAU CIRCUIT DE 15 AMPÈRES, 600 VOLTS ET 3 PHASES ET UN NOUVEAU DISJONCTEUR ASSORTI ET CE, À PARTIR DU TABLEAU RH-0-10 DANS LE LOCAL ADJACENT.

10. PRÉVOIR UN NOUVEAU CONDUIT ET L'ASSIGNER À L'ENTREPRENEUR OU AUX ENTREPRENEURS EXTERNES ET CE, À PARTIR DU CONDUIT EXISTANT DE TÉLÉCOMMUNICATIONS, AVEC UN PROLONGEMENT DE MANCHON VERS LE BAS, À PARTIR DU NIVEAU 02; À PROLONGER JUSQU'AUX PÉNÉTRATIONS DE CONDUITS À TRAVERS LA PARTIE EXTÉRIEURE DE LA HOTTE DE GARDE. SE REPORTER AU DESSIN E8 AFIN DE RETROUVER LES DÉTAILS DE CONDUIT D'EXTÉRIEUR.

1. DISCONNECT AND REMOVE PUMP GFCI CONTROL UNIT AND FOUNTAIN SPRAY PUMP DISCONNECT. REMOVE WIRING AND CONDUIT BACK TO SOURCE AND MAKE SAFE.

2. DISCONNECT AND REMOVE TIME CLOCK AND ASSOCIATED LIGHTING CONTACTORS FOR EXISTING FOUNTAIN.

3. DISCONNECT AND REMOVE CONTACTOR AND FEED TO PANEL RH-0-05 BACK TO DISCONNECT. PROVIDE NEW FEED TO PANEL RH-0-05 AS INDICATED IN NEW WORK 2/E3.

4. TYPICAL:
NEW SNOW MELT HEATING PUMPS SUPPLIED AND INSTALLED BY DIVISION 23. PROVIDE NEW 70A/600V NEMA 3R SPLITTER C/W 40A/600V/3ø CIRCUIT AND 40A/600V/3ø BREAKER FROM PANEL RH-0-10 IN ADJACENT ROOM. EXTEND WIRING TO EACH RESPECTIVE PUMP FROM SPLITTER. PROVIDE LOCAL DISCONNECT OR COMBINATION MAGNETIC STARTER AS INDICATED.

5. TYPICAL:
PROVIDE NEW PENETRATIONS THROUGH BUILDING EXTERIOR FOR NEW BURIED CONDUITS FROM FOUNTAIN PIT AND EXTERIOR FIXTURES. PROVIDE NEW 'LB' INTO PULL BOX FOR EACH PENETRATION. DRILL 3mm HOLES IN 'LBs' FOR DRAINAGE OF CONDUITS. PROVIDE SCANNING AND CORING FOR NEW PENETRATIONS. FILL GAPS WITH GROUT.

6. PROVIDE NEW LIGHTING CONTROL SYSTEM FOR NEW EXTERIOR FACADE LIGHTING CONTROL SYSTEM, EQUAL TO WATTSTOPPER DIGITAL LIGHTING MANAGEMENT (DLM), TO BE C/W DIGITAL ZONE CONTROLLER, MODEL LMZC-301, FOR AUTOMATION OF LIGHTING SYSTEM. SYSTEM SHALL PROVIDE CLASS 2 POWER TO FIELD MOUNTED FIXTURE CONTROLLERS AND SWITCHES AND SHALL HAVE BUILT IN ASTRONOMICAL TIMING FOR SYSTEM PROGRAMMING. PROVIDE NEW 120/15A CIRCUIT TO POWER DLM DIGITAL ZONE CONTROLLER.

7. TYPICAL (OF 2):
NEW SNOW MELT SYSTEM PANELS SUPPLIED AND INSTALLED BY DIVISION 23. INSTALL NEW 15A/120V BREAKER IN PANEL RH-0-7 AND PROVIDE 15A/120V CIRCUIT TO EACH PANEL.

8. NEW FOUNTAIN PUMP CONTROL PANEL INSTALLED IN FOUNTAIN PIT BY FOUNTAIN CONTRACTOR. PROVIDE NEW 80A, 600V, 3ø, 3W CIRCUIT C/W NEW BREAKER IN PANEL RH-0-10 TO PANEL IN FOUNTAIN PIT. REFER TO DRAWING E4 FOR DETAILS.

9. NEW SNOW MELT HEATING PUMP SUPPLIED, C/W VSD CONTROLLER, AND INSTALLED BY DIVISION 23. PROVIDE NEW 15A/600V/3ø CIRCUIT AND BREAKER FROM PANEL RH-0-10 IN ADJACENT ROOM.

10. PROVIDE NEW CONDUIT FOR USE BY EXTERNAL CONTRACTOR(S) FROM EXISTING TELECOMMUNICATIONS CONDUIT STUB DOWN FROM LEVEL 02, TO CONDUIT PENETRATIONS THROUGH EXTERIOR TO GUARD HUT. REFER TO DRAWING E8 FOR EXTERIOR CONDUIT DETAILS.

11. NEW LOW VOLTAGE CONTROLS TRANSFORMER SUPPLIED BY MECHANICAL CONTROLS CONTRACTOR. PROVIDE NEW 120V/15A CIRCUIT, INSTALL AND WIRE TRANSFORMER.

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PROFESSIONAL ENGINEER
J. MOFFAT
APR 13 2016
PROVINCE OF ONTARIO

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REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE RÉSIDENCE CCN - 2016

drawing
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ELECTRICAL POWER AND SYSTEMS DEMOLITION AND NEW WORK BASEMENT LEVEL

TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS DE COURANT ET SYSTÈMES - OUVRAGES DE DÉMOLITION ET NOUVEAUX TRAVAUX, AU SOUS-SOL

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
date	26/11/2012
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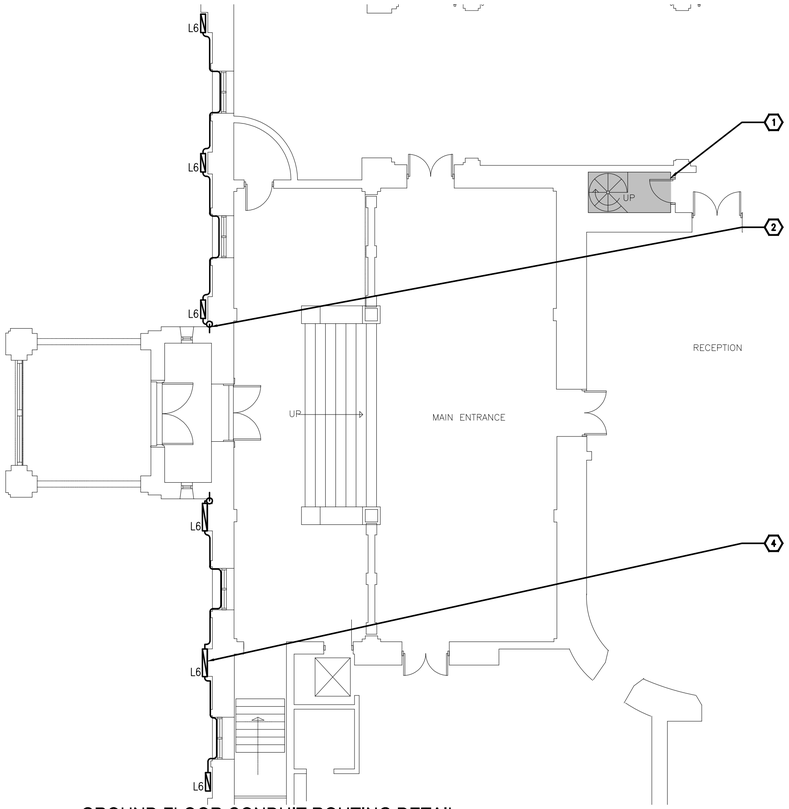
sheet no. n° de la feuille	E3



GROUND FLOOR CONDUIT ROUTING DETAIL

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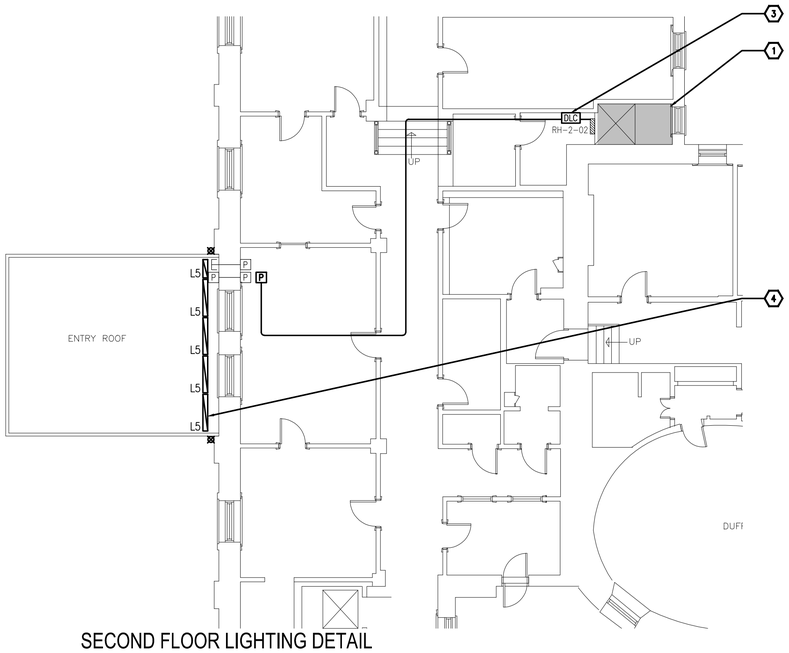
1/E4 1:100



SECOND FLOOR LIGHTING DETAIL

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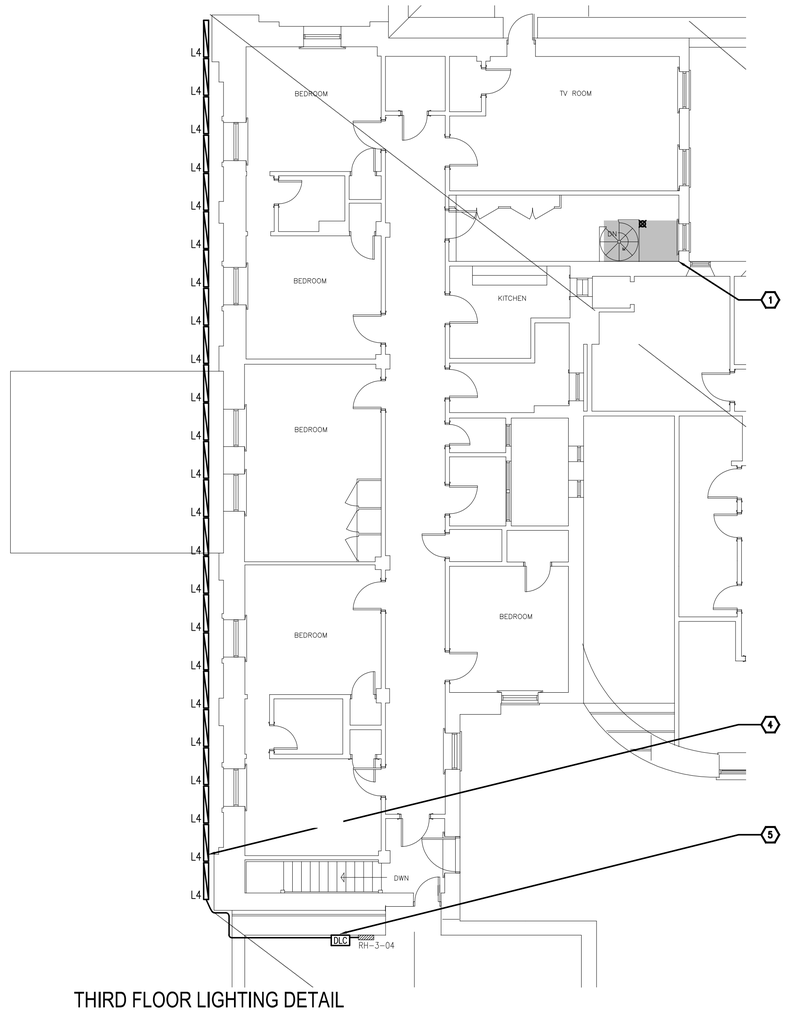
2/E4 1:100



THIRD FLOOR LIGHTING DETAIL

-

-

3/E4 1:100

DRAWING NOTES

1. TYPICAL:
CONTRACTOR TO MAKE USE OF VERTICAL CHASE FROM THIRD FLOOR TO BASEMENT FOR LOW VOLTAGE LIGHTING CONTROL WIRING.

2. TYPICAL:
RUN CABLES FOR TYPE L6 FIXTURES UP BUILDING EXTERIOR TO PORT-CUCHAIR ROOF AND MAKE USE OF EXISTING BUILDING PENETRATION. RUN CABLING TO EACH TYPE L6 FIXTURE TIGHT TO BUILDING FACADE. SECURE WIRING AT GROUT POINTS ONLY. REVIEW CABLING PATH WITH CONSULTANT AND NCC REPRESENTATIVE PRIOR TO INSTALLATION.

3. PROVIDE NEW DIGITAL 0-10V DIMMING LIGHTING CONTROLLER, EQUAL TO WATTSTOPPER LMRC-210, ADJACENT TO ELECTRICAL PANEL. CONTRACTOR TO WIRE NEW EXTERIOR LIGHTING THROUGH DIGITAL ROOM CONTROLLER TO PROVIDE 0-10V DIMMING SIGNAL TO LUMENPULSE FIXTURES. PROVIDE INTERCONNECTING CAT5E CONTROL WIRING DOWN THROUGH VERTICAL CHASE TO BASEMENT MECHANICAL ROOM AND TIE INTO NEW DIGITAL ZONE CONTROLLER INSTALLED IN BASEMENT. PROVIDE COMMISSIONING OF LIGHTING SYSTEM IN THE PRESENCE OF CONSULTANT AND NCC REPRESENTATIVE.

4. TYPICAL:
PROVIDE NEW EXTERIOR FIXTURES, TYPE AS SHOWN. REFER TO LIGHTING CONSULTANT DRAWINGS LTG-1 TO LTG-5 FOR INSTALLATION DETAILS.

5. PROVIDE NEW DIGITAL 0-10V DIMMING LIGHTING CONTROLLER, EQUAL TO WATTSTOPPER LMRC-210, ADJACENT TO ELECTRICAL PANEL. CONTRACTOR TO WIRE NEW EXTERIOR LIGHTING THROUGH DIGITAL ROOM CONTROLLER TO PROVIDE 0-10V DIMMING SIGNAL TO LUMENPULSE FIXTURES. PROVIDE INTERCONNECTING CAT5E CONTROL WIRING TO NEW DIGITAL ZONE CONTROLLER INSTALLED IN BASEMENT. RUN CONTROL WIRING UP INTO ATTIC, OVER TO VERTICAL CHASE AND DOWN TO BASEMENT LEVEL. PROVIDE COMMISSIONING OF LIGHTING SYSTEM IN THE PRESENCE OF CONSULTANT AND NCC REPRESENTATIVE.

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LICENSED PROFESSIONAL ENGINEER J. MOFFAT PROVINCE OF ONTARIO Apr. 13, 2016

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REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE RÉSIDENCE CCN - 2016

drawing
dessin

ELECTRICAL
LIGHTING LEVEL 00, 01 AND 02

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
date	26/11/2012
scale échelle	AS NOTED SELON LES IND.
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sheet no. n° de la feuille	E4

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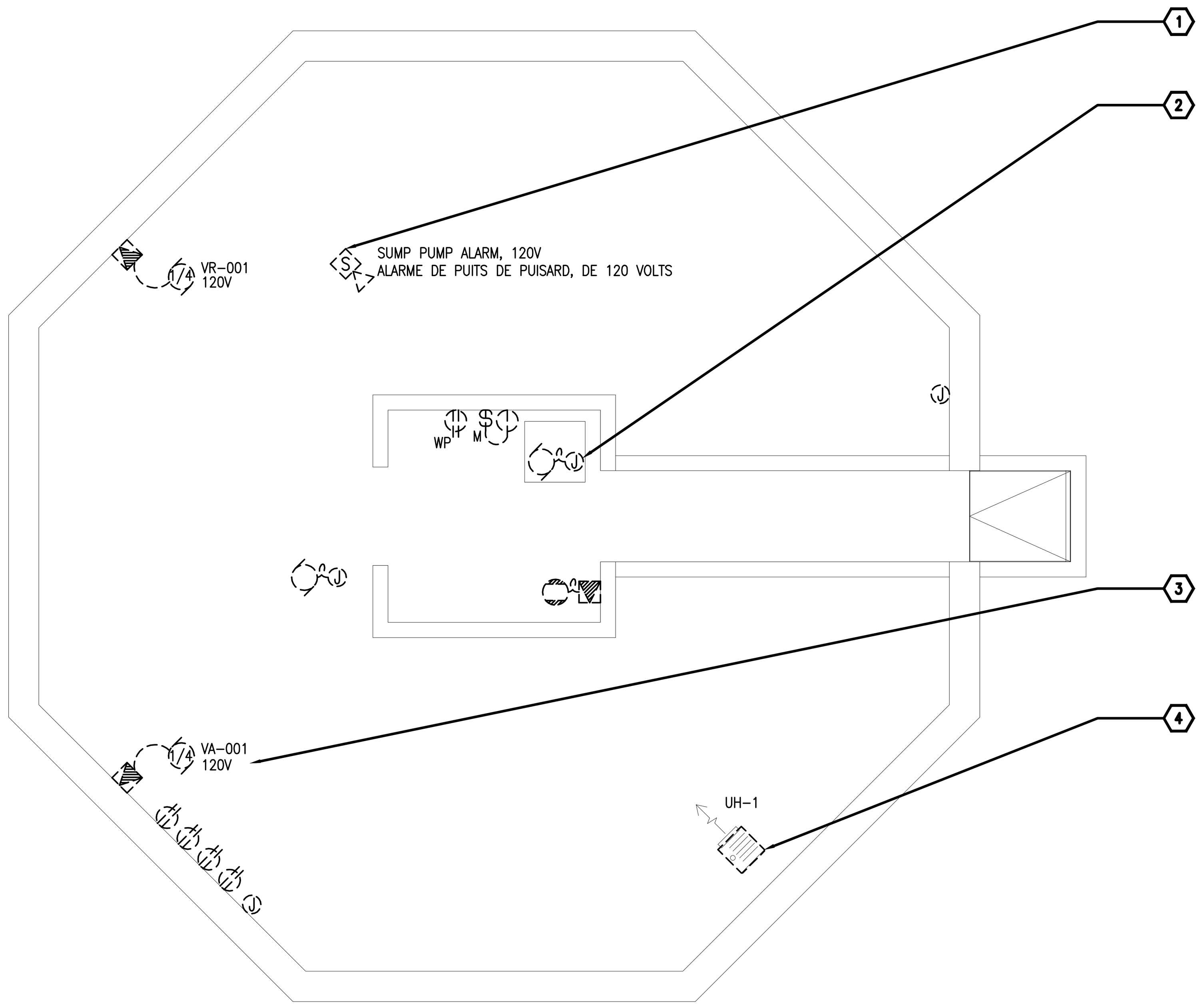
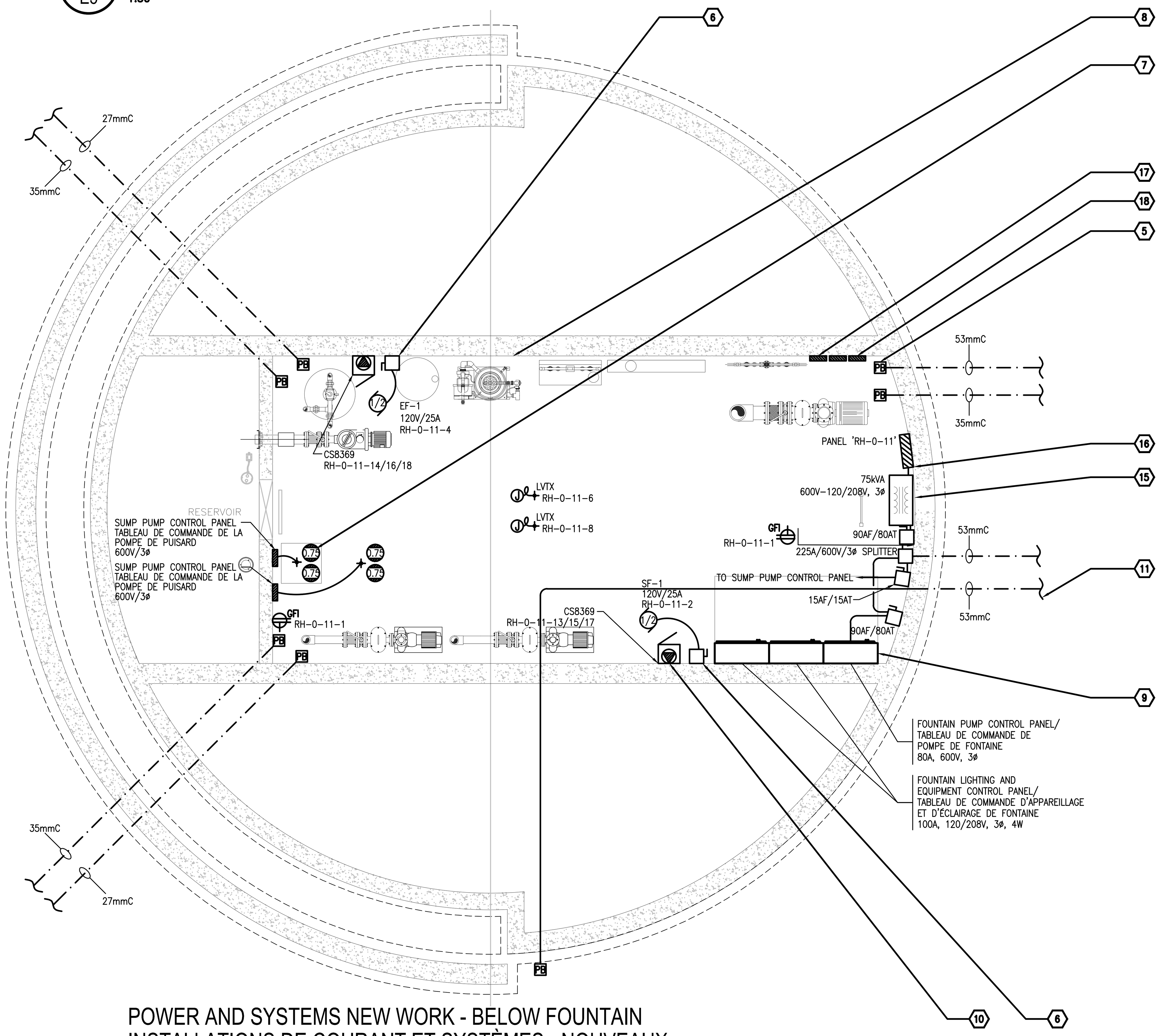


POWER AND SYSTEMS DEMOLITION WORK - BELOW FOUNTAIN
INSTALLATIONS DE COURANT ET SYSTÈMES - OUVRAGES DE DÉMOLITION, EN DESSOUS DE LA FONTAINE

1 / E5 — 1:50



POWER AND SYSTEMS NEW WORK - BELOW FOUNTAIN
INSTALLATIONS DE COURANT ET SYSTÈMES - NOUVEAUX TRAVAUX, EN DESSOUS DE LA FONTAINE

2 / E5 — 1:50

NOTES DU DESSIN
DRAWING NOTES

1. DÉCONNECTER ET ENLEVER LE CIRCUIT D'ALARME DE POMPE DE PUISARD DE 120 VOLTS ET CE, EN REVENANT JUSQU'AU TABLEAU, PUIS RENDRE LE TOUT PARFAITEMENT SÉCURITAIRE.

2. DÉTAIL TYPIQUE, À 3 ENDROITS :
DÉCONNECTER ET ENLEVER LE CONDUIT ET LE CÂBLE DE LA POMPE, EN REVENANT JUSQU'AU TABLEAU, PUIS RENDRE LE TOUT PARFAITEMENT SÉCURITAIRE.

3. DÉTAIL TYPIQUE, À 2 ENDROITS :
DÉCONNECTER ET ENLEVER LE DÉMARREUR DE MOTEUR MANUEL, LE CONDUIT ET LE CÂBLE ET CE, EN REVENANT JUSQU'AU TABLEAU; PAR LA SUITE, RENDRE LE TOUT PARFAITEMENT SÉCURITAIRE.

4. DÉCONNECTER ET ENLEVER LE CÂBLAGE ET LE CONDUIT DE L'AÉROTHERME ET CE, ENREVENANT JUSQU'AU TABLEAU, PUIS RENDRE LE TOUT PARFAITEMENT SÉCURITAIRE.

5. DÉTAIL TYPIQUE :
MÉNAGER DE NOUVELLES PÉNÉTRATIONS DANS LA PARTIE EXTÉRIEURE DU BÂTIMENT ET CE, AFIN D'ACCOMMODER DE NOUVEAUX CONDUITS ENFOUIS. PRÉVOIR UN NOUVEL ENSEMBLE « LB » DANS LA BOÎTE DE TIRAGE ET CE, POUR CHAQUE PÉNÉTRATION. FORER DES TROUS DE 3 mm DE DIAMÈTRE DANS LES « LB » ET CE, POUR LE DRAINAGE DES CONDUITS. SCANNER ET CAROTTER LE TOUT, AFIN DE RÉALISER LES NOUVELLES PÉNÉTRATIONS REQUISES. PRÉVOIR DU COULIS À L'EMPLACEMENT DE TOUTES LES OUVERTURES TRAVERSANT LA FAÇADE DU BÂTIMENT.

6. PRÉVOIR UN NOUVEAU CIRCUIT DE 35 AMPÈRES ET 120 VOLTS ET CE, AFIN DE DESSERVIR DE NOUVEAUX VENTILATEURS D'ALIMENTATION ET D'EXTRACTION. INTERRUPTEUR DE VITESSE, DE MONTAGE SUR L'ÉLÉMENT, DEVANT ÊTRE FOURNI PAR LES PERSONNES RESPONSABLES DE LA DIVISION 23 ET MONTÉ ET CÂBLÉ PAR LES PERSONNES RESPONSABLES DE LA DIVISION 26. PRÉVOIR UN NOUVEAU DÉMARREUR DE TYPE COMBINÉ POUR L'ÉLÉMENT. EMPLACEMENT, DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE.

7. DÉTAIL TYPIQUE :
PRÉVOIR UN NOUVEAU CIRCUIT DE 30 AMPÈRES ET 600 VOLTS, POUR DESSERVIR LE TABLEAU DE COMMANDE DE POMPE DE PUISARD DANS LE PUITS DE LA FONTAINE. PRÉVOIR DU CÂBLAGE D'INTERCONNEXION DE 120 VOLTS ENTRE LE TABLEAU DE COMMANDE DE LA POMPE DE PUISARD ET LES POMPES ET L'ENSEMBLE FLOTTEUR À MANŒUVRE MÉCANIQUE. POMPES ET TABLEAU DE COMMANDE, DEVANT ÊTRE FOURNIS ET INSTALLÉS PAR LES PERSONNES RESPONSABLES DE LA DIVISION 23 ET CÂBLÉS PAR LES PERSONNES RESPONSABLES DE LA DIVISION 26.

8. DÉTAIL TYPIQUE :
PRÉVOIR UN OUVRAGE D'EMBOÎTEMENT HYDROFUGE POUR L'ENSEMBLE DU NOUVEL APPAREILLAGE RELEVANT DES TRAVAUX COMPRIS DANS LA DIVISION 26.

9. NOUVELLE POMPE DE FONTAINE ET NOUVEAU TABLEAU DE COMMANDE D'ÉCLAIRAGE ET D'APPAREILLAGE, DEVANT ÊTRE FOURNIS ET MONTÉS PAR LA PERSONNE CHARGÉE DU MONTAGE DE LA FONTAINE. PRÉVOIR UN CIRCUIT DE 80 AMPÈRES, 600 VOLTS ET 3 PHASES JUSQU'AU CÔTÉ DE COMMANDE DE POMPE DU TABLEAU ET CE, À PARTIR DU TABLEAU RH-0-10. PRÉVOIR UN CIRCUIT DE 100 AMPÈRES, 120/208 VOLTS ET 3 PHASES À PARTIR DU RÉPARTITEUR DANS LE LOCAL DE COURANT 1, À PROLONGER JUSQU'AU CÔTÉ DE COMMANDE ET (OU) D'ÉCLAIRAGE DU TABLEAU. EMPLACEMENT EXACT, DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE ET CE, AVEC LA PERSONNE CHARGÉE DU MONTAGE DE LA FONTAINE. SE REPORTER AU DESSIN E3 AFIN DE RETROUVER PLUS DE DÉTAILS. TOUT LE CÂBLAGE ET TOUS LES CONDUITS DU SECONDAIRE À PARTIR DES TABLEAUX DE COMMANDE DE POMPE ET D'ÉCLAIRAGE JUSQU'À L'APPAREILLAGE RESPECTIF DEVRONT RELEVER DE L'INSTALLATEUR DE LA FONTAINE.

10. DÉTAIL TYPIQUE :
PRÉVOIR UNE NOUVELLE PRISE DE COURANT DE TYPE VERROUILLABLE ET NON STANDARD, DE MARQUE CS8369, DE FABRICATION COOPER ARROWHART ET À RÉGIME DE 3 PÔLES, 4 FILS, 50 AMPÈRES ET 120/250 VOLTS ET CE, À L'INTÉRIEUR D'UNE BOÎTE HYDROFUGE ET EN PVC DE TYPE NEMA 4X, AVEC COUVERCLE ARTICULÉ; POUR UNE UTILISATION TEMPORAIRE ET CE, POUR LA BOÎTE RHINO ET DE FABRICATION ARROWHART, TELLE QUE FOURNIE PAR LA CCN. À RACCORDER AU CIRCUIT ET CE, SELON LES INDICATIONS.

11. PRÉVOIR UN NOUVEAU CONDUIT DE 53 mm DE DIAMÈTRE ENTRE LA BOÎTE DE MICROPHONE EXISTANTE DE L'ENSEMBLE PORT-CUCHAIR ET LA NOUVELLE BOÎTE DE TIRAGE HYDROFUGE ET DE TYPE NEMA 4X, DE MONTAGE À L'INTÉRIEUR DUPUITS DE LA FONTAINE. MONTER LA NOUVELLE BOÎTE DE TIRAGE À CÔTÉ DU PUIS DE VENTILATION DE MÉCANIQUE.

1. DISCONNECT AND REMOVE 120V SUMP PUMP ALARM CIRCUIT BACK TO PANEL AND MAKE SAFE.

2. TYPICAL (OF 3):
DISCONNECT AND REMOVE CONDUIT AND WIRE FOR PUMP BACK TO PANEL AND MAKE SAFE.

3. TYPICAL (OF 2):
DISCONNECT AND REMOVE MANUAL MOTOR STARTER, CONDUIT AND WIRE BACK TO PANEL AND MAKE SAFE.

4. DISCONNECT AND REMOVE WIRING AND CONDUIT FOR UNIT HEATER BACK TO PANEL AND MAKE SAFE.

5. TYPICAL:
PROVIDE NEW PENETRATIONS THROUGH BUILDING EXTERIOR FOR NEW BURIED CONDUITS. PROVIDE NEW 'LB' INTO PULL BOX FOR EACH PENETRATION. DRILL 3mm HOLES IN 'LBs' FOR DRAINAGE OF CONDUITS. PROVIDE SCANNING AND CORING FOR NEW PENETRATIONS. PROVIDE GROUT AT ALL OPENINGS THROUGH BUILDING FACADE.

6. PROVIDE NEW 35A/120V CIRCUIT FOR NEW SUPPLY AND EXHAUST FANS. UNIT MOUNTED SPEED SWITCH SUPPLIED BY DIVISION 23, INSTALLED AND WIRED BY DIVISION 26. PROVIDE NEW COMBINATION STARTER FOR UNIT. COORDINATE LOCATION ON SITE.

7. TYPICAL:
PROVIDE NEW 30A/600V CIRCUIT FOR SUMP PUMP CONTROL PANEL IN FOUNTAIN PIT FROM NEW LOCAL DISCONNECT. PROVIDE INTERCONNECTING 120V WIRING FROM SUMP PUMP CONTROL PANEL TO PUMPS AND TO 120V MECHANICAL FLOAT. PUMPS AND CONTROL PANEL SUPPLIED AND INSTALLED BY DIVISION 23, WIRING BY DIVISION 26.

8. TYPICAL:
PROVIDE WATER-TIGHT ENCLOSURE FOR ALL NEW EQUIPMENT UNDER DIVISION 26 SCOPE OF WORK.

9. NEW FOUNTAIN PUMP, LIGHTING AND EQUIPMENT CONTROL PANEL SUPPLIED AND INSTALLED BY FOUNTAIN INSTALLER. PROVIDE 80A/600V/3ø CIRCUIT TO PUMP CONTROL SIDE OF PANEL FROM PANEL RH-0-10. PROVIDE 100A/120-208V/3ø/4W CIRCUIT FROM PANEL RH-0-11 IN FOUNTAIN PIT TO LIGHTING/CONTROL SIDE OF PANEL. CONFIRM EXACT LOCATION ON SITE WITH FOUNTAIN INSTALLER. ALL SECONDARY WIRING AND CONDUIT FROM PUMP AND LIGHTING CONTROL PANELS TO RESPECTIVE EQUIPMENT BY FOUNTAIN INSTALLER.

10. TYPICAL:
PROVIDE NEW COOPER ARROWHART CS8369 3POLE, 4WIRE, 50A, 120/250V NON-STANDARD LOCKING TYPE RECEPTACLE WITHIN WEATHERPROOF NEMA 4X PVC BOX, C/W HINGED COVER, FOR TEMPORARY USE FOR ARROWHART RHINOBOX'S, SUPPLIED BY NCC. CONNECT TO CIRCUIT AS SHOWN.

11. PROVIDE NEW 53mmC FROM EXISTING MICROPHONE BOX AT PORT-CUCHAIR TO NEW WEATHERPROOF NEMA 4X PULL BOX WITHIN VENTILATION SHAFT. REFER TO DETAIL 3/E4 FOR TERMINATION DETAIL.

12. TYPICAL:
TERMINATE FOUR (4) 101mm PVC CONDUITS WITHIN FOUNTAIN VENTILATION SHAFT, IN CLOSE PROXIMITY TO ACCESS HATCH. STUB CONDUITS INTO SHAFT AND PROVIDE THREADED CAP FOR EACH CONDUIT. COORDINATE CONDUIT SLEEVING WITH STRUCTURAL TRADES.

13. PROVIDE NEW NEMA 4X BOX WITHIN FOUNTAIN PIT FOR USE BY AV CONTRACTOR FOR MICROPHONE JACK INSTALLATION. SECURE BOX TO VENTILATION SHAFT WALL, IN PROXIMITY TO ACCESS HATCH.

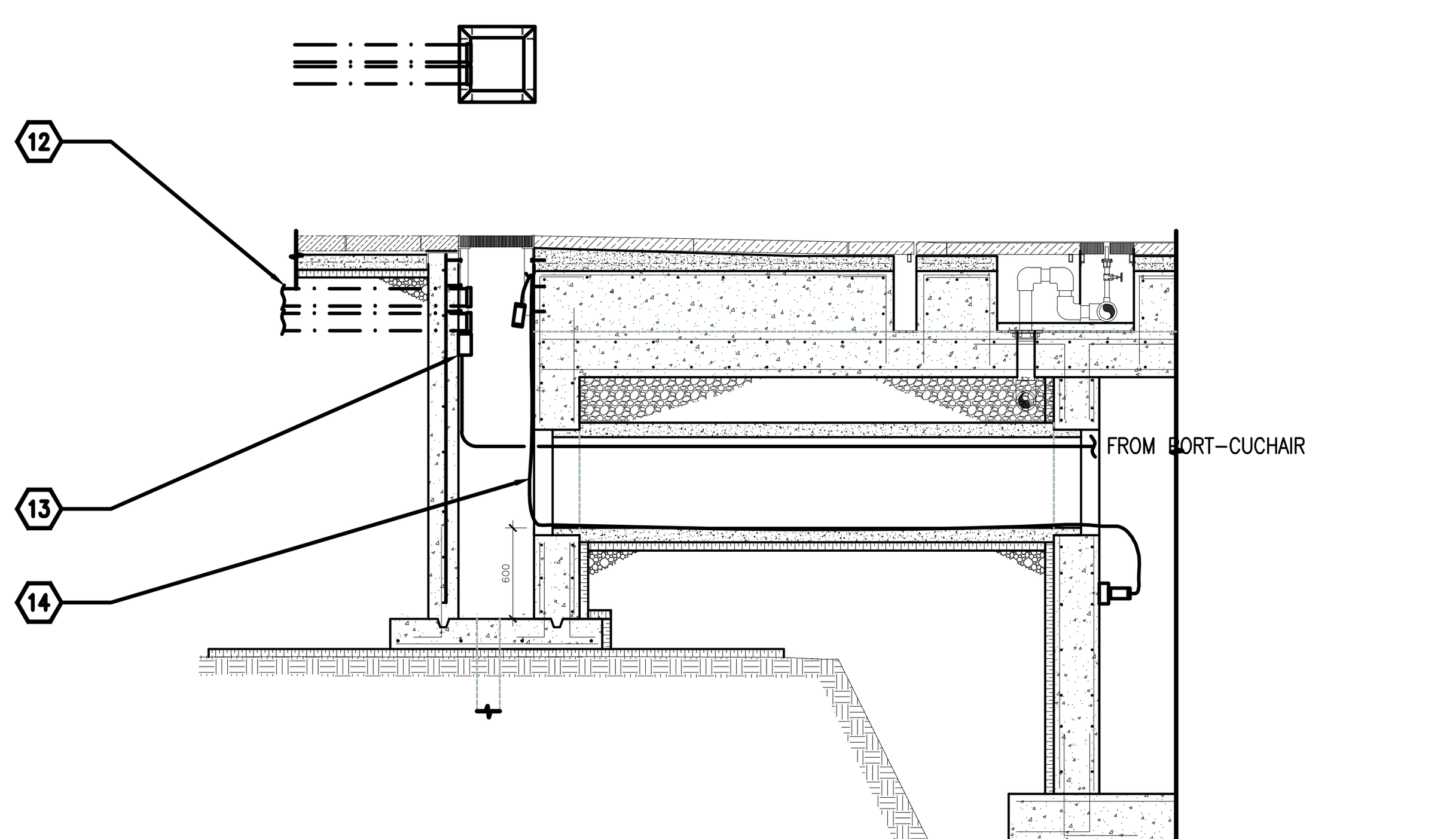
14. TYPICAL:
NEW 50A, 120/250V, 4W SOW CAB TIRE CABLE SUPPLIED BY NCC. RUN CABLE WITHIN VENTILATION SHAFT AND PROVIDE TWO OVERSIZED TWO HOLE CONDUIT STRAPS TO LOOSELY SECURE CABLE TO VERTICAL SECTION OF VENTILATION SHAFT. PROVIDE HOOK WITHIN SHAFT, APPROXIMATELY 500mm BELOW FINISHED GRADE, FOR USE BY MAINTENANCE STAFF TO HANG CABLE WHEN NOT IN USE.

15. PROVIDE NEW 225A/600V SPLITTER IN FOUNTAIN PIT, C/W 2-90AF/80AT DISCONNECTS FOR 120V TRANSFORMER AND FOUNTAIN PUMP PANEL AND 2-15AF/15AT DISCONNECTS FOR SUMP PUMPS. PROVIDE NEW 75kVA, 600V-120/208V, 3ø STEP DOWN TRANSFORMER C/W 3#3-35mmC FROM NEW DISCONNECT.

16. PROVIDE NEW 400A, 120/208V 42CCT PANEL IN FOUNTAIN PIT C/W 4#300MCM+GND-78mmC WIRING FROM STEP-DOWN TRANSFORMER. REFER TO DRAWING E6 FOR DETAILS.

17. NEW SNOW MELT SYSTEM PANEL SUPPLIED AND INSTALLED BY DIVISION 23. PROVIDE NEW 15A/120V CIRCUIT, C/W BREAKER IN PANEL RH-0-11, TO NEW SNOW MELT PANEL AND PROVIDE FINAL TERMINATION.

18. NEW HEAT TRACE PANEL, C/W WIRING, SUPPLIED BY MECHANICAL CONTRACTOR. INSTALL HEAT TRACE PANEL AND PROVIDE NEW 40A/120V AND 20A/120V CONNECTION TO HEAT TRACE PANELS. INSTALL AND CONNECT 120V HEAT TRACE WIRING AS DIRECTED BY MECHANICAL CONTRACTOR, APPROXIMATELY 90m OF CABLING.



