PART 1 GENERAL

1.1 Related Sections

1. Section 01 11 00 - Summary of Work
2. Section 01 56 00 – Temporary Barriers and Enclosures
3. Section 01 73 03 – Execution Requirements
4. Section 01 33 00 - Submittal Procedures
5. Section 09 91 22- Painting
6. Electrical Sections

1.2 Scope

1. Scope includes but is not limited to:

.1 Demolition or alteration of all components, equipment, fitments and finishes as required to execute the work.

.2 Cutting and removal of slabs on grade.

.3 Making good of all finishes or surfaces to remain as result of selective demolition.

1.3 Existing Conditions

1. Take over structures to be demolished or altered based on their condition on date that tender is accepted, at time of examination prior to tendering.
2. Contractor may confirm the prior removal of all asbestos containing materials in documentation left on site following prior abatement work contract. Should areas of asbestos be found which are not documented as removed or included in the scope of this work for removal, it shall be reported to the Consultant and Owner's representative for review and instructions for removal.
3. Prior to beginning alteration or demolition, confirm with Owner that no items to be salvaged or turned over to the owner remain in the work areas.

1.4 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 and underpinning required. Make good damage and be liable for injury caused by demolition.

.2 Take precautions to support structures and, if safety of building being demolished or adjacent structures or services appears to be endangered, cease operations and notify Consultant.

.3 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.

Part 2 Products

NOT USED

Part 3 Execution

3.1 Work

.1 Dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction. Confirm in Divisions 15 and 16 for removal and re-use of mechanical and electrical materials and equipment.

.2 Refer to drawings for furniture, materials or equipment to be removed and turned over to the owner. Carefully remove such items and store in location designated by Owner.

3. For a scope of work refer to all Drawings and also coordinate items to be altered, re-built, cleaned or otherwise "made good" as a result of the cutting and patching scope of work described in Section 01 73 03 Execution Requirements or other Sections.

3.2 Preparation

.1 Disconnect electrical, telephone/PA and data service lines in work areas without disrupting main service to building and in accordance with regulations of authorities having jurisdiction. Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.

.2 Disconnect and cap designated mechanical services in accordance with requirements of local authority having jurisdiction.

- .1 Natural gas supply lines, if applicable to be removed by gas company by qualified tradesman in accordance with gas company instructions.
- .2 Remove, cap or dispose of other underground services as indicated in drawings.
- .3 Do not disrupt active or energized utilities traversing premises designated to remain undisturbed.

.3 Ground scans to locate hidden or buried services in the work area have NOT previously been done. Prior to cutting, demolition or removal of any slabs on grade or areas where services may be concealed, engage a private locate firm to provide magnetic and X-ray scans of all areas involved. This is the responsibility of the General Contract and costs for such scans are to be included in the base contract price.

3.3 Disconnection and Removal of Materials and Equipment

.1 Contractor shall cooperate with the Owner to determine which materials are to be removed and retained by Owner. The Owner will decide which items or equipment they wish to retain as their property and all other materials shall be removed from the premises by this Contractor. The equipment which is to be retained by the Owner shall be stored on site where directed by the Owner.

.2 Refer to mechanical and electrical drawings and for disconnection and removal and/or relocated existing electrical, ductwork, piping and/or equipment.

3.4 Temporary Removals and Replacement

.1 All items to be removed and installed shall be completed so that replaced materials are left in a clean undamaged state. If required to be replaced due to damage, the contractor shall include in his price for the component to be replaced and installed at no additional cost to the Contract.

3.5 Selective Demolition

.1 Follow best trade practices for all demolition and alteration work. This includes but is not limited to the following items.

.1 The school will be vacant during July and August 2025. Ensure demolition work does not disrupt any ongoing aspect of the operation of the school including the period after Substantial Performance.

.2 Confirm all demolition work (including potential noise, vibration, tools or equipment noise, etc.) in advance with the principal of the school on a daily basis. Similarly, notify all building occupants in advance at each possible interruption in services or utilities.

.3 Protect all areas from damage and intrusion by means of locking rooms under construction when not in use, use of dust tight screens and temporary partitions and hoarding. Demolish to minimize dusting. Refer to drawings for locations and other Specification Sections for requirements.

.4 Signage to be posted at all times. Take precautions to demolish only areas as necessary to complete the work, and avoid damage to adjacent areas. Make good all areas affected by demolition or renovation activities, whether specifically included in the contract documents or not.

.5 The Contractor shall be responsible for damage to all areas affected by renovation or alteration activities.

.6 Prior to demolition, the Contractor shall carefully examine the drawings in relation to the site conditions, to ensure that all intended work can be carried out without ambiguity. Incorrect demolition of any work by the Contractor, will be back-charged to him. Any discrepancies between the drawings and the site conditions, must be reported to the Consultants immediately.

.7 Demolish or remove interior and exterior elements as indicated.

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

.9 At end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements at all times.

.10 Do not sell or burn materials on site.

.11 Remove contaminated or dangerous materials from site and dispose of in safe manner to minimize danger at site or during disposal, in accordance with all governing legislation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 Landscape Cast-in-Place Concrete

.2 Section 32 13 13 Concrete Paving and Edges

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

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

.2 CSA S269.1-[16] , Falsework and Formwork.

.3 CAN/CSA-S269.3-[M92(R2003)] , Concrete Formwork.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in formwork liners and coatings 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 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 Store and protect formwork from damages.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

.1 Use formwork materials to CSA-A23.1/A23.2.

.2 Tubular footing forms: round.

.1 Sonotube or equivalent

.3 Form ties:

.1 For vertical landscape architectural concrete; concrete seat walls; concrete retaining walls; raised concrete edges; snap ties complete with plastic cones and light grey concrete plugs.

.4 Form panels:

.1 Plywood: medium density overlay plyform

.5 Form release agent: Proprietary, non volatile material not to stain concrete or impair subsequent application of finishes or coatings to surface of concrete, derived from agricultural sources, non petroleum containing, low VOC and non-toxic.

.6 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels, and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Fabricate and erect falsework in accordance with CSA S269.1.

.3 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 CSA-A23.1/A23.2.

.4 Align form joints and make watertight.

.1 Keep form joints to minimum.

.5 Use 25 mm chamfer strips on external corners and 25 mm fillets at interior corners, joints, unless specified otherwise.

.6 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.7 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.8 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Remove formwork when concrete has reached 70% of its 28 day design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.2 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 01 Landscape Concrete Forming and Accessories

.2 Section 32 13 13 Concrete Paving and Edges

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C260/C260M-[10a(2016)] , Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-[11] , Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-[16] , Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C 881/C881M-[15] , Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

.5 ASTM C1017/C1017M-[13e1] , Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.6 ASTM C C1059/C1059M-[13] , Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.

.7 ASTM D412-[16] , Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.8 ASTM D624-[2012] , Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.9 ASTM D1751-[04(2013)e1] , Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.10 ASTM D1752-[04a(2013)] , Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-[M86] , Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA Group

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

.2 CSA A283-[06-R2016] , Qualification Code for Concrete Testing Laboratories.

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

1.3 ABBREVIATIONS AND ACRONYMS

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement types:

- .1 GU, GUb and GUL - General use cement.
- .2 MS and MSb - Moderate sulphate-resistant cement.
- .3 MH, MHb and MHL - Moderate heat of hydration cement.
- .4 HE, HEb and HEL - High early-strength cement.
- .5 LH, LHb and LHL - Low heat of hydration cement.
- .6 HS and HSb - High sulphate-resistant cement.

.2 Fly ash types:

- .1 F - with CaO content maximum 8%.
- .2 CI - with CaO content 15 to 20%.
- .3 CH - with CaO minimum 20%.

.3 GGBFS - Ground, granulated blast-furnace slag.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings: Submit complete reinforcement fabrication and installation shop drawings indicating location, bar size, dowls, lap length, placement and concrete coverage, and dimensions.

.4 Site Quality Control Submittals:

- .1 Provide testing and inspection reports for review by Consultant and do not proceed without written approval when deviations from mix design or parameters found.
- .2 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

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

.2 Provide Consultant, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

- .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture meet specified requirements.

.3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Consultant on following items:

.1 Falsework erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

.4 Quality Control Plan: provide written report to Consultant verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

.5 Mock-Ups:

.1 Provide site mock-up for finished concrete indicating forming methods and materials, and procedures proposed to achieve finish as shown on drawings, and to comply with following requirements, using materials indicated for completed work:

.1 Build mock-ups in location and of size as directed by Consultant.

.2 Obtain Consultant's acceptance of mock-ups before starting construction; mock-up used throughout construction period and used as standard of acceptance for subsequent architectural concrete work.

.3 Mock-up may form part of permanent structure when accepted by Consultant; repair or replace unacceptable mock-ups at no additional cost to Owner.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Modifying maximum time limit without receipt of prior written agreement from laboratory representative and concrete producer as described in CSA A23.1/A23.2. is prohibited.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

1.7 SITE CONDITIONS

.1 Placing concrete during rain or weather events that could damage concrete is prohibited.

.2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.

.3 Cold weather protection:

.1 Maintain protection equipment, in readiness on Site.

.2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.

.3 Placing concrete upon or against surface at temperature below 5°C is prohibited.

.4 Hot weather protection:

.1 Protect concrete from direct sunlight when ambient temperature above 27°C.

.2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.

.5 Protect from drying.

Part 2 Products

2.1 MATERIALS

.1 Portland Cement: GU to CSA A3001.

.2 White Portland-Limestone Cement: Federal White, GUL to CSA A30001

.3 Supplementary cementing materials: in accordance with CSA A3001.

.4 Water: to CSA A23.1.

.5 Aggregates: to CSA A23.1/A23.2.

.6 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.1 Sika AER, as distributed by Sika.

.2 Chemical admixture: to ASTM C494. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.7 Curing compound: to CSA A23.1/A23.2.

.8 Premoulded joint fillers:

.1 Bituminous impregnated fibre board: to ASTM D1751.

.9 Weep hole tubes: plastic or galvanized steel.

.10 Concrete Bonding Agents: Latex to ASTM C1059/C1059M.

.11 Reinforcing Steel:

.1 Concrete Walls or Raised Concrete Edges; #10M or #15M, epoxy coated continuous bars, placed as indicated on drawings.

.2 Flatwork: Refer to Section 32 13 13 Concrete Paving and Edges.

2.2 MIXES

.1 Mix in accordance with CSA A23.1/A23.2.

.1 Ensure materials used in concrete mix have been submitted for testing and meet requirements of CSA A23.1.

.2 Co-ordinate construction methods to suit concrete mix proportions and parameters.

.3 Identify and report immediately to Consultant when concrete mix design and parameters pose anticipated problems or deficiencies related to construction.

.1 Class of exposure: C-2.

.2 Nominal size of course Aggregate: 19mm

.3 Admixture: chemical to ASTM C494/C494M.

.4 Water: to CSA A23.1/A23.2

.5 Air content category: 1 .

.6 Slump: at time and point of discharge max 3 +/- 0.5in.

2.3 COLOUR PIGMENTS, STAINS AND RELEASES

.1 Concrete pavements designated as coloured are to be integrally coloured and meet or exceed the parameters outlined in Section 2.2 MIXES.

.1 Coloured Concrete: Interstar integrally coloured concrete.

.1 Field Colour: NR-5171R Midnight Bay

.2 Approved equivalent.

.2 Rose Petal Band Stain: Interstar NStar – Non-Reactive Stain

.1 Colour: NS-621 Blue Hydrangea

.3 Rose Textured Concrete:

.1 Federal White Portland Limestone Concrete with;

.1 Antiquing Release Agent: Coloured, finely powdered material formulated to break the bond between imprinting tools and surface of colour hardened concrete while imparting an antiqued appearance.

.2 Products: Scofield's "Lithochrome Antiquing Release"

.1 Colour: A-21 Deep Charcoal

.4 Sealants

.1 Solvent-Borne Curing Compound and Sealer: 100 percent methacrylate polymers and UV inhibitors blend. Low VOC waterborne modified acrylic formulation. Complaint with ASTM C 309.

.2 Product: Scofield's "SCOFIELD Cureseal-VOC"

Part 3 Execution

3.1 PREPARATION

.1 Obtain Consultant's approval before placing concrete.

.1 Provide consultant 24 hours minimum notice prior to placing of concrete.

.2 Place concrete reinforcing accurately and secure in place.

.3 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitate placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete permitted only after approval of equipment and mix.

.5 Disturbing reinforcement and inserts during concrete placement is prohibited.

.6 Prior to placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

.9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, workability, air content, temperature and test samples taken.

.10 In locations where new concrete dowelled to existing work, drill holes in existing concrete.

.1 Place steel dowels and pack solidly with shrinkage compensating grout to anchor and hold dowels in positions as indicated.

.11 Do not place load upon new concrete until authorized by Consultant.

3.2 INSTALLATION/APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Sleeves and inserts:

.1 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Consultant before placing of concrete.

.2 Confirm locations and sizes of sleeves and openings shown on drawings.

.3 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 in co-ordination with appropriate trade prior to placing concrete.

.2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Consultant.

.1 Drilled holes: to manufacturers' recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.4 Set bolts and fill holes with shrinkage compensating grout.

.5 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 03 10 01-Landscape Concrete Forming and Accessories. If wood forms used, remove them after concrete has set.

.2 Install weep hole tubes and drains as indicated.

.5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.6 Finishing and curing:

.1 Finish concrete to CSA A23.1/A23.2.

.2 Refer to Section 32 13 13 for concrete flatwork textured finishing.

.3 Use procedures as noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface not damaged.

.4 Use curing compounds compatible with applied finish on concrete surfaces.

.5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

.7 Joint fillers:

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.

.2 When more than one piece required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.3 Locate and form expansion joints as indicated.

.4 Install joint filler.

.5 Use 13 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12mm of finished slab surface unless indicated otherwise.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance to CSA A23.1, 3mm in 3m using straight edge method.

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials carried out by testing laboratory to CSA A23.1/A23.2.

.1 Ensure testing laboratory certified to CSA A283.

.3 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.4 Inspection or testing by Consultant not to augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

3.5 CLEANING

.1 Clean in accordance with Section 01 74 00- Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 09 91 22 – Painting

1.2 REFERENCES

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

- .1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- .2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- .3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer
- .2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating
- .3 CISC/CPMA 1 – 73B, Quick Drying, One-Coat Paint for Use on Structural Steel
- .4 CISC/CPMA 2 – 75, Quick Drying, Primer for use on Structural Steel

.3 Canadian Standards Association (CSA International)

- .1 G40.20-04: General Requirements for Rolled or Welded Structural Quality Steel
- .2 G40.21-04 (R2009): Structural Quality Steel
- .3 CAN/CSA G164-M92 (R2003): Hot Dip Galvanizing of Irregularly Shaped Articles
- .4 CSA S16.1-09: Limit States Design of Steel Structures
- .5 CAN/CSA – S136-07: North American Specification of the Design of Cold-formed Steel Structural Members
- .6 CSA W47.1-09: Certification of Companies for Fusion Welding of Steel
- .7 CSA W59-03 (R2008): Welded Steel Construction (Metal Arc Welding)
- .8 CSA NSS.3-1965 (r2003): Resistance Welding Qualification Code for Fabricators of Structural Members in Buildings

.4 The Environmental Choice Program

- .1 CCD-047a-98, Paints, Surface Coatings
- .2 CCD-048-98, Surface Coatings - Recycled Water-borne

1.3 SUBMITTALS

.1 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Deliver, store, handle and protect materials in accordance with manufacturer recommendations.

.2 Storage and Protection:

.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.

.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CSA-G40.20/G40.21, Grade 350W for hollow structural sections Class H and Grade 300W for Plates and Flat Shapes.

.2 Welding materials: to CSA W59.

.3 Bolts and anchor bolts: to ASTM A307.

.4 Stainless steel tubing: to ASTM A269, Type 316 alloy, Seamless welded with AISI No. 4 finish.

.5 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 PRIMERS, COATINGS AND SHOP PAINTING

.1 Interior Steel in Dry Areas: Quick drying oil alkyd conforming to CISC/CPMA 2.75.

.2 Exterior Steel, Interior Steel in Unheated Areas, Steel Embedded in Concrete**:** Hot dip galvanized conforming to CSA G164, minimum Z275 coating. Galvanizing of structural steel components and loose lintels: refer to Section 05 12 23.

.3 Galvanized Coating Touch-Up**:** W.R. Meadows “Galvafroid” or Kerry Industries “Z.R.C.” zinc rich coating or similar manufacturer containing minimum 90% zinc by weight.

.4 Apply two (2) shop coat(s) of primer or coating as indicated above and according to manufacturers recommendations. Do not prime aluminum, stainless steel or those components to be galvanized or encased in concrete.

.5 Use primer unadulterated, as provided by manufacturer. Paint on dry surfaces free from rust scale and grease. Do not paint when temperature is lower than 10 deg. Celsius and rising.

.6 Clean surfaces to be field welded; do not paint.

2.3 FASTENINGS

.1 Use nuts and bolts conforming to ASTM A307, A325, and A563 as applicable.

.1 For interior work, use cadmium-plated fastenings where other protection is not specified.

.2 For exterior work, use Type 300 or 400 stainless steel.

2.4 ANCHORS AND SHIMS

.1 For exposed anchorage of aluminum, if applicable, use stainless steel and otherwise to match metal anchored. For non-exposed work, anchors and shims may be galvanized steel.

2.5 PIPE

.1 To ASTM A53, extra strong steel pipe for bollards.

2.6 BITUMINOUS PAINT

.1 Alkali-resisting to meet specified requirements of CAN/CGSB-1.108, Type 2. Use to insulate contact between dissimilar metals.

2.7 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

.5 Weld all connections where possible, and bolt where not possible unless indicated otherwise on drawings.

.6 Weld all stainless steel by the Argon Arc Process. Grind smooth and polish joints, crence-free, and flush without seams.

2.8 LIST OF MISCELLANEOUS METAL FABRICATIONS

.1 This Section includes, but is not limited to the following list. Note: Galvanize all exterior items and other items noted. Prime paint all interior items.

.1 Anchors, Bolts, Inserts, Sleeves for work in this Section.

.2 Hangers and Supports (for work in this Section).

.3 Bollards.

.4 Gate enclosure for waste bins.

.5 HSS columns at waste bins.

Part 3 Execution

3.1 GENERAL

.1 Supply and install all miscellaneous metal work indicated on the Drawings and not indicated in work of other Sections in addition to items listed below.

3.2 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.

.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.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 CSA-S16.1, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding. Spray or brush apply a minimum of three (3) coats of zinc-rich paint to achieve a dry film thickness of 8 mils. Apply a finish coat of aluminum paint to provide a colour blend with the surround galvanizing.

3.3 GALVANIZED STEEL

.1 Galvanize steel members, fabrications, and assemblies after fabrication by the hot dip process in accordance with CSA G164, minimum Z275 coating.

.2 Galvanize bolts, nuts and washers and iron and steel hardware components in accordance with CSA G164.

.3 Safeguard products against steel embrittlement in conformance with ASTM A143.

.4 Design features which may lead to difficulties during galvanizing shall be pointed out prior to dipping.

.5 The composition of metal in the galvanizing bath shall be not less than 98.0% zinc.

3.4 BOLLARDS

.1 Supply and install galvanized steel bollards as shown on Drawings. Bollards shall be 140 mm diameter x 9.5 mm thick wall at 915 mm high, seamless steel pipe. Install 1220 mm into a concrete foundation. Fill bollard with 25 MPa concrete and round top. Round top of footing also. For number of Bollards required - refer to Contract Drawings.

.2 Bollard covers: Provide HDPE bollard covers for all bollards. Bollard covers: Covers fabricated from 3 mm thick high density polyethylene with high tensile strength and solvent resistance and two recessed reflective stripes for increased visibility. Colour: Yellow colour or as approved by the Consultant. Bollard covers as manufactured by Reliance Foundry Co. Ltd. or approved alternative.

3.5 GATE

.1 Welded steel pipe construction, as shown on drawings. Exterior epoxy paint after fabrication, or provide exterior grade system as fabricated by Spinanaker Industries as noted in section 10 11 25 manufactured specialties.

3.6 ERECTION

.1 Erect work in accordance with shop drawings and in coordination with trades whose work relates to this Section

.2 Erect work plumb, straight, square and accurately fitted with tight joints at intersections.

.3 Where possible install work in one continuous piece.

.4 Anchor all components to structure, walls, and floors as required with weld or other methods of anchorage approved by the Consultant.

3.7 TOUCH-UP AND REPLACEMENT

.1 Touch-up adjacent primed surfaces burned, scratched or otherwise damaged during erection with prime paint, to match shopcoat, or galvafroid for galvanized when erection is completed.

.2 Paint over bare areas on galvanized surfaces and welds with zinc rich paint.

.3 Replace damaged or unacceptable materials indicated by the Consultants.

3.8 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 RELATED SECTIONS

.1 Section 01 33 00 – Submittals Procedures

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA B111-[1974(R1998)], Wire Nails, Spikes and Staples.

.2 CAN/CSA-G164-[M92(R1998)], Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA O121-[M1978(R1998)], Douglas Fir Plywood.

.4 CAN/CSA-O141-[91(R1999)], Softwood Lumber.

.5 CSA O151-[M1978(R1998)], Canadian Softwood Plywood.

.6 CAN/CSA-O325.0-[92(R1998)], Construction Sheathing.

.7 CAN/CSA-086M-01(R2006), Engineering Design in Wood.

.2 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber [2000].

1.3 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Divert unused wood materials from landfill to recycling, reuse, composting facility approved by Consultant.

.3 Do not dispose of preservative treated wood through incineration.

.4 Do not dispose of preservative treated wood with materials destined for recycling or reuse.

.5 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Consultant.

.6 Dispose of unused wood preservative material at official hazardous material collections site approved by Consultant.

.7 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other locations where they will pose health or environmental hazard.

Part 2 Products

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

.1 CAN/CSA-O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Fencing Enclosure Lumber:

.1 Western Red Cedar species, well seasoned, processed and stamped at the same mill with appropriate grade markings. Conform to requirements of standard grading rule for Canadian Lumber of National Lumber Grades Authority (NLGA) with latest supplement, approved by Canadian Lumber Standard Administrative Board, as follows:

.1 Fence Boards and Framing: `No.2 Clear or Better' grade with dressed smooth surfaces.

2.2 ACCESSORIES

.1 Nails, spikes, staples, screws, bolts anchors lag screws, special fastening devices and supports required for erection of all carpentry components: to CSA B111. Use galvanized components where exposed to exterior atmosphere.

.2 Rough Hardware (cedar): Provide rough hardware such as nails, spikes, staples, bolts, nuts, washers, screws, clips, strap iron and including hardware for temporary enclosures. Nails shall be spiral type. All nails, spikes and staples shall conform to CSA B111. All rough hardware shall be galvanized unless otherwise noted.

2.3 FINISHES

.1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for exterior work and interior highly humid areas.

Part 3 Execution

3.1 GENERAL

.1 Supply and install all other carpentry shown on drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other sections, cut openings in woodwork when so required and make good disturbed surfaces.

3.2 PREPARATION

.1 Do all wood framing in accordance with the Ontario Building Code and CAN3 - 086M – 01 - (2006).

.2 Machine dressed work shall be slow fed using sharp cutters and finished members shall be free from drag, feathers, slivers or roughness of any kind.

.3 Frame materials with tight joints rigidly held in place.

.4 Design construction methods for expansion and contraction of the materials.

.5 Erect work plumb, level, square and to required lines.

.6 Be responsible for methods of construction for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other trades.

3.3 FURRING AND BLOCKING

.1 Supply and install furring and blocking, required.

.2 Align and plumb faces of furring and blocking to tolerance of 1:600.

3.4 ROUGH BUCKS AND NAILERS

.1 Install wood bucks and nailers, as indicated, including wood bucks and linings around frames for doors and windows.

.2 Except where indicated, otherwise, use material at least 38 mm thick secured with 9 mm bolts located within 300 mm from ends of members and uniformly spaced at 1200 mm between.

.3 Countersink bolts where necessary to provide clearance for other work.

3.5 INSTALLATION OF HOLLOW METAL FRAMES

.1 Set frames plumb and square in their exact location and at correct elevation. Firmly block and brace to prevent shifting. Shim up where required to ensure proper alignment dimensions from finished floor to head of frame. Install temporary wood spreaders at mid-height.