TYPICAL CONDUIT / AIR SHAFT INTERFACE DETAIL
AMÉNAGEMENT DE NOUVEAUX TRAVAUX D'INSTALLATIONS DE COURANT ET DE SYSTÈMES SOUS LA FONTAINE

3 / E5 — 1:50

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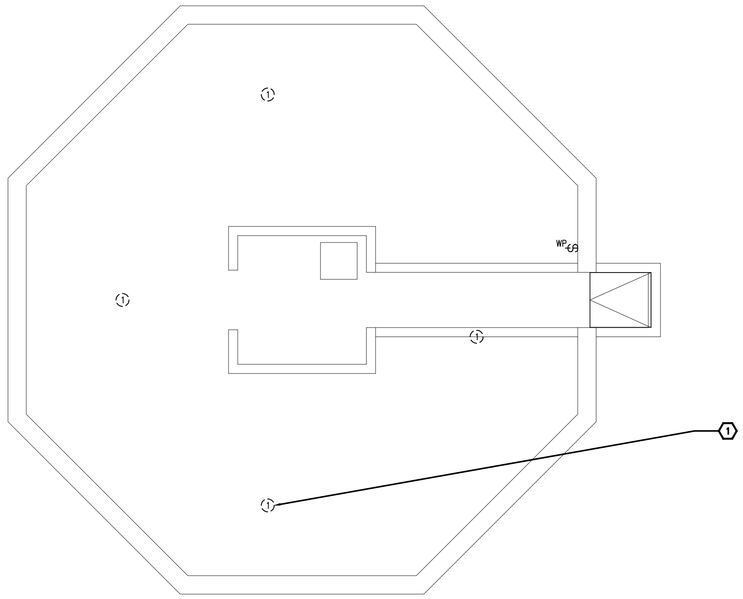
REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE R¤SIDENCE CCN - 2016

drawing
dessin

ELECTRICAL POWER AND SYSTEMS DEMOLITION AND NEW WORK BELOW FOUNTAIN

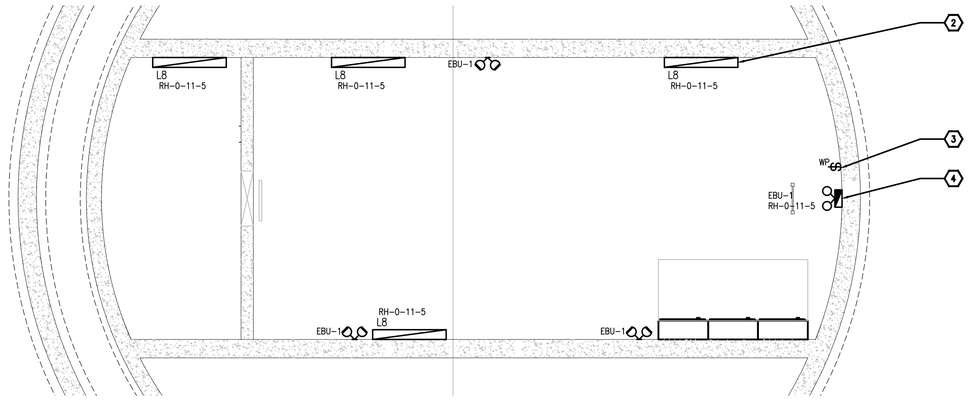
TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS DE COURANT ET SYSTÈMES - OUVRAGES DE DÉMOLITION ET NOUVEAUX TRAVAUX, EN DESSOUS DE LA FONTAINE

approved by / approuvé par: J.MOFFAT
designed by / conçu par: T.HOPKIN
drawn by / dessiné par: T.HOPKIN
date: 26/11/2012
scale / échelle: AS NOTED / SELON LES IND.
NCC project no. / n° du projet de la CCN: DC-2611-110
sheet no. / n° de la feuille: E5



LIGHTING DEMOLITION WORK - BELOW FOUNTAIN
INSTALLATIONS D'ÉCLAIRAGE - OUVRAGES DE DÉMOLITION - EN DESSOUS DE LA FONTAINE

1 / E6 **1:50**



LIGHTING NEW WORK - BELOW FOUNTAIN
INSTALLATIONS D'ÉCLAIRAGE - NOUVEAUX TRAVAUX - EN DESSOUS DE LA FONTAINE

2 / E6 **1:50**

DRAWING NOTES
NOTES DU DESSIN

1. DÉCONNECTER ET ENLEVER LES LUMINAIRES DE TYPE 1 ET L'INTERRUPTEUR CONNEXE.
2. DÉTAIL TYPIQUE :
   PRÉVOIR UN NOUVEAU LUMINAIRE DE TYPE 8, DE MONTAGE MURAL ET CE, À 2 000 mm AU–DESSUS DU PLANCHER FINI. EMPLACEMENT DÉFINITIF DES LUMINAIRES, DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE ET CE, EN FONCTION DES INSTALLATIONS DE PLOMBERIE.
3. PRÉVOIR UN NOUVEL INTERRUPTEUR À BASCULE ET DE TYPE ÉTANCHE AUX INTEMPÉRIES, À L'EMPLACEMETN DES NOUVEAUX LUMINAIRES DANS LE PUITS ET RACCORDER TOUS LES LUMINAIRES DE TYPE 8.
4. PRÉVOIR UN NOUVEL ÉLÉMENT À BATTERIE(S) DE SECOURS, DE TYPE DIODIQUE ET DE 12 VOLTS; À AMÉNAGER AVEC UN OUVRAGE D'EMBOÎTEMENT NEMA 4X, DE TYPE ÉTANCHE AUX INTEMPÉRIES ET DE FABRICATION ÉQUIVALENTE AUX PRODUITS DE LA SÉRIE EMERGI–LITE ESLNX. PRÉVOIR DE NOUVEAUX ÉLÉMENTS D'ÉCLAIRAGE TÉLÉCOMMANDÉS, DE TYPE DIODIQUE ET DE 12 VOLTS, DE FABRICATION ÉQUIVALENTE À CE QUI SUIT : EMERGI–LITE SURVIVE–ALL EF39. À RACCORDER À L'ÉLÉMENT À BATTERIE(S) QUI DESSERT LE PUITS.

1. DISCONNECT AND REMOVE TYPE 1 FIXTURES AND ASSOCIATED SWITCH.
2. TYPICAL:
   PROVIDE NEW TYPE 8 FIXTURE, WALL MOUNTED AT 2000mm A.F.F. COORDINATE FINAL FIXTURE LOCATIONS WITH FOUNTAIN PLUMBING ON SITE.
3. PROVIDE NEW WEATHERPROOF TOGGLE SWITCH FOR PIT NEW FIXTURES IN PIT AND CONNECT ALL TYPE 8 FIXTURES.
4. PROVIDE NEW EMERGENCY LED 24V BATTERY UNIT, C/W WEATHERPROOF NEMA 4X ENCLOSURE, EQUAL TO EMERGI–LITE ESLNX SERIES. PROVIDE NEW 24V LED REMOTE LIGHTING UNITS, EQUAL TO EMERGI–LITE SURVIVE–ALL EF39 AND CONNECT TO BATTERY UNIT SERVING PIT.

NEW PANEL/TABLEAU — RH-0-11

VOLTAGE/TENSION	120/208
PHASE	3ø
WIRE/FIL(S)	4W
RATING AMPS/AMPÉRAGE	400A
TRIM/MOULURE	SURFACE/EN SURFACE

SN

MAINTENANCE RECEPTACLES	GFI	20	1	2	25	SF–1
L2 POLE MOUNTED FIXTURES	HID	15	3	4	25	EF–1
VAPORTITE FIXTURES AND EBU–1		15	5	6	15	LOW VOLTAGE CONTROLS TRANSFORMER
		15	7	8	15	LOW VOLTAGE CONTROLS TRANSFORMER
SPARE		15	9	10	15	
		15	11	12	15	SPARE
			13	14		
RHINOBOX TWISTLOCK RECEPTACLE		50	15	16	50	RHINOBOX TWISTLOCK RECEPTACLE
			17	18		
			19	20		
RHINOBOX TWISTLOCK RECEPTACLE		50	21	22	50	RHINOBOX TWISTLOCK RECEPTACLE
			23	24		
			25	26		
			27	28		
			29	30		
SPACE			31	32		
			33	34		
			35	36		
			37	38		
			39	40		
FOUNTAIN PANEL		100	41	42		SPACE

EXISTING PANEL / TABLEAU EXISTANT — RH-0-07 / 24

VOLTAGE / TENSION	120/240
PHASE	1ø
WIRE / FIL(S)	3
RATING AMPS / AMPÉRAGE	225A
TRIM / MOULURE	SURFACE / EN SURFACE

SN

SNOW MELT SYSTEM SYSTÈME POUR FAIRE FONDRE LA NEIGE		15	1	2	15	LIGHTING CONTROL SYSTEM / SYSTÈME DE COMMANDE D'ÉCLAIRAGE
PLUG RM 304 / FICHE; LOCAL 304		15	3	4	15	PANEL PLUG 0142 / FICHE DE TABLEAU 0142
GLYCOL FILL STATION AND CONTROLS TRANSFORMER		15	5	6	15	UNIDENTIFIED / ARTICLE NON IDENTIFIÉ
SPARE / EN RÉSERVE		20	7	8	15	PLUG RM 1130 / FICHE : LOCAL 1130
PLUG RM 1130 / FICHE; LOCAL 1130		15	9	10	15	UNIDENTIFIED / ARTICLE NON IDENTIFIÉ
L1 LED FIXTURES, AT GRADE / LUMINAIRES DIODIQUES L1, AU NIVEAU DU SOL	GFI	15	11	12	15	
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		15	13	14	15	FLOOR PLUG RM 1124 / FICHE AU PLANCHER; LOCAL 1124
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		20	15	16	15	
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		20	17	18	15	SPLIT PLUG RM 138 / FICHE DE RÉPARTITION; LOCAL 138
PLUG RM 304 / FICHE; LOCAL 304		15	19	20	15	
PLUG RM 303 / FICHE; LOCAL 303		15	21	22	20	
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		15	23	24	20	SPARE / EN RÉSERVE
			25	26	15	UNIDENTIFIED / ARTICLE NON IDENTIFIÉ
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		30	27	28	15	UNIDENTIFIED / ARTICLE NON IDENTIFIÉ
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ			29	30	15	PLUG RM 128, LIGHT 1112, PLUG 1118 / FICHE : LOCAL 128; LAMPE 1112; FICHE 1118
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		20	31	32	15	LIGHT RM 1112 / LAMPE; LOCAL 1112
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		20	33	34	15	UNIDENTIFIED / ARTICLE NON IDENTIFIÉ
LIGHT RM 1112 / LAMPE; LOCAL 1112		15	35	36	15	LIGHT RM 1112 / LAMPE; LOCAL 1112
UNIDENTIFIED / ARTICLE NON IDENTIFIÉ		15	37	38	15	
			39	40	15	PLUG RM 206 / FICHE; LOCAL 206
RECEPTION PANEL / TABLEAU DE RÉCEPTION		30	41	42	15	UNIDENTIFIED / ARTICLE NON IDENTIFIÉ

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ELECTRICAL LIGHTING
DEMOLITION AND NEW WORK BELOW FOUNTAIN AND PANEL SCHEDULES

TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS D'ÉCLAIRAGE - OUVRAGES DE DÉMOLITION ET NOUVEAUX TRAVAUX, EN DESSOUS DE LA FONTAINE ET NOMENCLATURES DES TABLEAUX

approved by / approuvé par	J.MOFFAT
designed by / conçu par	T.HOPKIN
drawn by / dessiné par	T.HOPKIN
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sheet no. / n° de la feuille	E6

NOTES DU DESSIN
DRAWING NOTES

DÉCONNECTER ET RENDRE PARFAITEMENT SÉCURITAIRE LA PRISE DE COURANT DE TYPE ÉTANCHE AUX INTEMPÉRIES ET CE, À MÊME LA CAGE D'ESCALIER ET DE FAÇON À CRÉER SUFFISAMMENT D'ESPACE POUR L'ENLÈVEMENT DE LA FONTAINE.

(1) DISCONNECT AND MAKE SAFE WEATHERPROOF RECEPTACLE WITHIN STAIRWAY TO MAKE WAY FOR REMOVAL OF FOUNTAIN.

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LICENSED PROFESSIONAL ENGINEER
J. MOFFAT
Apr. 13, 2016
PROVINCE OF ONTARIO

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drawing
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ELECTRICAL
POWER AND SYSTEMS DEMOLITION WORK SITE PLAN

TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS DE COURANT ET SYSTÈMES - OUVRAGES DE DÉMOLITION - PLAN D'IMPLANTATION

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
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NCC project no. n° du projet de la CCN	DC-2611-110
sheet no. n° de la feuille	E7

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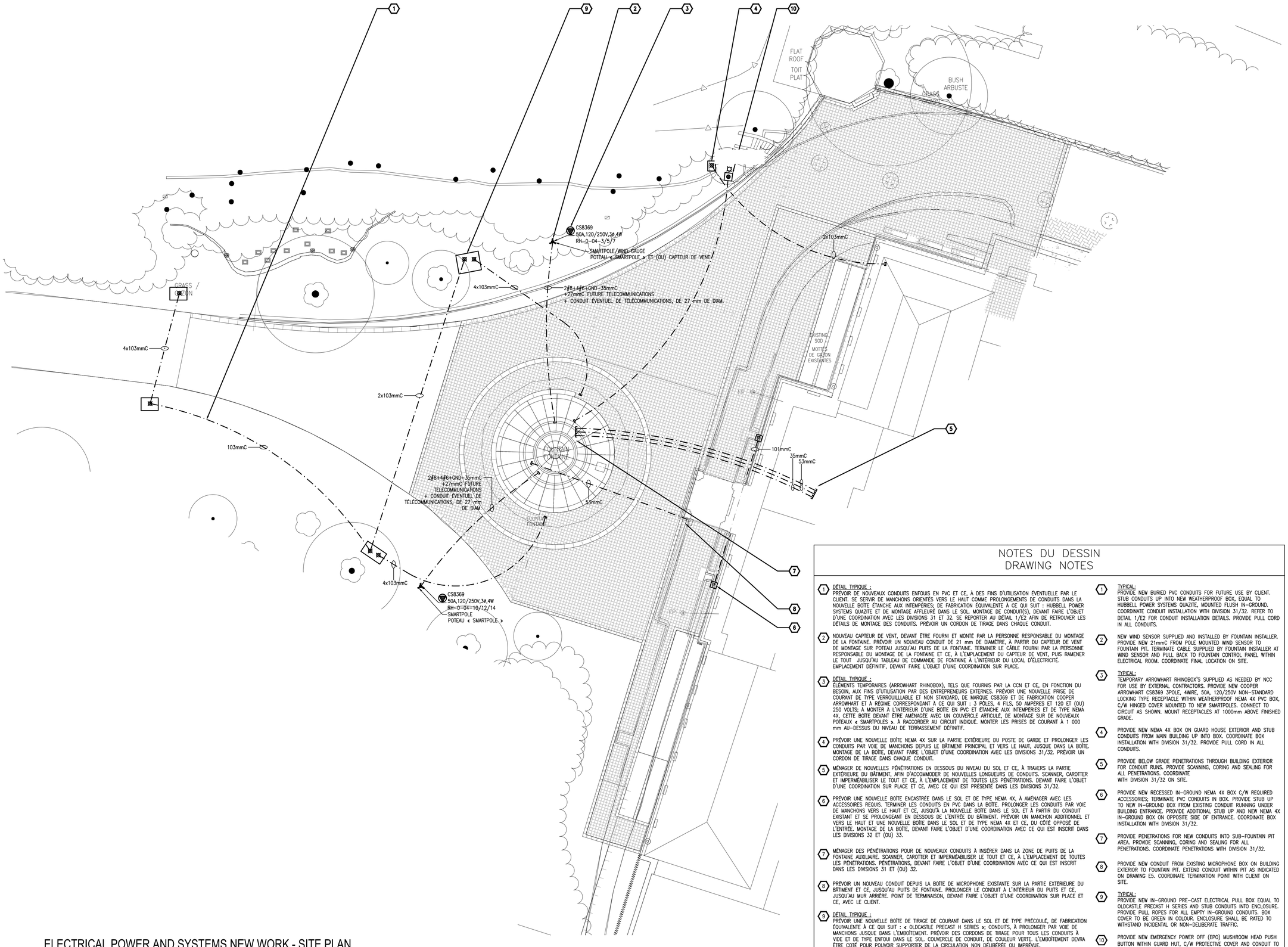

ELECTRICAL POWER AND SYSTEMS NEW WORK - SITE PLAN
TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS DE COURANT ET SYSTÈMES - NOUVEAUX TRAVAUX - PLAN D'IMPLANTATION

1
E8

1:200

NOTES DU DESSIN
DRAWING NOTES

1. DÉTAIL TYPIQUE :
PRÉVOIR DE NOUVEAUX CONDUITS ENFOUIS EN PVC ET CE, À DES FINS D'UTILISATION ÉVENTUELLE PAR LE CLIENT. SE SERVIR DE MANCHONS ORIENTÉS VERS LE HAUT COMME PROLONGEMENTS DE CONDUITS DANS LA NOUVELLE BOÎTE ÉTANCHE AUX INTEMPÉRIES; DE FABRICATION ÉQUIVALENTE À CE QUI SUIT : HUBBELL POWER SYSTEMS QUAZITE ET DE MONTAGE AFFLEURÉ DANS LE SOL. MONTAGE DE CONDUIT(S), DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC LES DIVISIONS 31 ET 32. SE REPORTER AU DÉTAIL 1/E2 AFIN DE RETROUVER LES DÉTAILS DE MONTAGE DES CONDUITS. PRÉVOIR UN CORDON DE TIRAGE DANS CHAQUE CONDUIT.

2. NOUVEAU CAPTEUR DE VENT, DEVANT ÊTRE FOURNI ET MONTÉ PAR LA PERSONNE RESPONSABLE DU MONTAGE DE LA FONTAINE. PRÉVOIR UN NOUVEAU CONDUIT DE 21 mm DE DIAMÈTRE, À PARTIR DU CAPTEUR DE VENT DE MONTAGE SUR POTEAU JUSQU'AU PUITS DE LA FONTAINE. TERMINER LE CÂBLE FOURNI PAR LA PERSONNE RESPONSABLE DU MONTAGE DE LA FONTAINE ET CE, À L'EMPLACEMENT DU CAPTEUR DE VENT, PUIS RAMENER LE TOUT JUSQU'AU TABLEAU DE COMMANDE DE FONTAINE À L'INTÉRIEUR DU LOCAL D'ÉLECTRICITÉ. EMPLACEMENT DÉFINITIF, DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE.

3. DÉTAIL TYPIQUE :
ÉLÉMENTS TEMPORAIRES (ARROWHART RHINOBOX), TELS QUE FOURNIS PAR LA CCN ET CE, EN FONCTION DU BESOIN, AUX FINS D'UTILISATION PAR DES ENTREPRENEURS EXTERNES. PRÉVOIR UNE NOUVELLE PRISE DE COURANT DE TYPE VERROUILLABLE ET NON STANDARD, DE MARQUE CS8369 ET DE FABRICATION COOPER ARROWHART ET À RÉGIME CORRESPONDANT À CE QUI SUIT : 3 PÔLES, 4 FILS, 50 AMPÈRES ET 120 ET (OU) 250 VOLTS; À MONTER À L'INTÉRIEUR D'UNE BOÎTE EN PVC ET ÉTANCHE AUX INTEMPÉRIES ET DE TYPE NEMA 4X, CETTE BOÎTE DEVANT ÊTRE AMÉNAGÉE AVEC UN COUVERCLE ARTICULÉ, DE MONTAGE SUR DE NOUVEAUX POTEAUX « SMARTPOLES ». À RACCORDER AU CIRCUIT INDIQUÉ. MONTER LES PRISES DE COURANT À 1 000 mm AU-DESSUS DU NIVEAU DE TERRASSEMENT DÉFINITIF.

4. PRÉVOIR UNE NOUVELLE BOÎTE NEMA 4X SUR LA PARTIE EXTÉRIEURE DU POSTE DE GARDE ET PROLONGER LES CONDUITS PAR VOIE DE MANCHONS DEPUIS LE BÂTIMENT PRINCIPAL ET VERS LE HAUT, JUSQUE DANS LA BOÎTE. MONTAGE DE LA BOÎTE, DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC LES DIVISIONS 31/32. PRÉVOIR UN CORDON DE TIRAGE DANS CHAQUE CONDUIT.

5. MÉNAGER DE NOUVELLES PÉNÉTRATIONS EN DESSOUS DU NIVEAU DU SOL ET CE, À TRAVERS LA PARTIE EXTÉRIEURE DU BÂTIMENT, AFIN D'ACCOMMODER DE NOUVELLES LONGUEURS DE CONDUITS. SCANNER, CAROTTER ET IMPERMÉABILISER LE TOUT ET CE, À L'EMPLACEMENT DE TOUTES LES PÉNÉTRATIONS. DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE ET CE, AVEC CE QUI EST PRÉSENTÉ DANS LES DIVISIONS 31/32.

6. PRÉVOIR UNE NOUVELLE BOÎTE ENCASTRÉE DANS LE SOL ET DE TYPE NEMA 4X, À AMÉNAGER AVEC LES ACCESSOIRES REQUIS. TERMINER LES CONDUITS EN PVC DANS LA BOÎTE. PROLONGER LES CONDUITS PAR VOIE DE MANCHONS VERS LE HAUT ET CE, JUSQU'À LA NOUVELLE BOÎTE DANS LE SOL ET À PARTIR DU CONDUIT EXISTANT ET SE PROLONGEANT EN DESSOUS DE L'ENTRÉE DU BÂTIMENT. PRÉVOIR UN MANCHON ADDITIONNEL ET VERS LE HAUT ET UNE NOUVELLE BOÎTE DANS LE SOL ET DE TYPE NEMA 4X ET CE, DU CÔTÉ OPPOSÉ DE L'ENTRÉE. MONTAGE DE LA BOÎTE, DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC CE QUI EST INSCRIT DANS LES DIVISIONS 32 ET (OU) 33.

7. MÉNAGER DES PÉNÉTRATIONS POUR DE NOUVEAUX CONDUITS À INSÉRER DANS LA ZONE DE PUITS DE LA FONTAINE AUXILIAIRE. SCANNER, CAROTTER ET IMPERMÉABILISER LE TOUT ET CE, À L'EMPLACEMENT DE TOUTES LES PÉNÉTRATIONS. PÉNÉTRATIONS, DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC CE QUI EST INSCRIT DANS LES DIVISIONS 31 ET (OU) 32.

8. PRÉVOIR UN NOUVEAU CONDUIT DEPUIS LA BOÎTE DE MICROPHONE EXISTANTE SUR LA PARTIE EXTÉRIEURE DU BÂTIMENT ET CE, JUSQU'AU PUITS DE FONTAINE. PROLONGER LE CONDUIT À L'INTÉRIEUR DU PUITS ET CE, JUSQU'AU MUR ARRIÈRE. POINT DE TERMINAISON, DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE ET CE, AVEC LE CLIENT.

9. DÉTAIL TYPIQUE :
PRÉVOIR UNE NOUVELLE BOÎTE DE TIRAGE DE COURANT DANS LE SOL ET DE TYPE PRÉCOULÉ, DE FABRICATION ÉQUIVALENTE À CE QUI SUIT : « OLDCASTLE PRECAST H SERIES »; CONDUITS, À PROLONGER PAR VOIE DE MANCHONS JUSQUE DANS L'EMBOÎTEMENT. PRÉVOIR DES CORDONS DE TIRAGE POUR TOUS LES CONDUITS À VIDE ET DE TYPE ENFOUI DANS LE SOL. COUVERCLE DE CONDUIT, DE COULEUR VERTE. L'EMBOÎTEMENT DEVRA ÊTRE COTÉ POUR POUVOIR SUPPORTER DE LA CIRCULATION NON DÉLIBÉRÉE OU IMPRÉVUE.

10. À L'INTÉRIEUR DU POSTE DE GARDE, PRÉVOIR UN NOUVEAU BOUTON POUSSOIR À TÊTE EN FORME DE CHAMPIGNON ET DE COUPURE DE COURANT EN CAS D'URGENCE, À AMÉNAGER AVEC UN COUVERCLE PROTECTEUR ET UN CONDUIT SE PROLONGEANT JUSQU'AU PUITS DE LA FONTAINE. PRÉVOIR UN OUVRAGE D'INTERCONNEXION À L'EMPLACEMENT DU TABLEAU DE COMMANDE DE POMPE DE FONTAINE ET CE, AFIN D'ASSURER LA POSSIBILITÉ DE TRANSMETTRE UN SIGNAL DE FERMETURE À L'AMORÇAGE OU À L'ÉCRASAGE DE CE BOUTON. TRAVAUX D'INTERCONNEXION À L'EMPLACEMENT DU TABLEAU, DEVANT FAIRE L'OBJET D'UNE COORDINATION AVEC L'INSTALLATEUR DE LA FONTAINE.

1. TYPICAL:
PROVIDE NEW BURIED PVC CONDUITS FOR FUTURE USE BY CLIENT. STUB CONDUITS UP INTO NEW WEATHERPROOF BOX, EQUAL TO HUBBELL POWER SYSTEMS QUAZITE, MOUNTED FLUSH IN-GROUND. COORDINATE CONDUIT INSTALLATION WITH DIVISION 31/32. REFER TO DETAIL 1/E2 FOR CONDUIT INSTALLATION DETAILS. PROVIDE PULL CORD IN ALL CONDUITS.

2. NEW WIND SENSOR SUPPLIED AND INSTALLED BY FOUNTAIN INSTALLER. PROVIDE NEW 21mmC FROM POLE MOUNTED WIND SENSOR TO FOUNTAIN PIT. TERMINATE CABLE SUPPLIED BY FOUNTAIN INSTALLER AT WIND SENSOR AND PULL BACK TO FOUNTAIN CONTROL PANEL WITHIN ELECTRICAL ROOM. COORDINATE FINAL LOCATION ON SITE.

3. TYPICAL:
TEMPORARY ARROWHART RHINOBOX'S SUPPLIED AS NEEDED BY NCC FOR USE BY EXTERNAL CONTRACTORS. PROVIDE NEW COOPER ARROWHART CS8369 3POLE, 4WIRE, 50A, 120/250V NON-STANDARD LOCKING TYPE RECEPTACLE WITHIN WEATHERPROOF NEMA 4X PVC BOX, C/W HINGED COVER MOUNTED TO NEW SMARTPOLES. CONNECT TO CIRCUIT AS SHOWN. MOUNT RECEPTACLES AT 1000mm ABOVE FINISHED GRADE.

4. PROVIDE NEW NEMA 4X BOX ON GUARD HOUSE EXTERIOR AND STUB CONDUITS FROM MAIN BUILDING UP INTO BOX. COORDINATE BOX INSTALLATION WITH DIVISION 31/32. PROVIDE PULL CORD IN ALL CONDUITS.

5. PROVIDE BELOW GRADE PENETRATIONS THROUGH BUILDING EXTERIOR FOR CONDUIT RUNS. PROVIDE SCANNING, CORING AND SEALING FOR ALL PENETRATIONS. COORDINATE WITH DIVISION 31/32 ON SITE.

6. PROVIDE NEW RECESSED IN-GROUND NEMA 4X BOX C/W REQUIRED ACCESSORIES; TERMINATE PVC CONDUITS IN BOX. PROVIDE STUB UP TO NEW IN-GROUND BOX FROM EXISTING CONDUIT RUNNING UNDER BUILDING ENTRANCE. PROVIDE ADDITIONAL STUB UP AND NEW NEMA 4X IN-GROUND BOX ON OPPOSITE SIDE OF ENTRANCE. COORDINATE BOX INSTALLATION WITH DIVISION 31/32.

7. PROVIDE PENETRATIONS FOR NEW CONDUITS INTO SUB-FOUNTAIN PIT AREA. PROVIDE SCANNING, CORING AND SEALING FOR ALL PENETRATIONS. COORDINATE PENETRATIONS WITH DIVISION 31/32.

8. PROVIDE NEW CONDUIT FROM EXISTING MICROPHONE BOX ON BUILDING EXTERIOR TO FOUNTAIN PIT. EXTEND CONDUIT WITHIN PIT AS INDICATED ON DRAWING E5. COORDINATE TERMINATION POINT WITH CLIENT ON SITE.

9. TYPICAL:
PROVIDE NEW IN-GROUND PRE-CAST ELECTRICAL PULL BOX EQUAL TO OLDCASTLE PRECAST H SERIES AND STUB CONDUITS INTO ENCLOSURE. PROVIDE PULL ROPES FOR ALL EMPTY IN-GROUND CONDUITS. BOX COVER TO BE GREEN IN COLOUR. ENCLOSURE SHALL BE RATED TO WITHSTAND INCIDENTAL OR NON-DELIBERATE TRAFFIC.

10. PROVIDE NEW EMERGENCY POWER OFF (EPO) MUSHROOM HEAD PUSH BUTTON WITHIN GUARD HUT, C/W PROTECTIVE COVER AND CONDUIT TO FOUNTAIN PIT. PROVIDE INTERCONNECTION TO FOUNTAIN PUMP CONTROL PANEL TO SEND SHUT DOWN SIGNAL ON ACTIVATION. COORDINATE INTERCONNECTION AT PANEL WITH FOUNTAIN INSTALLER.

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LICENSED PROFESSIONAL ENGINEER
J. MOFFAT
PROVINCE OF ONTARIO
Apr.13,2016

issued or revised
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REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE RÉSIDENCE CCN - 2016

drawing
dessin

ELECTRICAL
POWER AND SYSTEMS NEW WORK
SITE PLAN

TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS DE COURANT ET SYSTÈMES -
NOUVEAUX TRAVAUX - PLAN D'IMPLANTATION

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
date 26/11/2012	scale échelle AS NOTED SELON LES IND.
NCC project no. n° du projet de la CCN	sheet no. n° de la feuille
DC-2611-110	E8

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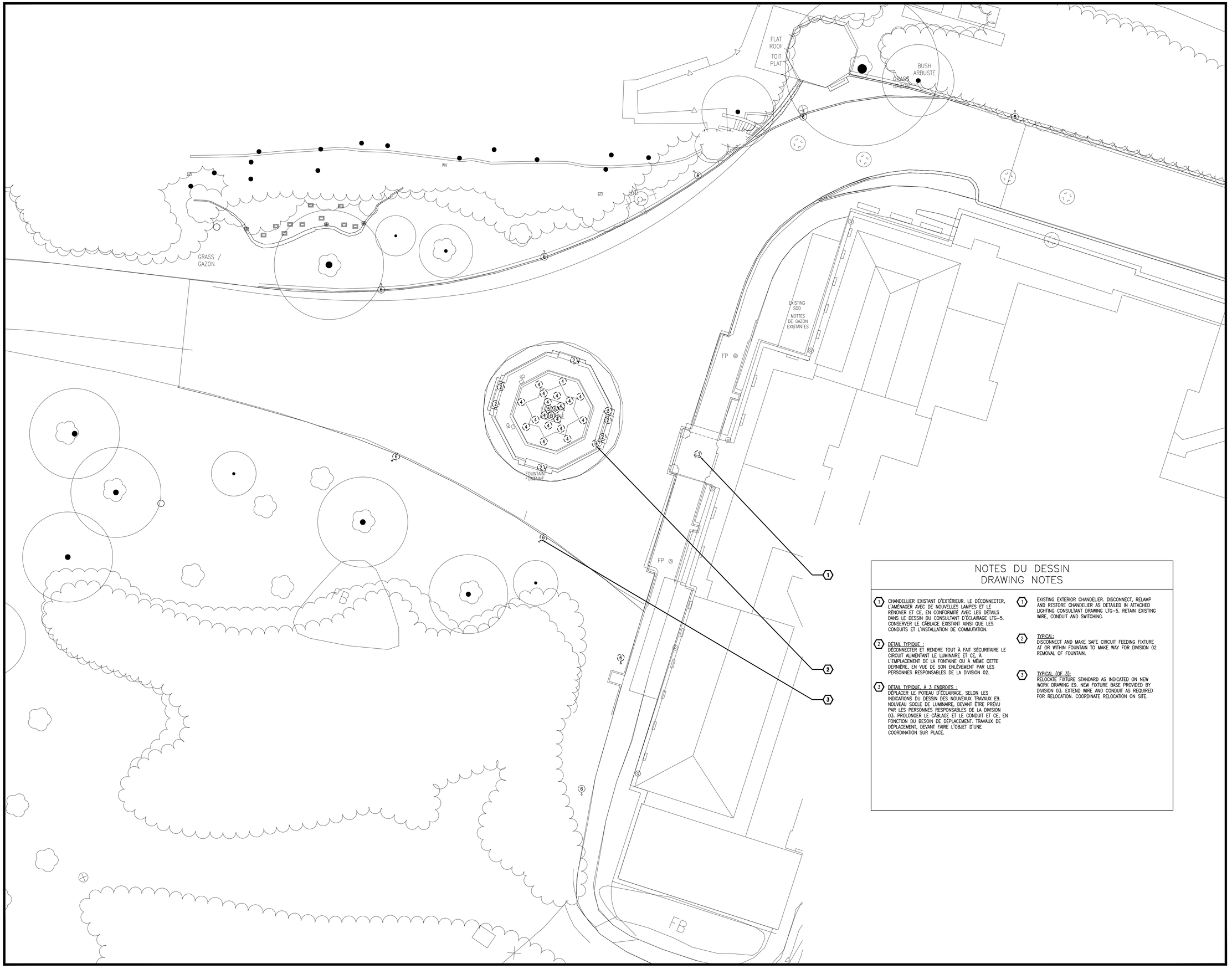

NOTES DU DESSIN
DRAWING NOTES

1. CHANDELLIER EXISTANT D'EXTÉRIEUR. LE DÉCONNECTER, L'AMÉNAGER AVEC DE NOUVELLES LAMPES ET LE RÉNOVER ET CE, EN CONFORMITÉ AVEC LES DÉTAILS DANS LE DESSIN DU CONSULTANT D'ÉCLAIRAGE LTG-5. CONSERVER LE CÂBLAGE EXISTANT AINSI QUE LES CONDUITS ET L'INSTALLATION DE COMMUTATION.

2. DÉTAIL TYPIQUE :
DÉCONNECTER ET RENDRE TOUT À FAIT SÉCURITAIRE LE CIRCUIT ALIMENTANT LE LUMINAIRE ET CE, À L'EMPLACEMENT DE LA FONTAINE OU À MÊME CETTE DERNIÈRE, EN VUE DE SON ENLÈVEMENT PAR LES PERSONNES RESPONSABLES DE LA DIVISION 02.

3. DÉTAIL TYPIQUE, À 3 ENDROITS :
DÉPLACER LE POTEAU D'ÉCLAIRAGE, SELON LES INDICATIONS DU DESSIN DES NOUVEAUX TRAVAUX E9. NOUVEAU SOCLE DE LUMINAIRE, DEVANT ÊTRE PRÉVU PAR LES PERSONNES RESPONSABLES DE LA DIVISION 03. PROLONGER LE CÂBLAGE ET LE CONDUIT ET CE, EN FONCTION DU BESOIN DE DÉPLACEMENT. TRAVAUX DE DÉPLACEMENT, DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE.

1. EXISTING EXTERIOR CHANDELIER. DISCONNECT, RELAMP AND RESTORE CHANDELIER AS DETAILED IN ATTACHED LIGHTING CONSULTANT DRAWING LTG-5. RETAIN EXISTING WIRE, CONDUIT AND SWITCHING.

2. TYPICAL:
DISCONNECT AND MAKE SAFE CIRCUIT FEEDING FIXTURE AT OR WITHIN FOUNTAIN TO MAKE WAY FOR DIVISION 02 REMOVAL OF FOUNTAIN.

3. TYPICAL (OF 3):
RELOCATE FIXTURE STANDARD AS INDICATED ON NEW WORK DRAWING E9. NEW FIXTURE BASE PROVIDED BY DIVISION 03. EXTEND WIRE AND CONDUIT AS REQUIRED FOR RELOCATION. COORDINATE RELOCATION ON SITE.

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REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE RꟷSIDENCE CCN - 2016

drawing
dessin

ELECTRICAL
LIGHTING DEMOLITION WORK
SITE PLAN

TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS D'ÉCLAIRAGE - OUVRAGES DE DÉMOLITION - PLAN D'IMPLANTATION

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
date	26/11/2012
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NCC project no. n° du projet de la CCN	DC-2611-110
sheet no. n° de la feuille	E9

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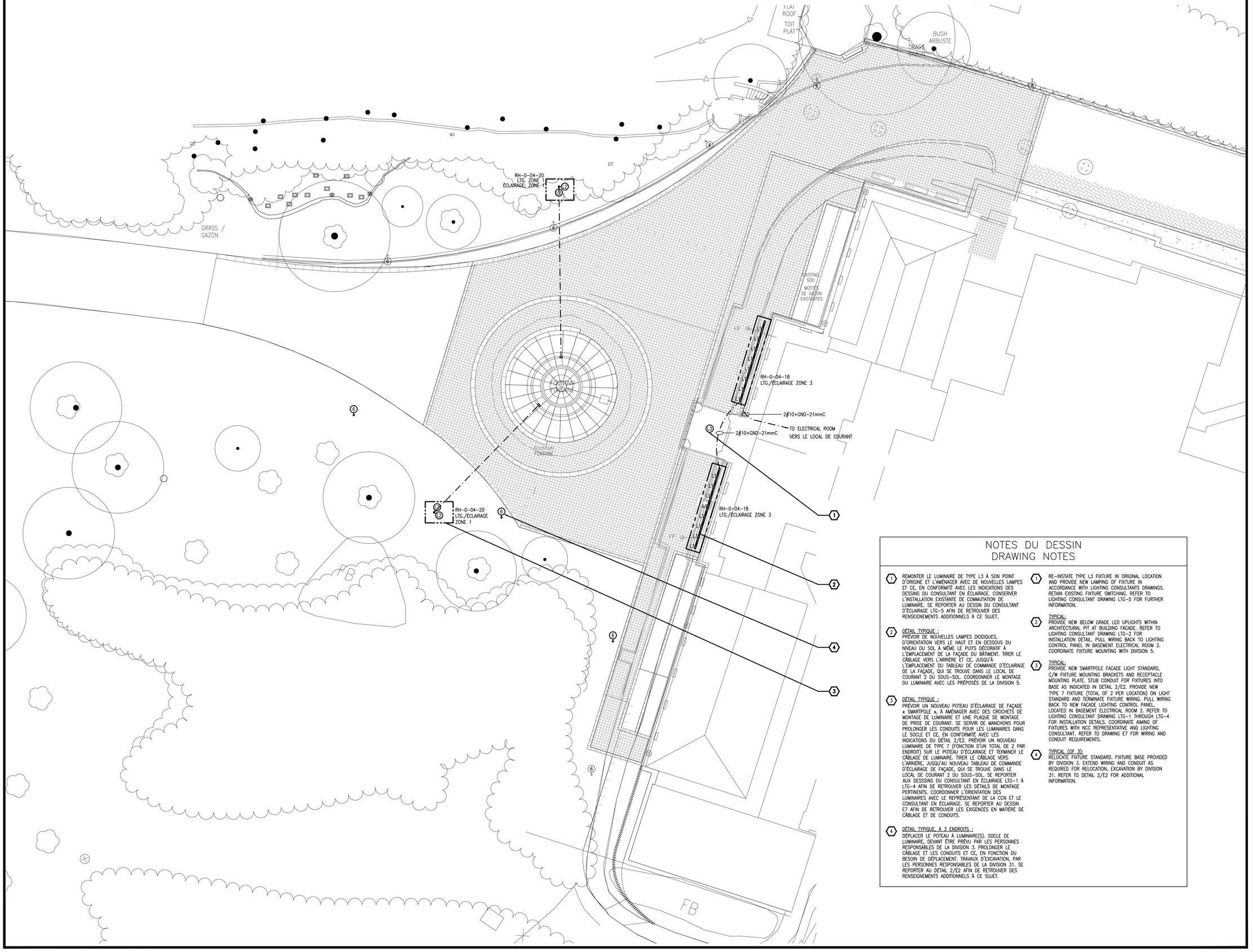

NOTES DU DESSIN
DRAWING NOTES

1. REMONTER LE LUMINAIRE DE TYPE L3 À SON POINT D'ORIGINE ET L'AMÉNAGER AVEC DE NOUVELLES LAMPES ET CE, EN CONFORMITÉ AVEC LES INDICATIONS DES DESSINS DU CONSULTANT EN ÉCLAIRAGE. CONSERVER L'INSTALLATION EXISTANTE DE COMMUTATION DE LUMINAIRE. SE REPORTER AU DESSIN DU CONSULTANT D'ÉCLAIRAGE LTG-5 AFIN DE RETROUVER DES RENSEIGNEMENTS ADDITIONNELS À CE SUJET.

2. DÉTAIL TYPIQUE :
PRÉVOIR DE NOUVELLES LAMPES DIODIQUES, D'ORIENTATION VERS LE HAUT ET EN DESSOUS DU NIVEAU DU SOL À MÊME LE PUITS DÉCORATIF À L'EMPLACEMENT DE LA FAÇADE DU BÂTIMENT. TIRER LE CÂBLAGE VERS L'ARRIÈRE ET CE, JUSQU'À L'EMPLACEMENT DU TABLEAU DE COMMANDE D'ÉCLAIRAGE DE LA FAÇADE, QUI SE TROUVE DANS LE LOCAL DE COURANT 2 DU SOUS-SOL. COORDONNER LE MONTAGE DU LUMINAIRE AVEC LES PRÉPOSÉS DE LA DIVISION 5.

3. DÉTAIL TYPIQUE :
PRÉVOIR UN NOUVEAU POTEAU D'ÉCLAIRAGE DE FAÇADE « SMARTPOLE », À AMÉNAGER AVEC DES CROCHETS DE MONTAGE DE LUMINAIRE ET UNE PLAQUE DE MONTAGE DE PRISE DE COURANT. SE SERVIR DE MANCHONS POUR PROLONGER LES CONDUITS POUR LES LUMINAIRES DANS LE SOCLE ET CE, EN CONFORMITÉ AVEC LES INDICATIONS DU DÉTAIL 2/E2. PRÉVOIR UN NOUVEAU LUMINAIRE DE TYPE 7 (FONCTION D'UN TOTAL DE 2 PAR ENDROIT) SUR LE POTEAU D'ÉCLAIRAGE ET TERMINER LE CÂBLAGE DE LUMINAIRE. TIRER LE CÂBLAGE VERS L'ARRIÈRE, JUSQU'AU NOUVEAU TABLEAU DE COMMANDE D'ÉCLAIRAGE DE FAÇADE, QUI SE TROUVE DANS LE LOCAL DE COURANT 2 DU SOUS-SOL. SE REPORTER AUX DESSSINS DU CONSULTANT EN ÉCLAIRAGE LTG-1 À LTG-4 AFIN DE RETROUVER LES DÉTAILS DE MONTAGE PERTINENTS. COORDONNER L'ORIENTATION DES LUMINAIRES AVEC LE REPRÉSENTANT DE LA CCN ET LE CONSULTANT EN ÉCLAIRAGE. SE REPORTER AU DESSIN E7 AFIN DE RETROUVER LES EXIGENCES EN MATIÈRE DE CÂBLAGE ET DE CONDUITS.

4. DÉTAIL TYPIQUE, À 3 ENDROITS :
DÉPLACER LE POTEAU À LUMINAIRE(S). SOCLE DE LUMINAIRE, DEVANT ÊTRE PRÉVU PAR LES PERSONNES RESPONSABLES DE LA DIVISION 3. PROLONGER LE CÂBLAGE ET LES CONDUITS ET CE, EN FONCTION DU BESOIN DE DÉPLACEMENT. TRAVAUX D'EXCAVATION, PAR LES PERSONNES RESPONSABLES DE LA DIVISION 31. SE REPORTER AU DÉTAIL 2/E2 AFIN DE RETROUVER DES RENSEIGNEMENTS ADDITIONNELS À CE SUJET.

1. RE-INSTATE TYPE L3 FIXTURE IN ORIGINAL LOCATION AND PROVIDE NEW LAMPING OF FIXTURE IN ACCORDANCE WITH LIGHTING CONSULTANTS DRAWINGS. RETAIN EXISTING FIXTURE SWITCHING. REFER TO LIGHTING CONSULTANT DRAWING LTG-5 FOR FURTHER INFORMATION.

2. TYPICAL:
PROVIDE NEW BELOW GRADE LED UPLIGHTS WITHIN ARCHITECTURAL PIT AT BUILDING FACADE. REFER TO LIGHTING CONSULTANT DRAWING LTG-2 FOR INSTALLATION DETAIL. PULL WIRING BACK TO LIGHTING CONTROL PANEL IN BASEMENT ELECTRICAL ROOM 2. COORDINATE FIXTURE MOUNTING WITH DIVISION 5.

3. TYPICAL:
PROVIDE NEW SMARTPOLE FACADE LIGHT STANDARD, C/W FIXTURE MOUNTING BRACKETS AND RECEPTACLE MOUNTING PLATE. STUB CONDUIT FOR FIXTURES INTO BASE AS INDICATED IN DETAIL 2/E2. PROVIDE NEW TYPE 7 FIXTURE (TOTAL OF 2 PER LOCATION) ON LIGHT STANDARD AND TERMINATE FIXTURE WIRING. PULL WIRING BACK TO NEW FACADE LIGHTING CONTROL PANEL, LOCATED IN BASEMENT ELECTRICAL ROOM 2. REFER TO LIGHTING CONSULTANT DRAWING LTG-1 THROUGH LTG-4 FOR INSTALLATION DETAILS. COORDINATE AIMING OF FIXTURES WITH NCC REPRESENTATIVE AND LIGHTING CONSULTANT. REFER TO DRAWING E7 FOR WIRING AND CONDUIT REQUIREMENTS.

4. TYPICAL (OF 3):
RELOCATE FIXTURE STANDARD. FIXTURE BASE PROVIDED BY DIVISION 3. EXTEND WIRING AND CONDUIT AS REQUIRED FOR RELOCATION, EXCAVATION BY DIVISION 31. REFER TO DETAIL 2/E2 FOR ADDITIONAL INFORMATION.

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drawing
dessin

ELECTRICAL
LIGHTING NEW WORK
SITE PLAN

TRAVAUX D'ÉLECTRICITÉ - INSTALLATIONS D'ÉCLAIRAGE - NOUVEAUX TRAVAUX - PLAN D'IMPLANTATION

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
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sheet no. nº de la feuille	E10

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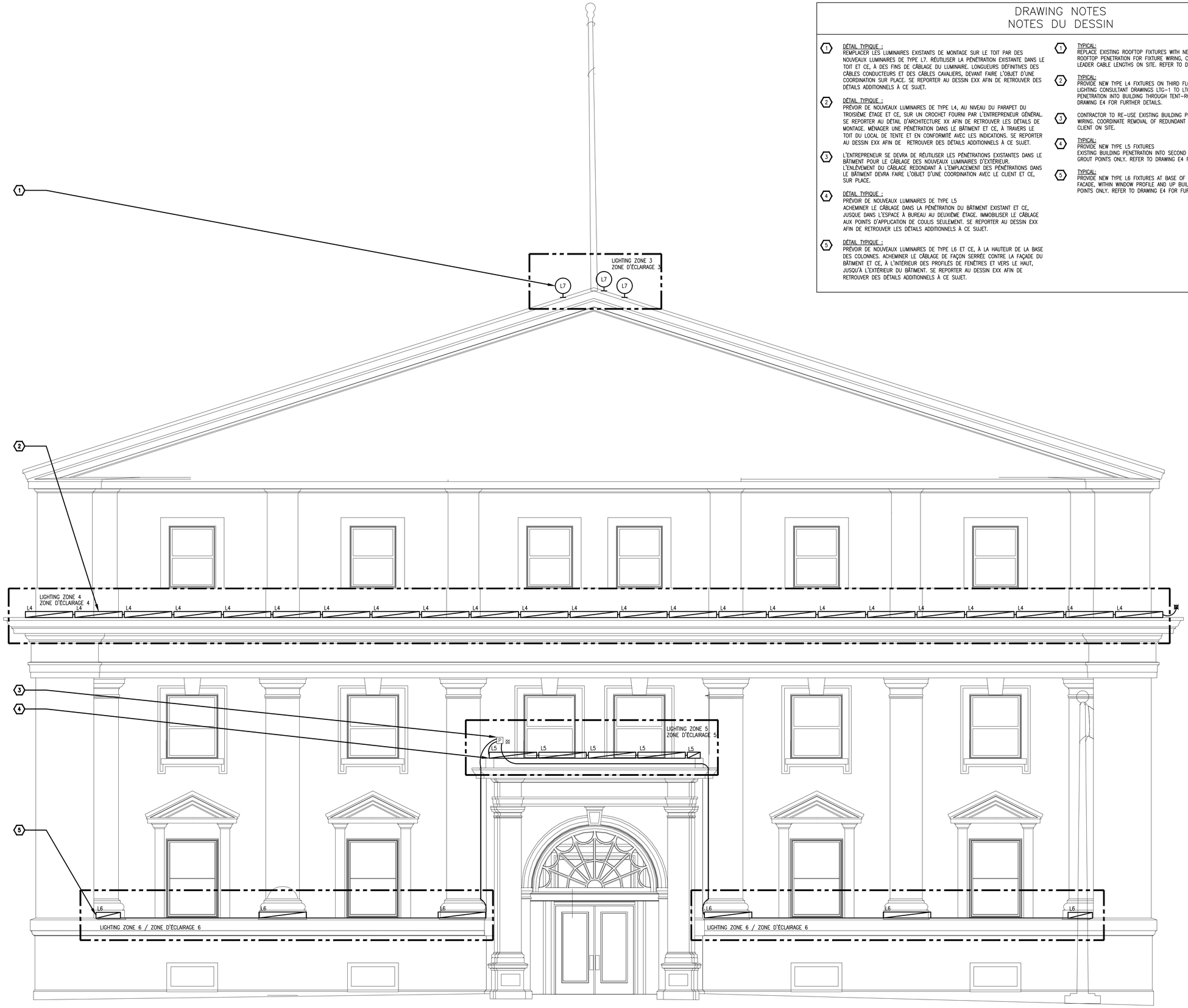

DRAWING NOTES
NOTES DU DESSIN

1. DÉTAIL TYPIQUE :
REMPLACER LES LUMINAIRES EXISTANTS DE MONTAGE SUR LE TOIT PAR DES NOUVEAUX LUMINAIRES DE TYPE L7. RÉUTILISER LA PÉNÉTRATION EXISTANTE DANS LE TOIT ET CE, À DES FINS DE CÂBLAGE DU LUMINAIRE. LONGUEURS DÉFINITIVES DES CÂBLES CONDUCTEURS ET DES CÂBLES CAVALIERS, DEVANT FAIRE L'OBJET D'UNE COORDINATION SUR PLACE. SE REPORTER AU DESSIN EXX AFIN DE RETROUVER DES DÉTAILS ADDITIONNELS À CE SUJET.

2. DÉTAIL TYPIQUE :
PRÉVOIR DE NOUVEAUX LUMINAIRES DE TYPE L4, AU NIVEAU DU PARAPET DU TROISIÈME ÉTAGE ET CE, SUR UN CROCHET FOURNI PAR L'ENTREPRENEUR GÉNÉRAL. SE REPORTER AU DÉTAIL D'ARCHITECTURE XX AFIN DE RETROUVER LES DÉTAILS DE MONTAGE. MÉNAGER UNE PÉNÉTRATION DANS LE BÂTIMENT ET CE, À TRAVERS LE TOIT DU LOCAL DE TENTE ET EN CONFORMITÉ AVEC LES INDICATIONS. SE REPORTER AU DESSIN EXX AFIN DE RETROUVER DES DÉTAILS ADDITIONNELS À CE SUJET.

3. L'ENTREPRENEUR SE DEVRA DE RÉUTILISER LES PÉNÉTRATIONS EXISTANTES DANS LE BÂTIMENT POUR LE CÂBLAGE DES NOUVEAUX LUMINAIRES D'EXTÉRIEUR. L'ENLÈVEMENT DU CÂBLAGE REDONDANT À L'EMPLACEMENT DES PÉNÉTRATIONS DANS LE BÂTIMENT DEVRA FAIRE L'OBJET D'UNE COORDINATION AVEC LE CLIENT ET CE, SUR PLACE.

4. DÉTAIL TYPIQUE :
PRÉVOIR DE NOUVEAUX LUMINAIRES DE TYPE L5
ACHEMINER LE CÂBLAGE DANS LA PÉNÉTRATION DU BÂTIMENT EXISTANT ET CE, JUSQUE DANS L'ESPACE À BUREAU AU DEUXIÈME ÉTAGE. IMMOBILISER LE CÂBLAGE AUX POINTS D'APPLICATION DE COULIS SEULEMENT. SE REPORTER AU DESSIN EXX AFIN DE RETROUVER LES DÉTAILS ADDITIONNELS À CE SUJET.

5. DÉTAIL TYPIQUE :
PRÉVOIR DE NOUVEAUX LUMINAIRES DE TYPE L6 ET CE, À LA HAUTEUR DE LA BASE DES COLONNES. ACHEMINER LE CÂBLAGE DE FAÇON SERRÉE CONTRE LA FAÇADE DU BÂTIMENT ET CE, À L'INTÉRIEUR DES PROFILÉS DE FENÊTRES ET VERS LE HAUT, JUSQU'À L'EXTÉRIEUR DU BÂTIMENT. SE REPORTER AU DESSIN EXX AFIN DE RETROUVER DES DÉTAILS ADDITIONNELS À CE SUJET.

1. TYPICAL:
REPLACE EXISTING ROOFTOP FIXTURES WITH NEW TYPE L7 FIXTURES. REUSE EXISTING ROOFTOP PENETRATION FOR FIXTURE WIRING, COORDINATE FINAL REQUIRED JUMPER AND LEADER CABLE LENGTHS ON SITE. REFER TO DRAWING E4 FOR FURTHER DETAILS.

2. TYPICAL:
PROVIDE NEW TYPE L4 FIXTURES ON THIRD FLOOR PARAPET ON NEW BRACKET. REFER TO LIGHTING CONSULTANT DRAWINGS LTG-1 TO LTG-5 FOR MOUNTING DETAILS. PROVIDE PENETRATION INTO BUILDING THROUGH TENT-ROOM ROOF, AS INDICATED. REFER TO DRAWING E4 FOR FURTHER DETAILS.

3. CONTRACTOR TO RE-USE EXISTING BUILDING PENETRATIONS FOR NEW EXTERIOR FIXTURE WIRING. COORDINATE REMOVAL OF REDUNDANT WIRING AT BUILDING PENETRATION WITH CLIENT ON SITE.

4. TYPICAL:
PROVIDE NEW TYPE L5 FIXTURES . ROUTE WIRING THROUGH EXISTING BUILDING PENETRATION INTO SECOND FLOOR OFFICE SPACE. SECURE WIRING AT GROUT POINTS ONLY. REFER TO DRAWING E4 FOR FURTHER DETAILS.

5. TYPICAL:
PROVIDE NEW TYPE L6 FIXTURES AT BASE OF COLUMNS. RUN WIRING TIGHT TO BUILDING FACADE, WITHIN WINDOW PROFILE AND UP BUILDING EXTERIOR. SECURE WIRING AT GROUT POINTS ONLY. REFER TO DRAWING E4 FOR FURTHER DETAILS.

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LICENSED PROFESSIONAL ENGINEER
J. MOFFAT
100151
Apr. 13, 2016
PROVINCE OF ONTARIO

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7	ISSUED FOR TENDER DOCUMENT DE SOUMISSION	13-04-2016
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3	100% CLIENT REVIEW DOCUMENT À 100 %, À SOUMETTRE À L'EXAMEN DU CLIENT.	27-02-2013
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project
projet

NCC RESIDENCE
FRONT ENTRANCE LANDSCAPE
REHABILITATION 2016

REMISE EN ÉTAT DE L'AMÉNAGEMENT PAYSAGE À L'ENTRÉE PRINCIPALE DE RꟷSIDENCE CCN - 2016

drawing
dessin

ELECTRICAL
BUILDING FACADE
LIGHTING ELEVATION
ÉLÉVATION - INSTALLATIONS D'ÉCLAIRAGE DE LA FAÇADE DU BÂTIMENT

approved by approuvé par	J.MOFFAT
designed by conçu par	T.HOPKIN
drawn by dessiné par	T.HOPKIN
date	26/11/2012
scale échelle	AS NOTED SELON LES IND.
NCC project no. n° du projet de la CCN	DC-2611-110
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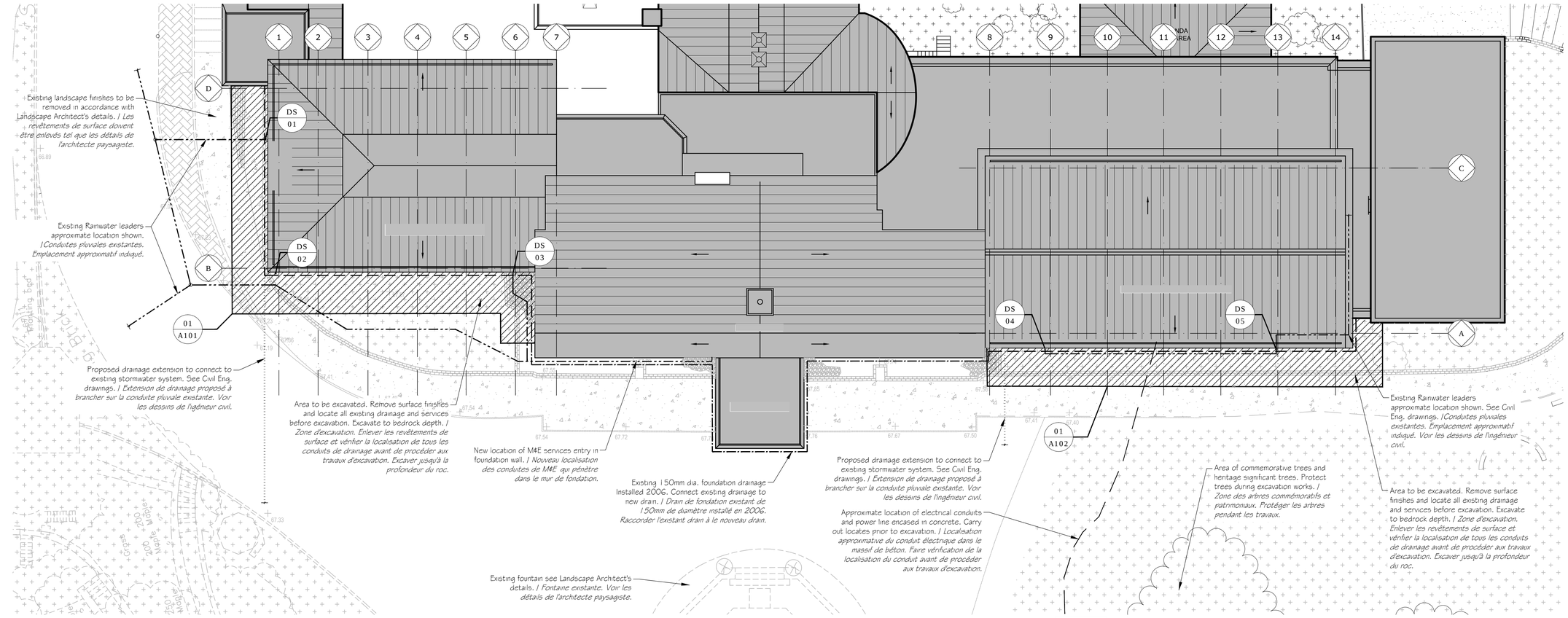
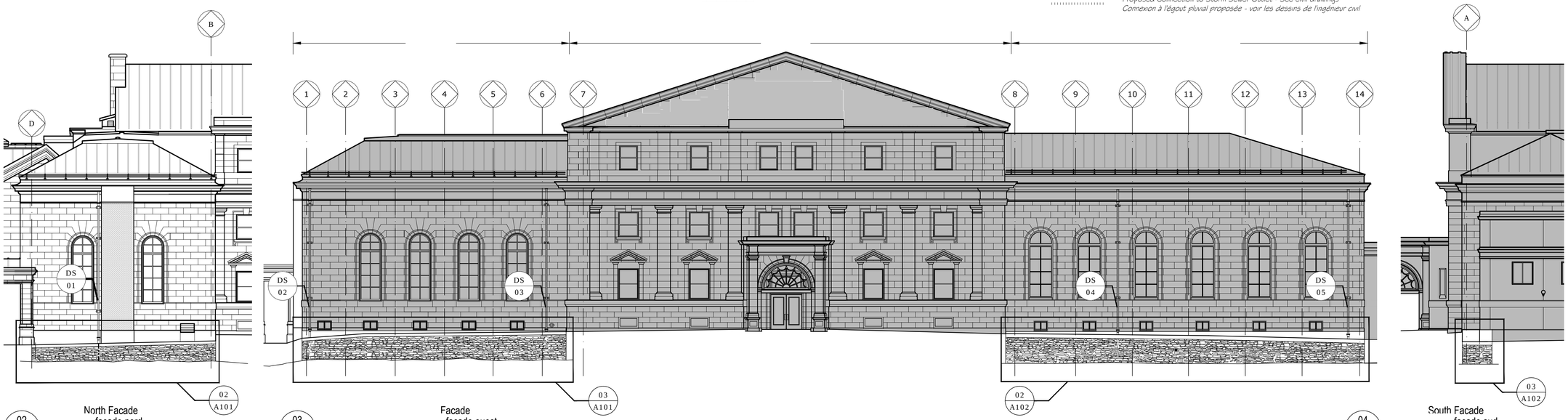


01 A100 Site Plan Extract / Extrait du plan de localisation
Scale / échelle : 1:150
2000 0 2000 4000 6000 8000 10000 mm



02 A100 North Facade / façade nord
Scale / échelle : 1:150
2000 0 2000 4000 6000 8000 10000 mm

03 A100 Facade / façade ouest
Scale / échelle : 1:150
2000 0 2000 4000 6000 8000 10000 mm

04 A100 South Facade / façade sud
Scale / échelle : 1:150
2000 0 2000 4000 6000 8000 10000 mm

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project / projet

NCC Residence Front Entrance Landscape Rehabilitation 2016 / Résidence CCN Réfection de l'aménagement paysager de l'entrée principale 2016

Foundation Wall Dampproofing / Imperméablisation de la fondations

drawing / dessin

Site Plan and Elevations. / plan du localisation et des élévations.

approved by / approuvé par	P. Létourneau
designed by / conçu par	A. Brooks
drawn by / dessiné par	A. Brooks
date	2016-02-15
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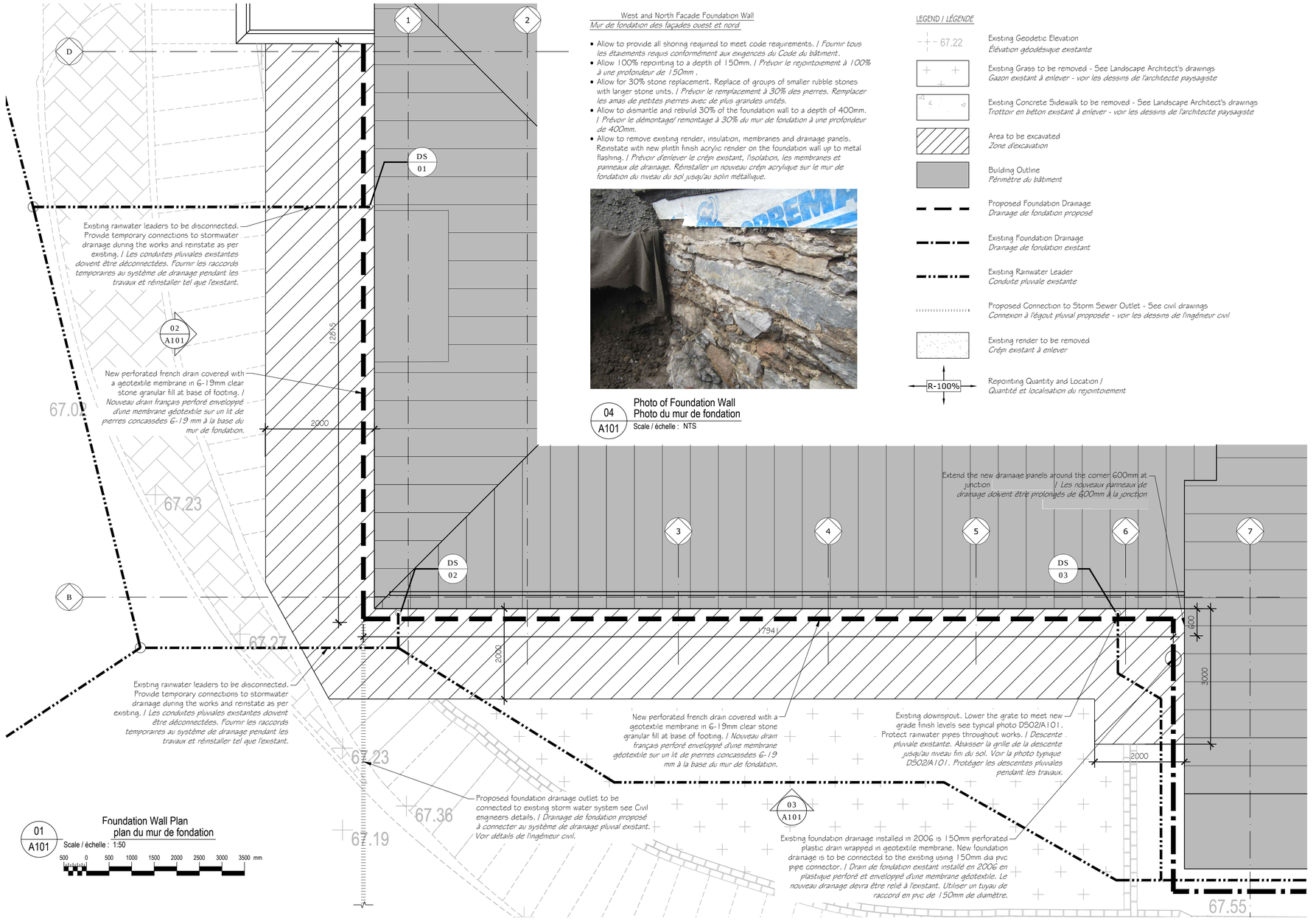


01 A101 Foundation Wall Plan
plan du mur de fondation
Scale / échelle : 1:50
500 0 500 1000 1500 2000 2500 3000 3500 mm

West and North Facade Foundation Wall
Mur de fondation des façades ouest et nord

- Allow to provide all shoring required to meet code requirements. / *Fournir tous les étaiements requis conformément aux exigences du Code du bâtiment.*
- Allow 100% repointing to a depth of 150mm. / *Prévoir le rejointoiement à 100% à une profondeur de 150mm .*
- Allow for 30% stone replacement. Replace of groups of smaller rubble stones with larger stone units. / *Prévoir le remplacement à 30% des pierres. Remplacer les amas de petites pierres avec de plus grandes unités.*
- Allow to dismantle and rebuild 30% of the foundation wall to a depth of 400mm. / *Prévoir le démontage/ remontage à 30% du mur de fondation à une profondeur de 400mm.*
- Allow to remove existing render, insulation, membranes and drainage panels. Reinstate with new plinth finish acrylic render on the foundation wall up to metal flashing. / *Prévoir d'enlever le crépi existant, l'isolation, les membranes et panneaux de drainage. Réinstaller un nouveau crépi acrylique sur le mur de fondation du niveau du sol jusqu'au solin métallique.*

04 A101 Photo of Foundation Wall
Photo du mur de fondation
Scale / échelle : NTS

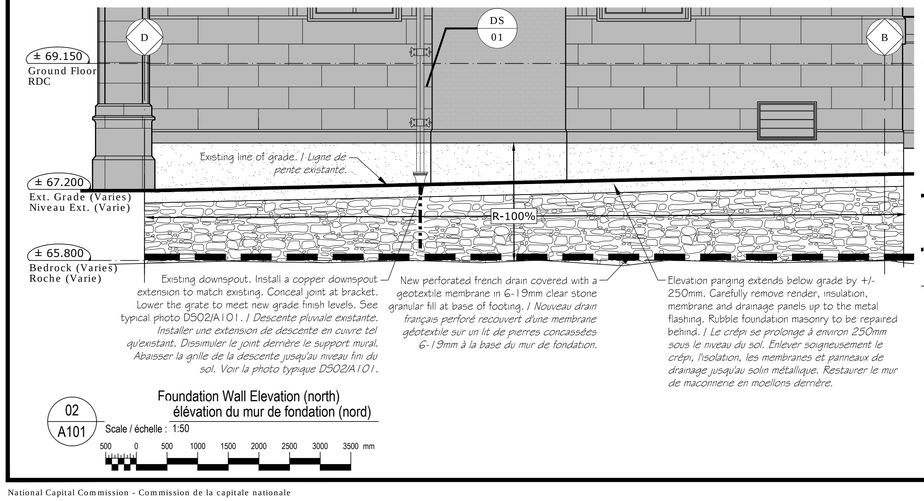
LEGEND / *LÉGENDE*

- 67.22 — Existing Geodetic Elevation / *Élévation géodésique exstante*
- Existing Grass to be removed - See Landscape Architect's drawings / *Gazon exstant à enlever - voir les dessins de l'architecte paysagiste*
- Existing Concrete Sidewalk to be removed - See Landscape Architect's drawings / *Trottoir en béton exstant à enlever - voir les dessins de l'architecte paysagiste*
- Area to be excavated / *Zone d'excavation*
- Building Outline / *Périmètre du bâtiment*
- Proposed Foundation Drainage / *Drainage de fondation proposé*
- Existing Foundation Drainage / *Drainage de fondation exstant*
- Existing Rainwater Leader / *Conduite pluviale exstante*
- Proposed Connection to Storm Sewer Outlet - See civil drawings / *Connexion à l'égout pluvial proposée - voir les dessins de l'ingénieur civil*
- Existing render to be removed / *Crépi exstant à enlever*
- R-100% — Repointing Quantity and Location / *Quantité et localisation du rejointoiement*

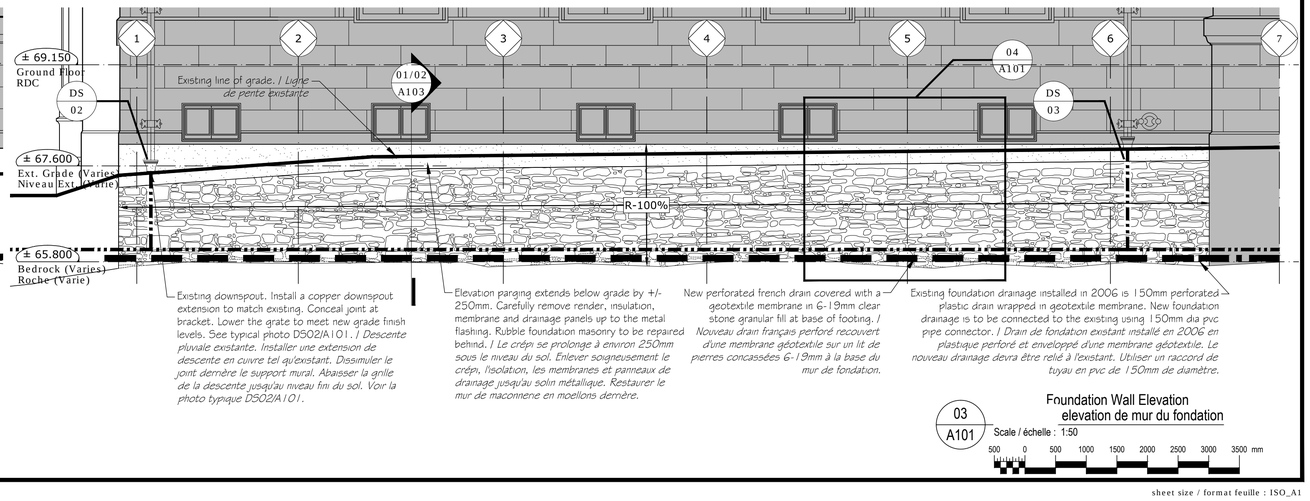
DS01 A101 Photo of Existing Downspout Grate
Photo de la grille de la descente pluviale exstante
Scale / échelle : NTS

DS02 A101 Photo of Existing Downspout Grate
Photo de la grille de la descente pluviale exstante
Scale / échelle : NTS

DS03 A101 Photo of Existing Downspout Grate
Photo de la grille de la descente pluviale exstante
Scale / échelle : NTS



02 A101 Foundation Wall Elevation (north)
élévation du mur de fondation (nord)
Scale / échelle : 1:50
500 0 500 1000 1500 2000 2500 3000 3500 mm



03 A101 Foundation Wall Elevation
elevation de mur du fondation
Scale / échelle : 1:50
500 0 500 1000 1500 2000 2500 3000 3500 mm

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03	100% Submission	15.01.2016
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project / projet

NCC Residence Front Entrance Landscape Rehabilitation 2016 / Résidence CCN Réfection de l'aménagement paysager de l'entrée principale 2016

Foundation Wall Dampproofing / Imperméabilisation de la fondations

drawing / dessin

West Facade and North Facade Foundation Wall Plan and Elevations. / façade ouest et façade nord plan et élévation de mur de fondation.

approved by / approuvé par	P. Létourneau
designed by / conçu par	A. Brooks
drawn by / dessiné par	A. Brooks
date	2016-02-15
scale / échelle	N/A
NCC project no. / no. du projet de la CCN	DC1110-17
package & sheet no. / no. document & feuille	---- | A101

04 / A102 — Photo of Foundation Wall After Parging Removal
Photo du mur de fondation après l'enlèvement du crépi
Scale / échelle : NTS

DS04 / A102 — Photo of Existing Downspout Grate
Photo de la grille de la descente pluviale existante
Scale / échelle : NTS

DS05 / A102 — Photo of Existing Downspout Grate
Photo de la grille de la descente pluviale existante
Scale / échelle : NTS

West Facade and South Facade Foundation Wall
mur de fondation des façades ouest et sud

- Allow to remove 100% of the existing cementitious parging (+/- 20mm thick) and damp-proof coating. / *Prévoir d'enlever 100% du crépi cimentaire existant (+/-20mm en profondeur) et l'enduit hydrofuge.*
- Allow 100% removal of existing mortar joints to a depth of 150mm and re-point joints. / *Prévoir d'enlever 100% des joints de mortier existant à une profondeur de 150mm et refaire les joints.*
- Allow for 10% stone replacement. Replace of groups of smaller rubble stones with larger stone units. / *Prévoir le remplacement à 10% des pierres. Remplacer les amas de petites pierres avec de plus grandes unités.*
- Allow to dismantle and rebuild 40% of the foundation wall to a depth of 400mm. / *Prévoir le démontage/ remontage à 40% du mur de fondation à une profondeur de 400mm.*
- Allow to remove existing render, insulation, membranes and drainage panels. Reinstate with new plinth finish acrylic render on the foundation wall up to metal flashing. / *Prévoir d'enlever le crépi existant, l'isolation, les membranes et panneaux de drainage. Réinstaller un nouveau crépi acrylique sur le mur de fondation du niveau du sol jusqu'au solin métallique.*

LEGEND / *LÉGENDE*

- 67.22 — Existing Geodetic Elevation / *Élévation géodésique existante*
- Existing Grass to be removed - See Landscape Architect's drawings / *Gazon existant à enlever - voir les dessins de l'architecte paysagiste*
- Existing Concrete Sidewalk to be removed - See Landscape Architect's drawings / *Trottoir en beton existant à enlever - voir les dessins de l'architecte paysagiste*
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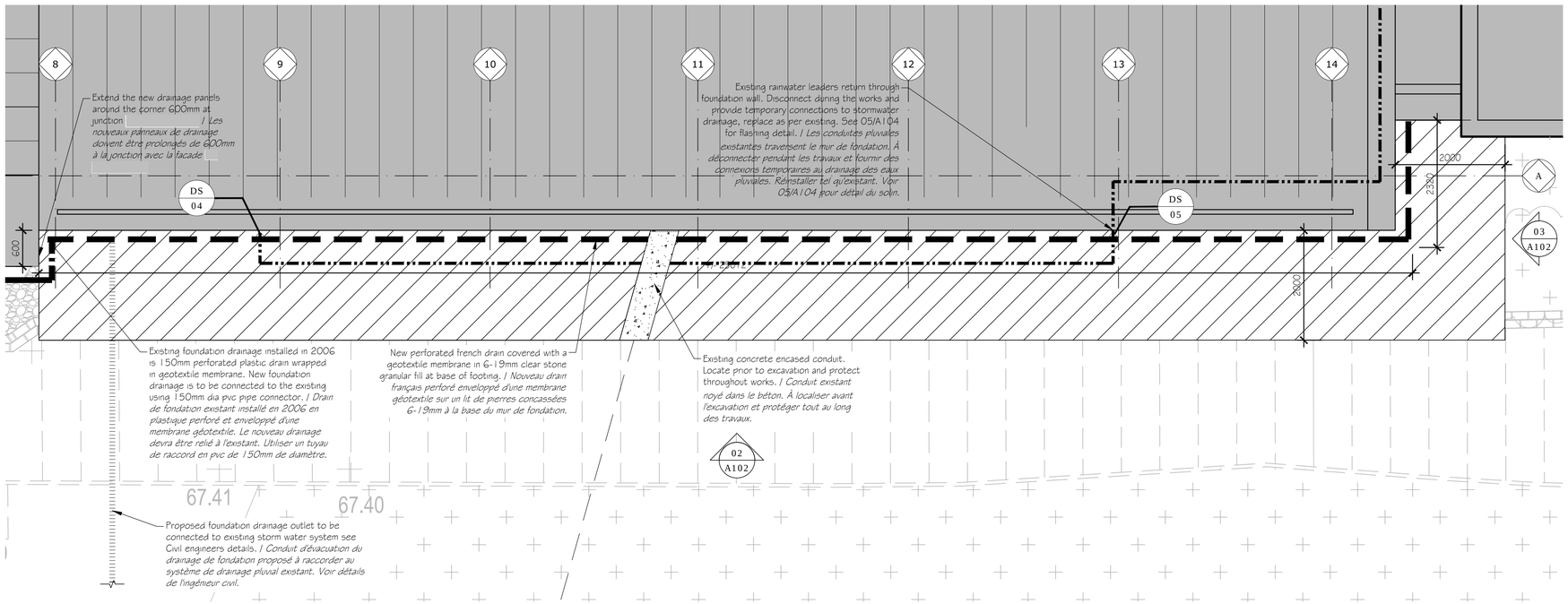
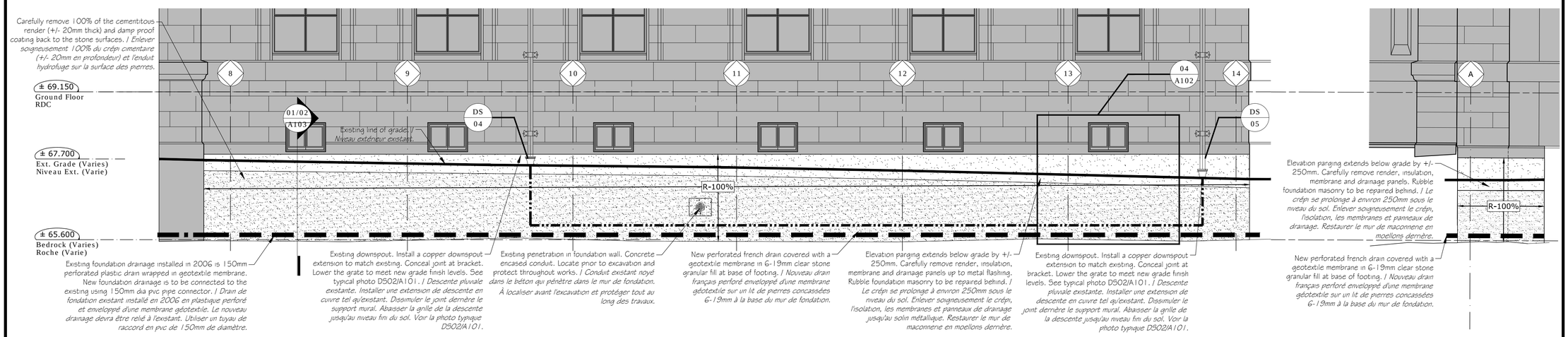
- Building Outline / *Périmètre du bâtiment*
- Proposed Foundation Drainage / *Drainage de fondation proposé*
- Existing Foundation Drainage / *Drainage de fondation existant*
- Existing Rainwater Leader / *Conduite pluviale existante*
- Proposed Connection to Storm Sewer Outlet - See civil drawings / *Connexion à l'égout pluvial proposé - voir les dessins de l'ingénieur civil*
- Existing cementitious render to be removed / *Crépi cimentaire existant à enlever*
- R-100% — Repointing Quantity and Location / *Quantité et localisation du rejointoiement*



01 / A102 — Foundation Wall Plan
plan du mur de fondation
Scale / échelle : 1:50
500 0 500 1000 1500 2000 2500 3000 3500 mm



02 / A102 — Foundation Wall Elevation
elevation du mur de fondation
Scale / échelle : 1:50
500 0 500 1000 1500 2000 2500 3000 3500 mm

03 / A102 — Foundation Wall Elevation (south)
élévation du mur de fondation (sud)
Scale / échelle : 1:50
500 0 500 1000 1500 2000 2500 3000 3500 mm

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03	100% Submission	15.01.2016
02	90% For Coordination	08.01.2016
01	50% For Coordination	12.22.2015

project / projet

NCC Residence Front Entrance Landscape Rehabilitation 2016 / Résidence CCN Réfection de l'aménagement paysager de l'entrée principale 2016

Foundation Wall Dampproofing / Imperméabilisation de la fondations

drawing / dessin

West Facade and South Facade Foundation Wall Plan and Elevations. / façade ouest et façade sud plan et élévation de mur de fondation.

approved by / approuvé par	P. Létourneau
designed by / conçu par	A. Brooks
drawn by / dessiné par	A. Brooks
date	2016-02-15
scale / échelle	N/A
NCC project no. / no. du projet de la CCN	DC1110-17
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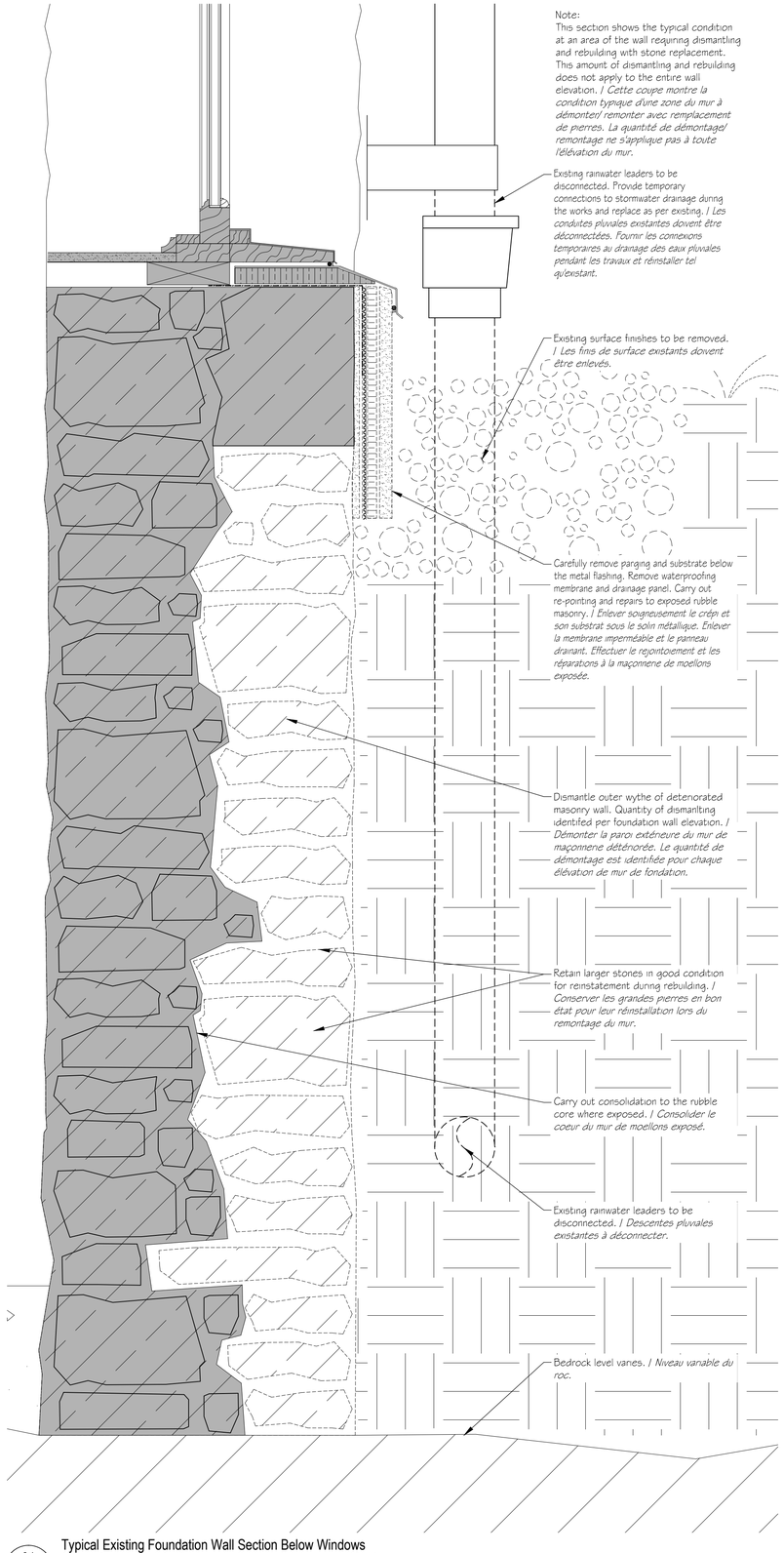
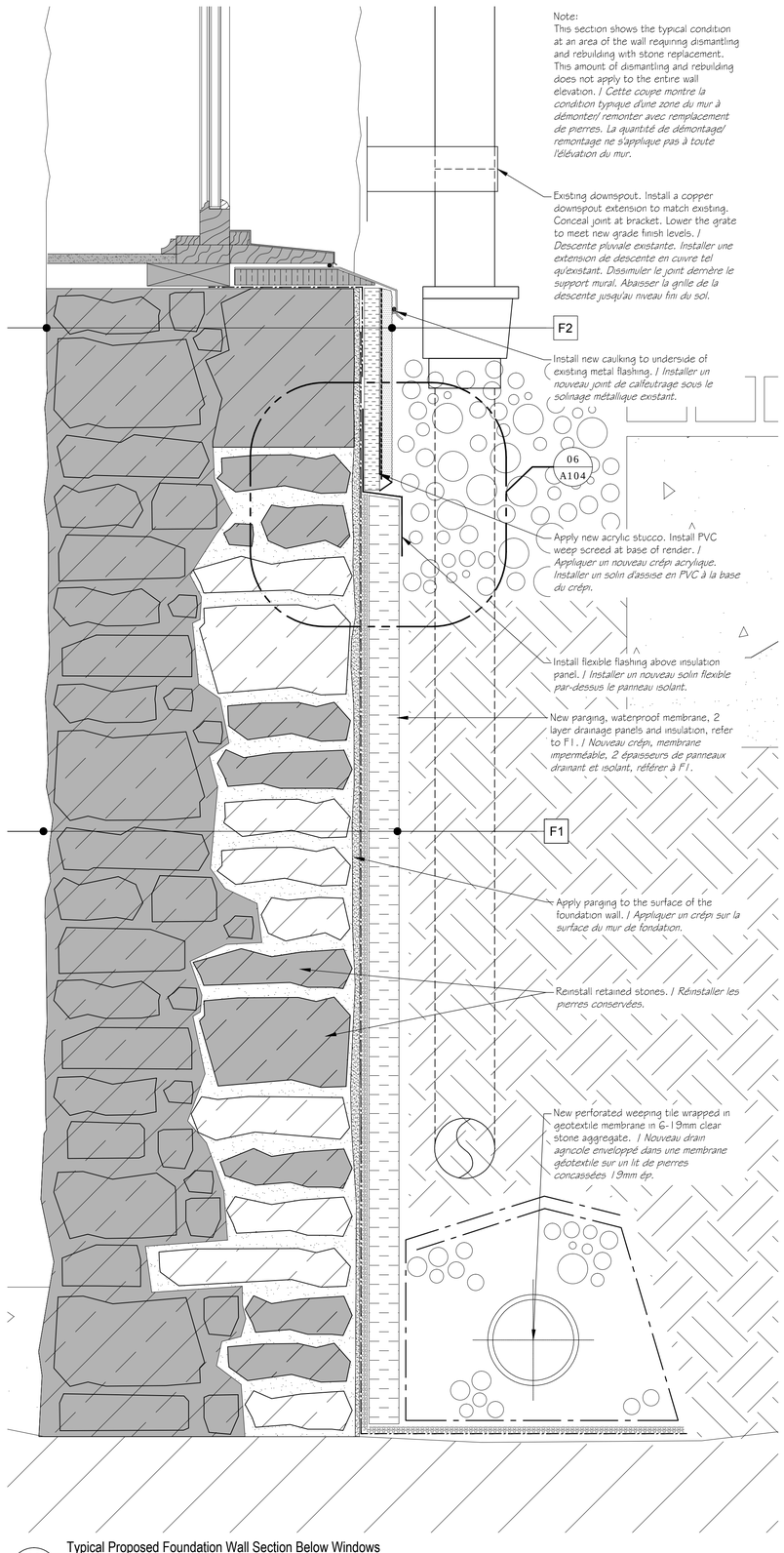


01 A103 Typical Existing Foundation Wall Section Below Windows
Coupe typique existante du mur de fondation sous les fênetres
Scale / échelle : 1:5

50 0 50 100 150 200 250 300 350 mm



02 A103 Typical Proposed Foundation Wall Section Below Windows
Coupe typique proposée du mur de fondation sous les fênetres
Scale / échelle : 1:5

50 0 50 100 150 200 250 300 350 mm

LEGEND / *LÉGENDE*

- Existing / *Existant*
- Proposed / *Proposé*
- Drainage Panel / *Panneau de drainage*
- Dampproof membrane / *Membrane imperméable*
- Semi rigid Insulation / *Isolant semi-rigide*
- Parging Coat 16mm / *Couche de crépi 16mm*
- To be removed or dismantled / *A enlever ou démanteler*

Stone Foundations Scope of Works:

1. Excavate around to bedrock level (variable depth). Contractor must provide and install required trench boxing as per code and approved by an engineer.
2. Remove 100% of existing parging and any waterproofing/damp proofing membranes.
3. Remove render plinth finish, insulation, drainage panel and membrane below metal flashing as indicated on the elevations.
4. Clean all foundations walls with high pressure water to remove all earth and dirt from surface. Allow for temporary sump pumps to remove water from the trench.
5. Carry out deep re-pointing of all foundation walls at 100% over entire area to the depth of 150mm. Note: The existing mortar is hard and cementitious in approximately 60% of the wall area.
6. Allow to replace groups of smaller stones with one larger unit. Quantity of stone replacement is indicated for each elevation. See elevation drawings.
7. Apply parging to 100% of the wall surface to a minimum thickness of 16mm to soften the sharp edges and eliminate a shelving effect so as to install a waterproofing membrane. Perform a continuous moist cure over 72 hours.
8. Install dampproofing system/membrane.
9. Install the drainage panels horizontally. The panels must under no circumstances be mechanically anchored to the walls. Overlap the horizontal panels by 50mm.
10. Install the perforated plastic french drain covered by a geotextile membrane at the base of footing level. Connect the drain in accordance with the civil Engineer's details.
11. Fill with clean 6-19mm crushed stones, from bottom of foundation wall to a minimum height of 600mm, wrapped in a geotextile membrane.
12. Re-apply plinth render finish up to metal flashing as per existing. Install new caulking.
13. Fill the remainder as per Landscape Architect's details.
14. See Landscape Architect's details for surface finishes.