.2 Where pressed steel frames are installed in concrete walls, secure frames to concrete using lead expansion shields and anchor bolts through pipe sleeves. Perform drilling of concrete as required. Fill recessed bolt heads flush to frame face with approved metal filler and sand smooth.

.3 Install fire rated door frames in accordance with requirements of National Fire Code Volume 4, produced by The National Fire Protection Association (NFPA 80).

3.6 GENERAL

.1 Supply and install all other carpentry shown on drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other sections, cut openings in woodwork when so required and make good disturbed surfaces.

3.7 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

3.8 INSTALLATION

.1 Lay out work carefully and to accommodate work of others. Cut and fit accurately. Erect in position indicated by drawings. Align, level, square, plumb, and secure work permanently in place. Brace work temporarily as required. Join work only over solid bracing.

.2 Bore holes true to line and to same size as bolts. Drive bolts into place for snug fit, and use plates or washers for bolthead and nut bearings. Turn up bolts and lag screws tightly when installed, and again just before concealed by other work or at completion of work.

.3 Co-operate with work of other Sections to ensure that unity of actions will ensure orderly progress to meet construction schedule.

.4 Provide anchors, bolts and inserts, required for attachment of the work of this Section, to those performing the work of other Sections and who are responsible for their installation.

.5 Work shall include rough hardware such as nails, bolts, nuts, washers, screws, clips, hangers, connectors, and strap iron required for installation of work and all operating hardware required on work of this Section for temporary use.

.6 Cut fastening work into lengths as long as practicable and with square ends. Erect work plumb, in true planes, and fastened rigidly in place.

.7 All members shall be accurately cut to length, angle and be true to line to assure tight joints.

.8 Correct alignment and plumb must be maintained until specified lateral bracing is installed. Cutting and altering of trusses is not permitted except by approval by the Engineer. Heavy concentrated loads must not be placed on top of trusses until permanent bracing and decking have been installed. In any event, these temporary loads must not exceed the truss design loads.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 05 50 00 – Metal Fabrications.

1.2 REFERENCES

.1 Architectural Painting Specifications Manual, Master Painters Institute (MPI).

.2 Ontario Painting Contractors Association (OPCA) Architectural Specification Manual - referenced as OPCA Manual, latest Edition. Paint formulations and methods referred to herein refer to this Manual. If contractor is unfamiliar with this reference standard, contact the OPCA at (416) 498-1897.

1.3 WARRANTY

.1 At outset of the contract, contractor to register with the OPCA for the inspection service paid for from Cash Allowances.

.2 Upon completion of the inspection program, contractor to furnish an OPCA 2 Year Guarantee. The Guarantee shall warrant that the work has been performed with respect to the standards and requirements incorporated in the OPCA specification manual-latest edition.

1.4 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Do not apply paint finish in areas where dust is being generated.

.2 Conform to requirements of OPCA Manual.

.3 Comply with the requirements of Section 01 35 30- Health and Safety.

1.5 JOB MOCK-UP

.1 Complete a mock-up room to be reviewed and approved by Owner, Consultant, and OPCA Inspector for approval on application of block filler and finish paint coats.

1.6 SCHEDULING OF WORK

.1 Submit work schedule for various stages of painting to Consultant for approval. Submit schedule minimum of 72 hours in advance of proposed operations.

.2 Obtain written authorization from Consultant for any changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about the building.

1.7 EXTRA MATERIALS

.1 Submit one - four litre can of each type and colour of [primer] [stain] [finish coating]. Identify colour and paint type in relation to established colour schedule and finish system.

.2 Deliver to Contractor and store where directed.

1.8 DELIVERY, HANDLING AND STORAGE

.1 Labels shall clearly indicate:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.2 Remove damaged, opened and rejected materials from site.

.3 Provide and maintain dry, temperature controlled, secure storage.

.4 Observe manufacturer's recommendations for storage and handling.

.5 Store materials and supplies away from heat generating devices.

.6 Store materials and equipment in a well ventilated area with temperature range 7^0C to 30^0C.

.7 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.8 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant. After completion of operations, return areas to clean condition to approval of Consultant.

.9 Remove paint materials from storage only in quantities required for same day use.

.10 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.11 Fire Safety Requirements:

.1 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.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.9 FINISHES AND COLOURS

.1 Review the requirements outlined in Section 099127, Finish Schedule and Colour Notes. A separate colour schedule will be issued after contract award.

.2 Allow for 10 colours total from all formulations for this project including room wall accent colours.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.,) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.2 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.3 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.4 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground the following procedures shall be strictly adhered to:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.5 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.6 Set aside and protect surplus and uncontaminated finish materials: galvanized touch up; wood stain, prefinished metal touch up paint. Deliver to or arrange collection by recycling organization for verifiable re-use or re-manufacturing.

.7 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

Part 2 Products

2.1 MATERIALS

.1 Acceptable Manufacturer's: Where OPCA code numbers are not referenced, use Products from one of the following manufacturers:

.1 Benjamin Moore & Co. Ltd.

.2 Canadian Industries Ltd.

.3 ICI (Glidden) Paints.

.4 Para Paints.

.5 Pratt & Lambert Inc.

.6 SICO Coatings.

.7 The Sherwin-Williams Company.

.2 Paint materials for paint systems shall be products of a single manufacturer.

.3 Acceptable products: Per Chapter 5 OPCA Manual and as listed.

.4 Paint materials for each paint system to be products of a single manufacturer.

.5 Use low-VOC and low-odour paints only.

Part 3 Execution

3.1 GENERAL

.1 Prepare surfaces to receive paint per Chapter 3 OPCA Manual.

3.2 APPLICATION

.1 Sand and dust between each coat to remove defects visible from distance up to 1.5 m.

.2 Finish closets and alcoves as specified for adjoining rooms.

.3 Apply each coat at the proper consistency. Each coat of finish should be fully dry and hard before applying the next coat, unless the manufacturer’s instructions state otherwise.

.4 Method of application to be as approved by Consultant. Apply paint by [brush] [roller] [air sprayer] [airless sprayer]. Conform to manufacturer's application instructions unless specified otherwise.

.5 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Consultant.

.5 Remove runs, sags and brush marks from finished work and repaint.

.6 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.

.4 Brush out immediately all runs and sags.

.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.7 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access and only when specifically authorized by Consultant.

.8 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.9 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.10 Sand and dust between coats to remove visible defects.

.11 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.

.12 Finish inside of cupboards and cabinets as specified for outside surfaces.

.13 Finish closets and alcoves as specified for adjoining rooms.

.14 Finish top, bottom, edges and cut-outs of doors after fitting as specified for door surfaces.

3.3 PAINT SYSTEMS

.1 System references listed are based on Chapters 4A and 4B of OPCA Manual and are OPCA Premium Grade, unless noted otherwise.

3.4 EXTERIOR PAINTING

.1 Pavement markings: EXT. 7-A, Zone Marking Alkyd Finish, Premium Grade.

.2 Miscellaneous metal:

.1 Primed: EXT. 11-A-Gloss, Premium Grade

.2 Galvanized: Touch up any welds, cuts or damage with ‘Galvafroid’ Paint by W.R. Meadows prior to prime and finish coats.; Finish System EXT. 6F, Two component epoxy finish, Premium Grade. Custom colour.

.3 Galvanized Structural Steel: Touch up any welds, cuts or damage with ‘Galvafroid’ Paint by W.R. Meadows prior to prime and finish coats.; Finish System: EXT. 6F, Two component epoxy finish, Premium Grade. Custom colour.

3.5 INSPECTIONS

.1 Provide Architect with all formulations at outset of project.

.2 Cooperate at all times with the paint inspection agency in the performance of their duties as required as part of the work of this Section.

.3 Inspection costs, if required, to be paid from Cash Allowance.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet 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.

.3 Samples:

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

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site packaging materials at appropriate recycling facilities.

.2 Dispose of recyclable packaging material in appropriate on-site bin for recycling.

Part 2 Products

2.1 MATERIALS

.1 Exterior Semi-Recessed (Buried) Garbage Container

.1 EarthBin front loader truck collected, semi-recessed Garbage containers as manufactured by EarthBin,
.2 Model: EB500 Premium
.3 Capacity: 6.5 cubic yard (5m3) each.
.4 Lids & Signage:
.1 Large Cardboard Slot. **Grey lid.**
.2 Recyclables. **Blue lid.**
.3 Garbage, square opening. **Black lid.**
.4 Compostables. **Green lid.**
.5 Framing panel colour: cedar
.6 Include excavation, supply and install of units.
.8 Acceptable alternates meeting or exceeding the above specifications. Must be front loader truck collected units.
.9 Quantity and location: Refer to Site Plan drawing(s).
.10 Alternates: Semi-recessed front-loader waste containers meeting or exceeding the above produce specifications by Earthbin, EnviroWirx and Exolaxia.

.2 Modular Welded Wire Partition System:

.1 Welded wire mesh partition and swing doors as manufactured by Spinnaker Industries Inc. May be fabricated through miscellaneous metal construction.

.2 Provide a complete assembly, complete with hinges and locking hasps.

.3 Location: Outdoor waste bin fencing.

.4 Size: as noted on drawings.

.3 Flagpole: Refer to Landscape drawings and specifications 32 33 00 Site Furnishings.

.4 Bicycle & Scooter Racks**:** Refer to Landscape drawings and specifications 32 33 00 Site Furnishings.

.5 Tactile Surface Warning Indicator Plates: Refer to Landscape drawings and specifications 32 33 00 Site Furnishings.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

.1 Install where indicated on drawings and as per manufacturer’s instructions.

3.3 DEMONSTRATION AND TRAINING

.1 Provide demonstration of operation to the Owner and his representatives.

.2 Provide training for operation, maintenance and repairs.

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Clean surfaces after installation using manufacturer's recommended cleaning procedures.

.3 Clean aluminum with damp rag and approved non-abrasive cleaner.

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

END OF SECTION

DIVISION 26 ELECTERICAL

END OF SECTION

PROJECT NAME: Exterior Upgrades to Norte Dame Catholic Secondary School
2333 Headon Forest Dr. Burlington, ON
Halton Catholic District School Board

RDZ PROJECT NUMBER: 25067

Following Supplementary Electrical Bid Form is submitted by:

…….

(Bidding Company)

…….

(Street Address or P. O. Box No.)

…….

(City, Province and Postal Code)

Dated …… And which is an integral part of Bid Form.

In accordance with Instructions to Bidders, we provide the Supplementary Electrical Bid Form. We understand that the information provided to be considered an integral part of Bid Form and is to be completed in full.

Where instructions are not provided, submit Supplementary Electrical Bid Form by time of Bid closing, via e-mail addressed to:

RDZ Engineers Ltd.
Attention: Tanweer Mozaffar
E-mail : tanweer@rdzeng.ca

Supplementary Bid Form Signature:

…….

(Signature of Authorized Representative)

…….

(Print Name)

…….

(Title)

A. LIST OF MANUFACTURERS/SUPPLIERS

We submit, herein, typed or neatly printed, the names of the manufacturers upon whose products our Bid Price is based and which we will supply. If no name is indicated, or if name identified is not listed in issued documents, or if more than one name is indicated for a particular product, we will if requested, provide the base specified manufacturer's product. Where products are named in the specifications with only one (1) manufacturer/supplier, or are not listed herein, we are also prepared to provide the base specified named product. We will provide Canadian manufactured products if costs and quality are similar.

We understand that the first manufacturer specified for any product is the manufacturer upon whose product the design is based, and that the other manufacturers specified for a particular product are manufacturers acceptable to the Owner and whose product produces equivalent quality, performance, and size. We further understand if we indicate a manufacturer other than the manufacturer whose product is the basis of the design, we are responsible for ensuring that the product supplied is equivalent in quality, performance, and size to the base design product, and that any additional costs incurred as a result of use of such products will be borne by us. Acceptance of non-base specified manufacturers with respect to their equivalency shall be as sole discretion of consultant.

We also acknowledge that failure to submit this list as specified or failure to submit within time defined may result in provision of base specified manufacturer's product, at discretion of consultant.

SECTION	PRODUCT	MANUFACTURER/SUPPLIER & CATALOGUE NUMBER
26 12 17	Dry Type Transformer	
26 28 23	Disconnect Switches-Fused and Non-Fused	
26 29 01	Contactors	
26 50 00	Lighting	

B. UNIT PRICES AND LABOUR RATES

We enclose herewith Unit Prices and Labour Rates which are an integral part of the Bid. Unit prices and labour rates are in effect for the duration of this Project's construction period. Owner is not obligated to accept unit prices and labour rates quoted.

1. Labour Rates:

   Labour at the following rates shall be applied for additions or deletions to the work not covered by unit prices. The prices consist of salary, all agreed local union benefits. The rate quoted represents the net cost to the Contractor, exclusive of overhead and profit.

   Journeyman $/hour _____

   Foreman $/hour _____

2. Unit Prices:

   The following unit costs will apply to all additional or deleted work from the Contract and should include their proportional share of all labour equipment, materials, accessories, profits, overhead and taxes for a job completely installed. Applications of unit prices will be to the net difference of quantities of individual products and materials in each contemplated Change Notice or Revision Notice.

3. The unit prices will be used for additions and deletions. Credit rate for deletions shall be at 80%

4. Conduit and Cable:

   Supply and install the following conduit and cables including fastenings, clips, connectors, coupling boxes, etc. as required based on length as shown.

27mm Empty Conduit for length of 3500mm	$ _____
2#12-16mmC for length of 3500mm	$ _____
3#12-16mmC for length of 3500mm	$ _____
2#10-21mmC for length of 3500mm	$ _____
3#10-21mmC for length of 3500mm	$ _____
3#8-21mmC for length of 3500mm	$ _____

5. Light Fixtures:

   Supply and installation of the following lighting fixtures. The supply and installation of lighting fixtures shall include the fixtures, flexible conduit, wiring and connection to nearest outlet box containing 347 and/or 120volt circuits and the supply and installation of built-in drivers, 0-10V dimmers, etc. (Base conduit and wiring on 4500mm length).

   .1 Supply and installation of one type "B" fixture. $ _____

   .2 Supply and installation of one type “S” fixture. $ _____

   .3 Supply and installation of one type “U” fixture. $ _____

END OF DOCUMENT

1. General

1.1 GENERAL

.1 This Section covers items common to Sections of Division 26, Division 27, and Division 28. The General Conditions, Supplementary Conditions and Division 1 are a part of this Specification and shall apply to this Division. This section also supplements requirements of Division 1, Division 23, Division 27, Division 28, Division 33, and Division 34.

.2 Issued for Construction documents are issued for Contractors' convenience for reference only and are a consolidation of issued drawings, specifications, and addenda. Consultant makes no representation of their completeness. Exact construction requirements to be based on official Bid issued drawings, specifications, and issued separate addenda. Contact Consultant for any clarifications.

1.2 APPLICATION

.1 This Section specifies requirements that are common to Electrical Divisions work Sections, and it is a supplement to each Section and is to be read accordingly. Where requirements of this Section contradict requirements of Divisions 00 or 01, conditions of Division 00 or 01 to take precedence.

.2 Mention herein, or indication on the Drawings of articles, materials, operations, or methods requires that all such items shall be provided in the quality and quantity required, and that the operations shall be performed according to the methods prescribed, complete with all necessary labour and incidentals.

.3 <u>These Specifications shall be considered as an integral part of the accompanying Drawings. Any item or subject omitted from either the Specifications or the Drawings, but which is mentioned or reasonably specified in the other shall be considered as properly and sufficiently specified and shall be provided.</u>

1.3 REFERENCES

.1 All work shall conform to the latest Codes, requirements and approval of the Authorities having jurisdiction and shall be subject to acceptance by the Consultant, and the following codes and standards:

- OBC, Latest Edition and Local Building Department requirements.
- Ontario Fire Marshall latest requirements.
- OESC – Latest Edition
- Electrical Safety Authority – Latest Inspection Bulletins
- CSA C22.1, Canadian Electrical Code, Part 1 - Latest Edition

1.4 DEFINITIONS

.1 The following are definitions of words found in Electrical Divisions of the Specification and on associated drawings:

.1 "concealed" – means hidden from normal sight in furred spaces, shafts, ceiling spaces, walls, and partitions.

.2 "exposed" – means work normally visible, including work in equipment rooms, service tunnels, and similar spaces.

.3 "finished" - means when in description of any area or part of an area or a product which receives a finish such as paint, or in case of a product may be factory finished.

.4 "provision" or "provide" (and tenses of "provide") – means supply and install complete. Include labour, materials, and services necessary to supply and install items or work referred to.

.5 "install" (and tenses of "install") – means secure in position, connect complete, test, adjust, verify, and certify.

.6 "As instructed" or where instructed" – means as instructed by the Consultant including supplementary instruction notices and job site instruction notices.

.7 "listed" - means that the materials or equipment has been tested in accordance with applicable standards and methods and has been approved and listed for the intended use by a testing company approved by the Authorities having jurisdiction.

.8 "supply" – means to procure, arrange for delivery to site, inspect, accept delivery, and administer supply of products; distribute to areas; and include manufacturer's supply of any special materials, standard on site testing, initial start-up, programming, basic commissioning, warranties, and assistance to Contractor.

.9 "delete" or "remove" (and tenses of "delete" or "remove") – means to disconnect, make safe, remove obsolete materials and patch and repair/finish surfaces to match adjoining similar construction; include for associated re-programming of systems and/or change of documentation identifications to suit deletions, and properly dispose of deleted products off site unless otherwise instructed by consultant.

.10 "BAS" – means building automation system; "BMS" – means building management system, "FMS" – means facility management system; and "DDC" means direct digital controls; references to "BAS", "BMS", "FMS" and "DDC" generally mean same.

.11 "Governing authority" and/or "authority having jurisdiction" and/or "regulatory authority" and/or "Municipal authority" – means government departments, agencies, standards, rules, and regulations that apply to and govern work and to which work must adhere.

.12 "Mechanical Divisions" – refers to Divisions 20, 21, 22, 23, 25 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Mechanical Contractor, unless otherwise noted.

.13 "Electrical Divisions" – refers to Divisions 26, 27, 28 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Electrical Contractor, unless otherwise noted.

.14 "Approved" or "Approval" - means approved by Authorities having jurisdiction as conforming to Codes, Standards, By-Laws, etc.

.15 "Acceptable" or "Acceptance" – means acceptable to the Consultant as conforming together to the requirements of the contract documents.

.16 "Submit for Review" or "Submit Notice" – means submit to the Consultant.

.17 "Subject to Review" – means work shall be laid out for review by the Consultant. No work shall proceed until instructions have been obtained from the Consultant. Submit further information, shop drawings, samples etc. as specified and as may be requested by the Consultants.

.18 "Accessible" - means reachable by person with tools as required and where obstacles may be removed and replaced without cutting or breaking out materials.

.19 "board", "owner" - means School board.

.2 Wherever words "indicated", "shown", "noted", "listed", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean product referred to is "indicated", "shown", "listed", or "noted" on Contract Documents.

.3 Wherever words "reviewed", "satisfactory", "as directed", "submit", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean that work or product referred to is "reviewed by", "to the satisfaction of", "submitted to", etc., Consultant.

1.5 DOCUMENTS

.1 Documents for bidding include but are not limited to issued Drawings, Specifications and Addenda.

.2 Drawings and Specifications are portions of Contract Documents and identify labour, products, and services necessary for performance of work and form a basis for determining pricing. They are intended to be cooperative. Perform work that is shown, specified, or reasonably implied on the drawings but not mentioned in Specification, or vice-versa, as though fully covered by both.

.3 Read Drawings and Specifications in conjunction with documents of other Divisions and, where applicable, Code Consultant's report.

.4 Unless otherwise specifically noted in Specifications and/or on Drawings, Sections of Electrical Divisions are not intended to delegate functions nor to delegate work and supply of materials to any specific trade, but rather to generally designate a basic unit of work, and Sections are to be read as a whole.

.5 Drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of building is to be taken on site. Do not scale Drawings, and do not use Drawings for prefabrication work.

.6 Drawings are intended to convey the scope of work and do not show architectural and structural details. Provide, at your cost, offsets, fittings, transformations, and similar products required as a result of obstructions and other architectural and/or structural details but not shown on Drawings.

.7 Locations of equipment and materials shown may be altered, when reviewed by consultant, to meet requirements of equipment and/or materials, other equipment or systems being installed, and of building, all at no additional cost to Contract.

.8 Specification does not generally indicate specific number of items or amounts of material required. Specification is intended to provide product data and installation requirements. Refer to schedules, Drawings (layouts, riser diagrams, schematics, details) and Specification to provide correct quantities. Singular may be read as plural and vice versa in Specification.

.9 Starter/motor control centre (MCC)/variable frequency drive (VFD) schedule drawings are both mechanical and electrical and apply to work of Mechanical Divisions and Electrical Divisions. Be responsible for reviewing starter, MCC, VFD, and motor specification requirements prior to Bid submission and confirm exact scope of work and responsibility of work between Mechanical Divisions and Electrical Divisions.

.10 Drawings and Specifications have been prepared solely for use by party with whom Consultant has entered a contract and there are no representations of any kind made by consultant to any other party.

.11 When scale and date of Drawings are the same, or when discrepancy exists within Specification, include most costly arrangement to take precedence.

.12 Unless otherwise specified in Division 00, Division 01, or "General Conditions", in the case of discrepancies or conflicts between Drawings and Specification, documents will govern in following order:
- .1 Specification.
- .2 Drawings of larger scale.
- .3 Drawings of smaller scale.
- .4 Drawings of later date when scale of Drawings is same.

1.6 IMPERIAL AND METRIC MEASUREMENTS

.1 Generally, both metric and imperial units of measurement are given in Sections of Specification governed by this section. Measurement conversions may be generally "soft" and rounded off. Exact measurements to be confirmed based on application. Where measurements are related to installation and onsite applications, confirm issued document measurements with applicable local code requirements, and/or as applicable, make accurate measurements onsite. Where significant discrepancies are found, immediately notify Consultant for direction.

1.7 EXAMINATION OF DOCUMENTS AND EXISTING SITE CONDITIONS

.1 Carefully examine Documents and visit site to determine and review existing site conditions that will or may affect work and include for such conditions in Bid Price.

.2 Carefully examine electrical, structural, mechanical, and architectural drawings, and fully understand the functioning of the system described and specified under this Section. If in doubt, contact the engineer before submitting the Bid Price.

.3 Report to Consultant, prior to Bid Submittal, any existing site condition that will or may affect performance of work as per Documents. Failure to do so will not be grounds for additional costs.

.4 Upon finding discrepancies in, or omissions from Documents, or having doubt as to their meaning or intent, immediately notify Consultant, in writing.

1.8 WORK STANDARDS

.1 Where any code, regulation, bylaw, standard, contract form, manual, printed instruction, and installation and application instruction are quoted it means, unless otherwise specifically noted, latest published edition at time of submission of Bids adopted by and enforced by local governing authorities having jurisdiction. Include for compliance with revisions, bulletins, supplementary standards, or amendments issued by local governing authorities.

.2 Where regulatory codes, standards and regulations are at variance with Drawings and Specification, more stringent requirement will apply unless otherwise directed by consultant.

.3 Supplementary mandatory specification and requirements to be used in conjunction with project include but are not limited to following:
- .1 Ontario Building Code (OBC)
- .2 Electrical Safety Authority (ESA)
- .3 Ontario Electrical Safety Code (OESC)
- .4 Canadian Standards Association (CSA)
- .5 Underwriters' Laboratories of Canada (ULC)
- .6 National Standards of Canada (CAN)
- .7 National Building Code of Canada (NBC)
- .8 National Fire Protection Association (NFPA)
- .9 American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., (ASHRAE)
- .10 National Electrical Manufacturers Association (NEMA)
- .11 Electrical and Electronic Manufacturers Association of Canada (EEMAC)
- .12 American National Standards Institute (ANSI)
- .13 Illuminating Engineering Society (IES)
- .14 Building Industry Consulting Services, International (BICSI)
- .15 Electronic Industries Association (EIA)
- .16 Canadian General Standards Board (CGSB)

.17 Institute of Electrical and Electronic Engineers (IEEE)
.18 Occupational Health and Safety Act (OHSA)
.19 Technical Standards and Safety Authority (TSSA)
.20 Workplace Hazardous Materials Information System (WHMIS)
.21 International Standards Organization (ISO)
.22 Material Safety Data Sheets by product manufacturers.
.23 Local utility inspection permits.
.24 Codes, standards, and regulations of local governing authorities having jurisdiction.
.25 Additional codes and standards listed in Trade Sections.
.26 Owner's standards.