Portée des travaux pour les fondations en pierre:

1. *Excaver le sol jusqu'au niveau du roc (profondeur variable). L'entrepreneur doit fournir et installer les étaiements de tranchée requis conformes aux normes en vigueur et approuvés par un ingénieur.*
2. *Enlever 100% du crépi existant et les membranes imperméabilisantes.*
3. *Enlever le crépi existant, l'isolation, le panneau drainant et la membrane sous le solin métallique tel qu'indiqué sur les élévations.*
4. *Nettoyer à l'eau sous pression les murs de fondations pour dégager la terre et les saletés en surface. Prévoir des pompes d'assèchement pour enlever l'eau de la tranchée.*
5. *Rejointoyer en profondeur à 100% les murs de fondation sur toute leur superficie à une profondeur de 150mm. Note: Le mortier existant à base de ciment est dur sur approximativement 60% de la superficie du mur.*
6. *Prévoir le remplacement des amas de petites pierres avec une unité plus grande. La quantité de pierres à remplacer est indiquée pour chaque élévation. Voir les élévations.*
7. *Appliquer une couche de crépi sur 100% de la superficie du mur d'une épaisseur minimale de 16mm afin d'adoucir les arêtes et d'égaliser la surface en vue de poser la membrane d'étanchéité. Effectuer une cure humide continue de 72 heures.*
8. *Poser le système/membrane d'imperméabilisation.*
9. *Poser les panneaux drainants à l'horizontale. Les panneaux doivent en aucun cas être ancrés mécaniquement aux murs. Chevaucher les panneaux horizontaux de 50mm.*
10. *Poser le drain français en plastique perforé recouvert d'une membrane géotextile à la base du niveau des semelles. Raccorder le drain tel que les détails de l'ingénieur civil.*
11. *Remblayer la tranchée avec de la pierre concassée propre 6-19mm enveloppée dans une membrane géotextile de la base du mur de fondation jusqu'à une hauteur minimale de 600mm .*
12. *Réinstaller le crépi jusqu'au solin metallique, tel qu'existant. Installer nouveau calfeutrage.*
13. *Remblayer le reste tel que les détails de l'architecte paysagiste.*
14. *Voir les détails de l'architecte paysagiste pour les finis de surface.*

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NCC Residence Front Entrance Landscape Rehabilitation 2016 / Résidence CCN Réfection de l'aménagement paysager de l'entrée principale 2016

Foundation Wall Dampproofing / Imperméabilisation de la fondations

drawing / dessin

Typical Foundation Wall Sections / Coupes typiques de mur de fondation

approved by / approuvé par	P. Létourneau
designed by / conçu par	A. Brooks
drawn by / dessiné par	A. Brooks
date	2016-02-15
scale / échelle	N/A
NCC project no. / no. du projet de la CCN	DC1110-17
package & sheet no. / no. document & feuille	---- A103

Remove all loose debris and deteriorated mortar from exposed core. Chip and clear away core masonry as necessary to allow new stone to fit. Backpoint all mortar joints of exposed surface to 100mm depth. Consolidate and parge 100% of the exposed core with mortar - Fill all exposed cavities. / *Retirer tous les débris lâches et le mortier détérioré du substrat exposé. Ajuster le substrat et le ravaler afin de pouvoir y insérer adéquatement la nouvelle pierre. Rejointoyer en profondeur (100mm de profondeur) tous les joints de mortier du substrat exposé. Consolider et crépisser 100% de la surface exposée du substrat et remplir toutes les cavités exposées avec un mortier.*

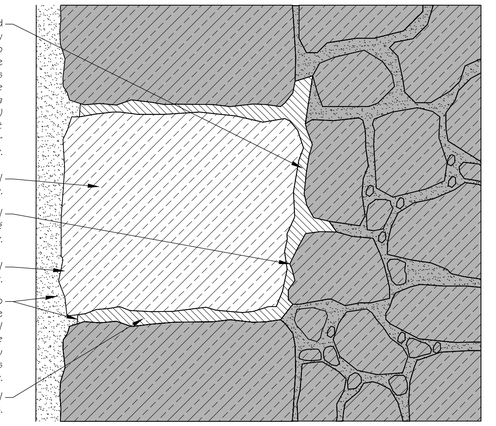
New stone. / *Nouvelle pierre.*

Allow for 50% stone replacement of exposed core volume. / *Prévoir 50% de remplacement des pierres du substrat exposé derrière les pierres à remplacer.*

Stone to be replaced as per existing. / *Pierre à remplacer tel qu'existant.*

New parging coat min 16mm. Provide 10mm indent at all joints to allow for parging to key into masonry. See 06/A104 for the position of membrane and drainage panels. / *Nouvelle couche de crépi de 16mm ép. min. Laisser une marque de 10mm sur tous les joints pour permettre une bonne adhérence du crépi à la maçonnerie. Voir 06/A104 pour la position des membranes et panneaux de drainage.*

Relaying of stone as per specifications. / *Mortier de pose tel que décrit au devis.*



01 / A104 — **Typical Replacement Stone Detail**
Détail typique de remplacement des pierres
Scale / échelle : 1:2

50 0 50 100 mm

Note:
Unless otherwise specified, use a hammer and chisel to cut out joints. ensure that adjacent masonry units and joints are not damaged in any way. Do not use rotary grinder, unless it is demonstrated as harmless to the stone and of real benefit in assisting with joint raking out. Fine joints (less than 4mm) are not to be raked out more than 10mm deep in order to reduce danger of chipping masonry edges. Stone damaged as a result of careless raking out or saw cutting will be replaced at no cost to owner.

Note:
L'évidement des joints de mortier doit se faire avec des ciseaux et marteaux, à moins d'indication contraire. Tous dommages occasionnés aux pierres et aux joints adjacents ne seront pas tolérés. L'usage d'une scie rotative n'est pas acceptable, à moins que l'entrepreneur démontre qu'il n'endommage pas les pierres. Les joints maigres (moins de 4mm) ne doivent pas être évidés à une profondeur de plus de 10mm afin de réduire le risque d'endommager les arrêtes de maçonnerie. Les pierres endommagées par négligence lors de l'évidement des joints seront remplacées sans frais additionnels pour le propriétaire.

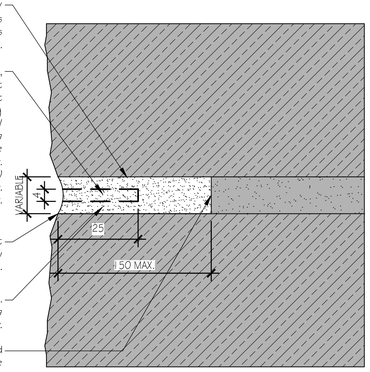
Rake joints free of deteriorated and loose mortar, dirt and undesirable materials. Fully remove existing mortar from the edges of the joints. / *Évider les joints de mortier et enlever les débris, la poussière et résidus de mortier existant. Enlever soigneusement le mortier existant des arrêtes des joints.*

Where grinders are deemed appropriated by the NCC representative to remove existing mortar, Proceed as follow: grind the centre of the joint only to a maximum depth that is equal to half of joint width. Mortar is to remain on both sides of the cut. Grinders must not touch the stone. ensure that joints smaller than 6mm are cut using specialty rotary grinding tools equiped with a diamond cutting blade of a small diameter. Ensure that remaining mortar is removed using hand tools. / *Là où la scie rotative est permise par le représentant de la CCN pour évider les joints, suivre la procédure suivante: passer un trait de scie au centre du joint à une profondeur maximale équivalente à la moitié de la hauteur du joint. Le mortier doit rester en place de chaque côté du trait de scie. Les scies rotatives ne doivent pas toucher aux pierres. Les joints maigres (plus petits que 6mm) doivent être évadés avec une scie rotative équipée d'une lame à pointe de diamant de faible diamètre. Le résiduel de mortier doit être enlevé manuellement.*

Clean surfaces of joints with compressed air without damaging texture of exposed joints or adjacent stones. / *Nettoyer les surfaces du joint avec un jet d'air sous pression sans endommager les fins ou les pierres adjacentes.*

Clean all raked out joints with low-pressure water and compressed air to remove all debris and dust. / *Nettoyer les joints évidés avec un jet d'eau à faible pression et un jet d'air afin d'enlever toute la poussière et les débris de mortier.*

Clean all joints to full depth of deteriorated mortar and not less than 50mm. Clean all cavities behind the joints from dust and debris. / *Nettoyer les joints sur toute la profondeur et jamais moins de 50mm en profondeur. Nettoyer toutes les cavités derrière les joints de toute poussière et débris.*



03 / A104 — **Typical Joint Raking Out Detail**
Détail typique d'évidement des joints
Scale / échelle : 1:1

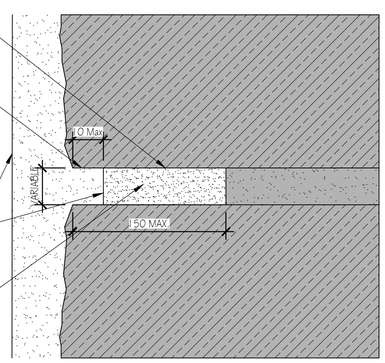
10 0 10 20 30 40 50 60 70 mm

Dampen joints and completely fill with mortar. Feathered edges are not permitted. pack mortar solidly into voids and joints. / *Humecter les joints et remplir complètement de mortier. Éviter de poser une mince couche de mortier sur une arête irrégulière. Compacter solidement le mortier dans les joints vides.*

Moisten wall prior to re-pointing and allow to dry to damp, not wet, conditions. Ensure that all dust, mortar particles and other debris are removed from joints and wall surfaces before re-pointing. / *Humidifier le mur avant le rejointoiement afin d'obtenir des conditions humides et non trempées. Nettoyer les surfaces et s'assurer d'enlever toute la poussière, résidus et autres débris dans le fond du joint avant le rejointoiement.*

New parging coat min 16mm. Provide 10mm indent at all joints to allow for parging to key into masonry. See 06/A104 for the position of membrane and drainage panels. / *Nouvelle couche de crépi de 16mm min. ép. Laisser une marque de 10mm sur tous les joints pour assurer la bonne adhérence du crépi à la maçonnerie. Voir 06/A104 pour la position des membranes et panneaux de drainage.*

New mortar: 1 part white portland cement, 1 part hydraulic lime type 1 and 6 parts sand (1:1:6). / *Nouveau mortier: 1 part de ciment portland blanc, 1 part de chaux hydraulique type 1 et 6 parts de sable (1:1:6)*



04 / A104 — **Typical Repointing Detail**
Détail typique de rejointoiement
Scale / échelle : 1:1

10 0 10 20 30 40 50 60 70 mm

Remove all loose debris and deteriorated mortar from exposed core. Chip and clear away core masonry as necessary to allow stones to be rebuilt to fit. Backpoint all mortar joints of exposed surface to 100mm depth. Consolidate and parge 100% of the exposed core with mortar - fill all exposed cavities. / *Retirer tous les débris lâches et le mortier détérioré du substrat exposé. Ajuster le substrat et le ravaler afin de pouvoir y insérer adéquatement les pierres à remonter une fois l'opération complétée. Rejointoyer en profondeur (100mm de profondeur) tous les joints de mortier du substrat exposé. Consolider et crépisser 100% de la surface exposée du substrat et remplir toutes les cavités exposées avec un mortier.*

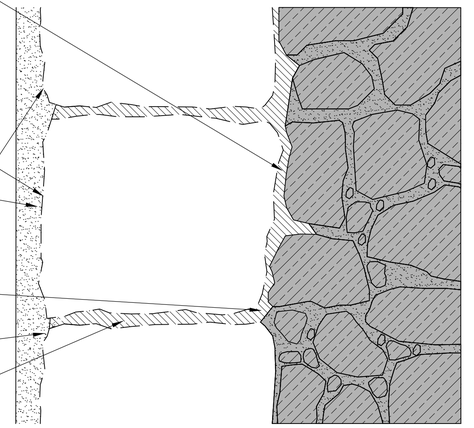
Existing stones to be dismantled and rebuilt. / *Pierres existantes à démonter et à remonter.*

New parging coat min 16mm. Provide 10mm indent at all joints to allow for parging to key into masonry. See 06/A104 for the position of membrane and drainage panels. / *Nouvelle couche de crépi de 16mm ép. min. Laisser une marque sur tous les joints pour permettre une bonne adhérence du crépi à la maçonnerie. Voir 06/A104 pour la position des membranes et panneaux de drainage.*

Allow for 50% stone replacement of exposed core in masonry dismantling areas. / *Prévoir 50% de remplacement des pierres du substrat exposé dans les zones de démontage de la maçonnerie.*

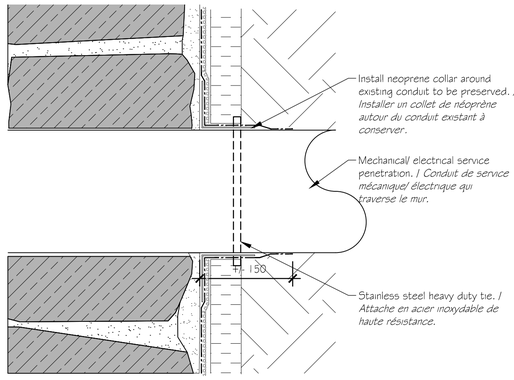
Existing stones to be dismantled and rebuilt. / *Pierres existantes à démonter et à remonter.*

Bedding mortar as per specifications. / *Mortier de pose tel que décrit au devis.*



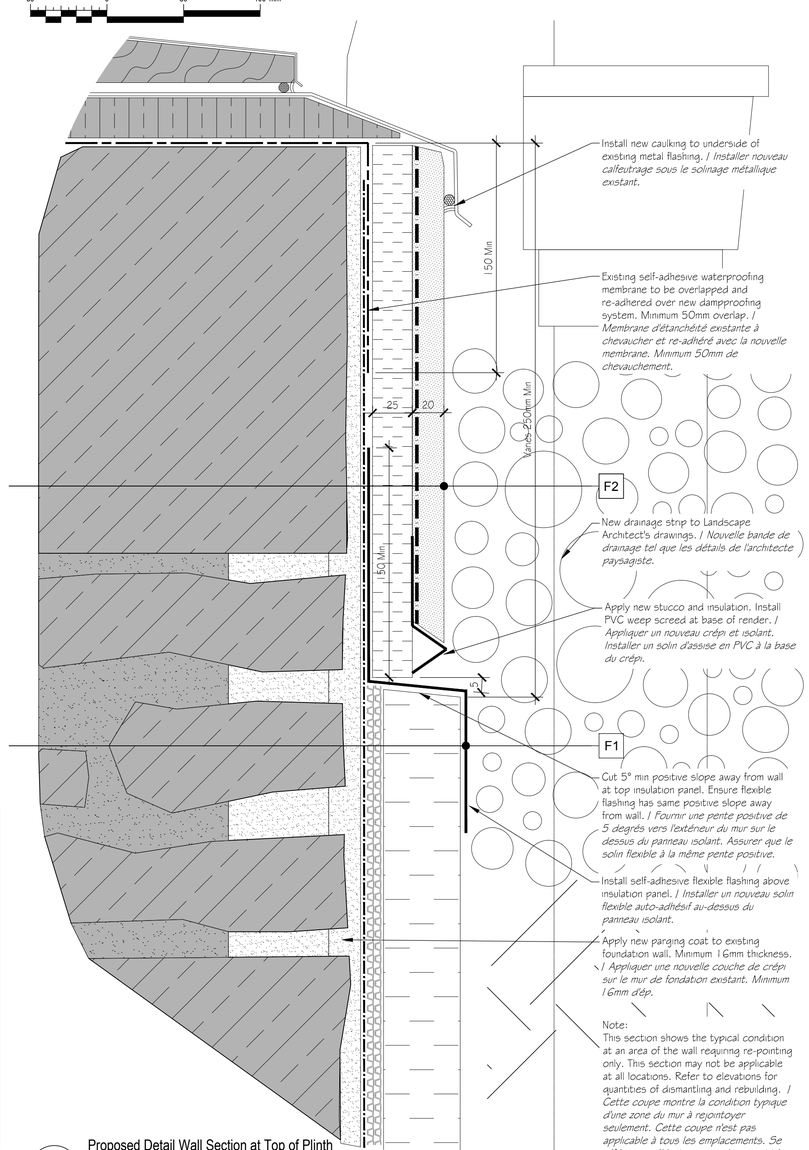
02 / A104 — **Typical Dismantling and Rebuilding Detail**
Détail typique de démontage/ remontage
Scale / échelle : 1:2

50 0 50 100 mm



05 / A104 — **Typical Penetration Waterproofing Detail**
Detail typique d'étanchéité autour d'un conduit
Scale / échelle : 1:5

50 0 50 100 150 200 250 300 350 mm



06 / A104 — **Proposed Detail Wall Section at Top of Plinth**
Coupe détail proposé partie supérieure du mur de fondation
Scale / échelle : 1:2

50 0 50 100 mm

LEGEND / *LÉGENDE*

- Existing / *Existant*
- Proposed / *Proposé*
- Drainage Panel / *Panneau de drainage*
- Dampproofing membrane / *Membrane imperméable*
- Self adhesive flexible flashing / *Solin flexible auto-adhésif*
- Wire lath / *Treillis métallique*
- Semi rigid insulation / *Isolant semi-rigide*
- Stucco Coat / *Enduit de stuc*
- To be removed or dismantled / *À enlever ou démanteler*

Wall Composition F1 - Interior to Exterior:

1. Existing interior finishes to remain.
2. Rubble masonry wall 600mm thick. Outer wythe to be dismantled and rebuilt to quantity indicated on the elevations. If no dismantling is required carry out with re-pointing as indicated on the elevations
3. Apply new parging coat after re-pointing and repairing the wall. Provide even, smooth external face. Thickness may vary due to existing undulations in the rubble masonry surface. Minimum 16mm thickness.
4. Apply dampproofing system to the surface of the parging. Overlap existing SA membrane at top of foundation and re-adhere over the new system before installing new plinth parging at the top of the wall. Min 50mm overlap.
5. Apply two layers of drainage panels. Stagger vertical joints.
6. Install 50mm semi-rigid insulation panels against drainage panels.
7. Reinstate retained backfill or new backfill as per Landscape Architects drawings.

Composition mur F1 - Intérieure à extérieure:

1. *Finitions intérieures existants à conserver.*
2. *Mur de maçonnerie en moellons de 600mm d'épaisseur. La paroi extérieure est à démonter et remonter tel que la quantité indiquée sur les élévations. Si aucun démontage n'est requis, effectuer le rejointoiement tel qu'indiqué sur les élévations.*
3. *Appliquer un nouveau crépi sur le mur après les travaux de rejointoiement et diverses réparations. La face externe du crépi doit être égale et lisse. L'épaisseur du crépi pourrait vaner à cause des surfaces inégales de la maçonnerie de moellons. Épaisseur minimale du crépi de 16mm.*
4. *Appliquer le système de imperméabilisation sur la surface du crépi. Chevaucher la membrane d'étanchéité existante de 50mm min. sur la nouvelle membrane avant d'installer le crépi dans la partie supérieure du mur.*
5. *Installer 2 épaisseurs de panneaux drainant. Décaler les joints verticaux.*
6. *Installer des panneaux isolant semi-rigide de 50mm d'ép. sur les panneaux de drainage.*
7. *Ragréer le remblai conservé ou la nouvelle terre tel que les détails de l'architecte paysagiste.*

Wall Composition F2 - Interior to Exterior:

1. Existing interior finishes to remain.
2. 600mm thick Rubble masonry with dressed Limestone block 300mm high outer wythe. Outer wythe to be dismantled and rebuilt to quantity indicated on the elevations. If no dismantling is required carry out with re-pointing as indicated on the elevations.
3. Apply new parging coat after re-pointing/re-building wall. Provide even, smooth external face. Thickness may vary due to existing undulations in the masonry surface. Minimum 16mm thickness.
4. Apply dampproofing system to the surface of the parging. Overlap existing SA membrane at top of foundation and re-adhere over the new system before installing new plinth parging at the top of the wall. Min 50mm overlap.
5. Apply self adhesive flexible flashing membrane over top of the foundation insulation extend 150mm up wall.
6. Attach 25mm semi-rigid insulation panels against drainage panels. Install PVC weep screed at base of 25mm insulation.
7. Install self furring wire lath. Apply scratch coat/base coat and finish acrylic coat. Build-up in layers to same level as wall above. Colour and finish as wall above.

Composition mur F2 - Intérieure à extérieure:

1. *Finitions intérieures existantes à conserver.*
2. *Mur de substrat en moellons de 600mm d'épaisseur et un parement en pierre calcaire de taille de 300mm d'épaisseur. Le parement extérieur est à démonter/ remonter tel que la quantité indiquée sur les élévations.*
3. *Appliquer un nouveau crépi après le rejointoiement/ reconstruction du mur. La face externe du crépi doit être égale et lisse. L'épaisseur du crépi pourrait vaner à cause des surfaces inégales de la maçonnerie. Épaisseur minimale du crépi de 16mm.*
4. *Appliquer le système de imperméabilisation sur la surface du crépi. Chevaucher la membrane d'étanchéité existante de 50mm min. sur la nouvelle membrane avant d'installer le crépi dans la partie supérieure du mur.*
5. *Poser un solin de membrane auto-adhésif sur le dessus de l'isolant. Prolonger la membrane de 150mm sur le mur.*
6. *Installer les panneaux d'isolant semi-rigide de 25mm d'ép. sur les panneaux drainant. Installer un solin dassise en PVC à la base de l'isolant.*
7. *Installer un treillis métallique. Appliquer une couche de base et une couche de finition en acrylique. Appliquer en couches au même niveau que le crépi existant en haut. Couleur et fini tel qu'existant.*

NCC CCN
Canada
Real Estate Management, Design and Construction Branch
Direction de la gestion de l'immobilier, design et construction
Design and Construction Division
Division design et construction
director - Claude Robert - directeur
consultant / expert-conseil
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for Civil / pour civil

stamp(s) / sceau(x)

key plan / plan de localisation

issued or revised / émis ou revisé

no.	description	date
06	----	----
05	Issued for Tender	13.04.2016
04	Tender Submission	12.02.2016
03	100% Submission	15.01.2016
02	90% For Coordination	08.01.2016
01	50% For Coordination	22.12.2015

project / projet

NCC Residence Front Entrance Landscape Rehabilitation 2016 / Résidence CCN Réfection de l'aménagement paysager de l'entrée principale 2016

Foundation Wall Dampproofing / Imperméabilisation de la fondations

drawing / dessin

Typical Masonry Repair Details and Detail Sections / Détails typiques de réparation de maçonnerie et les coupes en détail

approved by / approuvé par	P. Létourneau
designed by / conçu par	A. Brooks
drawn by / dessiné par	A. Brooks
date	2016-02-15
scale / échelle	N/A
NCC project no. / no. du projet de la CCN	DC1110-17
package & sheet no. / no. document & feuille	---- | A104

APPENDIX III

Request for Qualification of:

GENERAL CONTRACTOR, HERITAGE MASONRY, EXTERIOR ARCHITECTURAL FOUNTAIN INSTALLATION.

Project:

NCC – RESIDENCE FRONT ENTRANCE REHABILITATION

Date : April 25, 2016

SECTION 1 – GENERAL INFORMATION

1.1 Process

The purpose of this qualification process is to evaluate capability of Contractors for the proposed project. To qualify, a Contractor must have demonstrated a record of successful, timely completion of quality orientated construction projects of comparable scale, scope and activities as the NCC – Residence Front Landscape Rehabilitation Project. Contractor submissions will be evaluated in accordance with 1.4 Evaluation Methodology.

1.2 Project Description

The project site is an NCC Heritage Property and residence. The contractor must take extreme care working within this site to minimize damage and disruption to government functions.
Works under this contract cover the supply of all materials, labor, equipment and services required to perform the works described in the tender package for the present contract. This includes but is not limited to:

.1 Protection Measures for the adjacent areas including heritage elements and trees;
.2 Temporary Facilities, hoarding fencing, and traffic control, temporary access to building as required to complete the work;
.3 Selective demolition, removal and disposal / salvage of existing structures and surfaces;
.4 Grading, drainage, civil and servicing works;
.5 Mechanical and electrical works and improvements;
.6 Installation of a new exterior architectural granite fountain designed by Waterworx.
.7 Installation of a new fountain including pumps, nozzles, filters, and lighting;
.8 Installation of new sub-grade equipment chamber;
.9 The stone masonry work***** within the foundation conservation and damproofing component includes but is not limited to:
- Various stone masonry repairs to foundation walls, from the underside of the exterior wall sill plates above ground to the bottom of foundation wall at bedrock level (replacement of damaged stones, partial reconstruction, stabilization, mortar raking and repointing, etc.);
- Parging of foundation walls;

.10 Granite paving of the front forecourt;
.11 Extensive concrete and form work;
.12 Site reinstatement.

*****Please note that the NCC Heritage Property is a Federal Heritage Building Review Office (FHBRO) heritage building. The areas of stone masonry work at the front of the residence include buildings built between 1872 and 1878.

1.3 Evaluation and Selection of Contractors to be Qualified

The NCC will conduct the Request for Qualification process in a fair manner and will treat Proponents equitably. Objective standards will be applied uniformly to Proponents.

To that end, the NCC shall name a Technical Evaluation Committee. The Technical Evaluation Committee will be comprised of one (1) Landscape Architect (1) Architect (1) Mechanical Engineer and (1) Construction Site Supervisor currently working for the NCC in the Construction and Design domain. They shall assign a pass or fail rating to Proponents' submissions.

The qualification of Proponents shall be at the sole discretion of the NCC and the NCC reserves the right to accept or reject any or all responses to this Request for Qualification.

1.4 Evaluation Methodology

Following tender close, NCC Procurement will open the submission from each bidder. Bid prices will be shared with everyone present. Members of the Technical Evaluation Committee will not be present at the bid opening and the bid prices will not be shared with them.

Evaluation step #1

Following the opening, NCC procurement will review each submission to verify Mandatory Requirements have been met.

- If NCC Procurement is unable to find material for all Mandatory Requirements, the submission will be eliminated from further consideration;
- If NCC Procurement finds material for all Mandatory Requirements, it shall forward only the technical part of the submission to the Technical Evaluation Committee for qualitative review, in batches of three, starting with the submissions from the Proponents that submitted the three lowest bid prices.
- The list of documents that will be sent to the Technical Evaluation Committee will consist of strictly the following:
    - Mandatory submittal #1 Contractor's Qualification Statement/Company Profile;
    - Mandatory submittal #2 Contractor's Experience;
    - Mandatory submittal #3 Client References.
    - Mandatory submittal #4 Company Experience and competence in the domains of expertise required.

Requests for Qualification Responses which fail, in the sole discretion of NCC, to meet the Mandatory Requirements will be eliminated from further consideration in the evaluation process.

Evaluation step #2

Step 2.1: The Technical Evaluation Committee will evaluate the first batch of three technical submissions and assign a passing or failing grade to each one of them. The results from the technical evaluation of the first batch of three technical submissions will be sent to NCC Procurement.

If the Technical Evaluation Committee assigned a passing grade to one or more technical submissions from the first batch of three submissions, NCC Procurement will initiate the contract award process with the Proponent from the first batch with the lowest bid price that was assigned a passing grade.

Step 2.2: If the Technical Evaluation Committee assigned a failing grade to all three technical submissions from the first batch of submissions, NCC Procurement will reject the first three lowest bids and will forward to the Technical Evaluation Committee the second batch of three technical submissions from the Proponents that submitted the next three lowest bid prices.

The Technical Evaluation Committee will evaluate the second batch of three technical submissions and assign a passing or failing grade to each one of them. The results from the technical evaluation of the second batch of three technical submissions will be sent to NCC Procurement.

If the Technical Evaluation Committee assigned a passing grade to one or more technical submission from the second batch of three submissions, NCC Procurement will initiate the contract award process with the Proponent from the second batch with the lowest bid price that was assigned a passing grade.

Step 2.3: If the Technical Evaluation Committee assigned a failing grade to all three technical submissions from the second batch of submissions the process will be repeated with the next batch of three technical submissions, and so on until there is a successful Proponent with whom NCC Procurement can initiate the contract award process or there are no more submissions to evaluate.

Submittal	Rating	Criteria for Passing Grade
General Contractor's Qualification Statement / Company Profile	Pass/Fail	- Provide three (3) projects of a similar scale and complexity to the work of the NCC – Front Landscape Rehabilitation Project. - Projects must have been completed within the last seven (7) years. - Minimum 10 years' experience of coordination of civil, mechanical, electrical works associated with landscape and masonry work and the management of multiple sub-contractors. - Minimum 10 years' experience of proposed Principle-in-Charge Project Manager, Site Superintendent/ Foreman on projects of similar nature and evidence that their performance was deemed satisfactory to the consultants and owner, and that the project was completed within schedule. - General Contractor's experience on projects where the contractor's construction management processes (e.g. submittals, shop-drawings, procedures for change notices, timeline tracking systems etc.) was of importance to the client/consultants, and for which the General Contractor took utmost care to ensure the quality of the project delivery. - General contractor experience on heritage projects within the last seven (7) years with Federal, Provincial and /or Municipal departments and agencies clients that have structured construction management systems. - Demonstration of past performance on rehabilitation work at complex sites involving work near/around the public will be of special interest to the NCC's Evaluation Committee. - Each of the three project examples shall have a minimum value of $2 million. - Evaluation will be based the Contractor's Qualification Statement, List of Projects, and References. References may be contacted.

Heritage Masonry Contractors Qualification Statement / Company Profile	Pass/Fail	- Provide three (3) projects demonstrating Contractor's comparable experience and expertise on projects involving the rehabilitation of 1850-1950 masonry Canadian buildings and assemblies, including the rehabilitation and/or conservation of heritage stone wall assemblies, foundation conservation, structural stabilization of stone masonry. - Projects must have been completed within the last seven (7) years. - Minimum 10 years' experience in heritage masonry technique and practice of proposed Principle-in-Charge Project Manager, Site Superintendent/ Foreman, and Estimator on projects of similar nature and evidence that their performance was deemed satisfactory to the consultants and owner, and that the project was completed within schedule. - Heritage Masonry Contractor's experience on projects where the contractor's construction management processes (e.g. submittals, shop-drawings, procedures for change notices, timeline tracking systems etc.) was of importance to the client/consultants, and for which the Contractor took utmost care to ensure the quality of the project delivery. - Demonstration of Contractor's quality control measures in heritage masonry practice and ability to achieve well executed building assembly to specified standards and consultant/owner expectations, in particular the ability to meet demanding project schedules. Provide photographs/photocopies and testimonials/references . - The above will be evaluated from the Contractor's Qualification Statement, List of Projects, and References. References may be contacted.

Contractor Experience for Exterior Architectural Fountain installation Qualification Statement/ Company Profile	Pass/Fail	- Demonstration of Contractor's knowledge and experience of construction and installation requirements for exterior architectural fountains. - Provide three(3) examples of projects in which an exterior fountains of similar scale and complexity was installed and must have been completed within the last seven (7) years. - All three (3) project examples submitted must have a minimum value of $500,000. - Minimum 10 years' experience Architectural Fountain installation of proposed Principle-in-Charge Project Manager, Site Superintendent/ Foreman, and Estimator on projects of similar nature and evidence that their performance was deemed satisfactory to the consultants and owner, and that the project was completed within schedule. - A minimum of one (1) project must be installed in a northern climate that experiences freezing temperatures. - Demonstration of Contractor's quality control measures in fountain installation including ability to fine tune the overall design prior to equipment production and fountain installation to avoid unforeseen construction difficulties, delays and added costs. Provide photographs/photocopies and testimonials/references for each project.
Client References	Pass/Fail	- All examples must have three (3) references that confirm clients were satisfied with the performance of the Contractor. References may be contacted by NCC staff.

SECTION 2 – REQUEST FOR QUALIFICATION RESPONSE REQUIREMENTS

2.1 Overview of Section 2

This section provides the Proponent with the information that should be provided in their *Request for Qualification Response*.

2.2 Mandatory submittal #1 : Contractor's Qualification Statement/Company Profile

To help the NCC evaluate the Proponent's ability to meet project requirements and expectations, proponents shall provide the General Contractors' Qualification Statement/Company Profile.

2.3 Mandatory submittal #2 : General Contractor's, Heritage Stone Mason, Architectural fountain Installation Experience

The Proponent shall provide Project Examples for three (3) significant and recent landscape rehabilitation projects completed in the last seven (7) years, for which they were the General Contractor and which involved activities comparable in scale, scope and value to the work to be undertaken as part of this request for qualification. One form should be filled in for each project.

Notes:

- Proponents need to complete three (3) Project Example sheets
- Each project must respect the different values indicated (excluding PST/GST/HST);
- References may be contacted and the projects may be visited to assess workmanship and overall quality;
- Proponents may supplement the information requested with additional sheets if required;
- The Contractor may propose a sub-contractor who possesses the required experience on projects done while in the employ of another Contractor(s).

2.4 Mandatory submittal #3 : Client References

The Proponent shall provide Client Reference Forms filled out by the key client representative for each of the three (3) Project Examples of the Contractor. One form should be filled in for each project. The NCC may contact these clients for verification and clarification of information within approximately one week from the close of the qualification solicitation. Please ensure that the contact information is correct, current and that the persons identified are generally available. Proponents may provide a secondary client name and contact information.

Note:

- References may be contacted and the projects may be visited to assess workmanship and overall quality;

GENERAL CONTRACTOR'S QUALIFICATION STATEMENT / Company Profile

(Forms to be filled out in their entirety)

- This document is intended to provide information on the capacity, skill and experience of the General Contractor.
- The Proponent may supplement information requested with additional sheets if required.

1- Applicant Name

Company Name _____
Address _____
Telephone No. _____ Fax No. _____
e-mail _____

2- Legal Structure of Contractor

Year Established _____ Joint Venture _____
Corporation _____ Partnership _____ Registered _____
Sole Proprietor _____ Other _____

3- The names and Titles of Officers, Partners, Principals

_____
_____
_____
_____
_____
_____

4- Has any surety company ever had to complete any of your work?

If yes, please explain below or on a separate sheet.

_____
_____
_____
_____
_____
_____

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

5- List principal construction projects completed for public agencies (i.e. federal or provincial or municipal government departments, federal crown corporations) in the last 7 years.

Name of Agency and/or Client	Project	Project Value	Owner Reference Name and Tel #

6- List principal construction projects underway as of date of submission

Name of Agency and/or Client	Project	Project Value	Owner Reference Name and Tel #

7- Key office and site personnel proposed for this project. Attach resume of qualifications and experience. (i.e., Project Manager, Site Superintendent / Foreman, Estimator (Proponent may attach Reference letters or Reference contact information (i.e. Reference name and Tel. No.) to provide evidence of satisfactory performance)).

Name	Title/Position	Years of Experience	Years of company

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

I hereby acknowledge that the information provided is true and correct to the best of my knowledge, and that I have the authority to bind the firm:

_____ _____

Name Title

_____ _____

Signature Date

_____

Firm Name

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

CONTRACTOR FOR EXTERIOR ARCHITECTURAL FOUNTAIN INSTALLATION QUALIFICATION STATEMENT/Company Profile

(Forms to be filled out in their entirety)

- This document is intended to provide information on the capacity, skill and experience of the General Contractor.
- The Proponent may supplement information requested with additional sheets if required.

1- Applicant Name

Company Name _____
Address _____
Telephone No. _____ Fax No. _____
e-mail _____

2- Legal Structure of Contractor

Year Established _____ Joint Venture _____
Corporation _____ Partnership _____ Registered _____
Sole Proprietor _____ Other _____

3- The names and Titles of Officers, Partners, Principals

_____
_____
_____
_____
_____
_____

4- Has any surety company ever had to complete any of your work?

If yes, please explain below or on a separate sheet.

_____
_____
_____
_____
_____
_____

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

5- List principal architectural fountain installation construction projects completed for public agencies (i.e. federal or provincial or municipal government departments, federal crown corporations) in the last 7 years.

Name of Agency and/or Client	Project	Project Value	Owner Reference Name and Tel #

6- List principal architectural fountain installation construction projects underway as of date of submission

Name of Agency and/or Client	Project	Project Value	Owner Reference Name and Tel #

7- Key office and site personnel proposed for this project. Attach resume of qualifications and experience. (i.e., Project Manager, Site Superintendent / Foreman, Estimator (Proponent may attach Reference letters or Reference contact information (i.e. Reference name and Tel. No.) to provide evidence of satisfactory performance)).

Name	Title/Position	Years of Experience	Years of company

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

I hereby acknowledge that the information provided is true and correct to the best of my knowledge, and that I have the authority to bind the firm:

_____	_____
Name	Title
_____	_____
Signature	Date
_____	
Firm Name	

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

HERITAGE STONE MASON'S QUALIFICATION STATEMENT/Company Profile

(Forms to be filled out in their entirety)

- This document is intended to provide information on the capacity, skill and experience of the General Contractor.
- The Proponent may supplement information requested with additional sheets if required.

1- Applicant Name

Company Name _____
Address _____
Telephone No. _____ Fax No. _____
e-mail _____

2- Legal Structure of Contractor

Year Established _____ Joint Venture _____
Corporation _____ Partnership _____ Registered _____
Sole Proprietor _____ Other _____

3- The names and Titles of Officers, Partners, Principals

_____
_____
_____
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4- Has any surety company ever had to complete any of your work?

If yes, please explain below or on a separate sheet.

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INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

5- List principal heritage masonry construction projects completed for public agencies (i.e. federal or provincial or municipal government departments, federal crown corporations) in the last 7 years.

Name of Agency and/or Client	Project	Project Value	Owner Reference Name and Tel #

6- List principal heritage masonry construction projects underway as of date of submission

Name of Agency and/or Client	Project	Project Value	Owner Reference Name and Tel #

7- Key office and site personnel proposed for this project. Attach resume of qualifications and experience. (i.e., Project Manager, Site Superintendent / Foreman, Estimator (Proponent may attach Reference letters or Reference contact information (i.e. Reference name and Tel. No.) to provide evidence of satisfactory performance)).

Name	Title/Position	Years of Experience	Years of company

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

I hereby acknowledge that the information provided is true and correct to the best of my knowledge, and that I have the authority to bind the firm:

_____	_____
Name	Title
_____	_____
Signature	Date
_____	
Firm Name	

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX I

GENERAL CONTRACTOR
LIST OF PROJECTS (PROJECT EXAMPLES)

Proponents need to complete three (3) PROJECT EXAMPLE sheets providing information on three different projects of a similar scale and complexity to the work of the NCC – Residence Front Landscape Rehabilitation Project that your firm is handling as of this date (or has handled in the last seven (7) years) as a General contractor.

The evidenced projects should illustrate work described in Section 1.2 'Project Description'.

References may be contacted and the project may be visited to assess workmanship and overall quality.

Notes:

This portion of the submission is intended to provide information on specific projects completed by the Contractor, to illustrate the Contractor's ability to undertake the proposed Residence Front Landscape Rehabilitation work.

Proponents may supplement information requested with additional sheets if required.

National Capital Commission
202-40 Elgin Street
Ottawa, Canada
K1P 1C7

Commission de la capitale nationale
40, rue Elgin, pièce 202
Ottawa, Canada
K1P 1C7

REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

T

PROJECT # 1 - GENERAL CONTRACTOR

1. Project Title _____
2. Original Contract Price ($) _____ Final Contract Price ($) _____
3. % Completed to date _____
4. Scheduled completion _____ Actual Completion Date _____
5. Project Site Superintendent _____
6. Project Owner Reference
   Name and Title _____
   Company/Institution& Tel. No. _____
7. Project Landscape Architect/Consultant
   Name and Title _____
   Firm Name & Tel. No. _____

8. Did / Does this project involve any of the following?

a) 10 years' experience of coordination of civil, mechanical, electrical and landscape works associated with the management of multiple sub-contractors. yes no
b) Do all three (3) project examples submitted have a minimum value of $2million yes no
c) Construction in occupied and public traffic zones yes no
d) Coordination of civil and/or mechanical, structural and architectural work yes no
e) Meeting the milestones of a challenging project schedule yes no
f) Working within a complex building and/or site yes no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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National Capital Commission
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Ottawa, Canada
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Ottawa, Canada
K1P 1C7

REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

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PROJECT # 2 - GENERAL CONTRACTOR

1. Project Title _____
2. Original Contract Price($)_____Final Contract Price_____
3. % Completed to date_____
4. Scheduled completion _____Actual Completion date_____
5. Project Site Superintendent_____
6. Project Owner Reference_____
   Name & Title _____
   Firm Name & Tel, No. _____
7. Project Landscape Architect/Consultant
   Name & Title _____
   Firm Name & Tel No. _____
8. Did / Does this project involve any of the following?

a) 10 years' experience of coordination of civil, mechanical, electrical and landscape works associated with the management of multiple sub-contractors.	yes	no
b) Do all three (3) project examples submitted have a minimum value of $2million	yes	no
c) Construction in occupied and public traffic zones	yes	no
d) Coordination of civil and/or mechanical, structural and architectural work	yes	no
e) Meeting the milestones of a challenging project schedule	yes	no
f) Working within a complex building and/or site	yes	no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

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PROJECT #3 - GENERAL CONTRACTOR

1. Project Title _____
2. Original Contract Price($)_____Final Contract Price_____
3. % Completed to date_____
4. Scheduled completion _____Actual Completion date_____
5. Project Site Superintendent_____
6. Project Owner Reference_____
   Name & Title _____
   Firm Name & Tel, No. _____
7. Project Landscape Architect/Consultant
   Name & Title _____
   Firm Name & Tel No. _____
8. Did/ Does this project involve any of the following?
   a) 10 years' experience of coordination of civil, mechanical, electrical and landscape works associated with the management of multiple sub-contractors. yes no
   b) Do all three (3) project examples submitted have a minimum value of $2million yes no
   c) Construction in occupied and public traffic zones yes no
   d) Coordination of civil and/or mechanical, structural and architectural work yes no
   e) Meeting the milestones of a challenging project schedule yes no
   f) Working within a complex building and/or site yes no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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National Capital Commission
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Ottawa, Canada
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REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

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HERITAGE STONE MASON

LIST OF PROJECTS (PROJECT EXAMPLES)

Proponents need to complete three (3) PROJECT EXAMPLE sheets providing information on three different heritage masonry projects your firm is handling as of this date (or has handled in the last seven (7) years) as a Heritage Masonry General contractor and/or as Heritage Masonry sub-contractor
The evidenced projects should illustrate masonry work comparable to the masonry work described in Section 1.2 'Project Description'

References may be contacted and the project may be visited to assess workmanship and overall quality. Photos and/or photocopies of the project should be included, for illustrating quality of workmanship.

Notes:

This portion of the submission is intended to provide information on specific projects completed by the Contractor, to illustrate the Contractor's ability to proposed undertake masonry work. Proponents may supplement information requested with additional sheets if required.

National Capital Commission
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REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

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PROJECT # 1 - HERITAGE STONE MASON

1. Project Title _____
2. Original Contract Price ($) _____ Final Contract Price ($) _____
3. % Completed to date _____
4. Scheduled completion _____ Actual Completion Date _____
5. Project Site Superintendent _____
6. Project Owner Reference
   Name and Title _____
   Company/Institution & Tel. No. _____
7. Project Architect/Consultant
   Name and Title _____
   Firm Name & Tel. No. _____
8. Did / Does this project involve any of the following?
   a) Rehabilitation of masonry constructions dating from 1850-1950 yes no
   b) Excavations in occupied and public traffic zones yes no
   c) Application of lime and/or hydrated lime renders and mortars yes no
   d) Raking and repointing of heritage limestone masonry walls, or fieldstone yes no
   e) Partial and/or full rebuilt of heritage stone masonry walls. yes no
   f) Coordination of civil and/or mechanical work associated with the masonry work yes no
   g) Meeting the milestones of a challenging project schedule yes no
   h) Working within a complex building and/or site yes no
   i) Management of multiple sub-contractors yes no
   j) Engineered scaffolding, shoring and/or other stabilization measures yes no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

T

PROJECT # 2 - HERITAGE STONE MASON

1. Project Title _____
2. Original Contract Price ($) _____ Final Contract Price ($) _____
3. % Completed to date _____
4. Scheduled completion _____ Actual Completion Date _____
5. Project Site Superintendent _____
6. Project Owner Reference
   Name and Title _____
   Company/Institution & Tel. No. _____
7. Project Architect/Consultant
   Name and Title _____
   Firm Name & Tel. No. _____
8. Did / Does this project involve any of the following?
   a) Rehabilitation of masonry constructions dating from 1850-1950 yes no
   b) Excavations in occupied and public traffic zones yes no
   c) Application of lime and/or hydrated lime renders and mortars yes no
   d) Raking and repointing of heritage limestone masonry walls, or fieldstone yes no
   e) Partial and/or full rebuilt of heritage stone masonry walls. yes no
   f) Coordination of civil and/or mechanical work associated with the masonry work yes no
   g) Meeting the milestones of a challenging project schedule yes no
   h) Working within a complex building and/or site yes no
   i) Management of multiple sub-contractors yes no
   j) Engineered scaffolding, shoring and/or other stabilization measures yes no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

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PROJECT # 3 - HERITAGE STONE MASON

1. Project Title _____ Final Contract Price ($) _____
2. Original Contract Price ($) _____
3. % Completed to date _____
4. Scheduled completion _____ Actual Completion Date _____
5. Project Site Superintendent _____
6. Project Owner Reference
   Name and Title _____
   Company/Institution & Tel. No. _____
7. Project Architect/Consultant
   Name and Title _____
   Firm Name & Tel. No. _____

8. Did / Does this project involve any of the following?

a) Rehabilitation of masonry constructions dating from 1850-1950	yes	no
b) Excavations in occupied and public traffic zones	yes	no
c) Application of lime and/or hydrated lime renders and mortars	yes	no
d) Raking and repointing of heritage limestone masonry walls, or fieldstone	yes	no
e) Partial and/or full rebuilt of heritage stone masonry walls.	yes	no
f) Coordination of civil and/or mechanical work associated with the masonry work	yes	no
g) Meeting the milestones of a challenging project schedule	yes	no
h) Working within a complex building and/or site	yes	no
i) Management of multiple sub-contractors	yes	no
j) Engineered scaffolding, shoring and/or other stabilization measures	yes	no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

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CONTRACTOR FOR EXTERIOR ARCHITECTURAL FOUNTAIN INSTALLATION

LIST OF PROJECTS (PROJECT EXAMPLES)

Proponents need to complete three (3) PROJECT EXAMPLE sheets providing information on three different exterior architectural fountain installation projects your firm is handling as of this date (or has handled in the last seven (7) years) as a fountain installation contractor and/or as sub-contractor.

The evidenced projects should illustrate exterior architectural fountain installation comparable to the fountain installation work described in Section 1.2 'Project Description' (6 & 7).

References may be contacted and the project may be visited to assess workmanship and overall quality. Photos and/or photocopies of the project should be included, for illustrating quality of workmanship.

Notes:

This portion of the submission is intended to provide information on specific projects completed by the Contractor, to illustrate the Contractor's ability to undertake the proposed exterior fountain installation work. Proponents may supplement information requested with additional sheets if required.

National Capital Commission
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REQUEST FOR QUALIFICATION

NCC FILE NO.
NO DE DOSSIER DE LA CCN :

This page is part of _____(proponent's name) submission.

PROJECT # 1 - EXTERIOR ARCHITECTURAL FOUNTAIN INSTALLATION

1. Project Title _____
2. Original Contract Price ($) _____ Final Contract Price ($) _____
3. % Completed to date _____
4. Scheduled completion _____ Actual Completion Date _____
5. Project Site Superintendent _____
6. Project Owner Reference
   Name and Title _____
   Company/Institution & Tel. No. _____
7. Project Landscape Architect/Consultant
   Name and Title _____
   Firm Name & Tel. No. _____

8. Did / Does this project involve any of the following?

a) Construction of exterior architectural fountain	yes	no
b) Construction of (1) project in a northern climate that experiences freezing temperatures	yes	no
c) Do all three (3) project examples submitted have a minimum value of $500,000	yes	no
d) Construction in occupied and public traffic zones	yes	no
e) Coordination of civil and/or mechanical work associated with the fountain work	yes	no
f) Meeting the milestones of a challenging project schedule	yes	no
g) Working within a complex building and/or site	yes	no
h) Working with a multiple sub-contractors and contractors	yes	no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX III

This page is part of _____(proponent's name) submission.

PROJECT # 2 - EXTERIOR ARCHITECTURAL FOUNTAIN INSTALLATION

1. Project Title _____
2. Original Contract Price($)_____Final Contract Price_____
3. % Completed to date_____
4. Scheduled completion _____Actual Completion date_____
5. Project Site Superintendent_____
6. Project Owner Reference_____
   Name & Title _____
   Firm Name & Tel, No. _____
7. Project Landscape Architect/Consultant
   Name & Title _____
   Firm Name & Tel No. _____
8. Did/ Does this project involve any of the following?

a) Construction of exterior architectural fountain	yes	no
b) Construction of (1) project in a northern climate that experiences freezing temperatures	yes	no
c) Do all three (3) project examples submitted have a minimum value of $500,000	yes	no
d) Construction in occupied and public traffic zones	yes	no
e) Coordination of civil and/or mechanical work associated with the fountain work	yes	no
f) Meeting the milestones of a challenging project schedule	yes	no
g) Working within a complex building and/or site	yes	no
hi) Working with a multiple sub-contractors and contractors	yes	no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX III

This page is part of _____(proponent's name) submission.

PROJECT #3 - EXTERIOR ARCHITECTURAL FOUNTAIN INSTALLATION

1. Project Title _____
2. Original Contract Price($)_____Final Contract Price_____
3. % Completed to date_____
4. Scheduled completion _____Actual Completion date_____
5. Project Site Superintendent_____
6. Project Owner Reference_____
   Name & Title _____
   Firm Name & Tel, No. _____
7. Project Landscape Architect/Consultant
   Name & Title _____
   Firm Name & Tel No. _____
8. Did/ Does this project involve any of the following?

a) Construction of exterior architectural fountain	yes	no
b) Construction of (1) project in a northern climate that experiences freezing temperatures	yes	no
c) Do all three (3) project examples submitted have a minimum value of $500,000	yes	no
d) Construction in occupied and public traffic zones	yes	no
e) Coordination of civil and/or mechanical work associated with the fountain work	yes	no
f) Meeting the milestones of a challenging project schedule	yes	no
g) Working within a complex building and/or site	yes	no
h) Working with a multiple sub-contractors and contractors	yes	no

9. Project Description, specifically elaborating on any of the items identified in Section 8 above. Continue on back of sheet or add separate page(s) if additional space is required.

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SPECIAL INSTRUCTIONS TO BIDDERS

SI01 TENDER DOCUMENTS

1) The following are the tender documents:

   (a) Invitation to Tender & Acceptance Form and any Appendices attached thereto;

   (b) Special Instructions to Bidders; and

   (c) General Instructions to Bidders.

   Submission of a tender constitutes acknowledgement that the Bidder has read and agrees to be bound by these documents.

SI02 ENQUIRIES DURING THE SOLICITATION PERIOD

1) Enquiries regarding this tender must be submitted in writing to the following: Sr. Contract Officer, Lana Wilson, e-mail address – Lana.Wilson@ncc-ccn.ca, telephone number - 613-239-5678 ext. 5192, facsimile number - 613-239-5007 or as early as possible within the solicitation period. Except for the approval of alternative materials as described in GI15 of the General Instructions to Bidders, enquiries should be received no later than five (5) calendar days prior to the date set for solicitation closing to allow sufficient time to provide a response. Enquiries received after that time may result in an answer not being provided.

2) To ensure consistency and quality of the information provided to Bidders, the Sr. Contract Officer shall examine the content of the enquiry and shall decide whether or not to issue an amendment.

3) All enquiries and other communications related to this tender sent throughout the solicitation period are to be directed ONLY to the Sr. Contract Officer named above. Non-compliance with this requirement during the solicitation period can, for that reason alone, result in disqualification of a tender.

SI03 SITE VISIT

1) A site visit is **MANDATORY.** Two (2) site visits will be held. One on Thursday, May 26 and the other on Friday, May 27. Both will be held at 11:00am. The site visit will be at 1 Sussex Drive via the Princess Avenue Gate entrance. The meeting location is in the parking lot indicated on the map attached.

SI04 REVISION OF TENDER

1) A tender may be revised by letter or facsimile in accordance with GI10 of the General Instructions to Bidders. The facsimile number for receipt of revisions is 613-239-5012.

SI05 TENDER RESULTS

1) Following solicitation closing, tender results may be obtained by contacting the Sr. Contract Officer, Lana Wilson at e-mail address Lana.Wilson@ncc-ccn.ca.

SI06 NEGOTIATIONS

1) In the event that the lowest compliant tender exceeds the amount of funding the NCC has allocated for the construction phase of the work:

   (a) by 15% or less, the NCC, at its sole discretion, shall either:

      (i) cancel the invitation to tender; or

      (ii) obtain additional funding and, subject to the provisions of GI11 and GI09 of the General Instructions to Bidders, award the Contract to the Bidder submitting the lowest compliant tender; or

      (iii) revise the scope of the work accordingly and negotiate, with the Bidder submitting the lowest compliant tender, a corresponding reduction in its tender price.

   (b) by more than 15%, the NCC, at its sole discretion, shall either:

      (i) cancel the invitation to tender; or

      (ii) obtain additional funding and, subject to the provisions of GI11 and GI09 of the General Instructions to Bidders, award the Contract to the Bidder submitting the lowest compliant tender; or

      (iii) revise the scope of the work accordingly and invite those who submitted compliant tenders at the original invitation to tender to re-tender the work.

2) If negotiations or a re-tender are undertaken as is contemplated in subparagraphs 1)(a)(iii) or 1)(b)(iii) above, Bidders shall retain the same subcontractors and suppliers as they carried in their original tenders.

3) If the NCC elects to negotiate a reduction in the tender price as is contemplated in subparagraph 1)(a)(iii) herein and the negotiations fail to reach an agreement, the NCC shall then exercise either of the options referred to subparagraphs 1)(a)(i) or 1)(a)(ii).

SI07 TENDER VALIDITY PERIOD

1) The NCC reserves the right to seek an extension to the tender validity period prescribed in 3 of the Invitation to Tender & Acceptance Form. Upon notification in writing from the NCC, Bidders shall have the option to either accept or reject the proposed extension.

2) If the extension referred to in paragraph 1) of SI07 is accepted, in writing, by all those who submitted tenders, then the NCC shall continue immediately with the evaluation of the tenders and its approvals processes.

3) If the extension referred to in paragraph 1) of SI07 is not accepted in writing by all those who submitted tenders then the NCC shall, at its sole discretion, either:

(a) continue to evaluate the tenders of those who have accepted the proposed extension and seek the necessary approvals; or

(b) cancel the invitation to tender.

4) The provisions expressed herein do not in any manner limit the NCC's rights in law or under GI11 of the General Instructions to Bidders.

SI08 CONSTRUCTION DOCUMENTS

1) The successful contractor will be provided with one paper copy of the sealed and signed plans, the specifications and the amendments upon acceptance of the offer. Additional copies, may be available free of charge upon request by the contractor. If not, obtaining more copies shall be the responsibility of the contractor including costs.

SI09 PUBLIC TENDER OPENING

1) A public tender opening will be held on Tuesday, June 21, 2016 at 3:00pm Ottawa time at 40 Elgin Street, Ottawa, ON beside the Security office on the 2nd floor.

SI10 SECURITY REQUIREMENTS

Since the National Capital Commission (NCC) complies with the provisions of the Policy on Government Security, the Contractor shall ensure that none of the Employees of the Contractor and others for whom the Contractor is responsible and who are to perform the Contractor's obligations under this Contract constitute a security risk and shall, at the request of the NCC, ensure that all Employees of the Contractor and others for whom the Contractor is responsible who are to perform the Contractor's obligations under this Contract complete the NCC's security screening process in order that the NCC may obtain a security assessment of that person before accessing any site included in this Contract.

For this contract, it was determined that the NCC shall require **Site Access status**. A credit check can be performed when the duties or task to be performed require it or in the event of a criminal record based on this type of offence. Refer to the attached 2 page Security Requirement document.

GI01 Completion of Tender

1) The tender shall be:

   (a) submitted on the Invitation to Tender and Acceptance Form provided through the Government Electronic Tendering Service (GETS) or on a clear and legible reproduced copy of such Invitation to Tender and Acceptance Form that must be identical in content and format to the Invitation to Tender and Acceptance Form provided through GETS;

   (b) based on the Tender Documents listed in the Special Instructions to Bidders;

   (c) correctly completed in all respects;

   (d) signed by a duly authorized representative of the Bidder; and

   (e) accompanied by

      (i) tender security as specified in GI08; and

      (ii) any other document or documents specified elsewhere in the solicitation where it is stipulated that said documents are to accompany the tender.

2) Subject to paragraph 6) of GI11, any alteration to the pre-printed or pre-typed sections of the Invitation to Tender and Acceptance Form, or any condition or qualification placed upon the tender shall be cause for disqualification. Alterations, corrections, changes or erasures made to statements or figures entered on the Invitation to Tender and Acceptance Form by the Bidder shall be initialled by the person or persons signing the tender. Initials shall be original(s). Alterations, corrections, changes or erasures that are not initialled shall be deemed void and without effect.

3) Unless otherwise noted elsewhere in the Tender Documents, facsimile copies of tenders are not acceptable.

GI02 Identity or Legal Capacity of the Bidder

1) In order to confirm the authority of the person or persons signing the tender or to establish the legal capacity under which the Bidder proposes to enter into Contract, any Bidder who carries on business in other than its own personal name shall, if requested by the NCC prior to award of contract, provide satisfactory proof of:

(a) such signing authority; and

(b) the legal capacity under which it carries on business.

Proof of signing authority may be in the form of a certified copy of a resolution naming the signatory(ies) that is (are) authorized to sign this tender on behalf of the corporation or partnership. Proof of legal capacity may be in the form of a copy of the articles of incorporation or the registration of the business name of a sole proprietor or partnership.

GI03 Goods and Services Tax / Harmonized Sales Tax

1) The National Capital Commission (NCC) is a Crown Corporation subject to the Goods and Services Tax (GST), the Ontario Provincial Sales Tax (OST) and the Quebec Sales Tax (QST). The rates quoted are exclusive of the GST and the OST/QST. The successful firm will be required to indicate separately, on all invoices or requests for payments, the amount of Goods and Services Sales Tax (GST), the amount of Ontario Sales Tax (OST) and the amount of Quebec Sales Tax (QST), to the extent applicable, that the Commission must pay. These amounts will be paid to the successful Bidder who is required to make the appropriate remittances to Revenue Canada and the respective provincial governments.

Pursuant to paragraph 221 (1)(d) of the Income Tax Act, payments made by Crown Corporations under applicable service contracts (including contracts involving a mix of goods and services) must be reported on a "T1204" slip. To comply with this requirement, the Bidder is required to provide the following information on the "Supplier – Direct Payment and Tax Information Form" (see Appendix 11).

By signing this form, the Bidder/Proponent certifies that he/she has examined the information provided on the form and that it is correct, complete, and fully discloses the identification of the Contractor.

This "Supplier – Direct Payment and Tax Information Form" must be completed and returned to the Commission prior to any contract being awarded to your firm (see Appendix 11).

GI04 Quebec Sales Tax

1) See GI03.

GI05 Capital Developement and Redevelopment Charges

1) For the purposes of GC1.8 LAWS, PERMITS AND TAXES in the General Conditions of the Contract, only fees or charges directly related to the processing and issuing of building permits shall be included. The Bidder shall not include any monies in the tender amount for special municipal development, redevelopment or other fees or charges which a municipal authority may seek as a prerequisite to the issuance of building permits.

GI06 Registry and Pre-qualification of Floating Plant

1) Dredges or other floating plant to be used in the performance of the Work must be on Canadian registry. For dredges or other floating plant that are not of Canadian make or manufacture, the Bidder must obtain a certificate of qualification from Industry Canada, if applicable, and this certificate must accompany the tender. Plant so qualified by Industry Canada may be accepted on this project.

GI07 Listing of Subcontractors and Suppliers

1) Notwithstanding any list of Subcontractors that the Bidder shall be required to submit as part of the tender, the Bidder submitting the lowest acceptable tender shall, within 24 hours of receipt of a notice to do so, submit all information requested in the said notice including the names of Subcontractors and Suppliers for the part or parts of the Work listed. Failure to do so may result in the disqualification of its tender.

GI08 Tender Security Requirements

1) The Bidder shall submit tender security with the tender in the form of a bid bond or a security deposit in an amount that is equal to not less than 10% of the tender amount including all applicable taxes.

   The maximum amount of tender security required with any tender is $2,000,000.00.

2) A bid bond shall be in an approved form, properly completed, with original signature(s) and issued by an approved company whose bonds are acceptable to the NCC either at the time of solicitation closing or as identified on the list displayed at the following Website:

   http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12027

   The approved form for the bid bond is enclosed at the end of this section.

3) A security deposit shall be an original, properly completed, signed where required and be either:

   (a) a bill of exchange, bank draft or money order payable to the NCC;

   (b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada; or

4) A bill of exchange, bank draft or money order referred to in subparagraph 3)(a) of GI08 shall be certified by or drawn on:

   (a) a corporation or institution that is a member of the Canadian Payments Association;

   (b) a corporation that accepts public deposits and repayment of the deposits is unconditionally guaranteed by Her Majesty in right of a province;

   (c) a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the "Régie de l'assurance-dépôts du Québec" to the maximum permitted by law;

   (d) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137 (6)(b) of the *Income Tax Act*; or

   (e) Canada Post Corporation.

5) If a bill of exchange, bank draft or money order is drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in paragraph 4) of GI08, either by letter or by a stamped certification on the bill of exchange, bank draft, or money order.

6) For the purposes of this section, a bill of exchange is an unconditional order in writing signed by the Bidder and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable time, a certain sum of money to, or to the order of, the NCC.

7) Bonds referred to in subparagraph 3)(b) of GI08 shall be provided on the basis of their market value current at the date of solicitation closing, and shall be:

(a) payable to bearer;

(b) accompanied by a duly executed instrument of transfer of the bonds to the NCC in the form prescribed by the Domestic Bonds of Canada Regulations; or

(c) registered as to principal or as to principal and interest in the name of the NCC pursuant to the Domestic Bonds of Canada Regulations.

8) As an alternative to a security deposit an irrevocable standby letter of credit is acceptable to the NCC and the amount shall be determined in the same manner as a security deposit referred to above.

9) An irrevocable standby letter of credit referred to in paragraph 8) of GI08 shall:

(a) be an arrangement, however named or described, whereby a financial institution (the "Issuer") acting at the request and on the instructions of a customer (the "Applicant) or on its own behalf:

(i) is to make a payment to, or to the order of, the NCC as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by the NCC;

(iii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with.

(b) state the face amount which may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the NCC by way of the financial institution's draft against presentation of a written demand for payment signed by the NCC Contract Administrator identified in the letter of credit by his/her office;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600;

(g) clearly specify that it is irrevocable or deemed to be irrevocable pursuant to article 6 c) of the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600; and

(h) be issued or confirmed, in either official language, by a financial institution which is a member of the Canadian Payments Association and is on the letterhead of the Issuer or Confirmer. The format is left to the discretion of the Issuer or Confirmer.

10) Tender security shall lapse or be returned as soon as practical following:

(a) the solicitation closing date, for those Bidders submitting non-compliant tenders; and

(b) the administrative tender review, for those Bidders submitting compliant tenders ranked fourth to last on the schedule of tenders; and

(c) the award of contract, for those Bidders submitting the second and third ranked tenders; and

(d) the receipt of contract security for the successful Bidder; or

(e) the cancellation of the solicitation, for all Bidders.

11) Notwithstanding the provisions of paragraph 10) of GI08 and provided more than three (3) compliant tenders have been received, if one or more of the tenders ranked third to first is withdrawn or rejected for whatever reason, then the NCC reserves the right to hold the security of the next highest ranked compliant tender in order to retain the tender security of at least three (3) valid and compliant tenders.

GI09 Submission of Tender

1) The Invitation to Tender and Acceptance Form, duly completed with the bid security, shall be enclosed and sealed in an envelope provided by the Bidder, and shall be addressed and submitted to the office designated on the front page of the Invitation to Tender and Acceptance Form for the receipt of tenders.

2) Unless otherwise specified in the Special Instructions to Bidders:

(a) the tender shall be in Canadian currency;

(b) exchange rate fluctuation protection is not offered; and

(c) any request for exchange rate fluctuation protection shall not be considered.

3) Prior to submitting the tender, the Bidder shall ensure that the following information is clearly printed or typed on the face of the tender envelope:

(a) Solicitation Number;

(b) Name of Bidder.

5) Timely and correct delivery of the tender is the sole responsibility of the Bidder. The tender must be received on or before the date and time set for solicitation closing. Late tenders shall be disqualified.

GI10 Revision of Tender

1) A tender submitted in accordance with these instructions may be revised by letter or facsimile (fax number only 613-239-5012 provided the revision is received at the office designated for the receipt of tenders, on or before the date and time set for the closing of the solicitation. The letter or facsimile shall:

(a) be on the Bidder's letterhead or bear a signature that identifies the Bidder;

(b) for the Total Bid Amount, clearly identify the amount of the current revision. The total aggregate sum of all revisions submitted, including the current revision, shall be shown separately; and

(c) for the Price per unit portion of a tender, clearly identify the current revision(s) to the Price(s) per unit and the specific item(s) to which each revision applies. If a revision is to be applied to a specific Item that was previously amended then, in addition to the amount of the current

revision, the total aggregate sum of all revisions submitted, including the current revision, for that Item shall be shown separately.

2) A letter or facsimile submitted to confirm an earlier revision shall be clearly identified as "CONFIRMATION ONLY", for each contemplated change.

3) Failure to comply with any of the above provisions shall result in the rejection of the non-compliant revision(s) only. The tender shall be evaluated based on the original tender submitted and all other compliant revision(s).

GI11 Acceptance of Tender

1) The NCC may accept any tender, whether it is the lowest or not, or may reject any or all tenders.

2) Without limiting the generality of paragraph 1) of GI11, the NCC may reject a tender if any of the following circumstances are present:

(a) the Bidder, or any employee or subcontractor included as part of the tender, have been convicted under section 121 ("Frauds on the government" & "Contractor subscribing to election fund"), 124 ("Selling or purchasing office"), 380 (Fraud committed against Her Majesty) or 418 ("Selling defective stores to Her Majesty") of the Criminal Code of Canada, or under paragraph 80(1)(d) (False entry, certificate or return), subsection 80(2) (Fraud against her Majesty) or Section 154.01 (Fraud against her Majesty) of the Financial Administration Act;

(b) the Bidder's bidding privileges are suspended or are in the process of being suspended;

(c) the bidding privileges of any employee or subcontractor included as part of the tender are suspended or are in the process of being suspended, which suspension or pending suspension would render that employee or subcontractor ineligible to tender on the Work, or the portion of the Work the employee or subcontractor is to perform;

(d) with respect to current or prior transactions with the NCC

(i) the Bidder is bankrupt or if, for whatever reason, its activities are rendered inoperable for an extended period;

(ii) evidence, satisfactory to the NCC, of fraud, bribery, fraudulent misrepresentation or failure to comply with any law protecting individuals against any manner of discrimination, has been received with respect to the Bidder, any of its employees or any subcontractor included as part of its tender;

(iii) the NCC has exercised, or intends to exercise, the contractual remedy of taking the work out of the contractor's hands with respect to a contract with the Bidder, any of its employees or any subcontractor included as part of its tender; or

(iv) the NCC determines that the Bidder's performance on other contracts is sufficiently poor to jeopardize the successful completion of the requirement being tendered on.

3). In assessing the Bidder's performance on other contracts pursuant to subparagraph 2)(d)(iv) of GI11, the NCC may consider, but not be limited to, such matters as:

(a) the quality of workmanship in performing the Work;

(b) the timeliness of completion of the Work;

(c) the overall management of the Work and its effect on the level of effort demanded of the NCC and its representative; and
(d) the completeness and effectiveness of the Contractor's safety program during the performance of the Work.

4) Without limiting the generality of paragraphs 1), 2) and 3) of GI11, the NCC may reject any based on an unfavourable assessment of the:

(a) adequacy of the tender price to permit the work to be carried out and, in the case of a tender providing prices per unit, whether each such price reasonably reflects the cost of performing the part of the work to which that price applies;

(b) Bidder's ability to provide the necessary management structure, skilled personnel, experience and equipment to perform competently the work under the Contract; and

(c) Bidder's performance on other contracts.

5) If the NCC intends to reject a tender pursuant to a provision of paragraphs 1), 2), 3) or 4) of GI11, other than subparagraph 2)(b)of GI11, the NCC shall so inform the Bidder and provide the Bidder ten (10) days within which to make representation, prior to making a final decision on the tender rejection.

6) The NCC may waive informalities and minor irregularities in tenders received, if the NCC determines that the variation of the tender from the exact requirements set out in the Tender Documents can be corrected or waived without being prejudicial to other Bidders.

GI12 Procurement Business Number

1) Not applicable.

GI13 Bid Depository

1) If the solicitation advertisement states that a Bid Depository shall be used, the Bidder shall obtain bids in accordance with local Bid Depository rules and procedures.

GI14 Compliance with Applicable Laws

1) By submission of a tender, the Bidder certifies that the Bidder has the legal capacity to enter into a contract and is in possession of all valid licences, permits, registrations, certificates, declarations, filings, or other authorizations necessary to comply with all federal, provincial and municipal laws and regulations applicable to the submission of the tender and entry into any ensuing contract for the performance of the work.

2) For the purpose of validating the certification in paragraph 1) of GI14, a Bidder shall, if requested, provide a copy of every valid licence, permit, registration, certificate, declaration, filing or other authorization listed in the request, and shall provide such documentation within the time limit(s) set out in the said request.

3) Failure to comply with the requirements of paragraph 2) of GI14 shall result in the disqualification of the tender.

GI15 Approval of Alternative Materials

1) When materials are specified by trade names or trademarks, or by manufacturers' or suppliers' names, the tender shall be based on use of the named materials. During the solicitation period,

alternative materials may be considered provided full technical data is received in writing by the Contracting Officer at least seven (7) calendar days, unless otherwise noted in the Tender documents, prior to the solicitation closing date. If the alternative materials are approved for the purposes of the tender, an addendum to the tender documents shall be issued.

GI16 Performance Evaluation

1) Bidders shall take note that the performance of the Contractor during and upon completion of the work shall be evaluated by the NCC. The evaluation shall be based on the quality of workmanship, timeliness of completion of the work, project management, contract management and management of health and safety. Should the Contractor's performance be considered unsatisfactory, the Contractor's bidding privileges on future work may be suspended indefinitely. Contractor Evaluation Report Form is enclosed at the end of this section.

BID BOND

Bond Number _____

Amount $ _____

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal, hereinafter called the Principal, and _____ as Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee, hereinafter called the NCC, In the amount of _____ dollars ($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____ , _____ . WHEREAS, the Principal has submitted a written tender to the NCC, dated the _____ day of _____ , _____ , for: _____ .

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that if:

(a) The Principal, should his tender be accepted within the period be specified by the NCC, or, if no period be specified, within sixty (60) days after closing date of the tender:

1. does execute within a period specified by the NCC, or, if no period be specified therein, within fourteen (14) days after the prescribed forms are presented to him for signature, execute such further contractual documents, if any, as may be required by the terms of the tender as accepted; and does

2. furnish a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the Contract price and satisfactory to the NCC, or other security acceptable to the NCC; or

(b) the Principal does pay to the NCC the difference between the amount of the Principal's tender and the amount of the Contract entered into by the NCC for the work, supplies and services which were specified in the said tender, if the latter amount be in excess of the former,

then, this obligation shall be void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that the Surety and the Principal shall not be liable to the NCC for an amount greater than the amount specified in the bond.

PROVIDED FURTHER that the Surety shall not be subject to any suit or action unless such suit or action is instituted and process therefore served upon the Surety at its Head Office in Canada, within twelve (12) months from the date of this bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

Principal _____

Witness _____

Surety _____

Note: Affix Corporate seal if applicable.

NCC CCN Canada

CONTRACTOR PERFORMANCE EVALUATION REPORT FORM
FORMULAIRE - RAPPORT D'ÉVALUATION DU RENDEMENT DE L'ENTREPRENEUR

Date	Contract no. / No du contrat
Description of work / Description des travaux	
Contractor's business name / Nom de l'entreprise de l'entrepreneur	Contractor's site superintendent / Contremaître de l'entrepreneur
Contractor's business address / Adresse de l'entreprise de l'entrepreneur	

NCC representative / Représentant de la CCN

Name / Nom	Telephone no. / N°. de téléphone	E-mail address / Adresse électronique

Contract information / Information sur le contrat

Contract award amount / Montant du marché adjugé	Contract award date / Date de l'adjudication du marché
Final amount / Montant final	Actual contract completion date / Date réelle d'achèvement du contrat
Number of change orders / Nombre d'ordres de changement	Final certificate date / Date du certificat final

Quality of workmanship / Qualité des travaux exécutés	Category / Catégorie	Scale / Échelle	Points / Pointage
This is the rating of the quality of the workmanship. At final completion the quality of the materials and equipment incorporated in the work must meet the requirements set out in the plans and specifications. Il s'agit de l'évaluation de la qualité des travaux exécutés. À l'achèvement des travaux, la qualité des matériaux et de l'équipement doit satisfaire les exigences établies dans les plans et devis.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Supérieur	0 – 5 6 – 10 11 – 16 17 - 20	
Time / Délai d'exécution			
This is the rating of the timeliness of completion considering the actual completion date compared with the original (or amended) contract completion date and allowing for conditions beyond the control of the contractor. Il s'agit de l'évaluation du délai d'exécution des travaux en prenant en considération la date actuelle d'achèvement des travaux par rapport à la date originale (ou modifiée) et en tenant compte des conditions indépendantes de la volonté de l'entrepreneur.	Unacceptable / Inacceptable Late / En retard On time / À temps Ahead of schedule / En avance sur le calendrier	0 – 5 6 – 10 11 – 16 17 - 20	
Project management / Gestion de projet			
This is the rating of how the project, as described in the drawings and specifications, was managed including co-ordination, quality control, effective schedule development and implementation. Voici l'évaluation de la façon dont le projet décrit dans les documents contractuels a été géré, y compris la coordination, le contrôle de la qualité, l'élaboration d'un calendrier efficace et la mise en œuvre.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Supérieur Criteria not applicable / Critère non-applicable	0 – 5 6 – 10 11 – 16 17 - 20	☐ N/A / S/O
Contract management / Gestion de contrat			
This is the rating of how the contract was administered in accordance with the provisions expressed in the "front end" portion of the documents. Voici l'évaluation de la façon dont le contrat a été administré conformément aux dispositions comprises dans la partie « prioritaire » des documents.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Satisfaisant Criteria not applicable / Critère non-applicable	0 – 5 6 – 10 11 – 16 17 - 20	☐ N/A / S/O
Health and safety / Santé et sécurité			
This is the rating of the effectiveness of how the occupational health and safety provisions (whether identified in the contract or those of provincial legislation or those otherwise applicable) were managed and administered. Voici l'évaluation de l'efficacité avec laquelle les dispositions relatives à la santé et à la sécurité au travail (dans le contrat, dans les règlements provinciaux ou dans tout autre document) ont été gérées et administrées.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Satisfaisant	0 – 5 6 – 10 11 – 16 17 - 20	
		Total points / Pointage total	**/100**

Comments / Commentaires

Name / Nom	Title / Titre	Signature	Date

INSTRUCTIONS AND ADDITIONAL INFORMATION (Contractor Performance Evaluation Report)
INSTRUCTIONS ET RENSEIGNEMENTS SUPPLÉMENTAIRES (Rapport d'évaluation du rendement de l'entrepreneur)

QUALITY OF WORKMANSHIP – QUALITÉ DES TRAVAUX EXÉCUTÉS

The NCC representative is to consider how the workmanship compares with:

- the norms in the area in which the work was carried out
- the contractor's compliance with any quality provisions outlined in the drawings and specification
- the quality of workmanship provided by other contractors on similar projects in the same facility/facilities

Le représentant de la CCN doit évaluer la qualité de l'exécution en fonction de ce qui suit :

- le respect des normes s'appliquant aux travaux réalisés
- la conformité de l'entrepreneur aux exigences de qualité comprises dans les dessins et dans les devis
- la qualité de l'exécution des travaux accomplis par d'autres entrepreneurs dans le cadre de projets similaires réalisés dans la même installation ou dans des installations semblables.

TIME / DÉLAIS D'EXÉCUTION

For the purpose of evaluation the contractor's time performance, consideration must be given to conditions beyond the contractor's control including NCC / Consultant / Client performance.

Consider conditions beyond the contractor's control, e.g.,

- availability of, and access to the site
- changes in soil or site conditions
- weather extremes
- strikes
- material / equipment supply problems originating from manufacturers/suppliers
- quality of plans and specifications
- major change(s) in scope
- cumulative effect of changes
- was the NCC able to meet its obligations?
- timely decisions, clarifications, approvals, payments in due time
- delays caused by other contractors in the same facility

Afin d'évaluer le rendement de l'entrepreneur en matière de délai d'exécution, on doit prendre en considération les conditions indépendantes de la volonté de l'entrepreneur, y compris le rendement de la CCN, de l'expert-conseil et du client.

Prendre en considération les conditions indépendantes de la volonté de l'entrepreneur, par exemple :

- disponibilité du chantier et accès au chantier
- modifications des conditions du sol ou du chantier
- température
- grèves
- problèmes d'approvisionnement en matériel et en équipement provenant des manufacturiers/fournisseurs
- qualité des plan et devis
- modifications importantes à l'étendue des travaux
- effets cumulatifs des modifications
- la CCN a-t-elle été capable de remplir ses obligations?
- décisions, clarifications, approbations, paiements en temps opportun
- les retards occasionnés par d'autres entrepreneurs travaillant dans la même installation.

The NCC representative's estimate of a reasonable maximum time allowance resulting from conditions beyond the contractor's control is
L'estimation, par le représentant de la CCN, du temps maximum alloué pour les conditions indépendantes de la volonté de l'entrepreneur est ►

The period of delay attributable to the contractor is
La période de retard attribuable à l'entrepreneur est ►

Did the contractor make an effective effort / Est-ce que l'entrepreneur s'est efforcé :

- to meet the schedule / de respecter l'échéancier des travaux ► ☐ Yes / Oui ☐ No / Non
- to clean up deficiencies in a reasonable time / de corriger les vices dans un délai raisonnable ► ☐ Yes / Oui ☐ No / Non

Have you recommended assessments and damages for late completion under the contract?
Avez-vous recommandé des dédommagements pour retard d'exécution aux termes du marché? ► ☐ Yes / Oui ☐ No / Non

PROJECT MANAGEMENT / GESTION DU PROJET

The extent to which the contractor takes charge of and effectively manages the work has a direct effect on the inputs required of the NCC.

Consideration should be given to: Did the contractor

- employ a knowledgeable site superintendent
- required additional input from the NCC staff above that which is normal for a project of similar size and nature
- promptly commence the work
- provide realistic schedules and updates in accordance with the terms of the contract
- provide a comprehensive work plan and adhere to its milestones
- order material promptly and in such a way as to expedite the progress of the work
- provide shop drawings promptly and were they of sufficient detail

La mesure dans laquelle l'entrepreneur assume efficacement la gestion des travaux a une incidence directe sur les services qu'on attend de la CCN.