.4 Provide applicable requirements for barrier free access in accordance with latest edition of local governing building code.

.5 Where any governing Code, Regulation, or Standard requires preparation and submission of special details or drawings for review they are to be prepared and submitted. Pay associated costs associated with these submittals.

.6 Unless otherwise specified, equipment is to be installed in accordance with the equipment manufacturer's recommendations and instructions, and requirements of governing Codes, Standards, and Regulations. Governing Codes, Standards, and Regulations take precedence over manufacturer's instructions.

.7 Work is to be performed by journeyperson tradesmen who perform only the work that their certificates permit, or by apprentice tradesmen under direct on-site supervision of an experienced journeyperson tradesman. Journeyperson to apprentice ratio is not to exceed ratio determined as stated in Ontario College of Trades and Apprenticeship Act.

.8 Journeyperson tradesmen are to have a copy of valid trade certificates available at site for review by consultant at any time.

.9 Experienced and qualified superintendent is to be on-site at times when work is being performed.

.10 Coordinate work inspection reviews and approvals with governing inspection department to ensure that construction schedule is not delayed. Be responsible for prompt notification of deficiencies to consultant and submission of reports and certificates to consultant.

.11 Properly protect equipment and materials on site from damage due to elements and work of trades, to satisfaction of consultant. Equipment and materials are to be in new condition upon Substantial Performance of the Work.

.12 Electrical equipment and devices shall be certified and bear stamp or seal of a recognized testing agency such as CSA, UL, ULC, ETL, etc., or bear a stamp to indicate special electrical utility approval.

.13 Makes and quality of the materials used shall be approved by the Consultants and authority having jurisdiction.

.14 Products and materials provided shall be new and free from all defects. Related materials shall be of the same manufacturer throughout the Project.

.15 Products and materials called for on the drawings or in the specifications by trade names, manufacturer names and catalogue reference are those which shall be used based on the Tender.

.16 Alternative products and materials to those specified shall only be considered if they are shown in the Tender as a material variation with an appropriate price adjustment. The Consultant reserves the right to accept or reject any alternative without explanation.

.17 Assume full responsibilities for ensuring that when providing alternative products or materials, all space, weight, connections, power, and wiring requirements, etc., are considered. Any costs incurred for additional components, changes to services, structural or space requirements, layouts, and plans, etc., that may be necessary will be borne by this Division.

.18 Materials or equipment rejected by the Consultants shall be immediately removed from the project and suitable materials shall be provided.

1.9 PERMITS, CERTIFICATES AND FEES

.1 Contact and confirm with local authorities having jurisdiction including utility providers, requirements for approvals from such authorities. Obtain and pay for permits, certificates, and approvals required to complete Work.

.2 Be responsible for ensuring that authorities having jurisdiction which require on-site inspection of work, have ample notification to perform inspection, with sufficient lead time to correct deficiencies in a manner that will not impede schedule of completion of Work.

.3 Submit to Consultant, approval/inspection certificates issued by governing authorities to confirm that Work as installed is in accordance with rules and regulations of local governing authorities.

.4 Include in each copy of operating and maintenance instruction manuals, copies of approvals and inspection certificates issued by regulatory authorities to certify that completed Work is in accordance with regulations of regulatory authorities and is acceptable to them.

1.10 REQUIREMENTS FOR CONTRACTOR RETAINED ENGINEERS

.1 Professional engineers retained to perform consulting services with regards to Project work, i.e., seismic engineer, fire protection engineer, structural engineer, are to be members in good standing with local Association of Professional Engineers and are to carry and pay for errors and omissions professional liability insurance in compliance with requirements of governing authorities in Place of the Work.

.2 Retained engineer’s professional liability insurance is to protect Contractor's Consultants and their respective servants, agents, and employees against any loss or damage resulting from professional services rendered by aforementioned Consultants and their respective servants, agents, and employees in regard to the Work of this Contract.

.3 Liability insurance requirements are as follows:
- .1 coverage is to be a minimum of $1,000,000.00 inclusive of any one occurrence.
- .2 insurance policy is not to be cancelled or changed in any way without insurer giving Owner minimum thirty days written notice.
- .3 liability insurance is to be obtained from an insurer registered and licensed to underwrite such insurance in the Place of the Work.
- .4 retained Consultants are to ascertain that Sub-Consultants employed by them carry insurance in the form and limits specified above.
- .5 evidence of the required liability insurance in such form as may be required is to be issued to Owner, Owner’s Consultant, and Municipal Authorities as required prior to commencement of aforementioned Consultant’s services.

1.11 WORKPLACE SAFETY

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for products where required and maintain one copy at site in a visible and accessible location available to personnel.

.2 Comply with requirements of Occupational Health and Safety Act and other regulations pertaining to health and safety, including worker's compensation/insurance board and fall protection regulations. When working in confined spaces, comply with requirements of Occupational Health and Safety Act - Ontario Regulation 632, "Confined Spaces".

1.12 PLANNING AND LAYOUT OF WORK

.1 Base installation layout, design, terminations, and supply of accessories, on Contract Documents with specific coordination with reviewed shop drawings.

.2 Plan, coordinate, and establish exact locations and routing of services with affected trades prior to installation such that services clear each other as well as other obstructions. Generally, order of right of way for services to be as follows:
.1 large ducts (main runs)
.2 cable tray and bus duct
.3 conduit 100 mm (4") dia. and larger
.4 smaller branch ductwork
.5 conduit less than 100 mm (4") dia.

.3 Unless otherwise shown or specified, conceal work in finished areas, and conceal work in partially finished and/or unfinished areas to extent made possible by the area construction. Install services as high as possible to conserve headroom and/or ceiling space. Notify Consultant where headroom or ceiling space appears to be inadequate prior to installation of the work.

.4 Do not use Contract Drawing measurements for distribution equipment layout, conduit installation work and such other work. Locations and routing are to generally be in accordance with Contract Drawings, however, prepare layout drawings for such work. Use established benchmarks for both horizontal and vertical measurements. Coordinate with and make allowances for work of other trades. Accurately layout work and be entirely responsible for work installed in accordance with layout drawings. Where any grade or size is at variance with Contract Drawings, notify Consultant prior to proceeding with work.

.5 Prepare plan and interference drawings (at a minimum drawing scale of 1:50 or ¼"=1' 0") of the work for coordination with General Contractor. Arrange for preparation of detailed section drawings of ceiling spaces of corridors and any other congested areas. Sections are to be cross referenced with plan drawings so that trades may make use of section drawings. Section drawings to indicate lateral and elevation dimensions of major services within ceiling space. Lateral dimensions are to be from grid lines and elevations from top of floor slab. Obtain from Consultant, disks of engineering drawings for this use. Prints and/or disks of Contractors' interference drawings are to be distributed among other Trade Contractors and General Contractor. Submit drawings to consultant for review. Failure of General Contractor to prepare and coordinate overall interface drawings of trades does not relieve respective Division Contractor of responsibility to ensure that work is properly planned and coordinated.

.6 Carry out alterations in arrangement of work that has been installed without proper coordination, study, and review, even if in accordance with Contract Documents, in order to conceal work behind finishes, or to allow installation of other work, without additional cost. In addition, make necessary alterations in other work required by such alterations, without additional cost.

.7 Junction boxes for lighting, power, fire alarm, power packs, lighting controllers and such other systems devices and products located above suspended ceilings must be located for easy access for servicing and/or removal. Products which do not meet this location requirement are to be relocated to an accessible location at no additional cost.

.8 Be responsible for making necessary changes, at no additional cost, to accommodate structural and building conditions that were missed due to lack of coordination by this Division.

1.13 COORDINATION OF THE WORK

.1 Fully understands the functions of the systems specified and have no doubts regarding the extent of the Contract.

.2 Examine the Architectural, Structural, Mechanical and Electrical drawings and become fully familiar with the work of other Divisions.

.3 Co-ordinate with all Divisions providing equipment and services and ensure that there is no confliction. Coordination requirements are to include but not be limited to following:
- .1 requirements for openings, sleeves, inserts and other hardware necessary for installation of work.
- .2 concrete work such as housekeeping pads, sumps, bases, etc., required for work, and including required dimensions, operating weight of equipment, location, etc.
- .3 depth and routing of excavation required for work, and requirements for bedding and backfill.
- .4 wiring work required for equipment and systems but not specified to be done as part of mechanical work, including termination points, wiring type and size, and any other requirements.

.4 Ensure materials and equipment are delivered to site at proper time and in such assemblies and sizes to enter building and be moved into spaces where they are to be located without difficulty.

.5 Wherever possible, coordinate equipment deliveries with manufacturers and/or suppliers so equipment is delivered to site when it is required, or so it can be stored within building and protected from elements.

.6 Ensure proper access and service clearances are maintained around equipment, and, where applicable, access space for future equipment removal or replacement is not impeded. Comply with code requirements with regards to access space provision around equipment. Remove and replace any equipment which does not meet this requirement.

.7 Arrange equipment in proper relation with other apparatus, the building construction, the Architectural finish and with all work specified.

.8 Where space is shown for future equipment leave such space clear and ensure that the necessary connections can be made to the future equipment.

.9 Where work is to be integrated or is to be installed in close proximity with work of other trades, coordinate work prior to and during installation.

.10 Failures to fully understand Drawings and allow for the work of other Divisions or where relocations are necessary due to lack of co-ordination between Divisions shall be remedied at the expense of this Division.

1.14 WORKMANSHIP

.1 All work shall be executed in a workmanlike manner and present a neat mechanical appearance.

1.15 EQUIPMENT AND MATERIALS

.1 Be responsible for ordering of products (equipment and materials) in a timely manner to meet project-scheduling timelines. Failure to order products to allow manufacturers sufficient production/delivery time to meet project-scheduling timelines is an unacceptable reason to request for other suppliers or substitutions.

.2 Provide Canadian manufactured products wherever possible and where required quality and performance is obtainable. Unless otherwise specified, all materials and apparatus shall be new and shall comply with applicable Canadian Standards Association (CSA) Standards and/or Underwriters Laboratories of Canada (ULC) Standards and the requirements of the authorities having jurisdiction.

.3 Materials and equipment scheduled and/or specified, have been selected to establish a performance and quality standard, and, in some instances, a dimensional standard. In most cases, base specified manufacturers are stated for material and equipment, specified by manufacturer's name and model number. Unless otherwise noted, the Bid Price may be based on materials and equipment supplied by any of the manufacturers named as acceptable for the particular material or equipment. If acceptable manufacturers are not stated for a particular material or piece of equipment, base the Bid Price on material supplied by the base specified manufacturers.

.4 Documents have been prepared based on product available at time of Bidding. If, after award of Contract, and if successful manufacturer can no longer supply a product that meets base specifications, notify Consultant immediately. Be responsible for obtaining other manufacturers product that complies with base specified performance and criteria and meets project timelines. Proposed products are subject to review and consideration by consultant and are considered as substitutions subject to a credit to Contract. In addition, if such products require modifications to room spaces, mechanical systems, electrical systems, etc., include required changes. Such changes are to be submitted in detail to consultant for review and consideration for acceptance. There will be no increase in Contract Price for revisions. Note that above conditions supplement and are not to supersede any specification conditions with regards to substitutions or failure to supply product as per issued documents.

.5 If materials or equipment supplied by a manufacturer named as acceptable are used in lieu of the manufacturer specified, be responsible for ensuring that the substituted material or equipment is equivalent in quality, performance and operating characteristics (including energy consumption if applicable) to the specified materials or equipment, and, it shall be understood that any additional costs, and changes to associated or adjacent work resulting from provision of materials supplied by a manufacturer other than the specified manufacturer is included in the Bid Price. In addition, in equipment spaces where equipment named as acceptable is used in lieu of specified equipment and the dimension of such equipment differs from the specified equipment, prepare, and submit for review, accurately dimensioned layouts of rooms affected.

.6 In addition to the manufacturers specified or named as acceptable, other manufacturers of materials or equipment may be proposed to the Consultant for acceptance, listing in each case a corresponding credit for each alternative proposed, however, the Bid Price must be based on equipment or materials specified or named as acceptable. Certify in writing to the Consultant that the proposed alternative meets all space, power, design, energy consumption, and all other requirements of the specified or acceptable material or equipment. In addition, it shall be understood that there will be no increase in the contract Price by reason of any changes to associated equipment, mechanical and/or electrical, required by acceptance of proposed alternatives. The Consultant has sole discretion in accepting any such proposed alternative material or equipment.

.7 Where products you intend to provide are proposed as "an equal" and/or "or approved equal", to specified products, certify in writing that the proposed product to be used in lieu of specified product, at least meets space, power, design, energy consumption, noise criteria and other requirements of the specified product and thus shall be equivalent to or better than the specified product. When requested by the Consultant, provide full design detail drawings and specifications of proposed products. Acceptance of these "or equal" and/or "or approved equal" products shall be at the sole discretion of the Consultant. The Consultant's decision shall be final and shall not require explanation. There shall be no increase in the contract Price due to the Consultant's rejection of a proposed equivalent product.

.8 Only base specified products specified acceptable products or equipment listed as alternate will be considered for acceptance by the owner. No proposed substitutions will be accepted.

.9 Indicate in Form of Supplementary Electrical Tender, names of manufacturers for proposed products to be supplied, and which were based specified or scheduled with a manufacturer’s name. Names of proposed manufacturers on list must be one of names stated as acceptable for products unless prior approval from Owner has been given for use of products by other manufacturers. Submit to Consultant for review as directed.

1.16 SHOP DRAWINGS

.1 At start-up meeting, confirm with consultant products to be included in shop drawing submission. Prepare and submit list of products to consultant for review.

.2 Submit for review, drawings showing in detail design, construction, and performance of equipment and materials as requested in Specification. Submit shop drawings to consultant for review prior to ordering and delivery of product to site. Include minimally for preparation and submission of following, as applicable:
- .1 Product literature cuts.
- .2 Equipment data sheets.
- .3 Equipment dimension drawings.
- .4 System block diagrams.
- .5 Sequence of operation.
- .6 Connection wiring schematic diagrams.
- .7 Functionality with integrated systems.

.3 Each shop drawing or product data sheet is to be properly identified with project name and product drawing or specification section reference. Shop drawing or product data sheet dimensions are to match dimension type on drawings.

.4 Where any item of equipment is required by Code or Standard or By-Law to meet a specific energy efficiency level, or any other specific requirement, ensure this requirement is clearly indicated on submission.

.5 Ensure proposed products meet each requirement of Project. Endorse each shop drawing copy "CERTIFIED TO BE IN ACCORDANCE WITH ALL REQUIREMENTS". Include company name, submittal date, and sign each copy. Shop drawings that are received and are not endorsed, dated, and signed will be returned to be resubmitted. Submit electronic copies of shop drawings unless otherwise directed by consultant. Confirm exact requirements with consultant.

.6 Approval of a drawing by this Division implies the following:

1. The drawing has been checked by the person making the approval.

2. The equipment or material complies in all respects with the requirements of the specifications and drawings.

3. The quantities, if indicated on the drawing, are correct.

4. The physical dimensions of the components are such that they can be installed without interference with the building structure or other equipment, and that, after installation, there are sufficient clearances on all sides for the maintenance, servicing, and operation of the equipment.

.7 Consultant will review shop drawings and indicate review status by stamping shop drawing copies as follows:

.1 "REVIEWED" or "REVIEWED AS NOTED" (appropriately marked) – If Consultant's review of shop drawing is final, Consultant to stamp shop drawing.

.2 "REVISE AND RESUBMIT" – If Consultant's review of shop drawing is not final, Consultant to stamp shop drawing as stated above, mark submission with comments, and return submission. Revise shop drawing in accordance with Consultant's notations and resubmit.

.8 Following is to be read in conjunction with wording on Consultant's shop drawing review stamp applied to each shop drawing or product data sheet submitted:

"THIS REVIEW BY CONSULTANT IS FOR THE SOLE PURPOSE OF ASCERTAINING CONFORMANCE WITH GENERAL DESIGN CONCEPT. THIS REVIEW DOES NOT MEAN THAT CONSULTANT APPROVES DETAIL DESIGN INHERENT IN SHOP DRAWINGS, RESPONSIBILITY FOR WHICH REMAINS WITH CONTRACTOR, AND SUCH REVIEW DOES NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FOR ERRORS OR OMISSIONS IN SHOP DRAWINGS OR OF CONTRACTOR'S RESPONSIBILITY FOR MEETING REQUIREMENTS OF CONTRACT DOCUMENTS. BE RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT JOB SITE, FOR INFORMATION THAT PERTAINS SOLELY TO FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION AND INSTALLATION, AND FOR COORDINATION OF WORK OF SUB-TRADES."

.9 Resubmit any drawing on which notations have been made, after it has been modified or corrected.

.10 Drawings that are re-submitted shall have a distinct notation of the fact made on each drawing.

.11 Works shall not proceed on any equipment, material or installation until the drawings have been reviewed by the Consultant.

.12 Each system and each major component are to be separate shop drawing submissions. Shop drawings for common devices such as devices of each system are to be submitted together.

.13 Obtain shop drawings for submission from product manufacturer's authorized representatives and supplemented with additional items specified herein.

.14 Where extended warranties are specified for equipment items, submit specified extended warranty with shop drawing submittal.

1.17 EQUIPMENT LOADS

.1 Supply equipment loads (self-weight, operating weight, housekeeping pad, inertia pads, etc.) to consultant, via shop drawing submissions, prior to construction.

.2 When choice of specific equipment is made by Contractor, actual weight, location, and method of support of equipment may differ from those initially given to consultants and thus from those assumed for design. Consequently, it is necessary to back-check equipment loads, location, and supports.

.3 Where supporting structure consists of structural steel framing, it is imperative that equipment loads, location, and method of support be confirmed prior to fabrication of structural steel. Be responsible for confirming locations of equipment with consultant prior to construction.

1.18 OPENINGS

.1 Supply opening sizes and locations to consultant to allow verification of their effect on design, and for inclusion on structural drawings where appropriate.

.2 No openings are permitted through completed structure without written approval of consultant. Show required openings on a copy of structural drawings. Identify exact locations, elevations, and size of proposed openings and submit to consultant for review, well in advance of doing work.

.3 Chases, openings, cutting, patching, etc. shall be provided by this Division in accordance with those sections of the specification detailing the requirements.

.4 Flashing required for openings in walls, floors and roofs shall, unless otherwise noted, be provided by this Division.

.5 Electrical conduit roof flashing shall be similar to National Roofing supply product code# ECP-PVCH (electrical conduit post PVCH), Gooseneck S.S.A ARPGN2 (2")/ ARPGN3 (3").

.6 Drilling for hangers, rods, inserts and work of a similar nature shall be provided by this Division.

.7 Provide all necessary sleeves, inserts, anchor bolts, etc., prior to pouring of concrete or building of walls, roofs, etc.

.8 Advise the extent of such work and supply all information and details as to sizes and locations within thirty days after the award of the Contract.

.9 Failures to comply with the above requirements shall be remedied at this Division's expense.

.10 Where conduits pass through fire rated walls/ areas, proper fire stop material shall be used by Division 26. Submit shop drawings for review before installation.

1.19 SCAFFOLDING, RIGGING, AND HOISTING

.1 Unless otherwise specified or directed, supply, erect and operate scaffolding, rigging, hoisting equipment and associated hardware required for work, and subject to review by and coordination with consultant.

.2 Immediately remove from site scaffolding, rigging and hoisting equipment when no longer required.

.3 Do not place major scaffolding/hoisting equipment loads on any portion of structure without approval from consultant.

1.20 TEMPORARY CRANES

.1 Submit following to consultant for review:
- .1 Propose details showing existing structures and surfaces being used for lifting locations.
- .2 Copies of approvals of authorities for work.
- .3 Copies of approvals of property management of buildings affected by hoisting work, allowing for work.
- .4 Copies of required insurance for work.

1.21 CHANGES OR REVISIONS TO THE WORK

.1 Whenever Consultant proposes in writing to make a change or revision to design, arrangement, quantity, or type of work from that required by Contract Documents, prepare, and submit to consultant for approval, a quotation being proposed cost for executing change or revision.

.2 Quotation is to be a detailed and itemized estimate of product, labour, and equipment costs associated with change or revision, plus overhead and profit percentages and applicable taxes and duties.

.3 If overhead and profit percentages are not specified in Division 00 or 01, but allowable under Contract as confirmed with consultant prior to contract signing, then allowable maximum percentages for overhead and profit are to be 7% and 5% respectively.

.4 Unless otherwise specified in Divisions 00 or 01, following requirements apply to all quotations submitted:
- .1 When change or revision involves deleted work as well as additional work, cost of deleted work (less overhead and profit percentages but including taxes and duties) is to be subtracted from cost of additional work before overhead and profit percentages are applied to additional work.
- .2 Material costs are not to exceed those published in local estimating price guides.
- .3 Electrical material labour unit costs are to be in accordance with National Electrical Contractors Association Manual of Labour Units.
- .4 Costs for journeyperson and apprentice labour must not exceed prevailing rates at time of execution of Contract and must reflect actual personnel performing work.
- .5 Cost for site superintendent must not exceed 10% of total hours of labour estimated for change or revision and change or revision must be such that site superintendent's involvement is necessary.
- .6 Costs for rental tools and/or equipment are not to exceed local rental costs.
- .7 Overhead percentage will be deemed to cover quotation costs other than actual site labour and materials, and rentals.
- .8 Quotations, including those for deleted work, to include a figure for any required change to Contract time.

.5 Quotations submitted that are not in accordance with requirements specified above will be rejected and returned for re-submittal. Failure to submit a proper quotation to enable Consultant to expeditiously process quotation and issue a Change Order will not be grounds for any additional change to Contract time.

.6 Make requests for changes or revisions to work to Consultant in writing and, if Consultant agrees, will issue Notice of Change.

.7 Do not execute any change or revision until written authorization for the change or revision has been obtained from consultant.

1.22 BREAKDOWN OF ELECTRICAL WORK COST

.1 Prior to submittal of first progress payment draw, submit a detailed breakdown of work cost to assist Consultant in reviewing and approving progress payment claims.

.2 Payment breakdown is subject to Consultant's approval and progress payments will not be processed until an approved breakdown is in place. Breakdown is to include one-time claim items such as mobilization and demobilization, insurance, bonds (if applicable), shop drawings and product data sheets, commissioning including system testing and verification, and project closeout submittals.

.3 Indicate equipment, material, and labour costs for site services (if applicable) and indicate work of each trade in same manner as indicated on progress draw.

1.23 NOTICE FOR REQUIRED FIELD REVIEWS

.1 Whenever there is a requirement for consultant to perform a field review prior to concealment of any work, to inspect/re-inspect work for deficiencies prior to Substantial Performance of the Work, for commissioning demonstrations, and any other such field review, give minimum 5 working days' notice in writing to consultant.

.2 If Consultant is unable to attend a field review when requested, arrange an alternative date and time.

.3 Do not conceal work until consultant advises that it may be concealed.

.4 When Consultant is requested to perform a field review and work is not ready to be reviewed, reimburse Consultant for time and travel expenses.

1.24 PRELIMINARY TESTING

.1 When directed by consultant, promptly arrange, pay for, and perform site tests on any piece of equipment or any system for such reasonable lengths of time and at such times as may be required to prove compliance with Specification and governing Codes and Regulations, prior to Substantial Performance of the Work.

.2 When, in Consultant's opinion, tests are required to be performed by a certified testing agency, arrange, and pay for such tests.

.3 These tests are not to be construed as evidence of acceptance of work, and it is agreed and understood that no claim for delays or damage will be made for injury or breakage to any part or parts of equipment or system due to test where such injuries or breakage were caused by faulty parts and/or workmanship of any kind.

.4 When, in Consultant's opinion, tests indicate that equipment, products, etc., are defective or deficient, immediately remove such equipment and/or products from site and replace them with acceptable equipment and/or products, at no additional cost.

1.25 PROVISIONS FOR SYSTEMS/EQUIPMENT USED DURING CONSTRUCTION

.1 Confirm with Consultant what equipment can be used during construction.

.2 Any system or piece of equipment that is specified to be provided under requirements of Documents and is required to be used during construction stages of work prior to issuing of Certificate of Substantial Performance of the Work, are to be provided with special interim maintenance and service to cover systems/equipment during time of use during construction period of project until project has been certified as substantially performed and such systems/equipment are turned over to Owner.