Il faut examiner si l'entrepreneur a :

- fait appel aux services d'un surintendant de chantier expérimenté
- demandé au personnel de la CCN une plus grande contribution que ce qui est normal pour un projet de cette importance et de cette nature
- commencé les travaux dans les plus brefs délais
- fourni un calendrier réaliste et des mises à jour conformément aux modalités du contrat
- présenté un plan de travail complet et a respecté les échéances
- commandé le matériel rapidement et de façon à accélérer l'avancement des travaux.
- fourni rapidement des dessins d'atelier comprenant suffisamment de détails

PROJECT MANAGEMENT (cont'd) / GESTION DU PROJET (suite)

- effectively manage and complete all Division 1 work site activities

- promptly provide reasonable quotations for changes to the original scope of work
- cooperate when issued directions by the NCC representative
- interpret the contract documents accurately
- establish effective quality control procedures
- effectively coordinate and manage the work of its subcontractors

- promptly correct defective work as the project progressed
- promptly clean-up all deficiencies and incomplete work after issuance of the Interim Certificate of Completion
- satisfactorily clean the work site periodically and at the completion of the project

- géré et achevé efficacement toutes les activités sur le chantier de la Division 1
- proposé rapidement des prix raisonnables pour les modifications à l'énoncé des travaux initial
- accepté les directives du représentant de la CCN
- interprété les documents contractuels avec exactitude
- mis en place des procédures de contrôle de la qualité efficaces
- coordonné et géré efficacement les travaux confiés à des sous-traitants
- corrigé promptement le travail défectueux en cours de projet
- corrigé rapidement les travaux non acceptables et terminé les travaux incomplets après réception du certificat provisoire d'achèvement
- nettoyé de façon satisfaisante le chantier périodiquement ainsi qu'à la fin du projet.

CONTRACT MANAGEMENT / GESTION DU CONTRAT

The effectiveness of the contractor to administer the contract in accordance with the provisions expressed in the "front end" portion of the contract documents.

Consideration should be given to: Did the contractor

- in the time frame specified, provide its contract security, Insurance Certificate fully executed and WSIB form where applicable
- submit progress claims in the correct format, accurately representing the work successfully completed and material delivered to the site but not yet installed for each payment period
- submit a Statutory Declaration correctly completed with each progress claim
- submit an updated Schedule if so specified
- pay subcontractors and suppliers in a timely fashion in accordance with the terms and conditions of its subcontracts
- promptly appoint a competent site superintendent
- notify the NCC representative of all its subcontracting activities

- apply for, obtain and pay for all necessary permits, licenses and certificates
- cooperate with other contractors sent onto the site of the work

- remove a superintendent or unsuitable worker when requested by the NCC representative to do so
- effectively protect the work and the contract documents provided by the NCC
- comply with all warranty provisions up to the date of the Contractor Performance Evaluation Report Form (CPERF)

- effectively manage the site during a suspension or termination of the work to mitigate any additional costs to the NCC

- deal promptly with any claims from creditors

- maintain complete records of the project
- provide information promptly when requested to do so
- expedite and co-operate in the settlement of all disputes

Efficacité avec laquelle l'entrepreneur a administré le contrat conformément aux dispositions continues dans la partie « prioritaire » des documents contractuels.

Il faut examiner si l'entrepreneur a :

- fourni, dans le délai prescrit, une garantie contractuelle, un certificat d'assurance dûment signés et le formulaire de la CSST, le cas échéant
- présenté des réclamations périodiques dans le bon format, en décrivant avec précision les travaux exécutés et le matériel livré sur le chantier mains non encore installé, pour chaque période de paiement
- présenté une déclaration solennelle correctement remplie avec chaque réclamation périodique
- fourni un calendrier à jour, sur demande
- payé rapidement les sous-traitants et les fournisseurs conformément aux conditions des contrats de sous-traitance
- désigné dans les plus brefs délais un surintendant de chantier qualifié
- tenu au courant le représentant de la CCN de toutes les activités de sous-traitance
- demandé, obtenu et payé tous les permis, licences et certificats nécessaires
- collaboré avec les autres entrepreneurs envoyés sur le lieu des travaux
- remplacé un surintendant ou un travailleur inapte à la demande du représentant de la CCN
- protégé efficacement les travaux et les documents relativement aux travaux et au contrat fournis par la CCN
- respecté toutes les dispositions de garantie jusqu'à la date du Formulaire Rapport d'évaluation du rendement de l'entrepreneur (FRERE)
- géré efficacement le chantier pendant une suspension des travaux ou lors de leur achèvement, afin de limiter tout coût supplémentaire pour la CCN
- traité dans les plus brefs délais les demandes de paiement des créanciers
- tenu des dossiers complets sur le projet
- fourni promptement les renseignements demandés
- accélère et coopère dans le règlement des différends

HEALTH AND SAFETY / SANTÉ ET SÉCURITÉ

The effectiveness to which the contractor managed and administered the occupational health and safety provisions as stipulated in the contract documents and those required by provincial legislation or those that would otherwise be applicable to the site of the work.

Consideration should be given to: Did the contractor

- provide the NCC with a copy of its health and safety program prior to award of contract
- provide the NCC with a copy of its site specific hazardous assessment prior to award of contract
- apply for and obtain the provincial Notice of Project prior to commencement of the work
- apply for and obtain the Building Permit prior to commencement of the work
- provide a competent superintendent who
  - is qualified in health and safety matters because of her/his knowledge, training and experience
  - is familiar with the OH&S Act and its Regulations that apply to the site of the work
  - remedies any potential or actual danger of health and safety to those employed at the work site
- respond in a timely manner to any non-compliance safety issues noted by the NCC or a representative of the authority having jurisdiction
- implement its safety program in a proactive manner

Efficacité avec laquelle l'entrepreneur a géré et administré les dispositions relatives à la santé et à la sécurité au travail telles que stipulées dans les documents contractuels et dans les règlements provinciaux ou ceux s'appliquant normalement au lieu des travaux.

Il faut examiner si l'entrepreneur a :

- fourni à la CCN une copie de son programme en matière de santé et de sécurité avant l'octroi du contrat
- fourni à la CCN une copie de son évaluation des dangers pouvant survenir sur les lieux avant l'octroi du contrat
- demandé et obtenu l'avis de projet provincial avant le début des travaux
- demandé et obtenu le permis de construction avant le début des travaux
- engagé un surintendant qui :
  - est qualifié en matière de santé et de sécurité de par ses connaissances, sa formation et son expérience
  - connaît bien les dispositions de la Loi sur la santé et la sécurité au travail et de son règlement qui s'applique sur le lieu des travaux
  - remédie à tout danger possible ou réel en matière de santé et de sécurité pouvant toucher toutes les personnes travaillant sur le lieu des travaux
- traité rapidement tous les problèmes de non-conformité à la sécurité relevés par la CCN ou par un représentant de l'autorité qui a juridiction
- mis en œuvre son programme de sécurité de façon proactive

GC1.1 INTERPRETATION

GC1.1.1 Headings and References

1) The headings in the contract documents, other than those in the drawings and specifications, form no part of the Contract but are inserted for convenience of reference only.

2) A reference made to a part of the Contract by means of numbers preceded by letters is a reference to the particular part of the Contract that is identified by that combination of letters and numbers and to any other part of the Contract referred to therein.

3) A reference to a paragraph or subparagraph followed by an identifying number, letter or combination thereof is, unless specifically stated otherwise, a reference to the paragraph or subparagraph that forms part of the clause within which the reference is made.

GC1.1.2 Terminology

1) In the Contract

"Contract" means the contract documents referred to as such therein and every other document specified or referred to in any of them as forming part of the Contract, all as amended by agreement of the parties;

"Contract Amount" means the amount set out in the Contract to be payable to the Contractor for the Work, subject to the terms and conditions of the Contract;

"Contract Security" means any security given by the Contractor to the NCC in accordance with the Contract;

"Contractor" means the person contracting with the NCC to provide or furnish all labour, Material and Plant for the execution of the Work under the Contract, and includes the Contractor's superintendent as designated in writing to the NCC;

"Certificate of Completion" means a certificate issued by the NCC when the Work reaches Completion;

"Certificate of Measurement" means a certificate issued by the NCC certifying the correctness of the final quantities, prices per unit and values of labour, Plant and Material performed, used and supplied by the Contractor for the construction of the part of the Work to which a Unit Price Arrangement applies;

"Certificate of Substantial Performance" means a certificate issued by the NCC when the Work reaches Substantial Performance;

"NCC Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the NCC Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the NCC Representative to the Contractor;

"herein", "hereby", "hereof", "hereunder" and similar expressions refer to the Contract as a whole and not to any particular section or part thereof;

"Lump Sum Arrangement" means that part of the Contract that prescribes a lump sum as payment for performance of the Work to which it relates;

"Material" includes all commodities, articles, machinery, equipment, fixtures and things required to be furnished in accordance with the Contract for incorporation into the Work;

"NCC" means the National Capital Commission;

"Person" also includes, unless there is an express stipulation in the Contract to the contrary, any partnership, proprietorship, firm, joint venture, consortium or corporation;

"Plant" includes all tools, implements, machinery, vehicles, structures, equipment, articles and things that are necessary for the performance of the Contract, other than Material and those tools customarily provided by a tradesperson in practicing a trade;

"Security screening" is a generic term that applies to all types and levels of personnel security screening including Reliability Status, Site Access, and CONFIDENTIAL, SECRET and TOP SECRET security clearances conducted by the NCC;

"Sensitive Information and Assets" means information or assets that have been identified by the NCC as TOP SECRET, SECRET, CONFIDENTIAL or protected;

"Subcontractor" means a person having a direct contract with the Contractor, subject to GC3.6 SUBCONTRACTING, to perform a part or parts of the Work, or to supply Material customized for the Work;

"Superintendent" means the employee or representative of the Contractor designated by the Contractor to act pursuant to GC2.6 SUPERINTENDENT;

"Supplementary Conditions" means the part of the Contract that amends or supplements the General Conditions;

"Supplier" means a person having a direct contract with the Contractor to supply Plant or Material not customized for the Work;

"Unit Price Arrangement" means that part of the Contract that prescribes the product of a price per unit of measurement multiplied by a number of units of measurement for performance of the Work to which it relates;

"Unit Price Table" means the table of prices per unit set out in the Contract;

"Work" means, subject only to any express stipulation in the Contract to the contrary, everything that is necessary to be done, furnished or delivered by the Contractor to perform the Contract in accordance with the contract documents; and

"Working Day" means a day other than a Saturday, Sunday, or a statutory holiday that is observed by the construction industry in the area of the place of the Work.

GC1.1.3 Application of Certain Provisions

1) Any provisions of the Contract that are expressly stipulated to be applicable only to a Unit Price Arrangement are not applicable to any part of the Work to which a Lump Sum Arrangement applies.

2) Any provisions of the Contract that are expressly stipulated to be applicable only to a Lump Sum Arrangement are not applicable to any part of the Work to which a Unit Price Arrangement applies.

GC1.1.4 Substantial Performance

1) The Work shall be considered to have reached Substantial Performance when:

   (a) the Work or a substantial part thereof has passed inspection and testing and is, in the opinion of the NCC, ready for use by the NCC or is being used for the intended purposes; and

   (b) the Work is, in the opinion of the NCC, capable of completion or correction at a cost of not more than

      (i) 3% of the first $500,000;

      (ii) 2% of the next $500,000; and

      (iii) 1% of the balance

      of the Contract Amount at the time this cost is calculated.

2) Where the Work or a substantial part thereof is ready for use or is being used for the purposes intended and:

   (a) the remainder of the Work or a part thereof cannot be completed by the time specified in the Contract, or as amended in accordance with GC6.5 DELAYS AND EXTENSION OF TIME, for reasons beyond the control of the Contractor; or

   (b) the NCC and the Contractor agree not to complete a part of the Work within the specified time;

the cost of that part of the Work that was either beyond the control of the Contractor to complete or the NCC and the Contractor have agreed not to complete by the time specified, shall be deducted from the value of the Contract referred to in subparagraph 1)(b) of GC1.1.4, and the said cost shall not form part of the cost of the Work remaining to be done in determining Substantial Performance.

GC1.1.5 Completion

1) The Work shall be deemed to have reached Completion when all labour, Plant and Material required have been performed, used or supplied, and the Contractor has complied with the Contract and all orders and directions made pursuant thereto, all to the satisfaction of the NCC.

GC1.2 CONTRACT DOCUMENTS

GC1.2.1 General

1) The contract documents are complementary, and what is required by any one shall be as binding as if required by all.

2) References in the contract documents to the singular shall be considered to include the plural as the context requires.

3) Nothing contained in the contract documents shall create a contractual relationship between the NCC and any Subcontractor or Supplier, their subcontractors or suppliers, or their agents or employees.

GC1.2.2 Order of Precedence

1) In the event of any discrepancy or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:

   (a) any amendment or variation of the contract documents that is made in accordance with the General Conditions;

   (b) any amendment issued prior to tender closing;

   (c) Supplementary Conditions;

   (d) General Conditions;

   (e) the duly completed Invitation to Tender and Acceptance Form when accepted;

   (f) drawings and specifications.

   later dates shall govern within each of the above categories of documents.

2) In the event of any discrepancy or conflict in the information contained in the drawings and specifications, the following rules shall apply:

   (a) specifications shall govern over drawings;

   (b) dimensions shown in figures on a drawings shall govern where they differ from dimensions scaled from the same drawing; and

   (c) drawings of larger scale govern over those of smaller scale.

GC1.2.3 Security and Protection of Documents and Work

1) The Contractor shall guard and protect all sensitive contract information (TOP SECRET, SECRET, CONFIDENTIAL and PROTECTED) including printed and digital documents, drawings, information, models, copies thereof and processing systems, whether supplied by the NCC or the Contractor, against loss or compromise and damage from any cause.

2) The Contractor shall limit access to sensitive NCC information only to those with a "need-to-know" and who have been successfully security screened to at least the level of sensitivity of the information.

3) The Contractor shall ensure all contract information indicated in paragraph 1) is guarded and protected by any subcontractors, agents or suppliers and access limited only to those with a "need-to-know" and who have been successfully security screened to at least the level of sensitivity of the information.

4) The Contractor shall keep confidential all information provided to the Contractor by or on behalf of the NCC in connection with the Work, and all information developed by the Contractor as part of the Work, and shall not disclose any such information to any person without the written permission of the NCC, except that the Contractor may disclose to a subcontractor, authorized in accordance with the Contract, information necessary to the performance of a subcontract. This section does not apply to any information that:

   (a) is publicly available from a source other than the Contractor; or

   (b) is or becomes known to the Contractor from a source other than the NCC, except any source that is known to the Contractor to be under an obligation to the NCC not to disclose the information.

5) When the Contract, the Work, or any information referred to in paragraph 4) is identified as TOP SECRET, SECRET, CONFIDENTIAL or PROTECTED by the NCC, the Contractor shall, at all times, take all measures reasonably necessary for the safeguarding of the material so identified, including such measures as may be further specified elsewhere in the Contract or provided, in writing, from time to time by the NCC.

6) Without limiting the generality of paragraphs 4) and 5) of GC1.2.3, when the Contract, the Work, or any information referred to in paragraph 4) is identified as TOP SECRET, SECRET, CONFIDENTIAL or PROTECTED by the NCC, the NCC shall be entitled to inspect the Contractor's premises and the premises of its subcontractors or suppliers and any other person at any tier, for security purposes at any time during the term of the Contract, and the Contractor shall comply with, and ensure that any such subcontractors or suppliers comply with all written instructions issued by the NCC dealing with the material so identified, including any requirement that employees of the Contractor and its subcontractors and suppliers and any other person at any tier execute and deliver declarations relating to reliability status, site access security clearances and other procedures.

7) The Contractor shall report any suspected or actual security incidents immediately to the NCC involving loss, compromise or damage of NCC information or assets.

8) The Contractor shall safeguard the Work and the Contract, the specifications, drawings and any other information provided by the NCC to the Contractor, and shall be liable to the NCC for any loss or damage from any causes.

GC1.3 STATUS OF THE CONTRACTOR

1) The Contractor is engaged under the Contract as an independent contractor.

2) The Contractor, its subcontractors and suppliers and any other person at any tier and their employees are not engaged by the Contract as employees, servants or agents of the NCC.

3) For the purposes of the contract the Contractor shall be solely responsible for any and all payments and deductions required to be made by law including those required for Canada or Quebec Pension Plans, Employment Insurance, Worker's Compensation, provincial health or insurance plans, and Income Tax.

GC1.4 RIGHTS AND REMEDIES

1) Except as expressly provided in the Contract, the duties and obligations imposed by the Contract and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights, and remedies otherwise imposed or available by law.

GC1.5 TIME OF THE ESSENCE

1) Time is of the essence of the Contract.

GC1.6 INDEMNIFICATION BY CONTRACTOR

1) The Contractor shall pay all royalties and patent fees required for the performance of the Contract and, at the Contractor's expense, shall defend all claims, actions or proceedings against the NCC charging or claiming that the Work or any part thereof provided or furnished by the Contractor to the NCC infringes any patent, industrial design, copyright trademark, trade secret or other proprietary right enforceable in Canada.

2) The Contractor shall indemnify and save the NCC harmless from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings by any third party, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by, or attributable to the activities of the Contractor, its subcontractors and suppliers and any other person at any tier, in performing the Work.

3) For the purposes of paragraph 2) of GC1.6, "activities" means any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

GC1.7 INDEMNIFICATION BY THE NCC

1) Subject to the Crown Liability and Proceedings Act, the Patent Act, and any other law that affects the NCC's rights, powers, privileges or obligations, the NCC shall indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of the Contractor's activities under the Contract that are directly attributable to:

   (a) a lack of or a defect in the NCC's title to the Work site if owned by the NCC, whether real or alleged; or

   (b) an infringement or an alleged infringement by the Contractor of any patent of invention or any other kind of intellectual property occurring while the Contractor was performing any act for the purposes of the Contract employing a model, plan or design or any other thing related to the Work that was supplied by the NCC to the Contractor.

GC1.8 LAWS, PERMITS AND TAXES

1) The Contractor shall comply with all federal, provincial and municipal laws and regulations applicable to the performance of the Work or any part thereof including, without limitation, all laws concerning health and labour conditions and the protection of the environment, and shall require compliance therewith by all of its subcontractors and suppliers at any tier as if the Work were being performed for an owner other than the NCC. The Contractor shall furnish evidence of compliance with such laws and regulations to the NCC at such times as the NCC may reasonably request.

2) Unless stipulated otherwise in the Contract, the Contractor shall obtain and maintain all permits, certificates, licences, registrations and authorizations required for the lawful performance of the Work.

3) Prior to the commencement of the Work at the site, the Contractor shall tender to a municipal authority an amount equal to all fees and charges that would be lawfully payable to that municipal authority in respect of building permits as if the Work were being performed for an owner other than the NCC.

4) Within 10 days of making a tender pursuant to paragraph 3) of GC1.8, the Contractor shall notify the NCC of the amount properly tendered and whether or not the municipal authority has accepted that amount.

5) If the municipal authority has not accepted the amount tendered, the Contractor shall pay that amount to the NCC within 6 days after the time stipulated in paragraph 4) of GC1.8.

6) For the purposes of this clause, "municipal authority" means any authority that would have jurisdiction respecting permission to perform the Work if the owner were not the NCC.

7) Notwithstanding the residency of the Contractor, the Contractor shall pay any applicable tax arising from or related to the performance of the Work under the Contract.

8) In accordance with the Statutory Declaration referred to in paragraph 4) of GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK, a Contractor who has neither residence nor place of business in the province or territory in which work under the Contract is being performed shall provide the NCC with proof of registration with the provincial sales tax authorities in the said province.

9) For the purpose of the payment of any applicable tax or the furnishing of security for the payment of any applicable tax arising from or related to the performance of the Work, and notwithstanding the provision that all Material, Plant and interest of the Contractor in all real property, licences, powers and privileges, become the property of the NCC after the time of purchase in accordance with GC3.10 MATERIAL PLANT AND REAL PROPERTY BECOME PROPERTY OF THE NCC, the Contractor shall be liable, as a user or consumer, for the payment or for the furnishing of security for the payment of any applicable tax payable, at the time of the use or consumption of that Material, Plant or interest of the Contractor in accordance with the relevant legislation.

GC1.9 WORKERS' COMPENSATION

1) Prior to award of contract, at the time of submitting its first progress claim, at the time of Substantial Performance of the Work, and prior to issuance of the Certificate of Completion, the Contractor shall provide evidence of compliance with workers' compensation legislation applicable to the place of the Work, including payments due thereunder.

2) At any time during the term of the Contract, when requested by the NCC, the Contractor shall provide such evidence of compliance by the Contractor, its subcontractors and any other person at any tier and any other person performing part of the Work who is required to comply with such legislation.

GC1.10 NATIONAL SECURITY

1) If the NCC determines that the Work is of a class or kind that involves national security, the NCC may order the Contractor to:

(a) provide the NCC with any information concerning persons employed or to be employed by the Contractor for purposes of the Contract; and

(b) remove any person from the site of the Work if, in the opinion of the NCC, that person may be a risk to the national security;

and the Contractor shall comply with the order.

2) In all contracts with persons who are to be employed in the performance of the Contract, the Contractor shall make provision for the performance of any obligation that may be imposed upon the Contractor under paragraph 1) of GC1.10.

GC1.11 UNSUITABLE WORKERS

1) The NCC shall instruct the Contractor to remove from the site of the Work any person employed by the Contractor for purposes of the Contract who, in the opinion of the NCC, is incompetent or is guilty of improper conduct, and the Contractor shall not permit a person who has been removed to return to the site of the Work.

GC1.12 PUBLIC CEREMONIES AND SIGNS

1) The Contractor shall not permit any public ceremony in connection with the Work without the prior consent of the NCC.

2) The Contractor shall not erect nor permit the erection of any sign or advertising on the Work or its site without the prior consent of the NCC.

GC1.13 CONFLICT OF INTEREST

1) It is a term of the Contract that no individual, for whom the post-employment provisions of the Conflict of Interest and Post-Employment Code for Public Office Holders or the Values and Ethics Code for the Public Service apply, shall derive a direct benefit from the Contract unless that individual is in compliance with the applicable post-employment provisions.

GC1.14 AGREEMENTS AND AMENDMENTS

1) The Contract constitutes the entire and sole agreement between the parties with respect to the subject matter of the Contract and supersedes all previous negotiations, communications and other agreements, whether written or oral, relating to it, unless they are incorporated by reference in the Contract. There are no terms, covenants, representations, statements or conditions binding on the parties other than those contained in the Contract.

2) The failure of either party at any time to require performance by the other party of any provision hereof shall not affect the right thereafter to enforce such provision. Nor shall the waiver by either

party of any breach of any covenant, term or condition hereof be taken to be held to be a waiver of any further breach of the same covenant, term or condition.

3) The Contract may be amended only as provided for in the Contract.

GC1.15 SUCCESSION

1) The Contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and, subject to GC1.16 ASSIGNMENT, permitted assigns.

GC1.16 ASSIGNMENT

1) The Contractor shall not make any assignment of the Contract, either in whole or in part, without the written consent of the NCC.

GC1.17 NO BRIBE

1) The Contractor represents and covenants that no bribe, gift, benefit, nor other inducement has been nor shall be paid, given, promised or offered directly or indirectly to any official or employee of the NCC or to a member of the family of such a person, with a view to influencing the entry into the Contract or the administration of the Contract.

GC1.18 CERTIFICATION - CONTINGENCY FEES

1) In this clause:

(a) "contingency fee" means any payment or other compensation that is contingent upon or is calculated upon the basis of a degree of success in soliciting or obtaining a Government contract or negotiating the whole or any part of its terms;

(b) "employee" means a person with whom the Contractor has an employer/employee relationship; and

(c) "person" includes an individual or a group of individuals, a corporation, a partnership, an organization and an association and, without restricting the generality of the foregoing, includes any individual who is required to file a return with the registrar pursuant to section 5 of the Lobbyists Registration Act R.S.C. 1985 c.44 (4th Supplement) as the same may be amended from time to time.

2) The Contractor certifies that it has not directly or indirectly paid nor agreed to pay and covenants that it shall not directly or indirectly pay nor agree to pay a contingency fee for the solicitation, negotiation or obtaining of the Contract to any person other than an employee acting in the normal course of the employee's duties.

3) All accounts and records pertaining to payments of fees or other compensation for the solicitation, obtaining or negotiation of the Contract shall be subject to the accounts and audit provisions of the Contract.

4) If the Contractor certifies falsely under this section or is in default of the obligations contained therein, the NCC may either take the Work out of the Contractor's hands in accordance with the provisions of the Contract or recover from the Contractor by way of reduction to the Contract Amount or otherwise, the full amount of the contingency fee.

GC1.19 INTERNATIONAL SANCTIONS

1) Persons and companies in Canada, and Canadians outside of Canada are bound by economic sanctions imposed by the Government of Canada. As a result, the the NCC cannot accept delivery of goods or services that originate, either directly or indirectly, from the countries or persons subject to economic sanctions.
Details on existing sanctions can be found at:
http://www.dfait-maeci.gc.ca/trade/sanctions-en.asp.

2) It is a condition of the Contract that the Contractor not supply to the NCC any goods or services which are subject to economic sanctions.

3) By law, the Contractor must comply with changes to the regulations imposed during the life of the Contract. During the performance of the Contract should the imposition of sanctions against a country or person or the addition of a good or service to the list of sanctioned goods or services cause an impossibility of performance for the Contractor, the Contractor may request that the Contract be terminated in accordance with GC7.3 TERMINATION OF CONTRACT.

GC2 ADMINISTRATION OF THE CONTRACT

GC2.1 NCC REPRESENTATIVE'S AUTHORITY

1) The NCC shall designate an NCC Representative and shall notify the Contractor of the name, address and telephone number of the NCC Representative.

2) The NCC Representative shall perform the NCC's duties and functions under the contract.

3) The NCC Representative shall be authorized to issue notices, instructions and directions to the Contractor and to accept on behalf of the NCC any notice, order or other communication from the contractor relating to the Work.

4) The NCC Representative shall, within a reasonable time, review and respond to submissions made by the Contractor in accordance with the requirements of the Contract.

GC2.2 INTERPRETATION OF CONTRACT

1) If, at any time before the NCC has issued a Certificate of Completion, any question arises between the parties about whether anything has been done as required by the Contract or about what the Contractor is required by the Contract to do, and in particular but without limiting the generality of the foregoing, about:

   (a) the meaning of anything in the drawings and specifications;

   (b) the meaning to be given to the drawings and specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their wording or intention;

   (c) whether or not the quality or quantity of any Material or workmanship supplied or proposed to be supplied by the Contractor meets the requirements of the Contract;

   (d) whether or not the labour, Plant or Material performed, used and supplied by the Contractor for performing the Work and carrying out the Contract are adequate to ensure that the Work shall be performed in accordance with the Contract and that the Contract shall be carried out in accordance with its terms;

   (e) what quantity of any of the Work has been completed by the Contractor; or

   (f) the timing and scheduling of the various phases of the performance of the Work as specified in the Contract;

   the question shall be decided, subject to the provisions of GC8 DISPUTE RESOLUTION, by the NCC.

2) The Contractor shall perform the Work in accordance with any decisions of the NCC that are made under paragraph 1) of GC2.2 and in accordance with any consequential directions given by the NCC.

3) If the Contractor fails to comply with any instruction or direction issued by the NCC pursuant to the Contract, the NCC may employ such methods as the NCC deems advisable to do what the Contractor failed to do, and the Contractor shall, on demand, pay the NCC an amount that is equal to the aggregate of all costs, expenses and damages incurred or sustained by the NCC by reason of the Contractor's failure to comply with such instruction or direction, including the cost of any methods employed by the NCC in doing what the Contractor failed to do.

GC2.3 NOTICES

1) Subject to paragraph 3) of GC2.3, any notice, order or other communication may be given in any manner, and if required to be in writing, shall be addressed to the party to whom it is intended at the address in the Contract or at the last address of which the sender has received written notice in accordance with this section.

2) Any notice, order or other communication given in writing in accordance with paragraph 1) of GC2.3 shall be deemed to have been received by either party:

   (a) if delivered personally, on the day that it was delivered;

   (b) if forwarded by mail, on the earlier of the day it was received or the sixth day after it was mailed; and

   (c) if forwarded by facsimile or electronic mail, 24 hours after it was transmitted.

3) A notice given under GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS, GC7.2 SUSPENSION OF WORK, and GC7.3 TERMINATION OF CONTRACT shall be given in writing and, if delivered personally, shall be delivered, if the Contractor is a sole proprietor, to the Contractor or, if the Contractor is a partnership or corporation, to an officer thereof.

GC2.4 SITE MEETINGS

1) In consultation with the NCC, the Contractor shall arrange site meetings at regular intervals, with all involved parties who are to attend, in order to ensure, among other things, the proper co-ordination of the Work.

GC2.5 REVIEW AND INSPECTION OF WORK

1) The NCC shall review the Work to determine if it is proceeding in conformity with the Contract and to record the necessary data to make an assessment of the value of Work completed. The NCC shall measure and record the quantities of labour, Plant and Material performed, used or supplied by the Contractor in performing the Work or any part thereof that is subject to a Unit Price Arrangement and, on request, shall inform the Contractor of those measurements, and permit the Contractor to inspect any records pertaining thereto.

2) The NCC shall reject Work or Material which in the NCC's opinion does not conform to the requirements of the Contract, and shall require inspection or testing of Work, whether or not such Work is fabricated, installed, or completed. If such Work is not in accordance with the requirements of the Contract, the Contractor shall correct the Work and shall pay the NCC, on demand, all reasonable costs and expenses that were incurred by the NCC in having the examination performed.

3) The Contractor shall provide the NCC with access to the Work and its site at all times, and at all times shall provide sufficient, safe, and proper facilities for the review and inspection of the Work by persons authorized by the NCC and any representatives of those authorities having jurisdiction. If parts of the Work are in preparation at locations other than the site of the Work, the NCC shall be given access to such Work whenever it is in progress.

4) The Contractor shall furnish the NCC with such information respecting the performance of the Contract as the NCC may require, and render every possible assistance to enable the NCC to verify that the Work is performed in accordance with the Contract, carry out any other duties and exercise any powers in accordance with the Contract.

5) If Work is designated for tests, inspections, or approvals in the Contract or by the NCC's instructions, or by laws or ordinances of the place of the Work, the Contractor shall give the NCC reasonable notice of when such Work shall be ready for review and inspection. The Contractor shall arrange for and shall give the NCC reasonable notice of the date and time of inspections, tests or approvals.

6) If the Contractor covers, or permits to be covered, Work that has been designated for tests, inspections or approvals before such tests, inspections or approvals are made, completed or given, the Contractor shall, if so directed by the NCC, uncover such Work, have the inspections, tests or approvals satisfactorily made, completed or given and make good the covering of the Work at the Contractor's expense.

GC2.6 SUPERINTENDENT

1) Prior to commencing the Work, the Contractor shall designate a Superintendent and shall notify the NCC of the name, address and telephone number of the Superintendent. The Contractor shall keep the Superintendent at the Work site during working hours until the Work has reached completion.

2) The Superintendent shall be in full charge of the operations of the Contractor during the performance of the Work and shall be authorized to accept on behalf of the Contractor any notice, order or other communication given to the Superintendent or the Contractor relating to the Work.

3) Upon request of the NCC, the Contractor shall remove any Superintendent who, in the opinion of the NCC, is incompetent or has been guilty of improper conduct, and shall forthwith designate another Superintendent who is acceptable to the NCC.

4) The Contractor shall not substitute a Superintendent without the written consent of the NCC. If a Superintendent is substituted without such consent, the NCC shall be entitled to refuse to issue any documentation or certification relating to progress payments, Substantial Performance or Completion of the Work until the Superintendent has returned to the Work site or another Superintendent who is acceptable to the NCC has been substituted.

GC2.7 NON-DISCRIMINATION IN HIRING AND EMPLOYMENT OF LABOUR

1) For the purposes of this clause, “persons" include the Contractor, its subcontractors and suppliers at any tier and their respective employees, agents, licensees or invitees and any other individual involved in the performance of the Work or granted access to the Work site. A “person” includes any partnership, proprietorship, firm, joint venture, consortium and corporation.

2) Without restricting the provisions of paragraph 3) of GC2.6, SUPERINTENDENT, the Contractor shall not refuse to employ and shall not discriminate in any manner against any person because:

   (a) of that person's race, national origin, colour, religion, age, sex or marital status;

   (b) of the race, national origin, colour, religion, age, sex, or marital status of any person having any relationship or association with that person; or

   (c) a complaint has been made or information has been given by or in respect of that person relating to an alleged failure by the Contractor to comply with subparagraphs 2)(a) and 2)(b) of GC2.7.

3) Within two Working Days immediately following receipt of a written complaint pursuant to paragraph 2) of GC2.7, the Contractor shall:

(a) cause to have issued a written direction to the person or persons named by the complainant to cease all actions that form the basis of the complaint;

(b) forward a copy of the complaint to the NCC by registered mail or courier service; and

(c) when the Labour Conditions are applicable under the circumstances of the complaint, forward a copy of the complaint to HRSDC - Labour to the attention of the appropriate Director as described in the Labour Conditions ("HRSDC - Labour" means the labour component of the federal Department of Human Resources and Skills Development).

4) Within twenty four (24) hours immediately following receipt of a direction from the NCC to do so, the Contractor shall cause to have removed from the site of the Work and from the performance of Work under the Contract, any person or persons whom the NCC believes to be in breach of the provisions of paragraph 2) of GC2.7.

5) No later than thirty (30) days after receipt of the direction referred to in paragraph 4) of GC2.7, the Contractor shall cause the necessary action to be commenced to remedy the breach described in the direction.

6) If a direction is issued pursuant to paragraph 4) of GC2.7, the NCC may withhold from monies that are due and payable to the Contractor or setoff pursuant to GC5.9 RIGHT OF SETOFF, whichever is applicable, an amount representing the sum of the costs and payment referred to in paragraph 8) of GC2.7.

7) If the Contractor fails to proceed in accordance with paragraph 5) of GC2.7, the NCC shall take the necessary action to have the breach remedied, and shall determine all supplementary costs incurred by the NCC as a result.

8) The NCC may make a payment directly to the complainant from monies that are due and payable to the Contractor upon receipt from the complainant of:

(a) a written award issued pursuant to the federal Commercial Arbitration Act, R.S.C. 1985, c. 17 (2nd Supp.);

(b) a written award issued pursuant to the Canadian Human Rights Act, RS.C. 1985, c. H-6;

(c) a written award issued pursuant to provincial or territorial human rights legislation; or

(d) a judgement issued by a court of competent jurisdiction.

9) If the NCC is of the opinion that the Contractor has breached any of the provisions of this clause, the NCC may take the Work out of the Contractor's hands pursuant to GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS.

10) Subject to paragraph 7) of GC3.6 SUBCONTRACTING, the Contractor shall ensure that the provisions of this clause are included in all agreements and contracts entered into as a consequence of the Work.

GC2.8 ACCOUNTS AND AUDITS

1) The Contractor shall, in addition to the requirements expressed in paragraph 6) of GC3.4 EXECUTION OF THE WORK, maintain full records of the Contractor's estimated and actual cost of the Work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto, and shall make them available on request to audit and inspection by the NCC or by persons designated to act on behalf of the NCC.

2) The Contractor shall allow any of the persons referred to in paragraph 1) of GC2.8 to make copies of and take extracts from any of the records and material, and shall furnish such persons or entities with any information those persons or entities may require from time to time in connection with such records and material.

3) The Contractor shall maintain and keep the records intact until the expiration of two years after the date that a Certificate of Completion has been issued or until the expiration of such other period of time as the NCC may direct.

4) The Contractor shall cause all subcontractors at any tier and all other persons directly or indirectly controlled by or affiliated with the Contractor and all persons directly or indirectly having control of the Contractor to comply with the requirements of this clause as if they were the Contractor.

GC3.1 PROGRESS SCHEDULE

1) The Contractor shall:

   (a) prepare and submit to the NCC, prior to the submission of the Contractor's first progress claim, a progress schedule in accordance with the requirements set out in the Contract;

   (b) monitor the progress of the Work relative to the schedule and update the schedule as stipulated by the contract documents;

   (c) advise the NCC of any revisions to the schedule required as the result of any extension of time for completion of the Contract that was approved by the NCC; and

   (d) prepare and submit to the NCC, at the time of issuance of an Certificate of Substantial Performance, an update of any schedule clearly showing a detailed timetable that is acceptable to the NCC for the completion of any unfinished Work and the correction of all listed defects.

GC3.2 ERRORS AND OMISSIONS

1) The Contractor shall report promptly to the NCC any errors, discrepancies, or omissions the Contractor may discover when reviewing the contract documents. In making a review, the Contractor does not assume any responsibility to the NCC for the accuracy of the review. The Contractor shall not be liable for damage or costs resulting from such errors, discrepancies, or omissions in the contract documents prepared by or on behalf of the NCC that the Contractor did not discover.

GC3.3 CONSTRUCTION SAFETY

1) Subject to GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS, the Contractor shall be solely responsible for construction safety at the place of the Work and for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work. In any emergency, the Contractor shall either, stop the Work, make changes or order extra work to ensure the safety of life and the protection of the Work and neighbouring property.

2) Prior to commencing the Work, the Contractor shall notify the authorities having jurisdiction for construction safety at the site of the Work with respect to the intended commencement of the Work, and shall provide such authority with whatever additional information may be required by that authority.

GC3.4 EXECUTION OF THE WORK

1) The Contractor shall perform, use or supply and pay for, all labour, Plant, Material, tools, construction machinery and equipment, water, heat, light, power, transportation and other facilities and services necessary for the performance of the Work in accordance with the Contract.

2) The Contractor shall, at all times, perform the Work in a proper, diligent and expeditious manner as is consistent with construction industry standards and in accordance with the progress schedule prepared pursuant to GC3.1 PROGRESS SCHEDULE and shall provide sufficient personnel to fulfil the Contractor's obligations in accordance with that schedule.

3) Subject to paragraph 4) of GC3.4, the Contractor shall have complete care, custody and control of the Work and shall direct and supervise the Work so as to ensure compliance with the Contract. The Contractor shall be responsible for construction means, methods, techniques, sequences and procedures and for co-ordinating the various parts of the Work.

4) When requested in writing by the NCC, the Contractor shall make appropriate alterations in the method, Plant or workforce at any time the NCC considers the Contractor's actions to be unsafe or damaging to either the Work, existing facilities, persons at the site of the Work or the environment.

5) The Contractor shall have sole responsibility for the design, erection, operation, maintenance and removal of temporary structures and other temporary facilities and for the construction methods used in their erection, operation, maintenance and removal. The Contractor shall engage and pay for registered professional engineering personnel, skilled in the appropriate discipline to perform these functions if required by law or by the Contract, and in all cases when such temporary facilities and their methods of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.

6) The Contractor shall keep at least one copy of current contract documents, submittals, reports, and records of meetings at the site of the Work, in good order and available to the NCC.

7) Except for any part of the Work that is necessarily performed away from or off the site of the Work, the Contractor shall confine Plant, storage of Material, and operations of employees to limits indicated by laws, ordinances, permits or the contract documents.

GC3.5 MATERIAL

1) Unless otherwise specified in the Contract, all Material incorporated in the Work shall be new.

2) Subject to paragraph 3) of GC3.5, if a specified reused, refurbished, or recycled item of Material is not available, the Contractor shall apply to the NCC to substitute a similar item for the one specified.

3) If the NCC agrees that the Contractor's application for substitution of a reused, refurbished or recycled item is warranted, and that the substitute item is of acceptable quality and value to that specified and is suitable for the intended purpose, the NCC may approve the substitution, subject to the following:

   (a) the request for substitution shall be made in writing to the NCC and shall be substantiated by information in the form of the manufacturer's literature, samples and other data that may be required by the NCC;

   (b) the Contractor shall make the request for substitution in a manner that shall not negatively affect the progress schedule of the Contract and well in advance of the time the item of Material must be ordered;

(c) substitution of Material shall be permitted only with the prior written approval of the NCC, and any substituted items that are supplied or installed without such approval shall be removed from the site of the Work at the expense of the Contractor, and specified items installed at no additional cost to the NCC; and

(d) the Contractor shall be responsible for all additional expenses incurred by the NCC, the Contractor, its subcontractors and suppliers at any tier due to the Contractor's use of the substitute.

GC3.6 SUBCONTRACTING

1) Subject to the provisions of this clause, the Contractor may subcontract any part of the Work but not the whole of the Work.

2) The Contractor shall notify the NCC in writing of the Contractor's intention to subcontract.

3) A notification referred to in paragraph 2) of GC3.6 shall identify the part of the Work and the Subcontractor with whom the Contractor intends to subcontract.

4) The NCC may for reasonable cause, object to the intended subcontracting by notifying the Contractor in writing within six (6) days of receipt by the NCC of a notification referred to in paragraph 2) of GC3.6.

5) If the NCC objects to a subcontracting, the Contractor shall not enter into the intended subcontract.

6) The Contractor shall not change, nor permit to be changed, a Subcontractor engaged by the Contractor, in accordance with this clause, without the written consent of the NCC.

7) The Contractor shall ensure that all the terms and conditions of the Contract that are of general application shall be incorporated in every other contract issued as a consequence of the Contract, at whatever tier, except those contracts issued solely to suppliers at any tier for the supply of Plant or Material.

8) Neither a subcontracting nor the NCC's consent to a subcontracting shall be construed to relieve the Contractor from any obligation under the Contract or to impose any liability upon the NCC.

GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS

1) The NCC reserves the right to send other contractors or workers, with or without Plant and Material, onto the site of the Work.

2) When other contractors or workers are sent on to the site of the Work, the NCC shall:

(a) enter into separate contracts, to the extent it is possible, with the other contractors under conditions of contract that are compatible with the conditions of the Contract;

(b) ensure that the insurance coverage provided by the other contractors is co-ordinated with the insurance coverage of the Contractor as it affects the Work; and

(c) take all reasonable precautions to avoid labour disputes or other disputes arising from the work of the other contractors or workers.

3) When other contractors or workers are sent on to the site of the Work, the Contractor shall:

(a) co-operate with them in the carrying out of their duties and obligations;

(b) co-ordinate and schedule the Work with the work of the other contractors and workers;

(c) participate with other contractors and workers in reviewing their construction schedules when directed to do so;

(d) where part of the Work is affected by or depends upon the work of other contractors or workers for its proper execution, promptly report to the NCC in writing and prior to proceeding with that part of the Work, any apparent deficiencies in such work. Failure by the Contractor to so report shall invalidate any claims against the NCC by reason of the deficiencies in the work of other contractors or workers except those deficiencies that are not then reasonably discoverable; and

(e) when designated as being responsible for construction safety at the place for work, in accordance with the applicable provincial or territorial laws, carry out its duties in that role and in accordance with those laws.

4) If, when entering into the Contract, the Contractor could not have reasonably foreseen nor anticipated the sending of other contractors or workers on to the site of the Work and provided the Contractor:

(a) incurs extra expense in complying with the requirements of paragraph 3) of GC3.7; and

(b) gives the NCC written notice of a claim for that extra expense within thirty (30) days of the date that the other contractors or workers were sent onto the Work or its site,

the NCC shall pay the Contractor the cost of the extra labour, Plant and Material that was necessarily incurred, calculated in accordance with GC6.4 DETERMINATION OF PRICE.

GC3.8 LABOUR

1) The Contractor shall maintain good order and discipline among the Contractor's employees and workers engaged in the Work shall not employ, on the site of the Work, anyone not skilled in the tasks assigned.

GC3.9 TRUCK HAULAGE RATES

CANCELLED

GC3.10 MATERIAL, PLANT AND REAL PROPERTY BECOME PROPERTY OF THE NCC

1) Subject to paragraph 9) of GC1.8 LAWS PERMITS AND TAXES, all Material and Plant and the interest of the Contractor in all real property, licences, powers and privileges purchased, used or consumed by the Contractor for the Work shall, immediately after the time of their purchase, use or consumption be the property of the NCC for the purposes of the Work and they shall continue to be the property of the NCC:

(a) in the case of Material, until the NCC indicates that the Materials shall not be required for the Work; and

(b) in the case of Plant, real property, licences, powers and privileges, until the NCC indicates that the interest vested in the NCC therein is no longer required for the purposes of the Work.

2) Material or Plant, that is the property of the NCC by virtue of paragraph 1) of GC3.10, shall not be taken away from the site of the Work nor used nor disposed of except for the purposes of the Work without the written consent of the NCC.

3) The NCC is not liable for loss of nor damage from any cause to the Material or Plant referred to in paragraph 1) of GC3.10, and the Contractor is liable for such loss or damage notwithstanding that the Material or Plant is the property of the NCC.

GC3.11 DEFECTIVE WORK

1) The Contractor shall promptly remove from the site of the Work and replace or re-execute defective Work whether or not the defective Work has been incorporated in the Work and whether or not the defect is the result of poor workmanship, use of defective Material, or damage through carelessness or other act or omission of the Contractor.

2) The Contractor, at the Contractor's expense, shall promptly make good other work destroyed or damaged by such removals or replacements.

3) If, in the opinion of the NCC, it is not expedient to correct defective Work or Work not performed as provided for in the Contract documents, the NCC may deduct from the amount otherwise due to the Contractor the difference in value between the Work as performed and that called for by the Contract documents.

4) The failure of the NCC to reject any defective Work or Material shall not constitute acceptance of the defective Work or Material.

GC3.12 CLEANUP OF SITE

1) The Contractor shall maintain the Work and its site in a tidy condition and free from an accumulation of waste material and debris.

2) Before the issue of a Certificate of Substantial Performance, the Contractor shall remove waste material and debris, and all Plant and Material not required for the performance of the remaining Work and, unless otherwise stipulated in the Contract Documents, shall cause the Work and its site to be clean and suitable for occupancy by the NCC.

3) Before the issue of a Certificate of Completion, the Contractor shall remove all surplus Plant and Materials and any waste products and debris from the site of the Work.

4) The Contractor's obligations described in paragraphs 1) to 3) of GC3.12 do not extend to waste products and other debris caused by the NCC's servants, or by other contractors and workers referred to in GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS.

GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK

1) Without restricting any warranty or guarantee implied or imposed by law or contained in the Contract, the Contractor shall, at the Contractor's expense:

   (a) rectify and make good any defect or fault that appears in the Work or comes to the attention of the NCC with respect to those parts of the Work accepted in connection with the Certificate of Substantial Performance within 12 months from the date of Substantial Performance; and

   (b) rectify and make good any defect or fault that appears in or comes to the attention of the NCC in connection with those parts of the Work described in the Certificate of Substantial Performance within 12 months from the date of the Certificate of Completion;

   (c) transfer and assign, to the NCC, any subcontractor, manufacturer or supplier extended warranties or guarantees implied or imposed by law or contained in the Contract covering periods beyond the 12 months stipulated above. Extended warranties or guarantees referred to

herein shall not extend the 12-month period whereby the Contractor, except as may be provided elsewhere in the Contract, must rectify and make good any defect or fault that appears in the Work or comes to the attention of the NCC;

(d) provide, to the NCC prior to the issuance of the Certificate of Completion, a list of all extended warranties and guarantees referred to in paragraph (c) above.

2) The NCC may direct the Contractor to rectify and make good any defect or fault referred to in paragraph 1) of GC3.13 or covered by any other expressed or implied warranty or guarantee and the Contractor shall rectify and make good such defect within the time stipulated in the direction.

3) A direction referred to in paragraph 2) GC3.13 shall be in writing and shall be given to the Contractor in accordance with GC2.3 NOTICES.

GC4.1 PROTECTION OF WORK AND PROPERTY

1) The Contractor shall protect the Work and its site against loss or damage from any cause and shall similarly protect all Material, Plant and real property under the Contractor's care, custody and control whether or not such Material, Plant and real property are supplied by the NCC to the Contractor.

2) The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by the NCC to inspect or to take security measures in respect of the Work and its site.

3) The NCC may direct the Contractor to do such things and to perform such work as the NCC considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraphs 1) or 2) of GC4.1, and the Contractor, shall comply with such direction.

GC4.2 PRECAUTIONS AGAINST DAMAGE, INFRINGEMENT OF RIGHTS, FIRE AND OTHER HAZARDS

1) The Contractor shall do whatever is necessary to ensure that:

   (a) no person, property, right, easement nor privilege is injured, damaged or infringed upon by reasons of the Contractor's activities in performing the Work;

   (b) pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted nor endangered by the performance or existence of the Work, Material or Plant;

   (c) fire hazards in or about the site of the Work are eliminated and any fire is promptly extinguished;

   (d) the health and safety of all persons employed in the performance of the Work is not endangered by the methods nor means of their performance;

   (e) adequate medical services are available to all persons employed on the Work or its site at all times during the performance of the Work;

   (f) adequate sanitation measures are taken in respect of the Work and its site; and

   (g) all stakes, buoys and marks placed on the Work or its site by the NCC are protected and are not removed, defaced, altered nor destroyed.

2) The NCC may direct the Contractor to do such things and to perform such work as the NCC considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraph 1) of GC4.2, and the Contractor shall comply with the direction of the NCC.

GC4.3 MATERIAL, PLANT AND REAL PROPERTY SUPPLIED BY THE NCC

1) Subject to paragraph 2) of GC4.3, the Contractor is liable to the NCC for any loss of or damage to Material, Plant or real property that is supplied or placed in the care, custody and control of the Contractor by the NCC for use in connection with the Contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.

2) The Contractor is not liable to the NCC for any loss or damage to Material, Plant or real property referred to in paragraph 1) of GC4.3 if that loss or damage results from and is directly attributable to reasonable wear and tear.

3) The Contractor shall not use any Material, Plant or real property supplied by the NCC except for the purpose of performing the Contract.

4) When the Contractor fails to make good any loss or damage for which the Contractor is liable under paragraph 1) within a reasonable time, the NCC may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to the NCC for the cost thereof and shall, on demand, pay to the NCC an amount equal to that cost.

5) The Contractor shall keep records of all Material, Plant and real property supplied by the NCC as the NCC requires and shall satisfy the NCC, when requested, that such Material, Plant and real property are at the place and in the condition in which they ought to be.

GC4.4 CONTAMINATED SITE CONDITIONS

1) For the purposes of GC4.4, a contaminated site condition exists when a solid, liquid, gaseous, thermal or radioactive irritant or contaminant, or other hazardous or toxic substance or material, including moulds and other forms of fungi, is present at the site of the Work to an extent that constitutes a hazard, or potential hazard, to the environment, property, or the health or safety of any person.

2) If the Contractor encounters a contaminated site condition of which the Contractor is not aware or about which the Contractor has not been advised, or if the Contractor has reasonable grounds to believe that such a site condition exists at the site of the Work, the Contractor shall:

   (a) take all reasonable steps, including stopping the Work, to ensure that no person suffers injury, sickness or death, and that neither property nor the environment is injured or destroyed as a result of the contaminated site condition;

   (b) immediately notify the NCC of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification from the Contractor, the NCC shall promptly determine whether a contaminated site condition exists, and shall notify the Contractor in writing of any action to be taken, or work to be performed, by the Contractor as a result of the NCC's determination.

4) If the Contractor's services are required by the NCC, the Contractor shall follow the direction of the NCC with regard to any excavation, treatment, removal and disposal of any polluting substance or material.

5) The NCC, at the NCC's sole discretion, may enlist the services of experts and specialty contractors to assist in determining the existence of, and the extent and treatment of contaminated site conditions, and the Contractor shall allow them access and co-operate with them in the carrying out of their duties and obligations.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE shall apply to any additional work made necessary because of a contaminated site condition.

GC5.1 INTERPRETATION

In these Terms of Payment

1) The "payment period" means a period of 30 consecutive days or such other longer period as may be agreed between the Contractor and the NCC.

2) An amount is "due and payable" when it is due and payable by the NCC to the Contractor according to GC5.4 PROGRESS PAYMENT, GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK or GC5.6 FINAL COMPLETION.

3) An amount is overdue when it remains unpaid on the first day following the day upon which it is due and payable.

4) The "date of payment" means the date of the negotiable instrument of an amount due and payable by the NCC.

5) The "Bank Rate" means the rate of interest established by the Bank of Canada as the minimum rate at which it makes short term advances to members of the Canadian Payments Association.

6) The "Average Bank Rate" means the simple arithmetic mean of the Bank Rate in effect at 4:00 p.m. Ottawa Time each day during the calendar month which immediately precedes the calendar month in which payment is made.

GC5.2 AMOUNT PAYABLE

1) Subject to any other provisions of the Contract, the NCC shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which the amounts payable by the NCC to the Contractor in accordance with the Contract exceed the amounts payable by the Contractor to the NCC, and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by the Contractor in respect of the Work to which the payment relates.

2) When making any payment to the Contractor, the failure of the NCC to deduct an amount payable to the NCC by the Contractor shall not constitute a waiver of the right to do so, or an admission of lack of entitlement to do so in any subsequent payment to the Contractor.

3) No payment other than a payment that is expressly stipulated in the Contract, shall be made by the NCC to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.

GC5.3 INCREASED OR DECREASED COSTS

1) The Contract Amount shall not be increased nor decreased by reason of any increase or decrease in the cost of the Work that is brought about by an increase or decrease in the cost of labour, Plant, Material or any wage adjustment arising pursuant to the Labour Conditions.

2) Notwithstanding paragraph 1) of GC5.3, if any change, including a new imposition or repeal, of any tax, customs or other duty, charge, or any similar imposition that is imposed under sales, customs or excise tax legislation of the Government of Canada or any Provincial or Territorial legislation, affects the cost of the Work to the Contractor, and occurs:

   (a) after the date of submission by the Contractor of its tender; or

   (b) after the date of submission of the last revision, if the Contractor's tender was revised,

   the Contract Amount shall be adjusted in the manner provided in paragraph 3) of GC5.3.

3) If a change referred to in paragraph 2) of GC5.3 occurs, the Contract Amount shall be increased or decreased by an amount established by an examination by the NCC of the relevant records of the Contractor referred to in GC2.8 ACCOUNTS AND AUDITS to be the increase or decrease in the cost incurred by the Contractor that is directly attributable to that change.

4) For the purpose of paragraph 2) of GC5.3, if a tax is changed after the tender closing, but public notice of the change has been given by the Minister of Finance or the corresponding Provincial or Territorial authority before that closing, the change shall be deemed to have occurred before the solicitation closing.

5) Notwithstanding paragraphs 2) to 4) of GC5.3, no adjustment to the Contract Amount in respect of the Work or a part thereof shall be made for a change in any imposition referred to in this section that occurs after the date required by the Contract for completion of the Work or that part of the Work.

GC5.4 PROGRESS PAYMENT

1) On the expiration of a payment period, the Contractor shall deliver to the NCC:

   (a) a written progress claim in a form acceptable to the NCC that fully describes any part of the Work that has been completed, and any Material that was delivered to the Work site but not incorporated into the Work, during that payment period: and

   (b) a completed and signed statutory declaration containing a declaration that, up to the date of the progress claim, the Contractor has complied with all lawful obligations with respect to the Labour Conditions and that, in respect of the Work, all lawful obligations of the Contractor to its Subcontractors and Suppliers, referred to collectively in the declaration as "subcontractors and suppliers", have been fully discharged.

2) Within 10 days of receipt of a progress claim and statutory declaration from the Contractor, the NCC shall inspect, or cause to have inspected, the part of the Work and the Material described in the progress claim, and shall issue a progress report to the Contractor, that indicates the value of the part of the Work and the Material described in the progress claim that, in the opinion of the NCC:

   (a) is in accordance with the Contract; and

   (b) was not included in any other progress report relating to the Contract.

3) Subject to GC5.2 AMOUNT PAYABLE, and paragraph 5) of GC5.4, the NCC shall pay the Contractor an amount that is equal to:

   (a) 95% of the value that is indicated in the NCC's progress report if a labour and material payment bond has been furnished by the Contractor; or

   (b) 90% of the value that is indicated in the NCC's progress report if a labour and material payment bond has not been furnished by the Contractor.

4) Subject to GC5.2, "Amount Payable", and paragraph 5) of GC5.4, the NCC shall pay the Contractor an amount that is equal to 90% of the value that is indicated in the NCC's progress report

5) In the case of the Contractor's first progress claim, it is a condition precedent to the NCC's obligation under paragraph 3) of GC5.4 that the Contractor has provided all necessary documentation required by the Contract for the first progress claim and has provided evidence of compliance with workers' compensation legislation applicable to the place of the Work in accordance with GC1.9 WORKERS' COMPENSATION.

GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK

1) If, at any time before the issuance of a Certificate of Completion, the NCC determines that the Work has reached Substantial Performance as described in subparagraph 1) (b) of GC1.1.4 SUBSTANTIAL PERFORMANCE, the NCC shall issue a Certificate of Substantial Performance to the Contractor. The Certificate of Substantial Performance shall state or describe:

   (a) the date of Substantial Performance;

   (b) the parts of the Work not completed to the satisfaction of the NCC; and

   (c) all things that must be done by the Contractor before a Certificate of Completion is issued and before the 12-month warranty period referred to in GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK commences for the said parts and all the said things.

2) The issuance of a Certificate of Substantial Performance does not relieve the Contractor from the Contractor's obligations under GC3.11 DEFECTIVE WORK.

3) Subject to GC5.2 AMOUNT PAYABLE and paragraph 4) of GC5.5, the NCC shall pay the Contractor the amount referred to in paragraph 1) of GC5.2 AMOUNT PAYABLE, less the aggregate of:

   (a) the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT;

   (b) an amount that is equal to the NCC's estimate of the cost to the NCC of rectifying defects described in the Certificate of Substantial Performance; and

   (c) an amount that is equal to the NCC's estimate of the cost to the NCC of completing the parts of the Work described in the Certificate of Substantial Performance other than defects listed therein.

4) The NCC shall pay the amount referred to in paragraph 3) of GC5.5 not later than:

   (a) 30 days after the date of issue of a Certificate of Substantial Performance, or

   (b) 15 days after the Contractor has delivered to the NCC:

(i) a statutory declaration containing a declaration by the Contractor that up to the date of the Certificate of Substantial Performance, the Contractor has complied with all lawful obligations with respect to the Labour Conditions, discharged all its lawful obligations to its Subcontractors and Suppliers in respect of the work under the Contract, and discharged its lawful obligations referred to in GC1.8 LAWS, PERMITS AND TAXES;

(ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION; and

(iii) an update of the progress schedule in accordance with the requirements of GC3.1 PROGRESS SCHEDULE;

whichever is later.

GC5.6 FINAL COMPLETION

1) When the NCC is of the opinion that the Contractor has complied with the Contract and all orders and directions made pursuant thereto, and that the Work has been completed as described in GC1.1.5 COMPLETION, the NCC shall issue a Certificate of Completion to the Contractor and, if the Work or a portion of the Work is subject to a Unit Price Arrangement, the NCC shall issue a Certificate of Measurement that shall, subject to GC8, be binding upon and conclusive between the NCC and the Contractor as to the quantities referred to therein.

2) Subject to GC5.2 AMOUNT PAYABLE and paragraph 3) of GC5.6, the NCC shall pay the Contractor the amount referred to in GC5.2 AMOUNT PAYABLE, less the aggregate of the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT and GC5.5 SUBSTANTIAL PERFORMANCE OF WORK.

3) The NCC shall pay the amount referred to in paragraph 2) of GC5.6 not later than:

(a) 60 days after the date of issue of a Certificate of Completion; or

(b) 15 days after the Contractor has delivered to the NCC:

(i) a statutory declaration which contains a declaration by the Contractor that all of the Contractor's lawful obligations and any lawful claims against the Contractor that arose out of the performance of the Contract have been discharged and satisfied; and

(ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION;

whichever is later.

GC5.7 PAYMENT NOT BINDING ON NCC

1) Neither acceptance of a progress claim or progress report, nor any payment made by the NCC under the Contract, nor partial or entire use or occupancy of the Work by the NCC shall constitute an acceptance by the NCC of any portion of the Work or Material that is not in accordance with the requirements of the Contract.

GC5.8 CLAIMS AND OBLIGATIONS

1) The Contractor shall discharge all the Contractor's lawful obligations and shall satisfy all lawful claims against the Contractor arising out of the performance of the Work at least as often as the Contract requires the NCC to pay the Contractor.

2) Whenever requested to do so by the NCC, the Contractor shall make a statutory declaration declaring to the existence and condition of any obligations and claims against the Contractor arising out of the performance of the Work.

3) In order to discharge lawful obligations of and satisfy lawful claims against the Contractor or its Subcontractors arising out of the performance of the Contract, the NCC may pay an amount that is due and payable to the Contractor directly to the claimant. Such payment is, to the extent of the payment, a discharge of the NCC's liability to the Contractor under the Contract and may be deducted from any amount payable to the Contractor under the Contract.

4) For the purposes of paragraph 3) of GC5.8, and subject to paragraph 6) of GC5.8, a claim or obligation shall be considered lawful when it is so determined by:

   (a) a court of legal jurisdiction;

   (b) an arbitrator duly appointed to arbitrate the claim; or

   (c) the written consent of the Contractor authorizing payment of the claim or obligation.

5) If a claim or obligation would have been subject to the provisions of Provincial or Territorial lien legislation or, in the Province of Quebec, the law relating to legal hypothecs had the Contractor been performing the Work for an entity other than the NCC:

   (a) such amount as may be paid by the NCC pursuant to paragraphs 3) and 4) of GC5.8 shall not exceed the amount that the Contractor would have been obliged to pay had the provisions of such legislation or law been applicable to the Work;

   (b) a claimant need not comply with the provisions of such legislation, setting out the steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which the claimant might have had; and

   (c) for the purposes of determining the entitlement of a claimant, the notice required by paragraph 8) of GC5.8 shall be deemed to replace the registration or provision of notice after the performance of work as required by any applicable legislation and no claim shall be deemed to have expired, become void or unenforceable by reason of the claimant not commencing any action within the time prescribed by such legislation.

6) The Contractor shall, at the request of any claimant, submit to binding arbitration those questions that need to be answered to establish the entitlement of the claimant to payment. The arbitration shall have as parties to it any Subcontractor or Supplier to whom the claimant supplied Material, performed work or rented equipment should such Subcontractor or Supplier wish to be adjoined, and the NCC shall not be a party to such arbitration. Subject to any agreement between the Contractor and the claimant, the arbitration shall be conducted in accordance with the governing Provincial or Territorial legislation applicable to the site of the Work.

7) Paragraph 3) of GC5.8 shall apply only to claims and obligations:

   (a) the notification of which has set forth the amount claimed to be owing and the person who by contract is primarily liable and has been received by the NCC in writing before final payment is made to the Contractor pursuant to GC5.6 FINAL COMPLETION, and within 120 days of the date on which the claimant:

(i) should have been paid in full under the claimant's contract with the Contractor, its Subcontractor or Supplier if the claim is for money that was lawfully required to be held back from the claimant; or

(ii) performed the last of the services, work or labour, or furnished the last of the Material pursuant to the claimant's contract with the Contractor or its Subcontractor or Supplier where the claim is for money not lawfully required to be held back from the claimant; and

(b) the proceedings to determine the right to payment of which, pursuant to paragraph 5) of GC5.8, shall have commenced within one year from the date that the notification required by subparagraph 7)(a) of GC5.8 was received by the NCC.

8) Upon receipt of a notice of claim, the NCC may withhold, from any amount that is due and payable to the Contractor pursuant to the Contract, the full amount of the claim or any portion thereof.

9) The NCC shall notify the Contractor in writing in a timely manner of receipt of any claim and of the intention of the NCC to withhold funds. At any time thereafter and until payment is made to the claimant, the Contractor may be entitled to post, with the NCC, security in a form acceptable to the NCC in an amount equal to the value of the claim, and upon receipt of such security the NCC shall release to the Contractor any funds that would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of this clause in respect of the claim of any claimant for whom the security stands.

GC5.9 RIGHT OF SETOFF

1) Without limiting any right of setoff or deduction given or implied by law or elsewhere in the Contract, the NCC may set off any amount payable to the NCC by the Contractor under the Contract, or under any current contract, against any amount payable to the Contractor under the Contract.

2) For the purposes of paragraph 1) of GC5.9, "current contract" means a contract between the NCC and the Contractor:

(a) under which the Contractor has an undischarged obligation to perform or supply work, labour or material; or

(b) in respect of which the NCC has, since the date of the Contract, exercised any right to take the work that is the subject of that contract out of the Contractor's hands.

GC5.10 ASSESSMENTS AND DAMAGES FOR LATE COMPLETION

1) For the purposes of this clause:

(a) the Work shall be deemed to be completed on the date of the Certificate of Completion; and

(b) the "period of delay" means the number of days commencing on the day fixed for completion of the Work and ending on the day immediately preceding the day on which the Work is completed but does not include any day within a period of extension granted pursuant to GC6.5 DELAYS AND EXTENSION OF TIME and any other day on which, in the opinion of the NCC, completion of the Work was delayed for reasons beyond the control of the Contractor.

2) If the Contractor does not complete the Work by the day fixed for its completion but completes it thereafter, the Contractor shall pay the NCC an amount equal to the aggregate of:

(a) all salaries, wages and travelling expenses incurred by the NCC in respect of persons overseeing the performance of the Work during the period of delay;

(b) the cost incurred by the NCC as a result of the inability to use the completed Work for the period of delay; and

(c) all other expenses and damages incurred or sustained by the NCC during the period of delay as a result of the Work not being completed by the day fixed for its completion.

3) The NCC may waive the right of the NCC to the whole or any part of the amount payable by the Contractor pursuant to paragraph 2) of GC5.10 if, in the opinion of the NCC, it is in the public interest to do so.

GC5.11 DELAY IN MAKING PAYMENT

1) Notwithstanding GC1.5 TIME OF THE ESSENCE, any delay by the NCC in making any payment when it is due pursuant to GC5 TERMS OF PAYMENT, shall not be a breach of the Contract by the NCC.

2) Subject to paragraph 3) of GC5.11, the NCC shall pay to the Contractor simple interest at the Average Bank Rate plus 3 percent per annum on any amount that is overdue pursuant to paragraph 3) of GC5.1 INTERPRETATION, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment.

3) Interest shall be paid, on demand by the Contractor, except that:

(a) in respect of amounts that are less than 15 days overdue, no interest shall be paid in respect of payment made within such 15 days; and

(b) interest shall not be payable or paid on overdue advance payments, if any.

GC5.12 INTEREST ON SETTLED CLAIMS

1) For the purposes of this clause, a claim means a disputed amount subject to negotiation between the NCC and the Contractor under the Contract.

2) A claim is deemed to have been settled when an agreement in writing is signed by the NCC and the Contractor setting out the amount of the claim to be paid by the NCC and the items of work for which the said amount is to be paid.

3) A settled claim is deemed to be outstanding from the day immediately following the date the said claim would have been due and payable under the Contract had it not been disputed.

4) The NCC shall pay to the Contractor simple interest on the amount of a settled claim at the Average Bank Rate plus 3 per cent per annum from the date the settled claim was deemed to be outstanding until the day prior to the date of payment.

GC5.13 RETURN OF SECURITY DEPOSIT

1) After a Certificate of Substantial Performance has been issued, and if the Contractor is not in breach of nor in default under the Contract, the NCC shall return to the Contractor all or any part of a Security Deposit that, in the opinion of the NCC, is not required for the purposes of the Contract.

2) After a Certificate of Completion has been issued, the NCC shall return to the Contractor the remainder of any security deposit unless the Contract stipulates otherwise.

3) If the security deposit was paid to the NCC, the NCC shall pay interest thereon to the Contractor at a rate established pursuant to section 21(2) of the Financial Administration Act.

GC6.1 CHANGES IN THE WORK

1) At any time before issuance of a Certificate of Completion, Canada may issue orders for additions, deletions or other changes to the Work, or changes in the location or position of the whole or any part of the Work, if the addition, deletion, change or other revision is deemed by Canada to be consistent with the general intent of the Contract.

2) An order referred to in paragraph 1) of GC6.1 shall be in writing and given to the Contractor in accordance with GC2.3 NOTICES.

3) Upon receipt of an order, the Contractor shall promptly perform the work in accordance with the order as if the order had appeared in and been part of the original Contract.

4) If anything done or omitted by the Contractor pursuant to an order increases or decreases the cost of the Work to the Contractor, payment for the work shall be made in accordance with GC6.4 DETERMINATION OF PRICE.

GC6.2 CHANGES IN SUBSURFACE CONDITIONS

1) If, during the performance of the Work, the Contractor encounters subsurface conditions that are substantially different from the subsurface conditions described in the tender documents supplied to the Contractor, or a reasonable assumption of fact based thereon, the Contractor shall give notice to Canada immediately upon becoming aware of the situation.

2) If the Contractor is of the opinion that the Contractor may incur or sustain any extra expense or any loss or damage that is directly attributable to the changed subsurface conditions, the Contractor shall within 10 days of the date the changed subsurface conditions were encountered, give Canada written notice of intention to claim for that extra expense, loss or damage.

3) If the Contractor has given a notice referred to in paragraph 2) of GC6.2, the Contractor shall give Canada a written claim for extra expense, loss or damage no later than 30 days after the date that a Certificate of Substantial Performance is issued.

4) A written claim referred to in paragraph 3) of GC6.2 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified, and the Contractor shall supply such further and other information for that purpose as Canada requires.

5) If Canada determines that a claim referred to in paragraph 3) of GC6.2 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

6) If, in the opinion of Canada, the Contractor effects a saving of expenditure that is directly attributable to a substantial difference between the information relating to subsurface conditions at the site of the Work that is contained in the tender documents, or a reasonable assumption of fact based thereon, and the actual subsurface conditions encountered by the Contractor, the Contract Amount shall be reduced by the amount of the saving of expenditure determined in accordance with GC6.4 DETERMINATION OF PRICE.

7) If the Contractor fails to give a notice referred to in paragraph 2) of GC6.2 and a claim referred to in paragraph 3) of GC6.2 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

8) Canada does not warrant the content expressed in any subsurface report available for the perusal of the Contractor that does not form part of the tender and contract documents.

GC6.3 HUMAN REMAINS, ARCHAEOLOGICAL REMAINS AND ITEMS OF HISTORICAL OR SCIENTIFIC INTEREST

1) For the purposes of this clause

   (a) "human remains" means the whole or any part of a deceased human being, irrespective of the time of death;

   (b) "archaeological remains" are items, artefacts or things made, modified or used by human beings in antiquity and may include, but not be limited to, stone, wood or iron structures or monuments, dump deposits, bone artefacts, weapons, tools, coins, and pottery; and

   (c) "items of historical or scientific interest" are naturally occurring or manufactured objects or things of any age that are not archaeological remains but may be of interest to society because of their historical or scientific significance, value, rarity, natural beauty, or other quality.

2) If, during the course of the Work, the Contractor encounters any object, item or thing which is described in paragraph 1) of GC6.3 or which resembles any object, item or thing described in paragraph 1) of GC6.3, the Contractor shall

   (a) take all reasonable steps, including stopping work in the affected area, to protect and preserve the object, item or thing;

   (b) immediately notify Canada of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification in accordance with subparagraph 2)(b) of GC6.3, Canada shall promptly determine whether the object, item or thing is one described in, or contemplated by paragraph 1) of GC6.3, and shall notify the Contractor in writing of any action to be performed, or work to be carried out, by the Contractor as a result of Canada's determination.

4) Canada may, at any time, enlist the services of experts to assist in the investigation, examination, taking of measurements or other such recordings, placing of permanent protection around or removing of the object, item or thing encountered by the Contractor, and the Contractor shall, to the satisfaction

of Canada, allow them access and co-operate with them in the carrying out of their duties and obligations.

5) Human remains, archaeological remains and items of historical or scientific interest encountered at the site of the Work shall be deemed to be the property of Canada.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE and GC6.5 DELAYS AND EXTENSION OF TIME shall apply.

GC6.4 DETERMINATION OF PRICE

GC6.4.1 Price Determination Prior to Undertaking Changes

1) If a Lump Sum Arrangement applies to the Contract or a part thereof, the price of any change shall be the aggregate estimated cost of labour, Plant and Material that is required for the change as agreed upon in writing by the Contractor and Canada plus an allowance for supervision, co-ordination, administration, overhead, margin and the risk of undertaking the work within the stipulated amount, which allowance shall be equal to

   (a) 20% of the aggregate costs referred to herein for that portion of the Work done by the Contractor's own forces, if the aggregate cost of the Work does not exceed $50,000;

   (b) 15% of the aggregate costs referred to herein for that portion of the Work that is done by subcontract, if the aggregate cost of the Work does not exceed $50,000; or

   (c) a negotiated percentage of the aggregate costs referred to herein or a negotiated amount

      (i) if the aggregate cost of the Work exceeds $50,000; or

      (ii) if the Contractor and Canada agree in writing.

2) If a Unit Price Arrangement applies to the Contract or a part thereof, the Contractor and Canada may, by agreement in writing, add items, units of measurement, estimated quantities and prices per unit to the Unit Price Table.

3) A price per unit referred to in paragraph 2) of GC6.4.1 shall be determined on the basis of the aggregate estimated cost of labour, Plant and Material that is required for the additional item as agreed upon by the Contractor and Canada, plus an allowance determined in accordance with paragraph 1) of GC6.4.1.

4) To facilitate approval of the price of the change or the additional price per unit as applicable, the Contractor shall submit a cost estimate breakdown identifying, as a minimum, the estimated cost of labour, Plant, Material, each subcontract amount, and the amount of the allowance.

5) If no agreement is reached as contemplated in paragraph 1) of GC6.4.1, the price shall be determined in accordance with GC6.4.2.

6) If no agreement is reached, as contemplated in paragraphs 2) and 3) of GC6.4.1, Canada shall determine the class and the unit of measurement of the item of labour, Plant or Material and the price per unit shall be determined in accordance with GC6.4.2.

GC6.4.2 Price Determination Following Completion of Changes

1) If it is not possible to predetermine, or if there is failure to agree upon the price of a change in the Work, the price of the change shall be equal to the aggregate of

(a) all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, Plant and Material that fall within one of the classes of expenditure described in paragraph 2) of GC6.4.2, that are directly attributable to the performance of the Contract;

(b) an allowance for profit and all other expenditures or costs, including overhead, general administration costs, financing and interest charges, in an amount that is equal to 10% of the sum of the expenses referred to in subparagraph 1)(a) of GC6.4.2; and

(c) interest on the amounts determined under subparagraphs 1)(a) and 1)(b) of GC6.4.2 calculated in accordance with GC5.12 INTEREST ON SETTLED CLAIMS;

2) The cost of labour, Plant and Material referred to in subparagraph 1)(a) of GC6.4.2 shall be limited to the following categories of expenditure:

(a) payments to Subcontractors and Suppliers;

(b) wages, salaries, bonuses and, if applicable, travel and lodging expenses of employees of the Contractor located at the site of the Work and that portion of wages, salaries, bonuses and, if applicable, travel and lodging expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor provided they are actually and properly engaged on the Work under the Contract;

(c) assessments payable under any statutory authority relating to workers' compensation, employment insurance, pension plan or holidays with pay, provincial health or insurance plans, environmental reviews, and GST / HST collection costs;

(d) rent that is paid for Plant, or an amount equivalent to the said rent if the Plant is owned by the Contractor, that is necessary for and used in the performance of the Work, if the rent or the equivalent amount is reasonable and use of that Plant has been approved by Canada;

(e) payments for maintaining and operating Plant necessary for and used in the performance of the Work, and payments for effecting repairs thereto that, in the opinion of Canada, are necessary for the proper performance of the Contract, other than payments for any repairs to the Plant arising out of defects existing before its allocation to the Work;

(f) payments for Material that is necessary for and incorporated in the Work, or that is necessary for and consumed in the performance of the Contract;

(g) payments for preparation, delivery, handling, erection, installation, inspection, protection and removal of the Plant and Material necessary for and used in the performance of the Contract; and

(h) any other payments made by the Contractor with the approval Canada that are necessary for the performance of the Contract in accordance with the Contract Documents.

GC6.4.3 Price Determination - Variations in Tendered Quantities

1) Except as provided in paragraphs 2), 3), 4) and 5) of GC6.4.3, if it appears that the final quantity of labour, Plant and Material under a price per unit item shall exceed or be less than the estimated tendered quantity, the Contractor shall perform the Work or supply the Plant and Material required to complete the item and payment shall be made for the actual Work performed or Plant and Material supplied at the price per unit set out in the Contract.

2) If the final quantity of the price per unit item exceeds the estimated tendered quantity by more than 15%, either party to the Contract may make a written request to the other party to negotiate an

amended price per unit for that portion of the item which exceeds 115% of the estimated tendered quantity, and to facilitate approval of any amended price per unit, the Contractor shall, on request, provide Canada with

(a) detailed records of the actual cost to the Contractor of performing or supplying the tendered quantity for the price per unit item up to the time the negotiation was requested; and

(b) the estimated unit cost of labour, Plant and Material required for the portion of the item that is in excess of 115% of the tendered quantity.

3) If agreement is not reached as contemplated in paragraph 2) of GC6.4.3, the price per unit shall be determined in accordance with GC6.4.2.

4) If it appears that the final quantity of labour, Plant and Material under a price per unit item shall be less than 85% of the estimated tendered quantity, either party to the Contract may make a written request to the other party to negotiate a change to the price per unit for the item if

(a) there is a demonstrable difference between the unit cost to the Contractor of performing or supplying the estimated tendered quantity and the unit cost to the Contractor for performing or supplying the final quantity; and

(b) the difference in unit cost is due solely to the decrease in quantity and not to any other cause.

5) For the purposes of the negotiation referred to in paragraph 4) of GC6.4.3

(a) the onus of establishing, justifying and quantifying a proposed change lies with the party making the request for negotiation; and

(b) in no event shall the total price for an item that has been amended as a result of a reduction in quantity pursuant to paragraph 4) of GC6.4.3 exceed the amount that would have been payable to the Contractor had 85% of the tendered quantity actually been performed or supplied.

GC6.5 DELAYS AND EXTENSION OF TIME

1) Upon application of the Contractor made before the date first fixed for completion of the Work or before any other date previously fixed under this clause, Canada may extend the time for completion of the Work by fixing a new date if Canada determines that causes beyond the control of the Contractor have delayed its completion.

2) The Contractor's application shall be accompanied by the written consent of the bonding company whose bond forms part of the Contract Security.

3) Subject to paragraph 4) of GC6.5, no payment, other than a payment that is expressly stipulated in the Contract, shall be made by Canada to the Contractor for any extra expense, loss or damage incurred or sustained by the Contractor due to delay, whether or not the delay is caused by circumstances beyond the control of the Contractor.

4) If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of Canada in providing any information or in doing any act that the Contract either expressly requires Canada to do or that would ordinarily be done by an owner in accordance with the practice of the trade, the Contractor shall give Canada written notice of intention to claim for that extra expense or loss or damage within ten working days of the date the neglect or delay first occurred.

5) When the Contractor has given a notice referred to in paragraph 4) of GC6.5, the Contractor shall give Canada a written claim for the extra expense, loss or damage no later than 30 days after the date that a Certificate of Completion is issued and not afterwards.

6) A written claim referred to in paragraph 5) of GC6.5 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as Canada may require.

7) If Canada determines that a claim referred to in paragraph 5) of GC6.5 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

8) If the Contractor fails to give a notice referred to in paragraph 4) and a claim referred to in paragraph 5) of GC6.5 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

GC6.6 ALLOWABLE COSTS FOR CONTRACT CHANGES UNDER GC6.4.1

GC6.6.1 General

1) The Contractor shall submit a cost estimate breakdown for each contemplated change, in accordance with paragraph 4) of GC6.4.1 PRICE DETERMINATION PRIOR TO UNDERTAKING CHANGES. The breakdown shall itemize all labour, material, plant and equipment costs estimated by the Contractor and subcontractors, and the amount of each allowance.

2) It is the responsibility of the Contractor to ensure that all prices included in the Contractor's breakdown to the NCC, including those of subcontractors, are fair and reasonable in view of the terms expressed herein.

3) The labour hours required for the contemplated change shall be based on the estimated number of hours to perform the work.

4) Time spent by a working foreman may be included in the number of labour hours, at a rate agreed to in writing by the Contractor and the NCC.

5) Time attributable to material handling, productivity factors and approved rest periods is to be included in the number of hours required by the contemplated change and will not be paid as a separate item under hourly rates.

6) Allowances referred to in section 04 below are not to be included in the hourly labour rates.

7) Credit for work deleted will only be for the work directly associated with the change.

8) When a change deletes work which has not yet been performed, the NCC is entitled to an adjustment in the Contract Amount equal to the cost the Contractor would have incurred had the work not been deleted.

9) Allowances referred to in Section 04 below shall not be applied to any credit amounts for deleted work.

10) In those cases where the change involves additions and deletions to the work, the allowances referred to in section 04 below shall apply only when the cost of the additions minus the cost of the deletions would result in an increase in the Contract Amount. The percentage allowance shall only be applied to that portion of the costs of the additions that is in excess of the cost of the deletions.

11) If the contemplated change in the work necessitates a change in the contract completion date, or has an impact on the work, the Contractor shall identify and include the resulting cost in the breakdown.

GC6.6.2 Hourly Labour Rates

1) The hourly labour rates listed in the Contractor's breakdown shall be determined in accordance with the collective agreements that are applicable at the site of the work and shall include:

   (a) the base rate of pay;

   (b) vacation pay:

   (c) benefits which includes:

      (i) welfare contributions;

      (ii) pension contributions;

      (iii) union dues;

      (iv) training and industry funds contributions; and

      (v) other applicable benefits, if any, that can be substantiated by the Contractor.

   (d) statutory and legislated requirements, assessed and payable under statutory authority, which includes:

      (i) Employment Insurance contributions;

      (ii) Canada Pension Plan or Québec Pension Plan contributions;

      (ii) Worker's Compensation Board or Commission de la santé et de la sécurité du travail premiums;

      (iv) Public Liability and Property Damage insurance premiums; and

      (v) health tax premiums.

2) In the case of nonunion labour, all rates claimed shall be in accordance with the terms of the Labour Conditions forming part of this contract and the Contractor must provide satisfactory proof of the rates actually paid.

GC6.6.3 Material, Plant and Equipment Costs

1) The costs of all purchases and rentals must be based on the actual amount paid to the suppliers by the Contractor or subcontractor and said costs are to include all applicable discounts.

GC6.6.4 Allowance to the Contractor or Subcontractor

1) The allowances determined in accordance with paragraph 1) of GC6.4.1 PRICE DETERMINATION PRIOR TO UNDERTAKING CHANGES shall be considered as full compensation for:

   (a) supervision, co-ordination, administration, overhead, margin and the risk of undertaking the work within the stipulated amount; and

(b) miscellaneous additional costs related to:

(i) the purchase or rental of material, plant and equipment;

(ii) the purchase of small tools and supplies;

(iii) safety and protection measures; and

(iv) permits, bonds, insurance, engineering, as built drawings, commissioning and site office.

GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS

1) By giving notice in writing to the Contractor in accordance with GC2.3 NOTICES, the NCC, without any other authorization, may take all or any part of the Work out of the Contractor's hands, and may employ such means as the NCC sees fit to have the Work completed if the Contractor:

   (a) fails to remedy any delay in the commencement or default in the diligent performance of the Work to the satisfaction of the NCC within six days of the NCC giving notice to the Contractor in writing in accordance with GC2.3 NOTICES;

   (b) defaults in the completion of any part of the Work within the time fixed for its completion by the Contract;

   (c) becomes insolvent, or has committed an act of bankruptcy, and has neither made a proposal to its creditors nor filed a notice of intention to make such a proposal, pursuant to the Bankruptcy and Insolvency Act;

   (d) abandons the work;

   (e) makes an assignment of the Contract without the consent required by GC1.16 ASSIGNMENT; or

   (f) otherwise fails to observe or perform any of the provisions of the Contract.

2) If the whole or any part of the Work is taken out of the Contractor's hands, the Contractor's right to any further payment that is due or accruing due under the Contract is, subject only to paragraph 3) of GC7.1, extinguished, and the Contractor is liable to pay the NCC, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by the NCC in respect of the Contractor's failure to complete the Work.

3) If the whole or any part of the Work that is taken out of the Contractor's hands is completed by the NCC, the NCC may pay the Contractor the amount, if any, of the holdback or a progress claim as determined by the NCC that had accrued and was due prior to the date on which the Work was taken out of the Contractor's hands and that is not required for the purposes of having the Work performed or of compensating the NCC for any other loss or damage incurred or sustained by reason of the Contractor's default.

4) The taking of the Work or any part thereof out of the Contractor's hands does not relieve the Contractor from any obligation under the Contract or imposed by law except the obligation to complete the performance of that part of the Work that was taken out of the Contractor's hands.

5) If the Work or any part thereof is taken out of the Contractor's hands, all Plant and Material and the interest of the Contractor, or its suppliers or subcontractors at any tier, in all real property, licences, powers and privileges acquired, used or provided by the Contractor, or its suppliers or subcontractors at any tier, under the Contract shall continue to be the property of the NCC without compensation.