.3 During this period of construction, such systems/equipment to not become property of Owner or be Owner's responsibility for maintenance or service. Systems/equipment are to remain property of respective manufacturers/suppliers or Contractor, who are responsible for full maintenance and servicing of systems/equipment in order to maintain validity of warranties after turning over to Owner.

.4 Prior to application for a Certificate of Substantial Performance of the Work and turn over to Owner, such systems/equipment to be cleaned, restored to "new" condition, paint finishes "touched up" etc.

1.26 MAINTAINING EQUIPMENT PRIOR TO ACCEPTANCE

.1 Maintain equipment in accordance with the manufacturer's printed instructions prior to start-up, testing, and commissioning.

1.27 PROTECTION

.1 Protect all finished and unfinished work from damage due to carrying out the work specified.

.2 Repair all damage resulting from execution of the work to the satisfaction of the Consultant.

.3 Should the project be stopped for any cause, provide all necessary protection to prevent damage by weather or other causes while such stoppage exists.

1.28 HANDLING AND STORAGE

.1 Materials and equipment shall be handled and stored in such a manner so that no damage shall be done to the materials, the structure of the building or surrounding property.

.2 Packaged or bundled materials and equipment shall be stored in dry weathertight secure enclosures in original undamaged condition with manufacturer's seals and labels intact.

.3 All metals shall be protected against corrosion and bending.

.4 Storage of materials, equipment etc. in the building structure shall not be permitted unless otherwise noted.

1.29 MINOR FIELD CHANGES

.1 The location, arrangement and connection of equipment and materials as shown on the drawings represents a close approximation to the intent and requirements of the Contract.

.2 The right is reserved to make reasonable changes required to accommodate conditions arising during the progress of the work. Such changes, if made prior to the installation, shall be done at no additional cost, unless the location, arrangement or connection is more than six feet from that shown on the drawings.

1.30 CLEANING UP

.1 During construction, and daily, keep the site reasonably clear of rubbish and waste material resulting from electrical work to the satisfaction of the Consultant. Before applying for a Certificate of Substantial Performance of the Work, remove all rubbish and debris, and arrange for and pay for the repair of any damage caused as a result of electrical work.

.2 Clean the interior and exterior of all equipment and remove any debris during construction.

.3 Inspect and clean all systems and equipment prior to energizing and ensure that they are safe.

Perform a complete and thorough clean-up to the exterior and interiors of all systems and equipment before the final inspection. The interiors shall be cleaned using an industrial vacuum cleaner.

1.31 ELECTRICAL CONDUCTOR FIRE PTROTECTION

.1 Fire rated enclosures shall be provided to form service spaces for conduits containing electrical conductors for emergency power, elevators, and life safety equipment in accordance with the requirements of the Authorities having jurisdiction.

.2 Fire rated access panels shall be provided in the enclosures where required.

.3 The fire rated enclosures required by this Division shall, unless otherwise noted, be provided by this Division and shall be in accordance with the sections of the specification detailing the fire rated enclosures requirements.

.4 Advise the extent of the fire rated enclosures required and supply all information and details as to size and locations within thirty days after the award of the contract.

.5 Failures to comply with the above requirements shall be remedied at this Division's expense.

.6 Where fire rated cables, that comply with the requirements of the Authorities having jurisdiction, are provided it shall not be required that they be installed in fire rated enclosures.

1.32 SPRINKLER PROOF EQUIPMENT

.1 Where sprinklers are installed; electrical equipment shall be constructed so that water from the sprinkler heads shall not impair the effectiveness of the equipment.

.2 A separate and complete roof shall be provided on free standing or surface mounted equipment. An overhang at the front, rear and sides shall prevent the entrance of water either at the top or through projecting face plates, meters, etc. Provide complete gaskets to suit.

.3 Where openings are required in the roofs or sides of incoming and outgoing conduits and cables, removable gasketed plates shall be provided and the conduits and cables shall be installed using waterproof fittings. The plates are to be grounded by a separate copper strap to the equipment.

.4 Distribution and power panels, panel boards, etc. and switchboards shall be complete with gaskets and doors.

1.33 EQUIPMNENT AND MATERIAL COLOURS

.1 Where materials and equipment are specified to be a specific colour, a sample of the colour proposed by the manufacturer shall be submitted with the shop drawing.

.2 Where materials and equipment are specified to be of colours as selected by the Consultant, these shall be determined during the Contract. Obtain the colour requirements from the Consultant prior to submitting shop drawings so that the appropriate sample of the colour can be submitted with the shop drawings.

1.34 SLEEVES

.1 Provide sleeves of galvanized steel pipe with machine cut ends of ample size to accommodate conduits passing through walls, partitions, ceilings, floors, etc.

.2 For wall partitions and ceilings, the ends of the sleeves shall be flush with the finish on both sides. For floors they shall extend 50mm above and below finished floor level.

.3 The space between the sleeve and the conduit and spare sleeves shall be filled with Dow Corning silicone RTV foam for fire stop. Caulk around the top and bottom with approved permanently resilient, non-flammable and weatherproof silicone base compound.

1.35 EXCAVATION AND BACKFILL

.1 The excavation and backfill required by this Division shall, unless otherwise noted, be provided by this Division and shall be in accordance with the Sections of the Specification detailing the excavation and backfill requirements.

.2 Advise the extent of the excavation and backfill work required by this Division and supply all information and details as to size and locations within thirty days after the award of the Contract.

.3 Failures to comply with the above requirements shall be remedied at this Division's expense.

1.36 HOUSEKEEPING PAD

.1 All floor mounted electrical equipment installed by this Division shall be mounted on concrete housekeeping pads which shall, unless otherwise noted, be provided by this Division.

.2 Advise the extent of the housekeeping pads required by this Division and supply all information and details as to size and location within thirty days after the award of the Contract.

.3 Failures to comply with the above requirements shall be remedied at this Division's expense.

1.37 CONCRETE

.1 The concrete and reinforcing required by this Division shall, unless otherwise noted, be provided by this Division and shall be in accordance with the Sections of the Specifications detailing the concrete and reinforcing requirements.

.2 Advise the extent of the concrete and reinforcing work required by this Division and supply all information and details as to size and locations within thirty days after the award of the Contract.

.3 Failures to comply with the above requirements shall be remedied at this Division's expense.

1.38 PAINTING

.1 All equipment shall be supplied with manufacturer's standard finish coat, unless otherwise noted.

.2 All supports, hangers, etc. provided or fabricated by this Division shall be painted with two coats of zinc chromate primer.

.3 Where the finish on any materials or equipment installed by this Division is damaged, it shall be touched up, completely repainted or replaced to the satisfaction of the Consultant.

1.39 IDENTIFICATIONS

.1 Identify each item of equipment installed by this Division, whether supplied by it or not.

.2 Metal surfaces shall be thoroughly cleaned before application of identification.

.3 Identifications shall be installed after painting has been completed and shall be secured with self-tapping screws or rivets except when installed on the inside of doors when gluing will be acceptable.

.4 Manufacturer's nameplates shall be affixed to each item supplied showing the size, name of equipment, serial number and all information usually provided including voltage, cycle, phase, horsepower, etc., and the name of the Manufacturer and his address. Ensure that all stamped, etched, or engraved lettering on plates is perfectly legible. Do not paint over nameplates and where equipment is to be concealed attach the nameplates in an accessible location.

.5 Panels and all other equipment which have exposed faces in finished areas shall not have any visible trademarks or other identifying symbols. Nameplates shall be mounted on the inside of the doors.

.6 Each lighting panel shall have a directory mounted on the inside of the door behind a protective plastic screen. The directories shall be typewritten and shall identify each branch circuit used. Spares and spaces shall be noted in pencil.

.7 The nameplates for switchboards, distribution panels, power panels, etc. shall be Lamicoid with 13mm high letters with typical identification of e.g., "PP`AA, 600V 3 PH., 4W, fed from Switchboard `A' ".

.8 The nameplates for panel boards shall be Lamicoid with 9.5mm high letters with typical identification of: e.g., "LP`B', 208V, 3Ph, 4W, fed from PP'A'".

.9 Each breaker, switch, instrument, meter, etc. in switchboards, distribution panels, power panels, etc. shall have a Lamicoid nameplate with 6.4mm high letters with typical identification of: e.g., "Elevator #1" or “Pump-1A”.

.10 The nameplates for disconnect switches, starters, time clocks, dimmers etc. shall be Lamicoid with 6.4mm high letters with typical identification of: e.g., "Supply Fan "S4", 5 HP, 600V, 3Ph., 3W, fed from `PP-1'".

.11 Each feeder cable and feeder conduit shall be identified with 25mm high letters with typical identification of "208V, 3Ph, 4W to LP'B'". The identification shall be provided at each access door, each change of direction, each junction box, at each floor or platform for vertically exposed conduits or cables at 2 metres above floor, at not more than 15 metres apart in straight runs, and on both sides of sleeves through walls.

.12 The interior, exterior and lids of all junction boxes and outlet boxes shall be neatly identified with different colours of paint. The colours shall be consistent throughout the project for the following systems:
- .1 347/600 Volt System – Black
- .2 120/208 Volt System – Blue
- .3 120/208 Volt Lighting – Yellow
- .4 120/208 Volt Emergency Lighting System – Orange
- .5 Intrusion Detection System – Purple
- .6 Computer System – Pink
- .7 Fire Detection and Alarm System – Red
- .8 Telephone System – Brown
- .9 P.A./Telephone System – Green

.10 Cable TV – White (Co-ordinate with the Board)

.13 Provide all signs and marking of equipment as required by the Authorities having jurisdiction.

.14 Outlet boxes for light switch(es) and receptacle(s) and junction boxes provided for lighting or power connections shall be identified on the box cover with circuits contained in the box, the panels from which they are fed, the voltage and the purpose of the outlet.

.15 Each power switch and receptacle shall be complete with permanent printed adhesive label installed on faceplate, identifying panel and circuit from which it is fed.

1.40 MOCK-UP

.1 A mock-up of the ceiling shall be provided by another Division of the Specification.

.2 Provide samples of the lighting fixtures, fire alarm devices and all other items of equipment mounted in or on the ceiling and obtain acceptance for the samples and their installation.

1.41 TEMPORARY AND TRIAL USAGE

.1 When it is claimed that a portion of the work is completed and in accordance with the Drawings and Specifications, the Owner shall have the privilege of temporary and trial usage for a reasonable length of time for making a complete and thorough test of the portion of the work completed.

.2 Temporary or trial usage by the Owner of any electrical device, machinery, apparatus, equipment or any other work or materials supplied under this Contract before final completion and written acceptance, is not to be construed as evidence of acceptance of same.

1.42 RECORD (AS-BUILT) DRAWINGS

.1 Drawings for this project have been prepared on a CAD system using AutoCAD software of release version confirmed with consultant. For purpose of producing record "as built" drawings, copies of Contract Drawings can be obtained from consultant by paying $1,500. Drawings may also to be used for preparation of layouts and interference drawings.

.2 As work progresses at site, clearly mark in red in a neat and legible manner on a set of bound white prints of Contract Drawings, changes, and deviations from routing of services and locations of equipment shown on Contract Drawings, daily. Changes and deviations include those made by addenda, change orders, and site instructions. Use notes marked in red as required. Maintain white print red line as-built set at site for exclusive use of recording as-built conditions, keep always set up to date, and ensure set is always available for periodic review. As-built set is also to include the following:
   .1 Dimensioned location of inaccessible concealed work.
   .2 Locations of control devices with identification for each.
   .3 Location of all pull boxes and junction boxes.
   .4 Locate, with dimensions to the building grid and datum lines, all buried and concealed services, pull boxes, junction boxes, etc. for all systems.
   .5 Location of all conduits, ducts, wiring, and conductor runs for all systems including sizes, types of components, circuit numbers, etc. exactly as installed.
   .6 Location of concealed services terminated for future extension.
   .7 Room names and numbering, equipment names, etc. shall be in accordance with the Owner's designation and may not necessarily be those shown on the drawings.

.3 Before applying for a Certificate of Substantial Performance of the Work, update a clean copy of Contract Drawing set in accordance with marked up set of "as-built" white prints including deviations from original Contract Drawings, thus forming an "as-built" drawing set. Submit "as-built" site drawing prints to consultant for review. Make necessary revisions to drawings as per Consultant's comments, to satisfaction of consultant.

.4 Reviews of the record drawings by the Consultant shall be for general conformance only and is not an approval of the accuracy of the drawings. Electrical Division shall be responsible for the accuracy of the record drawings.

.5 Submit final reviewed "as-built" drawing set to consultant to produce final "as-built" CAD drawings for submission to the School Board.

.6 Transfer all recorded information from marked-up set of As-Built condition to AutoCAD.

.7 Unless otherwise noted in Divisions 00 or 01, failure to maintain accurate record drawings will incur additional 5% holdback on progress claims until drawings are brought up to date to satisfaction of consultant.

1.43 TESTING AND COMMISSIONING

.1 All systems, equipment and installation shall be inspected, tested, adjusted, and commissioned to ensure compliance with the Drawings, Specifications and the Requirements of the Authorities having jurisdiction.

.2 Provide testing equipment, instruments, material and labour for all testing and commissioning.

.3 Submit reports of all testing and commissioning for review by the Consultants.

.4 This Division shall include for the cost of one qualified serviceman, completely familiar with the project, complete with appropriate spare parts and tools, to become part of the commissioning team for the project. The serviceman shall assist the Owner for a total of 60 hours during the commissioning process. This work will be required at or near the substantial completion phase of the project. Each Division and/or trade providing serviceman shall ensure continuity of their function by having only one such person assigned to the commissioning team.

.5 The actual performance of this work will be scheduled and coordinated by the Owner.

1.44 SYSTEM ACCEPTANCES

.1 Prior to requesting final inspection, submit, for review by the Consultant, letters from the manufacturers of equipment and systems indicating that their Technical Service Representatives have inspected and tested the equipment and systems and are satisfied with the methods of installation, connections, and operation.

.2 Acceptance letters shall be submitted for the following, when applicable:
- .1 Switchboard
- .2 Distribution Panels
- .3 Power Panels
- .4 Panel Boards
- .5 Fire Detection and Alarm System
- .6 Emergency Lighting System
- .7 Intrusion Detection System
- .8 Video Surveillance System
- .9 Public Address System
- .10 Lighting Control System

1.45 INSTRUCTIONS AND DEMONSTRATIONS

.1 Instruct the Owner's designated personnel during construction and prior to requesting final inspection so that they are fully familiar with all aspects in the function, installation, operation and maintenance of all systems and equipment.

.2 Arrange for and pay for the services of manufacturer's service technicians, engineers and other personnel required for instruction on specialized systems or installation.

.3 After commissioning of the systems, equipment, and installation they shall be fully demonstrated by this Division and representatives of the manufacturers to the Authorities having jurisdiction.

.4 Prior to requesting final inspection submit, for each system, the following:
- .1 Dates and durations of instructions given to designated personnel and the names of persons instructed.
- .2 Signature of each person instructed stating that they understand and are familiar with the function, installation, operation, and maintenance of the system.
- .3 Dates and durations of demonstrations to Authorities having jurisdiction and names of all persons present.

1.46 OPERATING AND MAINTENANCE INSTRUCTION MANUALS

.1 Supply one hard copy of operating and maintenance (O&M) manuals consolidated in hardcover three "D" ring binders with each binder sized to include approximately 25% spare space for future data. Confirm exact quantity of manuals with consultant. Each binder to include:
- .1 On front cover: project name; wording – "Electrical Systems Operating and Maintenance Manual"; and date.
- .2 Introduction sheet listing Consultant, Contractor, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses.
- .3 Equipment manufacturer's authorized contact person name, telephone number and company website.
- .4 Table of Contents sheet, and corresponding Index tab sheets for all electrical specification sections.
- .5 Copy of each "Reviewed" or clean, updated "Reviewed As Noted" shop drawing or product data sheet, with manufacturer’s/supplier’s name, telephone and fax numbers, email address, company website address, and email address for local source of parts and service; when shop drawings are returned marked "REVIEWED AS NOTED" with revisions marked on shop drawing copies, they are to be revised by equipment supplier to incorporate comments marked on "reviewed" shop drawings and a clean updated copy is to be included in operating and maintenance manuals;
- .6 Testing and commissioning reports, and certificates issued by governing authorities.
- .7 Operating data is to include:
  - .1 Demonstration and instruction certificate.
  - .2 Description of each system and its controls.
  - .3 Control schematics for equipment/systems.
  - .4 Description of operation of each system.
  - .5 Operation instruction for each system and each component.
  - .6 Description of actions to be taken in event of emergencies and/or equipment failure.
  - .7 Testing procedures.
  - .8 Trouble finding procedure.
- .8 Maintenance data is to include:

.1 Servicing maintenance, operation, and trouble-shooting instructions for each item of equipment and each system.
.2 Schedules of tasks, frequency, tools required, and estimated task time.
.3 Complete spare parts lists with numbers.
.4 Catalogue sheets for all components.
.5 Approved shop drawings.
.6 Wiring diagram.

.9 Copies of warranties.
.10 Items requested specifically in Section Articles.

.2 Operating and maintenance instructions are to relate to job specific equipment supplied under this project and related to Owner's building. Language used in manuals is to contain simple practical operating terms and language easy for in-house maintenance staff to understand how to operate and maintain each system.

.3 Before applying for a Certificate of Substantial Performance of the Work, assemble one copy of O&M Manual and submit to consultant for review prior to assembling remaining copies. Incorporate Consultant's comments into final submission.

.4 Provide 1 digital copies of contents of operating and maintenance manuals and load onto separate USB type flash drives and submit to consultant. Prepare digital copies using version of Adobe Acrobat Portable Document Format or equal as confirmed with consultant and enhanced with bookmarks and internal document links. Each PDF file name shall be the same as that indicated in the binder. The contents in each PDF file shall be searchable.

1.47 COMMISSIONING

.1 A commissioning Authority will be appointed by the Board/Owner to oversee the commissioning activities of the electrical contract. Cooperate and coordinate with the Authority. Perform all commissioning activities for all aspects of work provided in Electrical Divisions. Perform all corrective work identified by the Authority.

.2 Comply with the requirements of sections 20 05 40 and 25 05 15, prepared by Commissioning consultant.

1.48 WARRANTY

.1 Unless otherwise specified in Divisions 00 and 01, warrant electrical work to be in accordance with Contract Documents and free from defects for a period of one (1) year from date of issue of a Certificate of Substantial Performance of the Work.

.2 Where equipment includes extended warranty period, e.g., five (5) years, first year of warranty period is to be governed by terms and conditions of warranty in Contract Documents, and remaining years of warranty are to be direct from equipment manufacturer and/or supplier to Owner.

.3 Warranty to include parts, labour, travel costs and living expenses incurred by manufacturer's authorized technician to provide factory authorized on-site service.

.4 Repair and/or replace any defects that appear in Work within warranty period without additional expense to Owner. Be responsible for costs incurred in making defective work good, including repair or replacement of building finishes, other materials, and damage to other equipment. Ordinary wear and tear and damage caused wilfully or due to carelessness of Owner's staff or agents is exempted.

.5 Do not include Owner deductible amounts in warranties.

.6 It is understood that warranties are to commence from time of Substantial Performance of the Work, regardless of what is noted within following Sections of Specification. Be responsible for providing whatever "bridging" or additional extended warranty period is required from time that material is purchased until this time.

.7 Submit signed and dated copies of extended warranties to consultant which clearly states herein specified requirements.

.8 Visit building during warranty period with Owner representatives. Owner to organize these visits. At these meetings, Owner representatives are to review performance of systems. If performance is satisfactory, then no further action needs to be taken. If unsatisfactory, then correct deficiencies, as directed by Owner representatives, to satisfaction of Owner's representatives. These site visits to occur:
.1 once during first month of building operation.
.2 once during third month of building operation.
.3 once between fourth and tenth month in a season opposite to first- and third-month visits.

.9 The following table indicates the warranty period that shall be provided for the following equipment:

EQUIPMENT	ITEMS	WARRANTY
LIGHTING	All types of lighting fixtures including LED lamps, drivers, and other associated components.	5 YEARS

.10 The Owner/Board reserves the right to initiate a service contract for all equipment with one of the boards approved certified service companies. This shall not affect any of the above extended warranties provided by the manufacturers.

1.49 EQUIPMENT AND SYSTEM MANUFACTURER'S CERTIFICATION

.1 When equipment/system installation is complete, but prior to start-up procedures, arrange and pay for equipment/system manufacturer's authorized representative to visit site to examine installation, and after any required corrective measures have been made, to certify in writing to consultant that equipment/system installation is complete and in accordance with equipment/system manufacturer's instructions.

1.50 EQUIPMENT AND SYSTEM START-UP

.1 When installation of equipment/systems is complete but prior to commissioning, perform start-up for equipment/systems as specified in electrical work Sections in accordance with following requirements:
.1 Submit a copy of each equipment/system manufacturer's start-up and verification report sheet to consultant for review and incorporate any comments.
.2 Under direct on-site supervision and involvement of equipment/system manufacturer's representative, start-up equipment/systems, make any required adjustments, document procedures, leave equipment/systems in proper operating condition, and submit a complete set of start-up and verification documentation sheets signed by manufacturer/supplier and Contractor, to consultant.

1.51 PROJECT CLOSEOUT SUBMITTALS

.1 Prior to application for Substantial Performance of the Work, submit required items and documentation specified, including following:
- .1 Operating and Maintenance Manuals.
- .2 As-built record drawings and associated data.
- .3 Extended warranties for equipment as specified.
- .4 Operating test certificates, i.e., Fire alarm verification Certificate.
- .5 Final commissioning report.
- .6 Identified keys for equipment and/or panels for which keys are required, and other items required to be submitted.
- .7 Other data or products specified.

1.52 INSTRUCTIONS TO OWNER

.1 Refer to equipment and system operational and maintenance training requirements specified in Division 01.

.2 Train Owner’s designated personnel in aspects of operation and maintenance of equipment and systems as specified. Demonstrations and training are to be performed by qualified technicians employed by equipment/system manufacturer/supplier. Supply hard copies of training materials to each attendee.

.3 Unless where specified otherwise in trade Sections, minimum requirements are for manufacturer/suppliers of each system and major equipment, to provide minimum two separate sessions each consisting of minimum 4 hours on site or in factory training (at Owner’s choice), of Owner’s designated personnel (for up to 6 people each session), on operation and maintenance procedures of system.

.4 For each item of equipment and for each system for which training is specified, prepare training modules as specified below. Use Operating and Maintenance Manuals during training sessions. Training modules include but are not limited to:
- .1 Operational Requirements and Criteria – equipment function, stopping and starting, safeties, operating standards, operating characteristics, performance curves, and limitations.
- .2 Troubleshooting – diagnostic instructions, test, and inspection procedures.
- .3 Documentation – equipment/system warranties, and manufacturer’s/supplier’s parts and service facilities, telephone numbers, email addresses, and the like.
- .4 Maintenance – inspection instructions, types of cleaning agents to be used as well as cleaning methods, preventive maintenance procedures, and use of any special tools.
- .5 Repairs – diagnostic instructions, disassembly, component removal and repair instructions, instructions for identifying parts and components, and review of any spare parts inventory.
- .6 The training sessions shall be scheduled and co-ordinated by the Commissioning Agent. The Commissioning Consultant shall video tape the sessions. Refer to Section 20 05 40 for further requirements.

.5 Before instructing Owner's designated personnel, submit to consultant for review a preliminary copy of training manual and a proposed schedule of demonstration and training dates and times. Incorporate Consultant's comments in final copy.

.6 Obtain in writing from consultant a list of Owner’s representatives to receive instructions. Submit to Consultant prior to application for a Certificate of Substantial Performance of the Work, a complete list of systems for which instructions were given, stating for each system:
- .1 Date instructions were given to Owner’s staff.
- .2 Duration of instruction.

.3 Names of persons instructed.
.4 Other parties present (manufacturer's representative, consultants, etc.).

.7 Obtain signatures of Owner's staff to verify they properly understood system installation, operation, and maintenance requirements, and have received operating and maintenance instruction manuals and "as-built" record drawings.

.8 Submit to Consultant, copy of electronic version of training materials used to train Owner's designated personnel. Include in operating and maintenance manuals submission.