6) When the NCC certifies that any Plant, Material, or any interest of the Contractor is no longer required for the purposes of the Work, or that it is not in the interests of the NCC to retain that Plant, Material, or interest, it shall revert to the Contractor.

7) If the Contractor has become insolvent or has committed an act of bankruptcy, and has either made a proposal to its creditors or filed a notice of intention to make such a proposal, pursuant to the Bankruptcy and Insolvency Act, the Contractor shall immediately forward a copy of the proposal or the notice of intention to the NCC.

GC7.2 SUSPENSION OF WORK

1) When, in the NCC's opinion, it is in the public interest to do so, the NCC may require the Contractor to suspend performance of the Work either for a specified or an unspecified period, by giving a notice of suspension in writing to the Contractor in accordance with GC2.3 NOTICES.

2) When a notice of suspension is received by the Contractor, the Contractor shall suspend all operations in respect of the Work except those that the NCC determines are necessary for the care and preservation of the Work, Plant and Material.

3) During a period of suspension, the Contractor shall not remove any part of the Work, Plant or Material from its site without the consent of the NCC.

4) If a period of suspension is 60 days or less, the Contractor shall resume the performance of the Work on the expiration of that period, and the Contractor is entitled to be paid the extra costs necessarily incurred by the Contractor as a result of the suspension, determined in accordance with GC6.4 DETERMINATION OF PRICE.

5) If a period of suspension is more than 60 days, the NCC and the Contractor may agree that the performance of the Work shall be continued by the Contractor, and the Contractor shall resume performance of the Work subject to any terms and conditions agreed upon by the NCC and the Contractor. If the NCC and the Contractor do not agree that performance of the Work shall be continued by the Contractor, or upon the terms and conditions under which the Contractor shall continue the Work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC7.3 TERMINATION OF CONTRACT.

GC7.3 TERMINATION OF CONTRACT

1) The NCC may terminate the Contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC2.3 NOTICES.

2) If the Contractor receives a notice of termination, the Contractor shall forthwith cease all operations in performance of the Contract, subject to any conditions stipulated in the notice.

3) Subject to paragraph 4) of GC7.3, if the Contract is terminated, the NCC shall pay the Contractor an amount determined to be due to the Contractor pursuant to GC6.4 DETERMINATION OF PRICE less the aggregate of all amounts that were paid to the Contractor by the NCC and all amounts that are due to the NCC from the Contractor pursuant to the Contract.

4) In no event shall the total amount payable by the NCC to the Contractor exceed the amount, calculated in accordance with GC5 TERMS OF PAYMENT, that would have been payable to the Contractor had the Contractor completed the Work.

5) Payment to the Contractor, if any, shall be made as soon as practicable under the circumstances.

GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN

1) If the Work is taken out of the Contractor's hands, or the Contractor is in breach of, or in default under, the Contract, the NCC may convert a security deposit to the NCC's own use.

2) If the NCC converts a security deposit, the amount realized shall be deemed to be an amount due from the NCC to the Contractor under the Contract.

3) Any balance of the amount realized that remains after payment of all losses, damage and claims of the NCC and others shall be paid by the NCC to the Contractor if, in the opinion of the NCC, it is not required for the purposes of the Contract.

GC8 DISPUTE RESOLUTION

1) The Contractor may, within 10 days after the communication to the Contractor of any decision or direction referred to in GC6.1 CHANGES IN THE WORK and GC2.2 INTERPRETATION OF CONTRACT, protest that decision or direction.

2) A protest referred to in paragraph 1) of GC8 shall be in writing, contain full reasons for the protest, be signed by the Contractor and be given to the NCC.

3) If the Contractor gives a protest pursuant to paragraph 2) of GC8, any compliance by the Contractor with the decision or direction that was protested shall not be construed as an admission by the Contractor of the correctness of that decision or direction, or prevent the Contractor from taking whatever action the Contractor considers appropriate in the circumstances.

4) The giving of a protest by the Contractor pursuant to paragraph 2) of GC8 shall not relieve the Contractor from complying with the decision or direction that is the subject of the protest.

5) Subject to paragraph 6) of GC8, the Contractor shall take any action referred to in paragraph 3) of GC8 within 3 months after the date of the Certificate of Completion referred to in GC5.6 FINAL COMPLETION and not afterwards, except where it is otherwise provided by law.

6) The Contractor shall take any action referred to in paragraph 3) of GC8 resulting from a direction under GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK, within 3 months after the expiry of a warranty or guarantee period and not afterwards, except where it is otherwise provided by law.

7) Subject to paragraph 8) of GC8, if the NCC determines that the Contractor's protest is justified, the NCC shall pay the Contractor the cost of the additional labour, Plant and Material necessarily incurred by the Contractor in carrying out the protested decision or direction.

8) Costs referred to in paragraph 7) of GC8 shall be calculated in accordance with GC6.4 DETERMINATION OF PRICE.

GC9.1 OBLIGATION TO PROVIDE CONTRACT SECURITY

1) The Contractor shall, at the Contractor's expense and within 7 days after the date that the Contractor receives notice that the Contractor's bid was accepted by the NCC, obtain and deliver Contract Security to the NCC in one or more of the forms prescribed in GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY.

2) If the whole or a part of the Contract Security provided is in the form of a security deposit, it shall be held and disposed of in accordance with GC5.13 RETURN OF SECURITY DEPOSIT and GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN.

3) If a part of the Contract Security provided is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond at the site of the Work.

4) It is a condition precedent to the release of the first progress payment that the Contractor has provided the Contract Security as specified herein.

5) In addition to the limitation imposed in paragraph 4) of GC9.1, the Contractor further acknowledges and agrees that it will not be entitled to have access to the site, nor to commence work pursuant to this contract until it has delivered the Contract Security as specified herein.

GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY

1) The Contractor shall deliver to the NCC (a), (b) or (c):

   (a) A performance bond and a labour and material payment bond each in an amount that is equal to not less than 50% of the Contract Amount including taxes

   (b) A labour and material payment bond in an amount that is equal to not less than 50% of the Contract Amount including taxes, and a security deposit in an amount that is equal to not less than 10% of the Contract Amount including taxes.

   (c) A security deposit in an amount prescribed by subparagraph 1)(b) of GC9.2, plus an additional amount that is equal to 10% of the Contract Amount including taxes.

2) The amount of a security deposit referred to in subparagraph 1)(b) of GC9.2 shall not exceed $2,000,000 regardless of the Contract Amount including taxes.

3) A performance bond and a labour and material payment bond referred to in paragraph 1) of GC9.2 shall be in a form and be issued by a bonding or surety company that is approved by the NCC.

   (a) The approved form for the performance bond is enclosed at the end of GC9.

   (b) The approved form for the labour and material payment bond is enclosed at the end of GC9

   (c) The list of approved bonding or surety companies is displayed at the following Website:

   http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12027 .

4) A security deposit referred to in subparagraphs 1)(b) and 1)(c) of GC9.2 shall be in the form of:

(a) a bill of exchange, bank draft or money order made payable to the NCC and certified by an approved financial institution or drawn by an approved financial institution on itself; or

(b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada.

5) For the purposes of subparagraph 4)(a) of GC9.2:

(a) a bill of exchange is an unconditional order in writing signed by the Contractor and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable future time a certain sum of money to, or to the order of, the NCC;

(b) if a bill of exchange, bank draft or money order is certified by or drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in subparagraph 5)(c) of GC9.2, either by letter or by a stamped certification on the bill of exchange, bank draft or money; and

(c) An approved financial institution is:

(i) a corporation or institution that is a member of the Canadian Payments Association as defined in the Canadian Payments Act;

(ii) a corporation that accepts deposits that are insured, to the maximum permitted by law, by the Canada Deposit Insurance Corporation or the Régie de l'assurance-dépôts du Québec;

(iii) a corporation that accepts deposits from the public if repayment of the deposit is guaranteed by Her Majesty the Queen in right of a province;

(iv) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137(6) of the Income Tax Act; or

(v) Canada Post Corporation.

6) Bonds referred to in subparagraph 4)(b) of GC9.2 shall be provided on the basis of their market value current at the date of the Contract, and shall be:

(a) made payable to bearer; or

(b) accompanied by a duly executed instrument of transfer of the bonds to the NCC in the form prescribed by the Domestic Bonds of Canada Regulations; or

(c) registered as to principal, or as to principal and interest, in the name of the NCC pursuant to the Domestic Bonds of Canada Regulations.

GC9.3 IRREVOCABLE STANDBY LETTER OF CREDIT

1) As an alternative to a security deposit, an irrevocable standby letter of credit is acceptable to the NCC, the amount of which shall be determined in the same manner as a security deposit referred to in GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY.

2) An irrevocable standby letter of credit shall:

(a) be an arrangement, however named or described, whereby a financial institution (the “Issuer”) acting at the request and on the instructions of a customer (the “Applicant”) or on its own behalf:

(i) is to make a payment to, or to the order of, the NCC as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by the NCC;

(ii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with;

(b) state the face amount that may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the NCC by way of the financial institution's draft against presentation of a written demand for payment signed by the NCC;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600;

(g) clearly specify that it is irrevocable or deemed to be irrevocable pursuant to article 6 c) of the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600; and

(h) be issued or confirmed, in either official language in a format left to the discretion of the issuer or confirmer, by an approved financial institution on its letterhead.

PERFORMANCE BOND

Bond Number _____

Amount $ _____

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal, hereinafter called the Principal, and _____ as Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee, hereinafter called the NCC, In the amount of _____ dollars ($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____ , _____ . WHEREAS, the Principal has entered into a Contract with the NCC, dated the _____ day of _____ , _____ , for: _____ .

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that if the Principal shall well and faithfully observe and perform all the obligations on the part of the Principal to be observed and performed in connection with the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. Whenever the Principal shall be, and declared by the NCC to be, in default under the Contract, the Surety shall
   (a) if the work is not taken out of the Principal's hands, remedy the default of the Principal,
   (b) if the work is taken out of the Principal's hands and the NCC directs the Surety to undertake the completion of the work, complete the work in accordance with the Contract provided that if a contract is entered into for the completion of the work,
      (i) it shall be between the Surety and the completing contractor, and
      (ii) the selection of such completing contractor shall be subject to the approval of the NCC,
   (c) if the work is taken out of the Principal's hands and the NCC, after reasonable notice to the Surety, does not direct the Surety to undertake the completion of the work, assume the financial responsibility for the cost of completion in excess of the moneys available to the NCC under the Contract,
   (d) be liable for and pay all the excess costs of completion of the Contract, and
   (e) not be entitled to any Contract moneys earned by the Principal, up to the date of his default on the Contract and any holdbacks relating to such earned Contract moneys held by the NCC, and the liability of the Surety under this Bond shall remain unchanged provided, however, and without restricting the generality of the foregoing, upon the completion of the Contract to the satisfaction of the NCC, any Contract moneys earned by the Principal or holdbacks related thereto held by the NCC may be paid to the Surety by the NCC.

2. The Surety shall not be liable for a greater sum than the amount specified in this Bond.

3. No suit or action shall be instituted by the NCC herein against the Surety pursuant to these presents after the expiration of two (2) years from the date on which final payment under the Contract is payable.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

Principal _____

Witness _____

Surety _____

Note: Affix Corporate seal if applicable.

LABOUR AND MATERIAL PAYMENT BOND

Bond Number _____

Amount $ _____

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal,

hereinafter called the Principal, and _____ as Surety, hereinafter

called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee,

hereinafter called the NCC, In the amount of _____ dollars

($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety

bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____ , _____ . WHEREAS, the Principal has entered into a Contract

with the NCC, dated the _____ day of _____ , _____ , for: _____

_____ which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that, if payment is promptly made to all Claimants who have performed labour or services or supplied material in connection with the Contract and any and all duly authorized modifications and extensions of the Contract that may hereafter be made, notice of which modifications and extensions to the Surety being hereby waived, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. For the purpose of this bond, a Claimant is defined as one having a direct contract with the Principal or any Sub-Contractor of the Principal for labour, material or both, used or reasonably required for use in the performance of the Contract, labour and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone services or rental of equipment (but excluding rental of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract.

2. For the purpose of this Bond, no payment is required to be made in respect of a claim for payment for labour or services performed or material supplied in connection with the Contract that represents a capital expenditure, overhead or general administration costs incurred by the Principal during the currency or in respect of the Contract.

3. The Principal and the Surety hereby jointly and severally agree with the NCC that if any Claimant has not been paid as provided for under the terms of his contract with the Principal or a Sub-Contractor of the Principal before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's labour or service was done or performed or materials were supplied by such Claimant, the NCC may sue on this bond, have the right to prosecute the suit to final judgment for such sum or sums as may be due and have execution thereon; and such right of the NCC is assigned by virtue of Part VIII of the Financial Administration Act to such Claimant.

4. For the purpose of this bond the liability of the Surety and the Principal to make payment to any claimant not having a contract directly with the Principal shall be limited to that amount which the Principal would have been obliged to pay to such claimant had the provisions of the applicable provincial or territorial legislation on lien or privileges been applicable to the work. A claimant need not comply with provisions of such legislation setting out steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which the claimant might have had. Any such claimant shall be entitled to pursue a claim and to recover judgment hereunder subject to the terms and notification provisions of the Bond.

5. Any material change in the Contract between the Principal and the NCC shall not prejudice the rights or interest of any Claimant under this Bond who is not instrumental in bringing about or has not caused such change.

6. No suit or action shall be commenced hereunder by any Claimant:

   (a) Unless such Claimant shall have given written notice within the time limits hereinafter set forth to the Principal and the Surety above named, stating with substantial accuracy the amount claimed. Such notice shall be served by mailing the same by registered mail to the Principal and the Surety at any place where an office is regularly maintained for the transaction of business by such persons or served in any manner in which legal process may be served in the Province or other part of Canada in which the subject matter of the Contract is located. Such notice shall be given

      (i) in respect of any claim for the amount or any portion thereof required to be held back from the Claimant by the Principal or by the Sub-Contractor of the Principal under either the terms of the Claimant's Contract with the Principal or the Claimant's Contract with the Sub-Contractor of the Principal within one hundred and twenty (120) days after such Claimant should have been paid in full under this Contract;

…/2

(ii) in respect of any claim other than for the holdback or portion thereof referred to above within one hundred and twenty (120) days after the date upon which such Claimant did or performed the last of the service, work or labour or furnished the last of the materials for which such claim is made under the Claimant's Contract with the Principal or a Sub-Contractor of the Principal

(b) After the expiration of one (1) year following the date on which the Principal ceased work on the said Contract, including work performed under the guarantees provided in the Contract;

(c) Other than in a court of competent jurisdiction in the province or district of Canada in which the subject matter of the Contract or any part thereof is situated and not elsewhere, and the parties hereto hereby agree to submit to the jurisdiction of such court.

7. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

8. The Surety shall not be entitled to claim any moneys relating to the Contract and the liability of the Surety under this Bond shall remain unchanged and, without restricting the generality of the foregoing, the Surety shall pay all valid claims of Claimants under this Bond before any moneys relating to the Contract held by the NCC are paid to the Surety by the NCC.

9. The Surety shall not be liable for a greater sum that the amount specified in this bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

Principal _____

Witness _____

Surety _____

Note: Affix Corporate seal if applicable.

GC10.1 INSURANCE CONTRACTS

1) The Contractor shall, at the Contractor's expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to the NCC in accordance with the requirements of GC10.

2) The insurance contracts referred to in paragraph 1) of GC10.1 shall:

   (a) be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in GC10; and

   (b) provide for the payment of claims under such insurance contracts in accordance with GC10.2 INSURANCE PROCEEDS.

GC10.2 INSURANCE PROCEEDS

1) In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the Contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid directly to the NCC, and:

   (a) the monies so paid shall be held by the NCC for the purposes of the contract; or

   (b) if the NCC elects, shall be retained by the NCC, in which event they vest in the NCC absolutely.

2) In the case of a claim payable under a General Liability insurance contract maintained by the Contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid by the insurer directly to the claimant.

3) If an election is made pursuant to paragraph 1) of GC10.2, the NCC may cause an audit to be made of the accounts of the Contractor and of the NCC in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between:

   (a) the aggregate of the amount of the loss or damage suffered or sustained by the NCC, including any costs incurred in respect of the clearing of the work and its site and any other amount that is payable by the Contractor to the NCC under the contract, minus any monies retained pursuant to subparagraph 1)(b) of GC10.2; and

   (b) the aggregate of the amounts payable by the NCC to the Contractor pursuant to the contract up to the date of the loss or damage.

4) A difference that is established pursuant to paragraph 3) of GC10.2 shall be paid forthwith by the party who is determined by the audit to be the debtor to the party who is determined by the audit to be the creditor.

5) When payment of a deficiency has been made pursuant to paragraph 4) of GC10.2, all rights and obligations of the NCC and the Contractor under the contract shall, with respect only to the part of the work that was the subject of the audit referred to in paragraph 3) of GC10.2, be deemed to have been expended and discharged.

6) If an election is not made pursuant to subparagraph 1)(b) of GC10.2, the Contractor shall, subject to paragraph 7) of GC10.2, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at the Contractor's expense as if that part of the work had not yet been performed.

7) When the Contractor clears and cleans the work and its site and restores and replaces the work referred to in paragraph 6) of GC10.2, the NCC shall pay the Contractor out of the monies referred to in paragraph 1) of GC10.2 so far as they will thereunto extend.

8) Subject to paragraph 7) of GC10.2, payment by the NCC pursuant to paragraph 7) of GC10.2 shall be made in accordance with the contract but the amount of each payment shall be 100% of the amount claimed notwithstanding subparagraphs 3)(a) and 3)(b) of GC5.4 PROGRESS PAYMENT.

GC10.3 INSURANCE TERMS

GC10.3.1 General

GC10.3.1.1 Proof of Insurance

1) Before commencement of the Work, and prior to contract award, the Contractor shall deposit with the NCC a Certificate of Insurance (approved Insurance form is enclosed at the end of this section).

2) Upon request by the NCC, the Contractor shall provide originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the provisions contained herein.

3) The insurance policies shall be endorsed to provide the NCC with no less than 30 days notice in writing in advance of a cancellation of insurance or any reduction in coverage.

GC10.3.1.2 Payment of Deductible

1) Any moneys paid or payable in respect of a deductible amount shall be borne exclusively by the Contractor.

GC10.3.2 Commercial General Liability

GC10.3.2.1 Scope of Policy

1) The insurance coverage provided shall not be less than that provided by IBC Form 2100, as amended from time to time, and shall have:

(a) an Each Occurrence Limit of not less than $5,000,000;

(b) a Products/Completed Operations Aggregate Limit of not less than $5,000,000; and

(c) a General Aggregate Limit of not be less than $10,000,000 per policy year, if the policy is subject to such a limit.

2) The policy shall either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:
   (a) Blasting;

   (b) Pile driving and caisson work;

   (c) Underpinning;

   (d) Removal or weakening of support of any building or land whether such support be natural or otherwise if the work is performed by the insured Contractor.

GC10.3.2.2 Insured

1) The policy shall insure the Contractor and shall include the NCC as an additional Insured, with respect to liability arising out of the operations of the Contractor with regard to the work.

GC10.3.2.3 Period of Insurance

1) Unless otherwise directed in writing by the NCC, or, otherwise stipulated elsewhere herein, the policy required herein shall be in force and be maintained from the date of contract award until the day of issue of the Certificate of Completion except that the coverage for Completed Operations Liability shall, in any event, be maintained for a period of at least six (6) years beyond the date of the Certificate of Substantial Performance.

GC10.3.3 Builder's Risk / Installation Floater

GC10.3.3.1 Scope of Policy

1) The insurance coverage provided by a Builder's Risk policy or an Installation Floater policy shall not be less than that provided by IBC Forms 4042 and 4047, as amended from time to time.

2) The policy shall permit use and occupancy of the project, or any part thereof, where such use and occupancy is for the purposes for which the project is intended upon completion.

3) The policy may exclude or be endorsed to exclude coverage for loss or damage caused by any of the following:

   (a) Asbestos;

   (b) Fungi or spores;

   (c) Cyber;

   (d) Terrorism.

GC10.3.3.2 Amount of Insurance

1) The amount of insurance shall not be less than the sum of the contract value plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by the NCC at the site of the project to be incorporated into and form part of the finished Work. If the value of the Work is changed, the policy shall be changed to reflect the revised contract value.

GC10.3.3.3 Insurance Proceeds

1) The policy shall provide that the proceeds thereof are payable to the NCC may direct in accordance with GC10.2, "Insurance Proceeds".

2) The Contractor shall, without delay, do such things and execute such documents as are necessary to effect payment of the proceeds.

CERTIFICAT OF INSURANCE
ATTESTATION D'ASSURANCE

- **To be completed by the insurer / À être rempli par l'assureur**

CONTRACT / MARCHÉ	
Description and location of work / Description et endroit des travaux	Contract no. / N° de contrat

INSURER / ASSUREUR			
Name / Nom			
Address / Adresse	No., Street / N°, rue		
	City / Ville	Province	Postal code / Code postal

BROKER / COURTIER			
Name / Nom			
Address / Adresse	No., Street / N°, rue		
	City / Ville	Province	Postal code / Code postal

INSURED / ASSURÉ			
Name of contractor / Nom de l'entrepreneur			
Address / Adresse	No., Street / N°, rue		
	City / Ville	Province	Postal code / Code postal

ADDITIONAL INSURED / ASSURÉ ADDITIIONNEL

The National Capital Commission / La Commission de la capitale nationale

This insurer certifies that the following policies of insurance are at present in force covering all operations of the Insured, in connection with the contract made between the named insured and the National Capital Commission.

L'assureur atteste que les polices d'assurances suivantes sont présentement en vigueur et couvrent toutes les activités de l'assuré en fonction du marché conclu entre l'Assuré dénommé la Commission de la capitale nationale

POLICY / POLICE

Type Genre	Number Numéro	Inception Date Date d'effet	Expiry Date Date d'expiration	Limit of Liability Limites de garantie
Commercial General Liability Responsabilité civile des entreprises				
Builder's Risk "All Risks" Assurance des chantiers « tous risques »				
Installation Floater "All Risks" Risques d'installation « tous risques »				
Other (list) / Autre (énumérer)				

Each of these policies includes the coverages and provisions as specified in Insurance Terms and each policy has been endorsed to cover the National Capital Commission as an Additional Insured. The Insurer agrees to notify the National Capital Commission in writing thirty (30) days prior to any material change in, or cancellation of any policy or coverage.	Chacune des présentes polices renferment des garanties et dispositions spécifiées aux Conditions d'assurance, et chaque police a été amendée pour couvrir la Commission de la capitale nationale en tant qu'assuré additionnel. L'assureur convient de donner un préavis de trente (30) jours à la Commission de la capitale nationale en cas de changement visant la garantie d'assurance ou les conditions ou de l'annulation de n'importe quelle police ou garantie.

Name of Insurer's Office or Authorized Employee / Nom du cadre ou de la personne autorisée

Telephone number / Numéro de téléphone

Signature

Date

OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS

1. General

1.1 In this Contract "OHS" means "occupational health and safety".

1.2 With respect to the work to be performed under the Contract, the Contractor covenants and agrees to perform at, and to enforce conformity with, a standard equivalent to or greater than the best practices prevailing in the construction industry at that time.

1.3 The Contractor acknowledges that, to the extent that the following matters may be affected by conduct of the work, it is responsible for the:

1.3.1 health and safety of persons on site;

1.3.2 safety of property on site;

1.3.3 protection of persons adjacent to the site; and,

1.3.4 protection of the environment.

1.4 Without limiting the generality of section 1.3, the Contractor acknowledges that it is required to, and covenants and agrees to, comply and to enforce compliance with all laws or regulations that may be applicable to the conduct of the work including, without limitation:

(a) the provisions of the *Occupational Health and Safety Act* of Ontario and all regulations, policies or directives issued thereunder for work performed in Ontario;

(b) La *Loi sur la santé et la sécurité du travail* of Québec and all regulations, policies or directives issued thereunder for work performed in Québec;

(c) Applicable provisions of the *Canada Labour Code, Part II;*

(d) Employment standards legislation in the province(s) in which any part of the work is performed; and

(e) Any policies or directives issued by the NCC in respect of the subject matter of the contract.

The NCC will present any such policies or directives referred to in paragraph (e) to the Contractor in written form by not later than the pre-construction meeting. The Contractor is obliged to ensure that the relevant policies and directives have been communicated to and acknowledged by all its employees and that they will be complied with. The NCC reserves the right to require the Contractor to produce evidence satisfactory to the NCC acting reasonably that the Contractor has discharged the foregoing obligations.

1.5 By entering into the Contract with the NCC, the Contractor represents and warrants to the NCC that it has informed itself of and is knowledgeable about the obligations imposed by the legislation referred to in 1.4. above.

1.6 For purposes of the relevant provincial OHS legislative regime the Contractor acknowledges and agrees that it is the "Constructor" and covenants to discharge and accept all liability for the performance of the obligations of the "Constructor" in respect of the work provided for in the Contract. Notwithstanding a determination by the relevant authority having jurisdiction that the NCC is the "Constructor" in the event of a dispute between the Contractor and the NCC, the Contractor acknowledges and agrees that the Contractor shall be financially responsible for the implementation of protective measures necessary to fulfill the obligations of the "Constructor".

1.7 As between the NCC and the Contractor, the NCC's decision as to whether the Contractor is discharging its obligations in respect of OHS issues shall be definitive. Without limiting the generality of the foregoing, in the event of any dispute with respect to instructions given by the NCC's designated representative, the Contractor may note such dispute, but must nevertheless forthwith comply with any such instructions.

1.8 The Contractor hereby indemnifies and agrees to hold harmless the NCC, its agents and employees, from and against any and all claims, demands, losses, costs (including legal fees on a full indemnity basis), damages, actions, suits or proceedings (hereinafter collectively referred to as "claims") by third parties that arise out of or are attributable to the Contractor's errors or omissions in the performance of the Contract. Without limiting the generality of the foregoing, this indemnification extends to any claims related to any violation of any statute or regulation relating to OHS matters.

1.9 The NCC shall provide the contractor:

1.9.1 a written description of every known and foreseeable health and safety hazard to which persons employed in the performance of the work may be exposed because of the nature of the site;

1.9.2 a list of any prescribed materials, equipment, devices and clothing necessary because of the nature of the site;

1.9.3 with written information indicating the prescribed circumstances and manner to use all prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2; and,

1.9.4 with a copy of any NCC policies and procedures that may be applicable in relation to the work site.

1.10 Without limiting the generality of 1.9, prior to the commencement of the work by the contractor, the contractor shall, at the contractor's expense:

1.10.1 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are informed of any health and safety hazard described pursuant to 1.9.1;

1.10.2 provide all persons employed in the performance of the work or granted access to the work or its site with prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2;

1.10.3 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are familiar with the prescribed circumstances and manner all prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2; and

1.10.4 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are familiar with policies and procedures referred to in 1.9.4.

2. Qualifications of Personnel

2.1 By entering into this agreement the contractor represents and warrants the it has the requisite experience, training, formal certification and equipment to enable it to discharge the obligations enumerated in sections 1.3. 1.4, 1.5 and 1.6 above.

2.2 The Contractor represents and warrants that supervisory personnel employed by the Contractor in respect of performance of any part of the work have the requisite experience, authority, training, formal certification and equipment to ensure that the obligations enumerated in sections 1.3 1.4, 1.5

and 1.6 above are discharged and agrees to deliver such evidence as may be required by the NCC from time to time to verify same.

3. Certification

3.1 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver a Worker's Compensation Clearance Certificate. Where the duration of the project is greater than sixty days, the Contractor covenants and agrees to deliver up-dated certificates at least every 60 days. In the event of a failure by the Contractor to deliver up-dated certificates, the NCC shall be entitled to immediately terminate the contract without notice and without incurring any liability to the Contractor.

3.2 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver historical information on its injury experience including any pertinent Worker's Compensation Experience Reports. Such historical information shall report data for the previous three years.

4. Plans Policies and Procedures

4.1 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver for the review and approval of the NCC:

(a) A copy of the contractor's OHS policy;

(b) A safety program and plan specific to the work to be performed pursuant to the Contract which plan shall include a risk assessment and analysis, a description of safe working methods, injury and incident reporting protocols, regular periodic reporting on compliance with OHS obligations including any policies, practices and procedures otherwise provided for herein, and a site-specific contingency and emergency response plan; and

(c) Health and safety training records of personnel and alternates responsible for OHS issues on site.

The Contractor covenants and agrees to deliver the necessary material safety data sheets for the review and approval of the NCC prior to entering the site to perform work related to the relevant material.

Approval by the NCC does not amend the provisions of the Contract with respect to the allocation of liability for discharging or failing to discharge OHS obligations. Such liability remains with the Contractor notwithstanding the granting of such approval.

4.2 The Contractor acknowledges and agrees that prior to commencement of work it must attend a pre-construction briefing at which any special or additional practices and procedures to be followed in completing the work are to be established. Without limiting the provisions of section 1.4(e) above, the representatives of the Contractor attending the briefing will be required to deliver a signed acknowledgement that the practices and procedures set out in the pre-construction briefing have been understood and will be complied with.

4.3 At any time and from time to time during the performance of the work, the NCC shall have the right to audit the manner in which the Contractor is discharging its OHS obligations and to determine whether the project specification and/or OHS policies, practices and procedures are being complied with. In the event that the audit discloses any failure by the Contractor to discharge such OHS obligations , the NCC shall be entitled to forthwith rectify at the Contractor's expense any such deficiency and the NCC shall have the further right to immediately terminate the contract without notice and without incurring any liability to the Contractor.

4.4 The Contractor covenants and agrees to conform with all requirements of the Workplace Hazardous Materials Information System.

4.5 The Contractor acknowledges and agrees that where required by any law or regulation applicable to the performance of the work it must establish and maintain a project health and safety committee. The contractor further acknowledges and agrees that it must enable staff to attend all relevant safety meetings, and that the cost of same, including costs attributable to standing down equipment is included in its bid price and is not independently recoverable.

4.6 Where required by the relevant provincial regulatory regime, the Contractor acknowledges and agrees that it is responsible for delivery of notice of the project to the relevant regulatory authority, and for the performance of any other administrative activity required to meet the obligations imposed in the pertinent provincial regulatory regime.

4.7 **(Optional depending on hazard or scope of project)**. The contractor covenants and agrees that it shall employ and assign to the work, a competent OHS professional as Health and Safety Coordinator that must:

(a) have a minimum two (2) years' site-related working experience specific to activities associated with.(identify specific subject matter)

(b) have basic working knowledge of specified occupational safety and health regulations,

(c) be responsible for completing health and safety training session and ensuring that personnel not successfully completing the required training are not permitted to enter the site to perform the Work,

(d) be responsible for implementing, enforcing daily and monitoring the site-specific Health and Safety Plan, and

(e) be on site during execution of the Work.

The parties acknowledge that in lieu of employing an OHS professional, the Contractor may provide same by sub-contracting for such services.

4.8 Upon completion of the work the Contractor covenants and agrees to participate with the NCC in a post performance interview to evaluate the performance of the Contractor in respect of the OHS obligations under the contract. Without limiting the generality of the foregoing, the interview will identify areas of compliance and non-compliance in terms of:

(a) actual performance of the work;

(b) reporting or procedural requirements;

(c) resolution of deficiencies.

The contractor acknowledges and agrees that the results of the post-completion interview may be relied upon by the NCC in evaluating bids subsequently submitted by the Contractor on other NCC projects.

Security Requirements

The NCC complies with Treasury Board's *Policy on Government Security* and consequently, it will require that the Contractor's employees submit to a personal security screening process (Security Clearance Form TBS/SCT 330-60E). The NCC may also perform a credit check when the duties or tasks to be performed require it or in the event of a criminal record containing a charge/offence of a financial nature.

The NCC reserves the right to not award the Contract until such time as the Contractor's core employees have obtained the required level of security screening as identified by the NCC's Corporate Security. In this case the level of security required will be **Reliability/Site Access/Secret**.

The NCC also reserves the right to request that the Contractor submit to a *Designated Organisation Screening* and/or *Facility Security Clearance*– depending on the nature of the information it will be entrusted with. In the event that the Contractor does not meet the requirements to obtain the requested clearance, the Contractor shall take the corrective measures recommended by the Canadian Industrial Security Directorate (of PWGSC) or by the NCC's Corporate Security in order to meet these requirements. If no corrective measures are possible or if the Contractor fails to take the recommended measures, then the Contractor shall be in default of its obligations under this Contract and the NCC shall have the rights and remedies listed in section 2.14, including the right to terminate the Contract without further notice to the Contractor.

Additional information

As part of their personal screening, individuals may be required to provide evidence of their status as a Canadian citizen or permanent resident as well as any other information/documentation requested by the NCC's Corporate Security in order to complete the screening.

The NCC reserves the right to refuse access to personnel who fail to obtain the required level of security screening.

The NCC reserves the right to impose additional security measures with respect to this Contract as the need arises.

Company Security Representative

The Contractor shall appoint one Company Security Representative (CSR) as well as one alternate (for companies who have more than five employees).

Selection criteria for the CSR and the alternate are the following:

- They must be employees of the Contractor;
- They must have a security clearance (the NCC will process the clearances once the individuals have been identified).

Responsibilities of the Company Security Representative

The CSR's responsibilities are the following:

- Act as liaison between the NCC's Corporate Security and the Contractor to ensure coordination;
- In collaboration with the NCC's Corporate Security, identify the Contractor's employees who will require access to NCC information/assets/sites **as well as any recurring subcontractors** (and their employees) who will require similar access and may not be supervised by the Contractor at all times during such access. Ensure that accurate and complete Personnel Security Screening documentation is

submitted to the NCC's Corporate Security for the employees/subcontractors who have been identified;

- Ensure that employees/subcontractors, upon notification of having been granted a reliability status, sign the *Security Screening Certificate and Briefing Form* and return to the NCC's Corporate Security;
- Ensure that only persons who have been security screened to the appropriate level and who are on a "need-to-know basis" will have access to information and assets;
- Maintain a current list of security screened employees/subcontractors;
- Ensure proper safeguard of all information and assets, including any information/assets entrusted to subcontractors;
- If a Security incident or suspected breach of security occurs, prepare and submit to the NCC an occurrence report as soon as possible.

NCC CCN Canada

PROTECTED "A" when completed
PROTÉGÉ « A » lorsque rempli

☐ New supplier / Nouveau fournisseur ☐ Update / Mise à jour

Supplier No. / N° du fournisseur

APPENDIX II SUPPLIER–DIRECT DEPOSIT PAYMENT AND TAX INFORMATION FORM
APPENDICE II FOURNISSEUR–FORMULAIRE DE PAIEMENT PAR DÉPÔT DIRECT ET RENSEIGNEMENTS AUX FINS DE L'IMPÔT

For NCC use only / À l'usage de la CCN seulement

PART 'A' – IDENTIFICATION / PARTIE 'A' - IDENTIFICATION

Legal name of entity or individual / Nom légal de l'entité ou du particulier	Operating name of entity or individual (if different from Legal Name) / Nom commercial de l'entité ou du particulier (s'il diffère du nom légal)

Former Public Servant in receipt of a PSSA Pension / Ancien fonctionnaire qui reçoit une pension en vertu de la LPFP	☐ **Yes / Oui**	☐ **No / Non**
An entity, incorporated or sole proprietorship, which was created by a Former Public Servant in receipt of a PSSA pension or a partnership made of former public servants in receipt of PSSA pension or where the affected individual has a controlling or major interest in the entity. / Une entité, constituée en société ou à propriétaire unique, créée par un ancien fonctionnaire touchant une pension en vertu de la LPFP, ou un partenariat formé d'anciens fonctionnaires touchant une pension en vertu de la LPFP, où les entités dans lesquelles ils détiennent le contrôle ou un intérêt majoritaire.	☐ **Yes / Oui**	☐ **No / Non**

Address / Adresse	Telephone No. / N° de téléphone :	Fax No. / N° de télécopieur :
Postal code / Code postal	( )	( )

PART 'B' – STATUS OF SUPPLIER / PARTIE 'B' – STATUT DU FOURNISSEUR

(1) Sole proprietor / Propriétaire unique ☐ — If sole proprietor, provide: / Si propriétaire unique, indiquez : Last Name / Nom de famille | First name / Prénom | Initial / Initiale

(2) Partnership / Société de personnes ☐ — SIN – mandatory for (1) & (2) / NAS – obligatoire pour (1) & (2)

Corporation / Société ☐ — Business No. (BN) / N° de l'entreprise (NE)

GST/HST / TPS et TVH	QST / TVQ (Québec)
Number / Numéro :	Number / Numéro :
Not registered / non inscrit ☐	Not registered / non inscrit ☐

Type of contract / Genre de contrat

Contract for services only / Contrat de services seulement ☐ — Contract for mixed goods & services / Contrat de biens et services ☐ — Contract for goods only / Contrat de biens seulement ☐

Type of goods and/or services offered / Genre de biens et/ou services rendus :

PART 'C' – FINANCIAL INSTITUTION / PARTIE 'C' – RENSEIGNEMENTS SUR L'INSTITUTION FINANCIÈRE

Please send a void cheque with this form / Veuillez, s.v.p., envoyer un spécimen de chèque avec ce formulaire

Branch Number / N° de la succursale — Institution No. / N° de l'institution : — Account No. / N° de compte :

Institution name / Nom de l'institution : — Address / Adresse : — Postal Code / Code postal :

PART 'D' – DIRECT DEPOSIT PAYMENT NOTIFICATION / PARTIE 'D' – AVIS DE PAIEMENT PAR DÉPÔT DIRECT

E-mail address / Adresse courriel :

PART 'E' – CERTIFICATION / PARTIE 'E' – CERTIFICATION

I certify that I have examined the information provided above and it is correct and complete, and fully discloses the identification of this supplier.

Where the supplier identified on this form completes part C, he hereby requests and authorizes the National Capital Commission to directly deposit into the bank account identified in part C, all amounts payable to the supplier.

Je déclare avoir examiné les renseignements susmentionnés et j'atteste qu'ils sont exacts et constituent une description complète, claire et véridique de l'identité de ce fournisseur.

Lorsque le fournisseur indiqué sur ce formulaire remplit la partie C, par la présente, il demande et autorise la Commission de la capitale nationale à déposer directement dans le compte bancaire indiqué à la partie C, tous les montants qui lui sont dus.

Name of authorized person / Nom de la personne autorisée — Title / Titre — Signature — Date

Telephone number of contact person / Numéro de téléphone de la personne ressource : ( )

IMPORTANT

Please fill in and return to the National Capital Commission with one of <u>your business cheque unsigned and marked « VOID</u> » or a letter from your bank (for verification purposes).

Mail or fax to: Procurement Assistant, Procurement Services
National Capital Commission
202-40 Elgin Street
Ottawa, ON K1P 1C7 Fax: (613) 239-5007

Veuillez remplir ce formulaire et le retourner à la Commission de la capitale nationale avec <u>un spécimen de chèque de votre entreprise non signé et portant la mention « ANNULÉ »</u> ou une lettre de votre banque (à des fins de vérification).

Poster ou télécopier à : Assistant à l'approvisionnement
Services de l'approvisionnement
Commission de la capitale nationale
40, rue Elgin, pièce 202
Ottawa (Ontario) K1P 1C7 Télécopieur : (613) 239-5007

SUPPLIER – DIRECT DEPOSIT PAYMENT AND TAX INFORMATION FORM

FOURNISSEUR – FORMULAIRE DE PAIEMENT PAR DÉPÔT DIRECT ET RENSEIGNEMENTS AUX FINS DE L'IMPÔT

Supplier Tax Information

Pursuant to paragraph 221(1) (d) of the *Income Tax Act*, NCC must declare form T-1204, contractual payments of government for services, all payments made to suppliers during the calendar year in accordance to related service contracts (including contracts for mixed goods and services).

The paragraph 237(1) of the *Income Tax Act* and the article 235 of the Income Tax Regulations require the supplier to provide all necessary information below to the organization who prepares the fiscal information forms.

Questions: Sylvie Monette, Accounts Payable and Receivable Officer – (613) 239-5678, ext. 5156 or sylvie.monette@ncc-ccn.ca

Renseignements sur les fournisseurs aux fins de l'impôt

En vertu de l'alinéa 221(1) (d) de la *Loi de l'impôt sur le revenu*, la CCN est tenu de déclarer, à l'aide du formulaire T-1204, Paiements contractuels de services du gouvernement, tous paiements versés aux fournisseurs pendant une année civile en vertu de marchés de services pertinents (y compris les marchés composés à la fois de biens et de services).

Le paragraphe 237 (1) de la *Loi de l'impôt sur le revenu* et l'article 235 du Règlement de l'impôt sur le revenu obligent les fournisseurs à fournir toutes les informations demandées ci-dessous à l'organisme qui prépare les formulaires de renseignements fiscaux.

Questions : Sylvie Monette, Agent aux comptes fournisseurs et comptes clients – (613) 239-5678, poste 5156 ou sylvie.monette@ncc-ccn.ca

Direct deposit payment information

All amounts payable by NCC to the supplier will be deposited directly into the account you identified in part C. A NCC payment advice notice will also be sent to you by e-mail detailing the particularities of the payment to the address identified in part D.

You must notify the NCC of any changes to your financial institution, branch or account number. You will then have to complete a new form.

The account you identified has to hold Canadian funds at a financial institution in Canada.

Renseignements sur le paiement par dépôt direct

Tous les montants versés par la CCN au fournisseur seront déposés directement dans le compte identifié à la partie C. Un avis de paiement de la CCN détaillant les particularités du paiement par dépôt direct vous sera envoyé par courriel à l'adresse courriel identifiée à la partie D.

Vous devez aviser la CCN de tout changement d'institution financière, de succursale ou de numéro de compte. Vous devrez donc remplir un nouveau formulaire.

Le compte que vous désignez doit être un compte en monnaie canadienne, détenu dans une institution financière au Canada.

The advantages of direct deposit payment

Direct deposit payment is a convenient, dependable, safe and timesaving way to receive your invoice payment. Direct deposit payment is completely confidential.

Funds made by direct deposit payment will be available in your bank account within two (2) days after receiving the NCC payment advice notice.

Avantages du paiement par dépôt direct

Le paiement par dépôt direct est une méthode pratique, fiable et sécuritaire, qui permet de gagner du temps dans la réception de vos paiements de factures. Le paiement par dépôt direct est entièrement confidentiel.

Les paiements effectués par dépôt direct seront disponible dans votre compte bancaire dans un délai de deux (2) jours après que la CCN envoi l'avis paiement.

Revised February 2015 / Révisé février 2015