1.53 FINAL INSPECTION

.1 Submit to Consultant, written request for final inspection of systems. Include written certification that:
.1 Deficiencies noted during job inspections have been completed.
.2 Field quality control procedures have been completed.
.3 Systems have been tested and verified, adjusted, and are ready for operation.
.4 Maintenance and operating data have been completed and submitted to, reviewed, and accepted by consultant.
.5 Tags and nameplates are in place and equipment identifications have been completed.
.6 Clean-up is complete.
.7 Spare parts and replacement parts specified have been provided and acknowledged by consultant.
.8 As built and record drawings have been completed and submitted to, reviewed, and accepted by consultant.
.9 Owner's staff has been instructed in operation and maintenance of systems.
.10 Commissioning procedures have been completed.

1.54 SUB-CONTRACTORS TO THE ELECTRICAL CONTRACTOR

.1 The Electrical Contractor agrees to employ those sub-contractors proposed in the Electrical Form(s) of Tender and accepted by the Board/Owner at the signing of the Contract with the General Contractor.
.1 The Board/Owner may, for reasonable cause object to the use of a proposed Sub-Contractor and consequently, may require the Electrical Contractor to employ one of the other Sub- Contractors or Bidders.

.2 If the Board/Owner requires a change from a proposed Sub-Contractor originally proposed by the Electrical Contractor, the Contract Price shall be adjusted by the difference in cost.

.3 The Electrical Contractor shall not be required to employ as a Sub-Contractor, a firm to whom he may reasonably object.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CAN/CSA-C22.2 No. 131, Type TECK 90 Cable.
.2 CSA-C22.2 No. 51 (latest edition), Armoured Cables.
.3 CSA C22.2 No. 38 (latest edition), Thermoset-Insulated Wires and Cables.
.4 CSA C22.2 No. 75 (latest edition), Thermoplastic-Insulated Wires and Cables.
.5 CSA C22.2 No .0.3 (latest edition), Test Methods for Electrical Wires and Cables.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Low voltage wires and cables up to 4/0 shall, unless otherwise noted, have copper conductors with T90 Nylon, 600-volt insulation.

.3 Low Voltages wires and cables 250 MCM and larger shall, unless otherwise noted, have copper conductors with RW90 X-Link minus 40 degrees F, 1000-volt insulation.

.4 Aluminium sheathed feeder cables shall, unless otherwise noted, have a corrugated seamless aluminium sheath, copper conductors, RA90 X-Link minus 40 degrees F, 1000-volt insulation and without P.V.C. jacket.

.5 M.I.C.C. cables shall have solid copper conductors insulated with magnesium oxide and enclosed in a seamless copper sheath with a protective jacket where required.

.6 All outdoor and underground wiring shall have copper conductors with RWU-90, X-Link, minus 40 degrees F, 1000-volt insulation.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Wires and cables shall be selected so that their current carrying capacity conforms to the standards of the Authorities having jurisdiction.

.3 Feeders and branch circuits shall be as indicated on the drawings. Supporting of wires and cables with tie wires, perforated straps, etc., shall not be permitted. Electrical Contractor shall use approved clips.

.4 Unless otherwise indicated on the drawings no wire smaller than #12 AWG shall be used except for internal wiring of lighting fixtures which can be #14.

.5 BX90 aluminium sheathed cable, unless otherwise noted, may be used in accessible ceiling space and where concealed only. Install BX cables with anti-short bushings.

.6 Aluminium sheathed and M.I.C.C. cables shall be installed with horizontal supports at not more than 1220mm intervals and shall be spaced, bonded, and grounded in accordance with the requirements of the Authorities having jurisdiction.

.7 Aluminium sheathed and M.I.C.C. cables shall be terminated with moisture proof connectors.

.8 Where single conductor cables enter a ferrous box, provide the required non-ferrous plates. Slotting between the knockouts shall not be accepted.

.9 Aluminium sheathed and M.I.C.C. cables shall be suitably protected, when installed within 5 feet of the floor and in all locations where they might be subject to mechanical injury.

.10 Joints in feeder cables shall not be permitted.

.11 Joints in branch circuit wiring shall only occur where such circuits divide at a junction box and shall be mechanically and electrically sound and shall be securely fastened by means of "Ideal" 600V special service wire nut connectors.

.12 Conductors shall be colour coded and the colour coding shall be consistent throughout the project.

.13 Conductors shall be identified with self-sticking wire markers, indicating circuit number at all terminations and joints, at panels, pull boxes, junction boxes, etc.

.14 Termination lugs for feeder cables shall be compression type.

.15 All outdoor and underground wiring shall have copper conductors with RWU-90, X-Link, minus 40 degrees F, 1000-volt insulation.

.16 Wiring terminated in an outlet box for future lighting or power shall have 250mm of slack and each cable shall be terminated in a connector.

.17 Exposed cable runs shall be installed parallel to, or horizontally on, the walls of the building.

.18 Loads shall be circuited to provide fully balanced feeders.

.19 Only lubricants approved by the Authorities having jurisdiction shall be used and they shall be suitable for the type of cables installed.

END OF SECTION

1.1 GENERAL

1.2 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.3 REFERENCES

.1 Canadian Standards Association (CSA)
.1 OESC – Latest Edition.
.2 Electrical Safety Authority – Latest Inspection Bulletins.
.3 CSA C22.1, Canadian Electrical Code, Part 1 – Latest Edition.
.4 CAN/CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities, where applicable.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The grounding equipment shall be in accordance with CSA C22.2 and the copper grounding conductors in accordance with ASA G7.1.

.3 Provide non corroding accessories necessary for the grounding system.

.4 Building ground system to consist of a grid of copper welded ground rods (minimum 4' to 10' (1.2m to 3m) long spaced minimum of 10' (3m) apart, interconnected with bare minimum No. 3/0 AWG copper loop. Ground rods shall be driven sufficiently to contact permanent water table. Provide minimum No. 3/0 AWG copper ground loop inside electrical room and vaults for grounding of equipment enclosures and connect to ground grid. Connect building water service pipes (both street and building sides), gas service pipes and sprinkler system pipes, supply and return hot water heating pipes to ground system with minimum No. 3/0 AWG copper ground conductor in conduit. Perform resistivity test on soil to determine exact quantity of rods (minimum of 4).

.5 All buried ground connections shall be Thermit welded type.

.6 Provide one (1) No. 3/0 AWG insulated green copper ground conductor in conduit from the main building ground to the main Telephone/LAN Room. Provide a minimum 24" (600mm) long x 2" (50mm) high x 3/8" (10mm) thick copper ground bus and install on wall with standoff isolators and connect to 3/0 cable. Ground bus to have eight drilled taps. Provide one (1) #6 AWG green ground conductor in conduit from this ground bus and extend to each satellite LAN Room and coil for future connection to computer cable termination rack.

.7 Where cable trays are used for the data cabling pathways, ensure that they are grounded and bonded in accordance with the Ontario Electrical Safety Code.

.8 Continuous rows of fluorescent/LED fixtures shall be equipped with No. 12 bare copper ground wire for the full length of fixture row.

.9 The accessories shall be as manufactured by Burndy, Erico, Amp or Caldweld.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide complete permanent and continuous, system and equipment grounding systems including, ground rods, conductors, connectors, accessories, to conform to requirements of the Authorities having jurisdiction.

.3 Install connectors to manufacturer's instructions.

.4 Protect exposed grounding conductors from mechanical injury.

.5 All Non-current carrying metal parts shall be bonded in accordance with ESA, CSA, and provincial inspection department standards.

.6 The neutrals of the dry-type transformer shall be connected by a separate copper ground wire to the ground bus in the switchboard.

.7 A separate copper ground wire to the ground bus in the switchboard shall be provided for each isolation transformer and isolated ground lighting panel.

.8 Separate copper wire shall be installed in all flexible conduits, in all rigid conduits, in wall or below slab conduits, EMT conduits and all non-metallic conduits.

.9 Connect the ground bus in the main switchboard to the main ground and incoming water main ahead of the water meter and provide a water meter shunt.

.10 The grounding system in the main switchboard shall be suitable for use with the ground fault system.

.11 Install separate grounding/bonding systems for telephone system, fire detection and alarm system, public address system, video surveillance system and intrusion detection system, in accordance with the systems suppliers' requirements.

.12 Install grounding system for pad mounted transformer in accordance with ESA and Local Hydro requirements.

.13 All grounding conductors run inside of building, except in electrical and LAN rooms, shall be run in EMT conduit.

.14 Install separate ground conductor for outdoor lighting standards.

.15 Install grounding connections to typical equipment included in, but not necessarily limited to following list: Service equipment, transformers, switchgear, duct systems, motor frames, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting etc.

.16 Install electrode interconnections where metal parts, circuits, or grounding conductors and/or electrodes are in proximity to lightning rod conductors.

.17 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Owner's Representative and local authority having jurisdiction over installation.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Type `C', `D', `T' and `E' pull boxes, junction boxes and cabinets shall be made of code gauge steel with corners lapped and welded and shall be painted and identified as noted in this specification.

.3 Cabinets shall provide proper space for conduits, wires and connections and their size shall be in accordance with the requirements of the Authorities having jurisdiction.

.4 The trim and cover shall be as required by the service and location.

.5 Splitters shall be sheet metal enclosure complete with welded corners and formed hinged cover suitable for locking in closed position.

.6 Splitters main and branch lugs/connection bars shall match the required size and number of incoming and outgoing conductors as indicated on drawings.

.7 At least three spare terminals shall be provided on each set of lugs in splitters less than 400A.

.8 The metal cabinets shall be as manufactured by Eaton, Square-D, Siemens, or Hammond.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Pull boxes, junction boxes and cabinets shall be independently supported from the conduit connected to them.

.3 Pull boxes shall be installed in inconspicuous but accessible locations.

.4 The cabinets shall be suitable for the installation and location.

.5 Cabinets shall be mounted with top not higher than 2m above finished floor.

.6 <u>All electrical pull boxes above drywall ceilings shall be accessible via a properly sized access door installed directly below the respective pull box in drywall ceilings. Temporary removal of electrical light fixtures will not be considered safe access to above ceiling electrical boxes and shall not be permitted and acceptable.</u>

.7 Install splitters and mount plumb, true and square to the building lines.

.8 All pull boxes, cabinets, equipment shall be identified in accordance with Section 26 05 01, Electrical Work General Instructions.

.9 Identification labels shall be provided indicating system name voltage and phase.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.1, Canadian Electrical Code, Part 1.
.2 OESC – Latest Edition.
.3 Electrical Safety Authority – Latest Inspection Bulletins.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Size boxes in accordance with latest edition of OESC and/or CSA C22.1.

.3 102 mm square or larger outlet boxes shall be provided as required for special devices.

.4 Blank cover plates shall be provided for all outlet boxes without wiring devices.

.5 347 V outlet boxes shall be provided for 347 V switching devices.

.6 Barriers shall be provided for outlet boxes where more than one system are grouped.

.7 Outlet boxes used with rigid steel conduit shall be `FS' or `FD' Feraloy condulets.

.8 Outlet boxes used with EMT conduit shall be electro-galvanized and made of code gauge steel except when they are surface mounted on walls and then they shall be `FS' or `FD' Feraloy condulets.

.9 Outlet boxes installed outside the building shall be weatherproof type, with neoprene gasket and cast cover.

.10 Electro-galvanized steel masonry single and multi-gang boxes shall be provided for devices flush mounted in exposed block walls.

.11 Electro-galvanized sheet steel concrete type boxes shall be provided for flush mount in concrete with matching extension and plaster rings as required.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 All outlet boxes shall be supported independently of connecting conduits.

.3 Outlet boxes shall have adequate knockouts, but only those knockouts actually required shall be opened.

.4 Outlet boxes shall be securely fastened to the surface on which they are mounted. If the boxes are not mounted on a surface, then adequate and independent supports must be provided.

.5 Outlet boxes shall be provided for each surface mounted lighting fixture.

.6 Outlet boxes shall be provided for each recessed mounted lighting fixture.

.7 Multi-gang outlet boxes with single cover plate shall be used where switches are grouped.

.8 Unused opened knockouts shall be closed with steel knockout plugs.

.9 Correct size of openings shall be provided in boxes for conduit, mineral insulated and armoured cable connections. Installation of reducing washers will not be acceptable and allowed.

.10 All electrical outlet boxes above drywall ceilings shall be accessible via a properly sized access door installed directly below the box in drywall ceilings. Temporary removal of electrical light fixtures will not be considered safe access to above ceiling electrical boxes and shall not be permitted and acceptable.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CSA C22.2 No. 45, Rigid Metal Conduit.
- .2 CSA C22.2 No. 83, Electrical Metallic Tubing.
- .3 CSA C22.2 No. 211.2, Rigid PVC (Un-plasticized) Conduit.
- .4 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .5 CAN/CSA C22.2 No. 227.3, Flexible PVC conduit. Non-metallic Mechanical Protection Tubing (NMPT), a National Standard of Canada.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Submit the following to the Consultant for review:
- .1 Location drawings for all required sleeves and formed openings in poured concrete or precast concrete construction.
- .2 Samples of materials and any other items as specified in succeeding Sections of this Division of the Specification.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Rigid metal conduits shall be electro-galvanized and made of standard weight steel pipe and connected with electro-galvanized threaded couplings.

.3 Electrical metallic tubing shall be a metal raceway which has a wall thinner than that of rigid metal conduit and an outside diameter sufficiently different from that of rigid metal conduit to render it impracticable for anyone to thread it with a standard pipe thread.

.4 Rigid PVC conduits shall be a rigid non-metallic conduit of un-plasticized polyvinyl chloride.

.5 Rigid Type I shall be similar to rigid PVC duct, Type EB1, to CSA Standard B196.1 requiring encasement in concrete.

.6 Rigid Type II shall be similar to Type I except of heavier construction and suitable for direct burial.

.7 Flexible conduits shall be liquid-tight flexible metal conduit.

.8 Rigid metal conduits entering boxes in dry locations shall be secured with galvanized steel locknuts and nylon insulated steel bushings.

.9 Rigid metal conduits entering boxes in wet locations shall be secured with steel bullet hub connectors, nylon insulated with neoprene `O' ring.

.10 Connectors for EMT surface mounted conduit shall be steel, set screw and nylon insulated.

.11 Connectors for EMT conduit in concrete shall be steel, raintight, concrete tight and nylon insulated.

.12 Couplings for EMT conduit surface mounted shall be steel set screw type.

.13 Couplings for EMT conduit in concrete shall be steel, rain tight and concrete tight.

.14 Connectors for flexible conduit shall be steel, liquid-tight, nylon insulated with neoprene `O' ring.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Install all conduit, conduit fittings and accessories in accordance with the latest edition of the Canadian Electrical Code in a manner that does not alter, change, or violate any part of the installed system components or the CSA/UL certification of these components.

.3 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.4 Raceways shall be as shown on the Drawings and as detailed in the Specification.

.5 The size of conduit shall be in accordance with the requirements of the Authorities having jurisdiction.

.6 All conduits inside the building shall, unless otherwise noted, be electrical metallic tubing.

.7 Unless otherwise noted branch circuit conduits shall be concealed in wall and ceilings or exposed in unfinished areas and shall not be installed below or in any concrete slab unless otherwise approved by the owner/consultant. Where it is noted that branch circuit conduits can be installed in a concrete slab that is not on grade the conduit shall be electrical metallic tubing with a copper ground wire.

.8 Conduits exposed to the weather, in wet locations, subject to mechanical injury or in any hazardous locations, shall be rigid metal conduit.

.9 Conduits in plenums shall be rigid metal conduit.

.10 Telephone zone conduits shall be PVC conduit when installed in concrete and EMT in other locations.

.11 Telephone distribution conduits shall be rigid P.V.C. conduit when installed in concrete or underground and EMT conduit in other locations.

.12 Motor feeder drops shall be in rigid conduit with a maximum 910mm of flexible metal conduit. Rigid conduit for the drops shall start at least 910mm ahead of the actual bend and have two additional clips over normal requirements. The minimum conduit size for the drops shall be 19mm.

.13 Liquid tight flexible metal conduit shall be used for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.14 Explosion proof flexible connection shall be used for connection to explosion proof motors.

.15 Conduit sealing fittings shall be installed complete with compound in hazardous areas.

.16 Conduits in finished areas shall be concealed and those in unfinished areas shall be surface mounted unless otherwise noted.

.17 Feeder conduits shall not be installed in or below any concrete slab, unless approved by the Consultant.

.18 Conduits shall be installed so that the conductors can be drawn in without strain or injury.

.19 Expansion fittings shall be installed in conduits crossing expansion joints.

.20 Conduits shall be installed to provide for expansion and expansion fittings shall be provided where required.

.21 Conduits shall not be installed within 75mm of water, sprinkler, drain or waste piping.

.22 Exposed conduits shall run parallel to or horizontally on the walls of the building.

.23 Conduit ends shall be carefully plugged during construction with steel capped bushings.

.24 The use of running threads shall not be permitted. Ericson couplings shall be used where required.

.25 Conduits shall not pass-through structural members without the approval of the Consultants.

.26 Powder activated fastenings can only be used if approved by the Consultant.

.27 Conduits shall be fastened with approved clips. Supporting of conduits with tie wires, perforated straps, etc. shall not be permitted. If a conduit rests on structural steel, etc., this will not be considered as a support. Provide proper supports, hangers, etc. and supports conduits from the top of structural beams/joists.

.28 Conduits shall not be attached or suspended from the metal deck unless approved by the Consultant.

.29 Conduit supports shall be spaced in accordance with the requirements of the Authorities having jurisdiction.

.30 An adequate number and size of pull boxes shall be installed where required in all conduits runs to facilitate the installation of the conductors.

.31 Fish wires shall be installed in all empty conduits, including telephone conduits.

.32 Excessive lengths of flexible conduit shall not be accepted. Maximum 10'-0" of length will be acceptable.

.33 Proper metallic contacts shall be made between conduit, boxes, etc.

.34 Maximum size of conduit on which ground bushings can be used is 32mm.

.35 A separate ground wire shall be installed in all flexible conduits, EMT conduits, underground conduits, in wall or below a concrete slab, underground parking lot lighting and in all non-metallic conduits or ducts.

.36 Installation of conduit in oversize knockouts shall not be accepted.

.37 Joints in conduits installed underground, in concrete slab on grade or in a concrete duct bank shall be pitched on the outside and made completely watertight.

.38 Minimum concrete thickness over a conduit in a concrete slab where applicable shall be 50mm.

.39 Spare or unused conduits that terminate in an enclosure shall be capped.

.40 Conduits passing through concrete and/or masonry floors, walls, roof and any other such construction shall be provided with sleeves.

.41 Electrical conduit roof flashing shall be similar to National Roofing supply product code# ECP-PVCH (electrical conduit post PVCH), Gooseneck S.S.A ARPGN2 (2”)/ ARPGN3 (3”).

.42 Protect conduits from damage where they stub out of concrete. Use rigid steel conduit for stub-up and adapt to in floor rigid PVC conduit.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Access panels for walls and ceiling shall be of the flush type with concealed flanges constructed from 12 gauge minimum bonderized steel and shall be complete with anchor straps, rust resistant concealed hinges and positive locking, self-opening screwdriver operated lock. Coordinate with Division 23.

.3 Access panels in tiled walls shall be stainless steel with recessed door panel to accept wall finish and shall be of a size to suit tile pattern.

.4 Access panels installed in fire rated walls, partitions or ceilings shall have a fire resistance rating equal to the materials in which they are installed.

.5 Access panels shall be as manufactured by LeHage, SMS, Pedlar or approved equal.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 All parts of the installation including, but not limited to, pull-in, junction and outlet boxes, cabinets, gutters, etc. shall be accessible.

.3 Supply access panels as required to provide complete access to all equipment and connections. The access panels shall be installed by other Sections of the specification.

.4 Provide drawings showing size, type and location of all access panels and submit for review by the Consultant.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 This Section is for provisions for Building Automation System only.

.3 Divisions 23 will supply and install a Computerized Building Automation System complete with the distribution boxes, control sequencing and all interfacing.

.4 Division 26 shall provide individual lighting relays and/or contactors for each individual circuit and associated relay boxes and connect to load side of relays, as shown on the drawings. All control wiring by Division 23.

.5 Contactors used in conjunction with building automation system shall be electrically operated, electrically held type. Refer to Section 26 29 01.

.6 Coordinate all work with Division 23.

Execution: NOT USED

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CAN/CSA C22.2 No. 47, Air Cooled Transformer (Dry Type).
.2 CSA C9, Dry Type Transformers.

.2 National Electrical Manufactures Association (NEMA).

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Dry type transformers shall, unless otherwise noted, be of the indoor air-cooled dry type of the size, rating and capacities as shown on the drawings and shall be sprinkler-proof.

.3 Transformers shall be of the 1.2 KV Class 10 KV B.I.L. 220°C insulation, copper wire, temperature rise above a maximum ambient temperature of 150 degrees C.

.4 Transformers shall have 4 - 2½% full capacity taps, 2 above and 2 below normal.

.5 Ample ventilation openings at top, bottom, front, and sides shall be provided but these shall be shielded to prevent access to the live parts.

.6 Transformers shall be equipped as required with eye bolts, braces, etc. to enable them to be wall mounted, floor mounted or suspended. Units shall be braced to block walls to suit seismic requirements.

.7 External anti-vibration isolation mountings shall be supplied and installed for all transformers.

.8 Transformers shall have two coats of primer and two finish coats of ASA 61 grey paint.

.9 Transformer nominal efficiency of different KVA ratings must follow ASHRAE Standard 90.1-2010. Transformers shall be Harmonic Mitigator and similar to Powersmiths Model T1000-C3, Delta Mitigator e-silver, Marcus Supreme, or approved equal by the Consultant.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Locate the dry type transformers where shown on the drawings and ensure that there is adequate ventilation so that they operate as specified and that there is no transfer of heat to adjacent surfaces or equipment.

.3 Prior to energizing or commissioning any transformer it shall be fully inspected, tested, checked, and adjusted to include, but not limited to the following:
- .1 Grounding.
- .2 Ratio.
- .3 Polarity.
- .4 Insulation resistance.
- .5 Taps adjusted to give rated voltage specified at rated capacity.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 29, Panel boards and enclosed Panel boards.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of panel board, branch breaker type, quantity, ampacity, KAIC rating and enclosure dimensions etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Panel boards shall be of the size, capacity and type as shown on the drawings. Series or integrated ratings shall not be an acceptable method of achieving specified interrupting levels for breakers, panels, or electrical equipment in general. Where an interrupting rating is specified, it shall be on a breaker, panel, or switchboard. Each breaker associated shall be fully rated to interrupt that magnitude of current. If there is a conflict between drawings and specifications, the higher rated value associated with that particular equipment shall be deemed to be correct.

.3 Panel boards shall be of the sprinkler-proof, dead front type enclosed in code gauge steel equipped with door, gasket, lock, and directory and shall be suitable for surface or flush mounting as required.

.4 Bussing in each panel shall be copper and shall extend the full length of the panel. Multi-section panels shall have full capacity rated horizontal bussing between each section.

.5 Breakers shall be ambient compensated type, calibrated at 40 degrees C and be of the bolt-on type. Multi-pole breakers shall have common trip.

.6 Panel boards for use on 240-volt or 208-volt system shall, unless otherwise noted be of the "NQ" panel or I-line panel as indicated on drawings.

.7 Panel boards for use on 600-volt system shall, unless otherwise noted be of the "NF" panel as indicated on drawings.

.8 Panels, including tubs, shall have two coats of primer paint and two coats of ASA 61 grey paint.

.9 Panel boards shall be of the same manufacturer as the switchboard.

.10 All circuit breakers shall be installed in panel boards before shipment.

.11 Panel boards shall be provided with mains, number of circuits, KAIC rating and branch circuit breaker sizes as indicated in contract documents.

.12 Lock-on devices shall be provided for fire alarm, emergency and exit lighting circuits and other circuits as indicated in contract documents.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Locate panel boards where indicated; and mount securely and plumb true and square to adjoining surfaces.

.3 Panels are to be mounted so that the top of the panels are 1800mm above finished floor.

.4 Provide 2 - 32mm empty conduits from each flush mounted panel to the ceiling spaces above and below for future installation.

.5 Provide wire-ways above multi-section panels to avoid cross-wiring.

.6 Numbering of breakers in multi-panel assemblies shall be consecutive. If necessary, provide narrow Dymomite strips with the required numberings.

.7 Prior to energizing or commissioning the panels, they shall be fully inspected, tested, checked, and adjusted to include, but not limited to, the following:
.1 Grounding.
.2 Breaker settings.
.3 Breaker operation.
.4 Continuity of feeder cables.
.5 Phase resistance of feeder cables.
.6 Insulation resistance of feeder cables.
.7 Proper phasing of incoming and feeder cables.
.8 Equal division of load between parallel conductors.
.9 Bus torque, supports, clearance, general mechanical conditions, and insulation resistance.

.8 30% of all breakers in panels shall be equipped with locking devices. These locking devices shall be installed as directed by the Consultant on completion of work and the unused units shall be handed over to the Owners.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA-C22.2 No.55, Special Use Switches.
  .2 CSA-C22.2 No.111, General-Use Snap Switches.
  .3 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices.
  .4 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Provide manufacturer’s printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Light switches on 120-volt circuits under 1200 watts shall be 15 amp. and above 1800 watts shall be 20 amp.

.3 Light switches shall be premium specification grade, A.C., Toggle type switches.

.4 Receptacles shall be of the type shown on the drawings with the standard C.S.A. configurations and shall be specification grade. Hubbell #5262.

.5 Light switches and receptacles on normal power shall be white unless noted otherwise.

.6 Isolated ground receptacles shall be orange. Hubbell #1G-5262.

.7 Wall plates for flush mounted devices shall be multiple gangs super stainless-steel type 302.

.8 Wall plates for surface mounted devices in unfinished areas shall be metal covers for F.S. type boxes.

.9 The weatherproof plates shall be cast aluminium with lift cover for F.S. type boxes.

.10 For T.V. and computer outlets provide blank cover plates unless work is complete.

.11 For telephone outlets provide blank cover plates unless work is complete.

.12 Receptacle mounted on the exterior walls of the building shall be with ground fault protection mounted in an F.S. type box with a Hubbell #5206WO and MX3200 weatherproof in-use cover plate.

.13 50A/208V 1 phase 3W receptacle, range receptacle Smith & Stone #1-8450 complete with plug and cord set.

.14 30A, 120/208V receptacle Smith & Stone #1-8430 dryer receptacle complete with plug and cord set.

.15 Wiring devices shall, unless otherwise noted, be of Pass & Seymour, Hubbell, Leviton, or Cooper manufacture.

.16 All service receptacles on roof shall be 15/20A combination GFI type receptacles complete with weatherproof in-use cover (Similar to Hubbell Cat. #MX3200).

.17 Receptacle controlled by occupancy sensor shall be Similar to Hubbell Cat. #BR15C2GRY.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Symbols on drawings show approximate locations. Care shall be taken to locate each device to ensure that it is in the appropriate location to suit the Architectural finishes.

.3 Mounting heights are referred to finished floor or finished ceiling unless related to benchmark elevations.

.4 Provide cover plates for flush mounted manual starters.

.5 Receptacle, telephone, etc. outlets shall, unless otherwise noted, be mounted vertically 400mm above finished floor in the finished areas and 1200mm in all unfinished areas. Thermostats shall be mounted 1400mm, unless otherwise noted.

.6 Telephone, P.A., etc. wall outlets shall be spaced 100mm from power outlet.

.7 All wiring devices cover plates shall be labelled using clear adhesive strips with black type identifying, panel and circuit number(s) for each device.

.8 Single throw switch(es) shall be installed with handle in "UP" position when switch closed.

.9 Switches shall be installed in gang type outlet box(es) when more than one switch is required in one location.

.10 Receptacles shall be installed in gang type outlet box(es) when more than one receptacle is required in one location.

.11 Suitable common cover plates shall be installed where wiring devices are grouped.

.12 Cover plates meant for flush mount outlet boxes shall not be use for surface mounted outlet boxes.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 248.12, Low Voltage Fuses

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of fuse type, quantity, ampacity, voltage rating and dimension etc.

.3 Submit fuse performance data characteristics for each fuse type and size. Performance data to include average melting time-current characteristics.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Fuses protecting motor circuits shall be Form I Class `J' time delay.

.3 Other fuses up to 600A shall be Form I Class `J'.

.4 Other fuses above 600A shall be Form I Class `L'.

.5 All fuses shall be of Ferraz, Shawmut or Bussman.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide fuses for the complete electrical installation.

.3 Supply six (6) spare fuses of each size and type installed.

.4 Provide in the main electrical room a wall mounted metal cabinet complete with doors and lock, and an adequate quantity of pigeonholes to accommodate the spare fuses.

.5 To avoid confusion and possible loss the fuses shall not be stored in the cabinets until they are physically counted by the Owner's representative and a written receipt obtained for them. A copy of the receipt shall be included in the manuals.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of disconnect switch, type, quantity, voltage, ampacity, and dimension etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Disconnect switch(es) shall have the operating handle interlocked with the switch cover so that it can only be opened when the switch is in the "Off" position, and the handle cannot be put in the "On" position unless the cover is closed.

.3 Fused disconnect switch(es) shall have steel reinforced clips and fuses shall be easily removable when the switch is in the "Off" position.

.4 Switches shall have ample gutter space for top or bottom wiring and shall have fully visible blades when in the "Off" position, quick-make, quick-break mechanism and be horsepower rated.

.5 Disconnect switch(es) shall be provided with ON-OFF switch position indication on switch enclosure cover.

.6 Switches used outdoors shall be in a weatherproof enclosure.

.7 Switches shall have provision for padlocking in the "Off" position and interlock defeat.

.8 All motors shall be provided with a disconnect switch by this Division unless otherwise noted.

.9 The disconnect switches shall be as manufactured by Eaton, Siemens, or Square `D'.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Disconnect switch(es) shall be installed complete with fuses as indicated on drawings and in contract documents.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No.14, Industrial Control Equipment.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of contactor, quantity, ampacity, voltage, control schematic wiring diagram and enclosure dimension etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Contactors controlling panel boards or branch circuits shall be tungsten rated, electrically operated, electrically held of the size and rating specified, complete with control transformer, control circuit fuses, pilot light warning label, NO/NC contacts and On/Off/Auto selector switch.

.3 Contactors shall be in sprinkler proof enclosure unless otherwise noted.

.4 The contactors ampere rating shown on the drawings is the minimum continuous enclosed de-rated rating of the contactors. Contactors shall be designed and manufactured in accordance with NEMA Standards.

.5 Contactors controlling branch circuits shall be mounted above the panel board from which they are fed, unless otherwise noted.

.6 Contactors shall be of Allen-Bradley, Eaton, Siemens or Square `D' manufacture.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Field designed and assembled contactor assemblies will not be acceptable.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 International Electrotechnical Commission (IEC).
.1 IEC 947-4-1, Part 4: Contactors and Motor-Starters.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The motors shall be provided and adjusted by Division 23, Mechanical.

.3 The starters shall be supplied by Division 23, Mechanical.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide and connect conduit and power wiring to the motors.

.3 Conduit and wiring for low voltage thermostats shall, unless otherwise noted, be provided by another Division of the Specification.

.4 Wiring and conduit for line voltage thermostats shall be by this Division. Coordinate with Division 23, Mechanical drawings.

.5 Take delivery of and install the starters and provide and connect conduit and power wiring to the starters. Control wiring and conduit shall, unless otherwise noted, be provided by Division 23, Mechanical.

.6 Fuses for the fused combination magnetic starters shall be supplied and installed by Division 23, Mechanical.

.7 Prepare schedule of each motor connected which shall include the following:
.1 Phase
.2 Voltage
.3 Horsepower
.4 Full load current
.5 Motor Purpose
.6 Fuse size and type
.7 Overload heater size and type

.8 Submit the motor schedule for review by the Consultant and include the schedule in the manuals.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

.3 Refer to section 26 50 10, Lighting Fixtures Schedule

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Light fixtures finish and construction shall meet ULC listings and CSA certifications related to intended installation.

.3 Light Emitting Diodes (LED) shall comply with the following:
.1 Light emitting diodes shall be manufactured by “Cree” or equal.
.2 Junction temperature at 25°C ambient shall not exceed 60°-70°C.
.3 LED light fixture(s) shall follow LM-79 and LM-80 Standards. Luminaire photometric shall be performed by an independent company.
.4 Lumens per watt output (LPW) shall be not less than 100 LPW.
.5 The lifetime rating of driver, LEDs and all electrical components of complete fixture shall be 60,000 hours (minimum) at full load.
.6 Colour temperature shall range from 3500K to 5100k as called for in the Lighting Fixtures Schedule.
.7 All electrical components shall have a 5-year replacement (parts and labour) warranty.
.8 LED light fixture(s) shall be DLC certified.
.9 LED light fixture(s) shall be complete with 0-10V dimming driver.

.4 The louvres for light coves in washrooms and display cases and where shown shall be 1/2"x1/2"x1/2" (13x13x13mm) continuous aluminium and shall be of American Louvre manufacture.

.5 Lenses shall be acrylic (minimum of 0.175mm) with a maximum flame spread rating of 250 and smoke development classification of 600 and shall be of KSH, American Louvre manufacture.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Remove from the site all empty cartons, crates, etc. in which the fixtures and associated components are delivered.

.3 Install lighting fixtures at locations as indicated on drawings and in contract documents.

.4 The chain supports required for mounting and installation of recessed lighting fixtures shall be supplied and installed by this Division. The supports shall be attached to the structure with minimum 2 supports per fixture. The ceiling system shall not be used as a supporting means. Prior to installation of lighting fixtures, Electrical Contractor shall coordinate with consultant and get approval.

.5 Surface mounted fixtures shall be independently supported from the structure above.

.6 Fixtures connected to the circuits exceeding 150 volts to ground shall be mounted at least 8 feet above floor level.

.7 Fixtures mounted in continuous rows shall be equipped with aligning clips to form straight uninterrupted line.

.8 Align light fixtures mounted individually parallel or perpendicular to building grid lines.

.9 The location of lighting fixtures in Service Areas, Electrical and Mechanical Rooms, etc. shall be determined after the equipment is installed.

.10 Refer to the Architectural reflected ceiling drawings for the exact location of the lighting fixtures.

.11 Cooperate with the other Divisions to establish proper clearances from sprinkler heads, diffusers, ducts, etc.

.12 Surface mounted fixtures shall have minimum clearance of 2'-0" (600mm) from adjacent sprinkler heads.

.13 Provide additional supports, hangers etc. required to support fixtures mounted under ductwork and the fixture supports shall not be attached to either the ductwork or the ductwork supports.

.14 Provide and connect all branch circuit conduit and wiring to the signs (if required).

.15 Angles required for support of 1/2"x1/2"x1/2" (13x13x13mm) louvre shall be by Ceiling Division.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Submit the following to the Consultant for review:
.1 Manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
.2 Samples of materials and any other items as specified in succeeding Sections of this Division of the Specification.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The lighting fixtures with the letter shown, shall be of the types as described below:

Type ‘B’ Shall be BEGA, Cat. #B77589, 31” high light bollard with 120 volt input voltage and integral driver. Finish colour to be confirmed by the Architect at a later date.

Type ‘S’ Shall be BEGA Cat. #B24151, round recessed wall LED light fixture, with 120V input voltage and integral driver. Finish colour to be confirmed by the Architect at a later date.

Type ‘U’ Shall be BEGA pole top luminaire Cat. #B84120, pole top LED light fixture with symmetrical light distribution, mounted on 12 ft. pole. **No alternate**. Light fixture shall be complete with low copper aluminum alloy die cast housing, integral weathertight LED driver compartment and high-performance aluminum heat sinks with finish colour. Fixture finish colour to be confirmed by Architect at later date.

Pole shall be 5” round aluminum pole CAT.#906HR, complete with handhole, base plate, anchor bolts, shroud over the base and all other components required for proper installation and operation. All welds on the pole assembly shall be ground smooth and painted with primer. The complete pole assembly shall be guaranteed for wind, sleet, ice and snow loads. The poles, etc. shall have two prime coats of X-60 Rust-Oleum. The finish of the pole assembly and luminaries shall be two coats of finish paint with a dry film thickness between one and two mills per coat. The pole shall be complete with 7” wide x 12” long handhole. At the handhole, provide multi-section terminal block, neutral block bar and grounding stud, and Essma in-line or approved equal fuse holders and fuses for each fixture. All incoming and outgoing conduits shall be brought to the handholes, and all wiring connections shall be made at this point. Wiring shall be brought from each driver and connected to the fuses and terminal block. All wiring inside the pole shall be TWU of minimum #12 and shall be supported from straps at the hand hole. All connections are to be provided with neoprene covers.

LED light fixtures, unless otherwise noted, Signify/Philips Canada, Cooper, Acuity and Current Lighting shall be considered equal provided they meet the specifications, designed lighting calculations based on absolute IES files of the respective light fixtures.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Site Grading — Section 31 23 13

.2 Excavating, Trenching and Backfilling — Section 31 23 10

1.2 EXAMINATION

.1 Examine the Drawings and Specifications. Visit the site and determine the work extent and nature of the existing conditions. In no circumstances will any claims against the Owner be allowed resulting from failure to ascertain the work herein described or implied.

.2 Report to the Consultant in writing any conditions which will prejudice the proper completion of the work of this Section. Commencement of work constitutes acceptance of existing conditions.

1.3 BURIED SERVICES

.1 Before commencing work confirm no buried services remain on the site and locate all services adjacent to the site. Engage private locate firm for underground scan for all areas of work outside the property lines.

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

1.4 PROTECTION

.1 Establish locations of all electrical, telephone, or other service installations existing in the areas of site preparation by contacting the service owners and obtaining their approval to work in such areas. Contact the Municipality, the Region of Durham and local utilities to review proposed scheduling, work activities and regulations pertaining to all work beyond the limits of the property including but not limited to parking areas, storm water outlet and headwall and asphalt driveway entrances. Provide adequate markers or take protective measures to ensure that no damage will be caused under this Section. Repair or replace damaged work as required without cost to the Owner.

.2 Electronically locate, map and record location of services prior to doing any excavation.

1.5 DUST CONTROL

.1 Provide and maintain to the Consultant’s satisfaction, adequate system to avoid any nuisance caused by dust and dirt rising throughout the area of operations.

1.6 SILT CONTROL

.1 Provide and maintain to the Consultant’s and to the Authorities’ satisfaction, control systems to prevent silt from entering any storm drainage system.

Part 2 Products

2.1 NOT APPLICABLE

Part 3 Execution

3.1 DISPOSAL OF WASTE AND SURPLUS MATERIALS

.1 Except where specified or indicated on Drawings to be retained on site, or to be reused, remove from the site, all waste and surplus materials resulting from site preparation work on a daily basis. Dispose of as required in accordance with local or provincial regulations. Under no circumstances shall the burning of rubbish be permitted on the site. Where items are to be reused, store on site where designated and provide temporary protection to same to prevent damage by construction operations.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Read and be governed by conditions of the Contract and sections of Division 1.

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D698-[07e1] , Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.2 CSA Group (CSA)

.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.

.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 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: arrange with authority having jurisdiction for relocation of buried services that interfere with execution of work.

1.4 PROTECTION

.1 Prevent damage to trees, landscaping, natural features, benchmarks, surface or underground utility lines, which are to remain. Make good any damage.

Part 2 Products

2.1 MATERIALS

.1 Obtain approval of excavated or graded material used in fill for grading work. Protect approved material from contamination.

.2 Granular A and B to OPSS 1010.

Part 3 Execution

3.1 EXAMINATION

.1 Evaluation and Assessment:

.1 Examine Geotechnical Report, if available.

.2 Before commencing work verify locations of buried services on and adjacent to site.

3.2 PREPARATION

.1 Temporary erosion and sedimentation control:

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

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

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

.2 Protection of in-place conditions:

.1 Protect excavations from freezing.

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

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Consultant'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 Removal:

.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 600 mm below finished grade elsewhere.

3.3 EXCAVATION

.1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Municipal or Provincial regulations whichever is more stringent.

.2 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. Refer to Section 32 91 19 Topsoil and Finish Grading.

.1 Stockpile topsoil on site for later use.

.3 Excavate as required to carry out work.

.1 Do not disturb soil or rock below bearing surfaces.

.2 Notify Consultant 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 Consultant's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.

.4 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.

.5 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.

3.4 FIELD QUALITY CONTROL

.1 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory approved by Consultant.

.2 Not later than 1 week minimum before backfilling or filling, submit to designated testing agency, samples of backfill as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Do not begin backfilling or filling operations until material has been approved for use by Consultant.

.4 Not later than 48 hours before backfilling or filling with approved material, compaction tests to be carried out by approved testing agency.

3.5 BACKFILLING

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

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

.3 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.

.4 Placing:

.1 Place backfill, fill and base course material in 150 mm lifts: add water as required to achieve specified density.

.5 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: 95%.

.6 Under slabs and paving:

.1 Use site excavated material

.7 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 Consultant.

.8 Under sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

.9 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 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Rough grade to depths below finish grades as required to install pavements and landscape treatments. Refer to details for required depths.

.3 Slope rough grade away from building 1:50 minimum.

.4 Prior to placing fill over existing ground, scarify surface to depth of 150mm. Fill all depressions, etc., with approved fill. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.5 Compact filled and disturbed areas to corrected minimum dry density/maximum dry density to ASTM D698-00, Standard Proctor, method C/D, as follows:

.1 90% under soft landscaped areas

.2 98% under paved and walkway areas

.6 Do not disturb soil within branch spread of trees or shrubs to remain.

3.7 TESTING

.1 Inspection and testing of soil compaction will be carried out by designated testing laboratory.

3.8 SURPLUS MATERIAL

.1 Remove surplus material from site in accordance with all municipal with provincial regulations.

.2 Remove material unsuitable for fill, grading or landscaping from site.

3.9 CLEANING

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

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

.2 Dispose of cleared and grubbed material off site daily.

.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 SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

.3 Section 01 35 43 - Environmental Procedures.

.4 Section 31 23 13 - Rough Grading.

.5 Section 32 91 19 – Top soil and Finish Grading.

.6 Section 32 12 17 – Asphalt Paving.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

.1 Work of this Section shall include protection measures, consisting of materials, constructions, and methods required by the Occupational Health and Safety Act, 1987, of the Province of Ontario, and as otherwise imposed by Jurisdictional Authorities to save persons and property from harm.

.2 Submit shop drawings required by authorities.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-98, Standard Test Method for Particle-Size Analysis of Soils.

.4 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}).

.5 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ^{3}) (2,700 kN-m/m ^{3}).

.6 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 Canadian Standards Association (CSA)

.1 CAN/CSA-A3000-98-A5-98, Portland Cement.

.2 CAN/CSA-A23.1-00, Concrete Materials and Methods of Concrete Construction.

1.4 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

- .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.
- .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: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.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 Unsuitable materials:

- .1 Weak and compressible materials under excavated areas.
- .2 Frost susceptible materials under excavated areas.
- .3 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 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.7 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.5 SUBMITTALS

.1 Samples:

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Consultant at least 2 weeks prior to commencing Work, of proposed source of fill materials and provide access for sampling.
- .3 Submit 25 kg samples of type of fill specified including representative samples of excavated material.
- .4 Ship samples prepaid to Inspection firm, in tightly closed containers to prevent contamination.

1.6 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Where Consultant/Engineer is employee of Contractor, submit proof that Work by Consultant/Engineer is included in Contractor's insurance coverage.

.3 Submit design and supporting data at least 2 weeks prior to commencing Work.

.4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

.5 Keep design and supporting data on site.

.6 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.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate plastic, paper packaging and corrugated cardboard and place in designated containers.

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

.3 Ensure emptied containers are sealed and stored safely.

1.8 PROTECTION OF EXISTING FEATURES

.1 Refer to *Section 01 11 00 – 'Summary of Work – article 1.5 Existing Conditions'* and *Section 31 21 13 – 'Rough Grading'* for requirements to provide underground scan in addition to service locates for all areas of work beyond the property lines.

.2 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

.3 Existing buried utilities and structures:

.1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.2 Prior to commencing excavation Work, notify applicable Owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.

.3 Confirm locations of buried utilities by careful test excavations.

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.

.5 Ensure that adjacent property is not damaged in any way by excavating and grading work; by the removing, stockpiling and transporting of materials; by blown sand and dust or by spillage during the removing, stockpiling and transporting of materials; by the collapse or movement of excavated banks and stockpiles; or by storm water from altered drainage course.

.6 Ensure that no damage is caused by earthwork to existing structures, trees, buried and above-ground services, bench marks, and survey monuments on the site, or

adjacent property. Arrange or ensure that all damage which occurs is repaired completely and immediately.

.7 Protect newly-graded areas from the action of the elements. Repair settlement and washouts that occurs before acceptance of the work, and re-establish grades to the required elevations and slopes. Fill to required subgrade levels any area where settlement occurs.

.8 Bail or pump all water out of excavation, from whatever cause, as it accumulates. Take all necessary measures to prevent flow of water and earth fines into the excavation.

.9 Support existing buildings, walks, roads, and services, and prevent cave-ins of excavated banks. A Professional Engineer specializing in this work shall design all protection. Provide shop drawings for authorities as required.

.10 Temporarily cover all existing catchbasins and manholes to prevent entry of earth or debris.

.11 Electronically locate underground services such as electrical and telephone lines, gas and water and sewer lines. Mark line of services with yellow ribbons or stakes with tip fluorescent painted, and indicating both plan location and depth.

.12 Protect the bottom and sides of the excavated pits and trenches from exposure to sun and rain to prevent cave-ins and softening of the bed upon which concrete and drains rest.

1.9 DUST CONTROL

.1 Provide and maintain adequate system to avoid any nuisance caused by dust and dirt rising throughout the area of operations. The use of calcium chloride is prohibited.

Part 2 Products

2.1 MATERIALS

.1 Fill "A": Granular material meeting OPSS Material Specification for Aggregates, Form 1010, Granular "A". Minimum compaction density 98% Standard Proctor. For use primarily as bedding material.

.2 Fill "B": Granular material meeting OPSS Material Specification for Aggregates, Form 1010, Granular "B"-Type 2. Optional material: 50mm crusher run limestone – type 2. Minimum compaction density 100% Standard Proctor. For use as fill to raise grades under building foundation, slab on grade areas and paved parking and driveway areas.

.3 Fill "C": Site (native) material, containing no organic or foreign matter, and which the Contractor can demonstrate is compactable to a density of min. 98% - 100% Standard Proctor meeting MOE Table 1. For use primarily as fill under playfields areas (min. 98% SPDD) and landscaped areas (95% SPDD). Any Fill “C” intended to be imported to site must be pre-approved by consultant.

.4 Crushed Stone Fill Under Slabs on Grade: Clean, Graded 20mm angular, natural clear crushed stone from approved source, free from shale, clay and friable materials and organic matter and containing no more than 10% passing the No.4 sieve

.5 Impervious Fill: Fine grain material such as clay, which is relatively impervious to the flow of water.

.6 Granular Bedding: OPSS Granular "A", concrete sand (CAN/CSA A23.1-M90) or crusher-run limestone. Minimum compaction 100% Standard Proctor density.

Part 3 Execution

3.1 SITE PREPARATION

.1 Refer to specification section 31 32 00 - Soil Stabilization for requirements to improve bearing capacity of the existing fill material.

.2 Fill “B” granular material is to be used to raise grades under walkway, parking and driveway areas.

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

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

3.2 EXAMINATION

.1 Ensure in examination of the site that all possible factors concerning earthwork are investigated, and that the following are known in particular:

.1 Methods and means available for material handling, disposal, storage, and transportation.

.2 Physical conditions of site, including ground water table and drainage courses.

.3 Conformation and condition of ground surfaces.

.4 Character, quality, and quantity of surface and subsurface materials.

3.3 STOCKPILING

.1 Stockpile fill materials in areas designated by Engineer Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.4 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.2 Construct temporary Works to depths, heights and locations as directed by Engineer.

.3 During backfill operation:

.1 Unless otherwise as indicated or as directed by Engineer, 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 an elevation at least 500 mm above toe of sheeting.

.4 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.5 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

.2 Remove excess materials from site and restore water courses as indicated and as directed by Engineer.

3.5 DEWATERING AND HEAVE PREVENTION

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

.2 Dewater the site as necessary for the installation of the work, by providing a series of temporary trenches/pits and pumping as necessary. Backfill temporary trenches/pits and restore area when dewatering is no longer required.

.3 At no additional cost to the Owner, dewater the site as necessary to maintain the schedule and protect the work. Ensure the water pumped from site does not contaminate sewers municipal or on site sewer system. If required, arrange and pay for the cost of flushing sewers used for dewatering drainage routes.

.4 Submit for Engineer's approval details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs.

.5 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

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

.7 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in manner not detrimental to public and private property, or any portion of Work completed or under construction.

.8 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, water courses or drainage areas.

3.6 EXCAVATION

.1 Advise Engineer at least 7 days in advance of excavation operations for initial cross sections to be taken.

.2 Remove top layer of soil and fill containing organics.

.3 Excavated material will be very sensitive to moisture content and handling. Granular B to be used to backfill areas and raise grades as required.

.4 Perform bulk excavation and detailed excavation for construction of building (and for installation of mechanical and electrical services). Excavate beyond wall faces sufficiently to allow removal of forms, if applicable, but generally no more than 900 mm beyond centre of wall. Do not re-fill over excavated areas with materials removed, nor any other material without the approval of the Consultant. Excavation and disposal of boulders is part of this section.

.5 Note results of the Soil Chemical Testing Report provided in Binder C and account for disposal requirements in the bid price.

.6 Remove disturbed earth displaced by adjacent construction.

.7 Notify the Consultant of completion of excavation work and before any concrete or fill is placed on the bearing strata, in order that he may inspect the exposed bearing surfaces.

.8 Remove excess and unsuitable excavated materials from the site. Comply with the MOE regulations and those of other regulating bodies, regarding disposal of contaminated soil.

.9 Blasting is prohibited, except upon written permission of Consultant. Rock removal, if required, shall be by means of Ram Splitting equipment only.

.10 Keep all surfaces against which concrete, unit masonry or fill is to be placed free from frost. Thaw out frozen surfaces against which concrete or fill is to be placed to unfrozen depth.

.11 Excavation must not interfere with bearing capacity of adjacent foundations.

.12 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.13 Keep excavated and stockpilled materials a safe distance away from edge of trench as directed by Engineer.

.14 Restrict vehicle operations directly adjacent to open trenches.

.15 Do not obstruct flow of surface drainage or natural watercourses.

.16 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.17 Notify Engineer when bottom of excavation is reached.

.18 Obtain Engineer approval of completed excavation.

.19 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Engineer.

3.7 COMPACTION

.1 Provide, operate and maintain compacting equipment necessary to achieve the compaction densities specified.

.2 Compact fill until the required density is achieved. Do not compact material containing frost.

.3 Fill hollows and depressions which develop under compaction with matching backfill material. If the base becomes rutted or displaced due to any cause, regrade the surface.

.4 Compact backfill by means of vibratory type equipment capable of achieving the desired degree of compaction. Use manually operated vibratory tampers in the proximity of foundations and in areas not readily accessible to roller equipment. Make good damage to the structure due to compaction and settlement of fill. Report damage to foundations promptly to the Consultant. Obtain approval of remedial procedures.

3.8 BACKFILLING

.1 Plug unused services such as drains, sewers, field tile, and service pipes uncovered by excavation.

.2 Backfill at foundation walls only after they have been approved by Consultant.

.3 Backfill with 200 mm deep layers of fill or as specified, each consolidated before the next is placed.

.4 Backfill to mechanical and electrical service trenches as specified in the electrical and mechanical specifications.

.5 When backfilling both sides of walls, place fill simultaneously on both inner and outer faces to balance pressure on wall.

.6 Where walls are to be backfilled on one side only, commence backfilling only when the ground floor structural members are in place, if applicable, or adequate bracing is provided for top and bottom of foundation walls.

.7 Compact fill to densities specified for material requirements.

.8 Do not proceed with backfilling operations until [Engineer] [Consultant] has inspected and approved installations.

.9 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.10 Do not use backfill material which is frozen or contains ice, snow or debris.

.11 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.12 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 Engineer.

.2 If approved by Engineer erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Engineer.

.13 Install drainage system in backfill as directed by Consultant.

3.9 FILL UNDER PAVED AREAS

.1 Prior to filling, proof-roll existing earth subgrade in order to identify inconsistencies or soft areas. Proceed with filling operations only after inconsistencies or soft areas have been reworked and compacted or excavated, backfilled and compacted as required to eliminate such conditions.

.2 Avoid proof-rolling close to caissons, columns, walls and other structures within the confines of the proof rolling operations.

.3 Prior to placing fill, ensure existing ground is compacted to 98% Standard Proctor density.

.4 Place specified granular fill in layers of 150mm maximum, and consolidate each before placing next layer, up to underside of pavement sub-base elevation.

.5 Compact fill to density specified for material requirements with a heavy vibrating roller. Compact fill adjacent to walls, piers, or wherever else heavy roller equipment cannot approach, with mechanical tampers to equivalent density. Dig out soft spots and re-fill and compact to specified density.

3.10 FILL UNDER LANDSCAPED AREAS

.1 Construction access, contractor parking areas and Portables Area are intended to be reinstated in time for sod to have a minimum of 6 weeks to “take” prior to Fit for Occupancy. Identify this target date on the project schedule. Conduct site work and schedule accordingly to complete work related to sodding these areas as early as possible prior to contract completion.

.2 Use Fill “C” native site material for fill under the landscaped areas as indicated on drawings.

.3 Prior to placing fill, ensure existing ground is compacted to 95% Standard Proctor Density.

.4 Place fill in layers of 300 mm maximum and consolidate each before placing next layer.

.5 Compact Fill “C” to minimum 95% Standard Proctor Density under playfields.

3.11 RESTORATION

.1 Upon completion of Work, remove waste materials and, trim slopes, and correct defects as directed by Consultant.

.2 Place topsoil as directed by Consultant.

.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 Consultant.

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.7 The Owner will engage the services of an Inspection and Testing Company to verify that work conforms to the requirements of the specifications.

.8 The Contractor shall cooperate fully with the testing and inspection company.

.9 The Contractor shall maintain its own quality control program to ensure that its work conforms to the drawings and specifications.

.10 Submit 4 kg. samples of the fill materials to the inspection and testing company at least 10 days prior to commencement of backfill operations. Materials tested and approved shall constitute a standard for the acceptance of material delivered to the site.

.11 The inspection and testing company shall be responsible for the following work:

.12 Determine the depth of unsatisfactory material, if any, to be removed.

.13 Inspect and approve the sub-grade prior to commencement of backfill operations.

.14 Test and approve the proposed backfill materials.

.15 Be present full time during operations in order to inspect and approve the methods of placing and compacting and to carry out the necessary tests to determine the Proctor Density of the backfill and the actual field densities being obtained. Take sufficient tests to ensure that adequate information is obtained to judge the uniformity of compaction. Inspect all piping and conduit in place in trenches prior to backfilling to ensure correct slope and placement as designed.

.16 Check the quality of backfill being delivered to the site.

.17 Check the depth of granular fill.

.18 Confirm bearing elevations. Confirm and record spot elevations of all piping at critical locations to confirm design depths and slopes.

.19 Check installation of weeping tile.

.20 Issue reports to the Consultant tabulating test results and giving final approval and suggestions as to the backfilling and compaction operation.

.21 The cost of such inspection and testing shall be paid for under the Fill and Compaction Testing Allowance specified in Section 01 11 00- Summary of Work. The cost of retesting unacceptable compaction shall be borne by this Section.

3.12 INSPECTION AND TESTING

.1 Refer to Section 01 11 00- Summary of Work, Section 1.29.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 013543 – Environmental Protection.

.2 Section 329121 – Topsoil and Finish Grading.

.3 Section 329310 – Planting of Trees, Shrubs and Ground Covers.

.4 Section 31 23 10 - Excavation, Trenching and Backfilling.

.5 Section 03 30 01 – Landscape Cast-in-Place Concrete.

.6 Section 32 12 17 – Asphalt Paving.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D698-[91(1998)], Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ^{3}).

1.3 EXISTING CONDITIONS

.1 Contractor shall coordinate and obtain required separate Permits for all work to public boulevard areas outside the property line. Refer to *Section 00 11 00 – 'Summary of Work, article 1.5 Existing Conditions*' and *Section 00 21 13 – 'Instructions to Bidders, article 1.26'* for additional permit requirements prior to construction.

.2 Contractor is responsible to quantify all on-site material to achieve design grades and is responsible for the importation or exportation of material from the site as required.

.3 Known underground and surface utility lines and buried objects are indicated on site plan. Confirm exact locations of utility lines and buried objects prior to machine excavation or grading. In addition to all utility locates, contractor shall conduct engage a private locate company to conduct an underground scan for all areas of grading and excavation outside the property lines.

1.4 PROTECTION

.1 Protect and/or transplant existing trees, landscaping, natural features, bench marks, pavement, surface or underground utility lines which are to remain as directed by Consultant. If damaged, restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

Part 2 Products

2.1 MATERIALS

.1 Fill material to all parking and driveway areas, asphalt and concrete paving areas: OPSS Granular B-Type 2 in accordance with of Section 31 23 10 - Excavating, Trenching and Backfilling.

.2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Consultant and uncontaminated type of existing materials meets the requirements herein for stated locations.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

.1 There is no reusable topsoil on this site. Topsoil has already been generally stripped and removed from the site as part of previous fill and rough grading operations.

.2 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Consultant

.3 Examine the site and determine the extent of areas previously stripped and approximate depth of remaining topsoil, if any.

.4 Strip the remaining topsoil from the site as part of the work in this Section.

.5 Remove any remaining top soil that may exist from areas to be excavated, paved and regraded.

.6 Strip top soil when dry enough to prevent contamination of subgrade.

.7 Contractor is responsible to quantify all on-site material to achieve design grades and is responsible for the importation or exportation of material from the site as required. Existing excess topsoil, if any, must be quantified before tender and may be re-used for general sodded areas as described in Section 32 91 21 Topsoil Placement and Grading.

.8 Remove from site existing grass and vegetation and surplus top soil, if any.

3.2 GRADING

.1 Grading Plan includes the existing, as-built conditions of the site within the property limits.

.2 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated. Ensure that rough grading operations to not promote water ponding in construction areas. Level depressions outside the building area with Type “D” for paved areas or Type “C” fill if suitable moisture content and compaction can be demonstrated.

.3 Perform construction grading to allow proper construction access to the work.

.4 Grade to prevent water ponding on site during construction period. Create additional ditches, swales, slopes, ponds, etc. as required by Contract Documents and Municipal Authorities for control of drainage, sedimentation and topsoil retention.

.5 Unless suitable uncontaminated fill or cut has been completed by previous contract, rough grade to following depths below finish grades:

.1 150 mm for grassed areas.

.2 400 mm for flowerbeds.

.3 450 mm for shrub beds.

.4 600 mm for heavy asphalt paving.

.5 540 mm for medium duty asphalt paving.

.6 275 mm for concrete walks.

.7 Maximum tolerance for rough grade elevation : .+- 25 mm

.6 Slope rough grade away from building 1:50 2 % minimum.

.7 Grade swales and ditches to depths as indicated.

.8 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.

.9 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:

.1 95% under landscaped areas.

.2 98 % under paved and walk areas.

.10 Do not disturb soil within branch spread of trees or shrubs to remain.

3.3 TESTING

.1 Inspection and testing of soil compaction will be carried out by testing agency hired by the owner.

.2 Tests to be conducted on imported soils and provided by a ULC designated laboratory prior to bringing to and placing on the site.

.3 Costs of tests will be paid under a Cash Allowance. Refer to Section 01 11 00 – Summary of Work.

.4 Submit testing procedure, frequency of tests, [testing laboratory as designated by ULC or certified testing personnel to Consultant for approval and review.

3.4 SURPLUS MATERIAL

.1 Remove surplus material and material unsuitable for fill, grading or landscaping as directed by Consultant and Municipal Authorities.

.2 Include for removal and disposal of asphalt driveways, excess fill, rubble, etc. beyond property lines within work areas shown on SG.1 and SS.1

.3 Confirm locations on site prior to tender.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 23 13 - Rough Grading.

.3 Section 31 23 10 – Excavation, Trenching and Backfilling.

.4 321613 Concrete Curbs and Gutters

.5 Section 32 17 23 – Pavement Markings

.6 Section 03 30 00 – Cast-in-Place Concrete.

1.2 REFERENCES

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

.1 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-1.5- [M91 (March 1999)], Low Flash Petroleum Spirits Thinner (Reaffirmation of December 1991).

.2 CAN/CGSB-1.74- [2001], Alkyd Traffic Paint.

.3 Government of Québec, Minister of Transport

.1 Cahier des charges et devis généraux (CCDG)-[97].

.4 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 302-[April 1999], Construction Specification for Primary Granular Base.

.2 OPSS 310-[March 1993], Construction Specification for Hot Mixed, Hot Laid Asphaltic Concrete Paving and Hot Mix Patching.

.3 OPSS 314-[December 1993], Construction Specification for Untreated Granular, Subbase, Base, Surface Shoulder and Stockpiling.

.4 OPSS 1010-[March 1993], Material Specification for Aggregates, Granular A, B, M and Select Subgrade Material.

.5 OPSS 1103-[February 1996], Material Specification for Emulsified Asphalt.

.6 OPSS 1150-[May 1994], Material Specification for Hot Mixed, Hot Laid Asphalt Concrete.

1.3 SAMPLES

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

.2 Submit to Consultant, samples of material for sieve analysis at least 2 weeks before beginning Work.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

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

.3 Divert unused aggregate materials from landfill to facility for reuse as approved by Consultant.

.4 Dispose of unused paint and paint thinner materials at official hazardous material collections site as approved by Consultant.

.5 Fold up metal banding, flatten and place in designated area for recycling.

.6 Do not dispose of unused paint and paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose health environmental hazard.

.7 Divert unused asphalt from landfill to facility capable of recycling materials.

1.5 EXTENDED WARRANTY

.1 Submit a warranty for asphalt paving installation, covering materials and labour and the repair or replacement of defective work in accordance with the Contract, but for two (2) years total.

Part 2 Products

2.1 MATERIALS

.1 Sub-Base**:** Suitably compacted native material only where approved density and drainage is achieved**.** Otherwise in upfill locations use Fill type"B" where required to reach design elevations.

.2 Base: 50 mm and 19 mm graded, crusher run limestone to depths indicated on AD details.

.3 Heavy Duty Pavement for all asphalt areas**:** Hot mix, hot laid asphaltic concrete HL8 and HL3, mixture conforming to O.P.S.S. #1150.05.

.4 Joint Painting Material**:** SS-1 emulsion in accordance with O.P.S.S. #1103.05.

Part 3 Execution

3.1 PREPARATION

.1 Regard locations and instructions on drawings. Report any discrepancies or questions to the Consultant prior to proceeding with the work. In particular pay attention to the exact delineation of all edges of pavement and types of pavement;

.2 Set out work in accordance with lines and levels shown on Drawings. Maintain such lines and levels through duration of work. Ensure positive drainage toward catch basins is maintained in all areas.

.3 Compact sub-grade to a minimum of 98% Standard Proctor density.

.4 Ensure the granular base extends beyond the proposed edge of asphalt where otherwise unsupported.

.5 Paint exposed edge of asphaltic joints, edge of manhole and catchbasin frames, curbs and similar items with SS-1 emulsion.

3.2 INSTALLATION

.1 Inspect site grades prior to installation. Review the precise grade requirements required on the grading plan. Review with the Consultant prior to installation if any conditions exist that may cause deviations from grades shown on Drawings. Coordinate catchbasin elevations with those shown on Mechanical site plan.

.2 Pavement Section:

.1 Heavy Duty: at all parking and driveway areas (refer to site drawings)

.1 minimum 300 mm compacted thickness of Granular B Sub-base compacted to 100% Standard Proctor Maximum Dry Density (SPMDD), ASTM-D698 .

.2 150 mm compacted thickness Base course of 19 mm crusher run limestone compacted to 100% SPMDD.

.3 60 mm compacted thickness of granular asphalt HL8.

.4 40 mm compacted thickness of granular asphalt HL3.

.3 Placing Granular Materials:

.1 Exercise due care at all times to prevent granular materials from being contaminated by clay or other types of deleterious materials.

.2 Place materials immediately after sub-grade is inspected by the Architect and as follows:

.1 To required width and thickness indicated on Drawings in layers not exceeding 100 mm compacted thickness crusher run limestone?

.2 Grade each layer and compact to a minimum 100% standard Proctor density to a smoother surface conforming to required cross-section.

.4 Finished surface of granular material must not deviate more than 10 mm from designed grade.

.5 Placing Asphaltic Pavement:

.1 Obtain Consultant's inspection of compacted granular base before commencing asphalt paving.

.2 Air temperature during placing of mixture must be minimum 7 deg. C and rising. Temperature of mixture when spread must be not less than 120 deg. C nor more than 150 deg. C. Do not increase temperature of mixture to offset long distance hauling.

.3 Compact asphaltic mixture as soon as it can bear roller without undue displacement and hairline cracking and continue until all roller marks are eliminated. Speed of roller must at all times be slow enough to avoid displacement of mixture. Keep roller wheels slightly moistened by water to prevent adhesion of mixture. Excess water will not be permitted. Compact mixture with hot tampers in locations that are not easily accessible to machine roller.

.4 Rolling Procedure:

.1 Initial and final rolling must be accomplished using self-propelled Class "B" roller.

.2 Intermediate rolling must be carried out using self-propelled Class "C" roller or "D" roller. Intermediate roller must follow breakdown roller as closely as possible.

.5 Upon completion of compaction each pavement course must be:

.1 Smooth and true to crown and grade with variation not more than 6 mm from thickness shown on Drawing. Do not place any asphaltic course less than 25 mm thick nor more than 75 mm thick.

.2 Free from depressions exceeding 3 mm as measured with 3 m straight edge paralleling centre line of driveways/aisles.

.3 Compacted to a density not less than 97% Marshall.

.6 Finishing:

.1 Backfill all curbs.

.7 Joints:

.1 Cut back bituminous course to its full depth in straight or curved lines as required to expose fresh, straight, vertical surface. Remove broken and loose material.

.2 Asphalt must be placed in such a manner that joint must not be allowed to cool before adjacent asphalt course is applied.

.3 Where paving is comprised of two or more courses, joints must overlap by not less than 600 mm.

.4 Carefully place and compact hot asphaltic material against joints. Correct any unsatisfactory joint before proceeding with work.

.5 Feathering of joints will not be permitted.

.8 Inspection and Testing:

.1 Refer to Section 01 11 00 – Summary of Work, section 1.29.

.2 Field inspections during installation and core samples of all asphalt areas will be taken as part of Inspection and Testing. If tests show asphalt to be substandard to that specified, all asphalt shall be removed and replaced at the Contractor's expense. Cash credits will not be accepted for work which does not fully comply with drawings and specifications.

3.3 CERTIFICATION OF GRADES

.1 The Contractor is required to provide as-constructed elevations of the parking area by an O.L.S. surveyor to verify that the parking lot has been constructed in accordance with the contract drawings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 01 Landscape Concrete Forming and Accessories

.2 Section 03 30 01 Landscape Cast-in-Place Concrete

.3 Section 31 22 00 Landscape Grading

1.2 REFERENCE STANDARDS

.1 ASTM International

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

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

.3 ASTM C 309 [03] , Liquid Membrane Forming Compounds for Curing Concrete.

.4 ASTM D1751, Standard Specification For Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

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

.2 CSA Group

.1 CSA-A23.1-[14] /A23.2-[14] , Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete, Including Update No. 1 [2015] .

.2 CSA B651-[2012] Accessible Design for the Built Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, and limitations.

.2 Inform Consultant of proposed source of materials and provide access for sampling minimum 4 weeks prior to commencing work.

.3 If materials have been tested by independent testing laboratory within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

1.4 QUALITY ASSURANCE

.1 Mock-Ups:

.1 Provide site mock-up for finished concrete indicating forming methods and materials, and procedures proposed to achieve finish as shown on drawings, and

to comply with following requirements, using materials indicated for completed work:

.1 Build temporary mock-ups in location and of size as directed by Consultant.

.2 Obtain Consultant's acceptance of mock-ups before starting construction; mock-up used throughout construction period and used as standard of acceptance for subsequent architectural concrete work.

.3 Remove and dispose of mock-up at no additional cost to Owner.

Part 2 Products

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 01- Landscape Cast-in-Place Concrete.

.2 Reinforcing steel:

.1 For paved surfaces: WWM 152 x 152 MW11.1

.2 For Raised Edges: three #10M, or two #15M, epoxy coated continuous bars, placed as indicated on drawings.

.3 Joint filler: in accordance with Section 03 30 01- Landscape Cast-in-Place Concrete.

.4 Granular base:

.1 Granular ‘A’ in accordance with OPSS 101.05.02.

.5 Non-staining mineral type form release agent: chemically active release agents containing compounds reacting with free lime to provide water-soluble soap.

.6 Curing Agent: to ASTM C309, Type 1.

.7 Expansion Joint Filler: Premoulded bituminuous fibre board, conforming to ASTM D1751.

.8 Tactile Walking Surface Indicators (TWSI): Cast iron, AODA compliant.

.1 Locations as shown on drawings.

.2 Exterior Advantage Tactile System, Supplied by Kinesik Engineered Products (www.kinesik.ca).

.1 Finish: Dual-Layered Electrocoating & Powdercoat Paint System. Colour to be onyx black

.2 Quantity: as required to meet AODA compliance for exterior ramps, or curb ramps.

.9 Finishes:

.1 Pedestrian and Coloured Concrete Paving: Light Broom Finish

.2 Interior Rose Textured Concrete Paving: Federal White Concrete complete with latex faux limestone roller texture with antiquing release. Refer to 03 30 01 Landscape Cast in Place Concrete.

.3 Rose Petal Bands: Federal White Concrete with medium sandblast with concrete Stain. Refer to 03 30 01 Landscape Cast in Place Concrete.

.4 Raised Concrete Edges: Formed with steel trowel top

Part 3 Execution

3.1 GRADE PREPARATION

.1 Do grade preparation work in accordance with Section 31 22 00 Landscape Grading.

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

.1 Dispose of surplus and unsuitable excavated material off site.

.3 Place fill in maximum 150mm layers and compact to minimum 98% of maximum dry density to ASTM D698.

3.2 GRANULAR BASE

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

.2 Place granular base material to lines, widths, and depths as indicated.

.3 Compact granular base in maximum 150 mm layers to minimum 98 % of maximum density to ASTM D698.

3.3 CONCRETE

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

.2 Do concrete work in accordance with Section 03 30 01- Landscape Cast-in-Place Concrete.

.3 Immediately after floating, give sidewalk surface finish as indicated. Broom finishes to produce regular corrugations not exceeding 2mm deep, by drawing broom side to side across sidewalk.

.4 Provide edging as indicated on drawings.

3.4 TOLERANCES

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

3.5 EXPANSION AND CONTRACTION JOINTS

.1 Install tooled transverse contraction joints after floating, when concrete stiff, but still plastic, at intervals of shown on drawings.

.2 Install expansion joints as indicated on drawings or at intervals of no more than 6m.

.3 When sidewalk adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6 ISOLATION JOINTS

.1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structures.

.2 Install joint filler in isolation joints in accordance with Section 03 30 01- Landscape Cast-in-Place Concrete.

.3 Seal isolation joints with sealant approved by Consultant.

3.7 TACTILE WALKING SURFACE INDICATORS

.1 Install tactile walking surface indicators at curb ramp edges, top of ramps and stairs, where indicated on drawings and in accordance with local municipal by-laws and AODA.

3.8 CURING

.1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for minimum 1 day after placing, or sealing moisture in by curing compound.

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

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

3.9 BACKFILL

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

.2 Backfill to designated elevations with material as directed by Consultant.

.1 Compact and shape to required contours as indicated.

3.10 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 22 00 Landscape Grading

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C136-[13] , Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

.3 ASTM C936, Standard Specification for Solid Concrete Interlocking Paving Units.

.4 ASTM C979/C979M-[10] , Standard Specification for Pigments for Integrally Colored Concrete.

.5 ASTM C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units

.2 CSA Group

.1 CSA A23.1/A23.2-[09] , Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A179-[04(R2009)] , Mortar and Grout for Unit Masonry.

.3 CSA A231.1/A231.2-[06(R2010)] , Precast Concrete Paving Slabs/Precast Concrete Pavers.

.4 CSA A283-[06(R2011)] , Qualification Code for Concrete Testing Laboratories.

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 precast concrete unit paving and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit full size samples of each paver type, thickness, colour and finish that indicate the range of colour variation and texture expected upon project completion for consultant approval.

.2 Accepted samples become the standard of acceptance for the product produced.

.4 Test and Evaluation Reports:

.1 Submit following sampling and testing data:

.1 Sieve analysis for gradation of bedding and joint material.

.2 Unit paver sampling and testing.

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

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in precast concrete paver installations of similar complexity, size and material with 5 documented years of experience.

.2 Mock-ups:

.1 Construct 3 x 3 m area mock-up.

.2 Mock-up will be used:

.1 To judge quality of work, substrate preparation, operation of equipment and material application.

.2 To determine surcharge of bedding layer, joint sizes, lines, laying patterns, colours, texture and levelness.

.3 Locate mock-up where directed by Consultant.

.4 Allow 48 hours for inspection of mock-up before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.5 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 Store and protect materials free from mud, dirt, and other foreign materials.

.3 Store and protect precast concrete units from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

.4 Coordinate delivery and paving schedule to minimize interference with normal use of streets and sidewalks adjacent to paver installation.

.5 Prevent joint and sand setting bed sand from exposure to rainfall, or removal by wind with secure, waterproof covering.

1.6 PROJECT / SITE CONDITIONS

.1 Environmental Requirements:

.1 Install pavers only on unfrozen setting bed aggregate materials

.2 Install pavers only on unfrozen base or sub-base aggregate materials

.3 Install base or subbase only over unfrozen subgrade

.4 Install setting bed sand or pavers only when there is no heavy rain or snowfall.

.5 Install polymeric joint sand only when ambient temperature is above 5◦C, under dry conditions with no rain forecast for 24 hours and when surface of pavement is completely dry.

1.7 CONCRETE PAVER OVERAGE AND ATTIC STOCK

.1 Provide a minimum of 5% additional material for overage to be used during construction.

.2 Contractor to provide a minimum of 10 sq. m of each product and size used to owner for maintenance and repair. Furnish pavers from the same production run as installed materials.

Part 2 Products

2.1 CONCRETE PAVERS

.1 Concrete pavers to be manufactured by Oaks or approved equivalent.

.1 Contact: Contact: Glenn Harold, gherold@oakspavers.com

.2 Concrete Paver: Beaumont

.1 Size: 200x200x80mm

.2 Colour: Greyfield

.3 Pavers shall meet the minimum material and physical properties set forth in ASTM C936.

.1 Average compressive strength 8000psi (55 MPa) with no individual unit under 7,200 psi (50 MPa)

.2 Average absorption of 5% with no greater than 7% when tested according to ASTM C140.

.3 Conforming to ASTM C 1645 when tested for freeze-thaw requirements.

.4 Height tolerances +/- 3.2mm.

.4 Pigment in concrete pavers: to ASTM C979/C979M.

.5 Maximum allowable breakage of product is 5%.

2.2 JOINT MATERIAL

.1 Unit Paving Joint Sand

.1 Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.

.2 Do not use limestone screenings, stone dust, or sand for the Joint Sand material that does not conform to conform to the grading requirements of ASTM C 33.

.3 Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.

.4 Gradation as shown in Table below:

Table – Joint Sand Gradation Requirements for Joint Sand		
ASTM C144		
Sieve Size	**Natural Sand Percent Passing**	**Manufactured Sand Percent Passing**
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 75
No. 50 (0.300 mm)	10 to 30	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075)	0 to 1	0 to 10

.5 Polymeric Joint Sand:

.1 Product as recommended by unit paver manufacturer.

.2 Colour to be selected from colour chart by the consultant.

.3 Provide Polymeric Joint Sand meeting the minimum material and physical properties as follows:

.1 Compression Strength: proven resistance to compression of 550 PSI after drying for 7 days under controlled conditions (73°F (23°C) at 50% humidity).

.2 Gradation as shown in Table 1 above.

2.3 SETTING BED

.1 Unit Paving Setting Bed Sand

.1 Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.

.2 Do not use limestone screenings, stone dust, or sand material that does not conform to conform to the grading requirements of ASTM C 33.

.3 Do not use mason sand or sand conforming to ASTM C 144.

.4 Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.

.5 Conform to the grading requirements of ASTM C 33 with modifications as shown in Table below:

Table – Setting Bed Sand Gradation Requirements for Setting Bed Sand	
ASTM C 33	
Sieve Size	**Percent Passing**
3/8 in (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075)	0 to 1

2.4 BASE AGGREGATE

.1 Unit Paving Base Aggregate

.1 Provide Base Aggregate materials conforming to ASTM D 2940 and gradation requirements as presented in Table below:

Table – Base Aggregate Gradation Requirements	
ASTM D 2940	
Sieve Size	**Percent Passing**
2 in (50 mm)	100
1-1/2 in (37.5 mm)	95 to 100
3/4 in (19 mm)	70 to 92
3/8 in (9.5 mm)	50 to 70
No. 4 (4.75 mm)	35 to 55
No. 30 (600 μm)	12 to 25
No. 200 (75 μm)	0 to 8

2.5 EDGE RESTRAINTS

.1 Edge restraints shall be aluminum

.1 Aluminum Original#150 as manufactured by Brickstop.

.2 Approved equivalent.

2.6 CLEANING COMPOUND

.1 Clear, organic solvent, designed and recommended by manufacturer for cleaning concrete pavers of contamination encountered.

.2 Acid based chemical detergent, designed and recommended by manufacturer for removal of contamination encountered on pavers.

2.7 SEALING COMPOUND

.1 Sealing compound to be used only as recommended by manufacturer where applicable.

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 precast concrete unit paving installation in accordance with manufacturer's written instructions and requirements for installation tolerances and other conditions affecting performance prior to placing concrete pavers.

.1 Unit Paving on Aggregate Base:

.1 Verify that the Base and Sub-base aggregate materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.

.2 Provide written density test results for soil subgrade, base and subbase aggregate to Owner and Consultant.

.3 Verify location, type, and elevations of edge restraints, concrete curbs, concrete collars around utility structures and drainage inlets.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

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

.1 Beginning Paver installation signifies acceptance of base and edge restraint conditions.

3.2 INSTALLATION OF EDGE RESTRAINTS

.1 Install restraints true to grade, in accordance with manufacturer's recommendations and as shown on drawing details.

3.3 BASE AGGREGATES

.1 Unit Paving Base:

.1 Provide the Base Aggregate material in uniform lifts not exceeding 6 in. (150 mm) over the compacted Subbase Aggregate (or Subgrade) material and compact to at least 100 percent Standard Proctor Density as per ASTM D 698.

.2 Compact the Base Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the roller.

.3 Tolerance: Do not exceed the specified surface grade of the compacted Base Aggregate material more than ±3/8 in. (10 mm) over a 10 ft. (3 m) long straightedge laid in any direction.

.4 Compact and grade the upper surface of the base sufficiently to prevent infiltration of the bedding sand into the base both during construction and

throughout its service life. Blend segregated areas of the granular base by the application of crushed fines that have been watered and compacted into the surface.

3.4 SETTING BED

.1 Unit Paving:

.1 Provide, spread and screed Setting Bed Sand evenly over the Concrete base.

.1 Protect screeded Setting Bed Sand from being disturbed by either pedestrian or vehicular traffic.

.2 Screed only the area which can be covered by pavers in one day.

.2 Keep moisture content constant and density loose and constant until Concrete Pavers are set and compacted.

.3 Screed Setting Bed Sand using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards. Maintain in a loose condition slightly ahead of the paving units and fully protect against incidental compaction following screeding. Loosen compacted sand by rain or screeded sand left overnight before further paving units are placed.

.4 Inspect the Setting Bed Sand course prior to commencing the placement of the Concrete Pavers. Acceptance of the Setting Bed Sand occurs with the initiation of Concrete Paver placement.

3.5 INSTALLATION OF CONCRETE PAVERS

.1 Replace Concrete Pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.

.2 Mix Concrete Pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures.

.3 Exercise care in handling face mix concrete pavers to prevent surfaces from contacting backs or edges of other units.

.4 Provide Concrete Pavers using laying pattern as indicated. Adjust laying pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.

.5 Use string lines or chalk lines on Setting Bed to hold all pattern lines true.

.6 Set surface elevation of pavers 1/8 in. (3 mm) above adjacent drainage inlets, concrete collars or channels.

.7 Place units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.

.1 When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

.8 Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.

.9 Prevent joint (bond) lines from shifting more than ±1/2 in. (±13 mm) over 50 ft. (15 m) from string lines.

.10 Fill gaps between units or at edges of the paved area that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.

.11 Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

.12 Prevent all traffic on installed Concrete Pavers until joint material has been vibrated into joints. Keep skid steer and forklift equipment off newly laid Concrete Pavers that have not received initial compaction and Joint material.

.13 Vibrate Concrete Pavers into leveling course with a low-amplitude plate vibrator capable of a to 5000-lbf (22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:

.1 After edge pavers are installed and there is a completed surface or before surface is exposed to rain.

.2 Compact installed Concrete Pavers to within 6 feet (1.8 meters) of the laying face before ending each day's work. Cover Concrete Pavers that have not been compacted and leveling course on which pavers have not been placed, with nonstaining plastic sheets to prevent Setting Bed from becoming disturbed.

.14 Protect face mix Concrete Paver surface from scuffing during compaction by utilizing a urethane pad.

3.6 INSTALLATION OF JOINT MATERIAL

.1 Remove any cracked or structurally damaged Concrete Pavers and replace with new units prior to installing Joint material.

.2 Provide, spread and sweep joint material into joints immediately after vibrating pavers into Setting Bed course until full. Vibrate pavers and add Joint material until joints are completely filled, then remove excess material. This will require at least 4 passes with a plate compactor.

.3 Remove excess Joint material broom clean from surface when installation is complete.

.4 Polymeric Joint Sand

.1 Install polymeric joint sand per manufacturers recommended instructions.

3.7 FIELD QUALITY CONTROL

.1 Verify final elevations for conformance to the drawings after sweeping the surface clean.

.1 Prevent final Concrete Paver finished grade elevations from deviating more than ±3/8 in. (±10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.

.2 Paver-to-Paver Lippage:

.1 No greater than 3 mm (1/8 inch) difference in height between adjacent pavers.

3.8 REPAIRING, CLEANING AND SEALING

.1 Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

.2 Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.

.1 Clean Concrete Pavers in accordance with the manufacturer's written recommendations.

3.9 PROTECTION

.1 Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDE

.1 Materials and installation for chain link fences and gates.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 03 30 00 - Cast-in-Place Concrete.

1.3 SCOPE OF WORK

.1 The work specified under this Section includes all labour, materials and equipment necessary for the complete repair and supply, installation and erection of the following:

.1 Chain link fence, all posts, top posts and foundations;

.2 Brace Units;

.3 Fence gates.

.2 Fencing shall be prepared and installed in accordance with the manufacturer's instructions and according to the details and in the locations shown on the Drawings.

1.4 QUALIFICATIONS

.1 Welding shall be undertaken by Fabricators fully approved by the Canadian Welding Bureau to qualification requirements of CSA W 47.1-1973.

1.5 MEASUREMENT PROCEDURES

.1 Measure supply and erection of chain link fence in metres erected including any gates.

.2 Measure supply and erection of chain link fence gates as units of each size erected.

1.6 REFERENCES

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

.1 ASTM A53/A53M-[02], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A90/A90M-[01], Standard Test Method for Weight of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

.3 ASTM A121-[99], Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

.4 A653/A653M-[03], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM C618-[03], Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

.6 ASTM F1664-[01], Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-138.1-[96], Fabric for Chain Link Fence.
.2 CAN/CGSB-138.2-[96], Steel Framework for Chain Link Fence.
.3 CAN/CGSB-138.3-[96], Installation of Chain Link Fence.
.4 CAN/CGSB-138.4-[96], Gates for Chain Link Fence.
.5 CAN/CGSB-1.181-[99], Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International).

.1 CAN/CSA-A23.1/A23.2-[00(August 2001)], Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
.2 CAN/CSA-G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-A3000-[98(R2002)], Cementitious Materials Compendium. Includes:
.1 CAN/CSA-A23.5-[98], Supplementary Cementing Materials

.4 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

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

.1 Material Safety Data Sheets (MSDS).

.6 The Master Painters Institute (MPI) - Architectural Painting Specification Manual - [March 1998].

.1 MPI # 18, Organic Zinc Rich Primer.

.7 Transport Canada (TC).

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

1.7 SUBMITTALS

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

1.8 DELIVERY, STORAGE AND HANDLING

.1 Provide adequate and suitable facilities for storage and protection of fencing and be responsible for any loss of, or damage to, when handling and delivering.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal packaging material for recycling.

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

.4 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

.5 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Consultant.

.6 Divert unused concrete materials from landfill to local facility as approved by Consultant.

.7 Unused paint or coating material must be disposed of at official hazardous material collections site as approved by Consultant.

.8 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.9 Fold up metal banding, flatten and place in designated area for recycling.

1.10 SHOP DRAWINGS

.1 Submit Shop Drawings and/or Catalogue Illustrations in accordance with Section 013300 – Shop Drawing, Product Data and Samples.

Part 2 Products

2.1 MATERIALS

.1 Fencing: chain-link fencing fabric, posts, hardware, etc. to be supplied from one manufacturer as a complete, co-ordinated system.

.1 Acceptable material: Frost Fence or equal.

.2 Concrete mixes and materials:

.1 To CAN3-A23.1-M77.

.2 Compressive Strength: 20 Mpa minimum at 28 days.

.3 Footings: 250 mm minimum diameter - 1200 mm minimum depth at line posts, 1500 mm minimum depth at terminal or gate posts.

.3 Chain-link fence fabric: to CGSB/CAN2-138.1-M80.

.1 Woven steel wire fabric as follows:

.1 Mesh Size: 38 mm x 38 mm

.2 Wire Gauge: 6 gauge

.3 Top and Bottom Selvage: “Twisted and Knuckled” (TK)

.4 Height of Fabric: 1800 mm and 1200 mm or as noted on plans. Refer to drawing SP.1 and LP.1 and AD drawings for locations and details.

.2 Wire to be treated and finished as follows:

.1 Finish vinyl coated. Colour: All chain link fabric also to be flack vinyl coated

.4 Posts and rails: to CGSB/CAN2-138.2-M80+Amdt-June-82, galvanized steel pipe to ASTM A120 Schedule 40. Pipe sizes as follows:

.1 Terminal, Corner and Gate Posts: 89 mm (3-1/2 in) diameter.

.2 Line Posts: 60 mm (2-1/2 in) diameter.

.3 Top Rail, Gate Frames, Brace Rails, Bottom Rail: 43 mm (1-11/16 in) diameter.

.4 Posts and rails to be galvanized and black gloss enamel finish by powder coat application. Prior to application of finish, treat with Parker Bondertie and chlorothenesolvent applied in a thickness of 4-5 mils by electrostatic coat and oven cured for smooth and even surface.

.5 Tie wire fasteners: single strand, vinyl coated steel wire conforming to requirements of fence fabric, 9 gauge.

.6 Tension bar: 5 x 20 mm minimum size galvanized steel.

.7 Tension bar bands: 3 x 20 mm minimum size galvanized steel or 5 x 20 mm minimum size aluminum.

.8 Fittings and hardware: cast aluminum alloy, galvanized steel or malleable or ductile cast iron. Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail (line posts). Turnbuckles to be drop forged. Use black painted or vinyl coated fittings at all locations.

.9 Zinc-Rich Pigmented Paint: to CGSB 1-GP-178Ma: Black.

.10 'Safety Top Caps' by Pexco (supplied by PDS Fence Products) are to be installed at all 1200mm high fencing around kindergarten and child care play areas. Colour: Black.

2.2 FINISHES

.1 Galvanizing:

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

.2 For pipe: 550 g/m^{2}minimum to ASTM A90.

.3 For other fittings: to CAN/CSA-G164.

.2 Vinyl coating: to ASTM F1664.

.1 0.045 mm dry film thickness minimum. Colour to be black.

.3 Locations: vinyl coated fencing to all locations except as noted on Drawings A1 and A2.

2.3 FABRICATION

.1 Wire fabric shall be woven into 38 mm mesh with top of fabric barbed and bottom knuckled. Fabric shall be hot-dip galvanized after weaving.

.2 All posts to be complete with necessary fittings and hardware.

.3 Gate frames and braces shall be electrically welded at all joints and hot-dip galvanized after welding, and complete with malleable iron hinges, latch and latch catch.

.4 Gate latches are to be designed such that padlock can be attached and operated from either side of gate.

.5 Double gates are to have centre rest with drop bolt for closed position and chain hook to hold gates open.

2.4 TEMPORARY FENCING

.1 Refer to Sections 01 52 00 – Construction Facilities and 01 11 00 Summary of Work for Temporary Fencing.

Part 3 Execution

3.1 ERECTION

.1 Line posts shall be spaced at 3000 mm centres for fences 1200 mm high and over, unless specifically indicated on drawings. Foundations for fence posts shall be 300 mm x 300 mm concrete, 1,200 mm deep below the lowest adjoining grade, with smooth tops domed above grade to shed water.

.2 All terminal posts for fence to be horizontally braced with brace unit extending from terminal post to adjacent line post. Corner posts shall have two (2) brace units.

.3 All posts shall be placed in a vertical plumb position and set accurately to line shown on Drawings.

.4 The space between the ground surface and the bottom of the fabric shall not be less than 40 mm and not more than 80 mm.

3.2 TOUCH UP

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas as indicated. in accordance with Section 09 91 13 - Exterior Painting.

.1 Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

3.3 CLEANING

.1 Clean and trim areas disturbed by operations.

.1 Dispose of surplus material and replace damaged turf with sod.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Submit shop drawings indicating dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.

1.2 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for care and cleaning of site furnishings for incorporation into manual specified in Section 01 78 00- Closeout Submittals.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 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 furnishings from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 FREESTANDING BENCH

.1 Product:

.1 Ogden, OGM1900, OGM1900-63502, with backrest and end arms as manufactured by Maglin Site Furniture

.1 Sean Mealand, sean.mealand@maglin.com

.2 Frame: steel, square legs, MS1, surface mount

.3 Seat: Thermally modified oak, (LR) left to right slat configuration

.4 Backrest: Thermally modified oak, (FB) front to back slat configuration

.5 Armrests: On both ends, circular, Arm 2

.6 Dimensions: 1.822m length

.7 Quantity: 6

2.2 RADIUS SEAT WALL BENCH TOPS

.1 Product:

Ogden, OGM1900, MS4 wall top mounted, as manufactured by Maglin Site Furniture. Sean Mealand, sean.mealand@maglin.com

.1 Radius Bench 1 (BT1): Custom OGM1900-63483

.1 Inside Angle: 50°

.2 Inside Arc Length: 1.95m

.3 Inside Arc Radius: 2.15m

.4 Slat Direction: Left to Right

.5 Back Rest: Yes

.6 Quantity: 1

.2 Radius Bench 2 (BT2): Custom OGM1900-63508

.1 Inside Angle: 75°

.2 Inside Arc Length: 5.3m

.3 Inside Arc Radius: 4.043m

.4 Slat Direction: Left to Right

.5 Back Rest: No

.6 Skate Deterrent: Style 2, Both Ends

.7 Quantity: 3

.3 Radius Bench 3 (BT3): OGM1900-63504

.1 Inside Angle: 15°

.2 Inside Arc Length: 1.656m

.3 Inside Arc Radius: 6.35m

.4 Back Rest: Yes

.5 Armrest Table Top: 12” Round, Middle of Sections

.6 Quantity: 1

.4 Radius Bench 4 (BT4): OGM1900-63505

.1 Inside Angle: 18°

.2 Inside Arc Length: 1.65m

.3 Inside Arc Radius: 6.76m

.4 Back Rest: Yes

.5 Armrest Table Top: 12” Round, Middle of Sections

.6 Quantity: 3

.2 Seat: Thermally modified oak, (LR) left to right slat configuration

.3 Backrests: Thermally modified oak, (FB)front to back slat configuration

.4 Finish:

.1 Metal Components: powdercoated, RAL5000, Violet Blue

.2 Wood Slats: unfinished

2.3 PRECAST CONCRETE SEATING

.1 Products: UrbaStyle Galet Series, as manufactured by Ed's Concrete Products. T:1-877-265-6590

.1 Galet II, Galet III, Galet IX, Galet X

.2 Finish:

.1 Colour: White Premium

.2 Surface Finish: Acid Etch

.3 Quantity:

.1 Galet II: 5

.2 Galet III: 5

.3 Galet IX: 6

.4 Galet X: 4

2.4 METAL TABLE AND SEATS

.1 Product:

.1 Fava Cluster Seating, 2800 Series as manufactured by Maglin Site Furniture.

.1 Contact: Sean Mealand, sean.mealand@maglin.com

.1 MTB-2800-00134 (4 backless seats)

.2 MTB-2800-00135 (2 backless double seats)

.3 MTB-2800-00136 (1 backless single seat, 1quad seat)

.4 MTB-2800-00138 (3 backless single seat, wheelchair accessible)

.2 Dimensions:

.1 Height: 78.7cm

.2 Seat Height: 46.7cm

.3 Finish:

.1 Seat & Table Tops: Thermally modified Oak Wood

.2 Frame: Steel, Powdercoat RAL 5000, Violet Blue

.4 Quantity:

.1 MTB-2800-00134: 1

.2 MTB-2800-00135: 2

.3 MTB-2800-00136: 1

.4 MTB-2800-00138: 1

2.5 BICYCLE RACK

.1 Product:

.1 400 Series Bike Rack, MBR-0400-00011 as manufactured by Maglin Site Furniture

.1 Contact: Sean Mealand, sean.mealand@maglin.com

.2 Frame: H.S. Steel Tube

.3 Mount: Surface Mount

.4 Length: 163.8cm

.5 Finish: Powdercoat, RAL 5000 Violet Blue

.6 Quantity: 20

2.6 SCOOTER RACK

.1 Product: BR-201B Double Scooter Rack, 20 scooter capacity as manufactured by Blue Imp, T:1-800-661-1462.

.1 Approved equivalent.

.2 Mount: In-ground direct bury

.3 Finish: Powdercoat, Black

.4 Quantity: 1

2.7 TACTILE SURFACE WARNING INDICATOR PLATES

.1 Product: Exterior Advantage Tactile System, Supplied by Kinesik Engineered Products (www.kinesik.ca).

.1 Cast iron, AODA compliant.

.2 Locations as shown on drawings.

.2 Finish: Dual-Layered Electrocoating & Powdercoat Paint System. Colour to be onyx black

.3 Quantity: as required to meet AODA compliance, full width of ramps and curb ramps. Locations as shown on drawings.

2.8 METAL SHADE UMBRELLA

.1 Product:

.1 Roma Sun Shade, Summit Pattern, MUM – 3200 – 00001, as manufactured by Maglin Site Furniture.

.1 Contact: Sean Mealand, sean.mealand@maglin.com

.2 Dimensions:

.1 Height: 239.4cm

.2 Weight: 75lbs

.3 Width: 213.1cm

.3 Mount: Direct Bury

.4 Finish: Powdercoat, RAL 5000, Violet Blue

.5 Quantity: 5

2.9 FLAGPOLE

.1 Product:

.1 Tapered aluminum flagpole: Model “HCAN” as manufactured by Ewing.

.2 Cone tapered models meeting or exceeding these criteria will be accepted as alternate products.

.3 Acceptable Alternates: John Ewing or All-Canadian Flagpole Co.

.2 Dimensions and Components:

.1 Minimum 9150 mm high (30'), complete with tilt anchor base, base cover, and concrete anchors.

.2 Shaft to be fitted with an internal #12 braided nylon halyard revolving truck system, stepped shaft aluminum alloy 6063-T6 (butt 127 o.d., butt wall 4.8 mm).

.3 Ball -152 mm in diameter, color ball: clear anodized.

.4 Base cover spun aluminum alloy 6061, 254 mm in diameter, wall thickness of 2.3 mm.

.3 Finish:

.1 Finish of pole and accessories: Clear anodized.

Quantity: 2

2.10 ANTI-SKATE HARDWARE

.1 Stainless Steel Flat Bar with 0.75” Beveled Corner, FB.75B, Skateblock as manufactured by Ravensforge (T: 1-800-743-3490)

.2 Quantity: as required as shown on drawing details.

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 exterior site furnishing installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

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

3.2 PREPARATION

.1 Locate and protect utility lines.

.2 Notify and acquire written acknowledgement from utility authorities before beginning installation Work

3.3 INSTALLATION

.1 Assemble and install furnishings in accordance with manufacturer's written recommendations.

.2 Install anchored, true, level, and plumb.

.3 Touch-up damaged finishes to approval of Consultant, by method as recommended by manufacturer.

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.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by site furnishings installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 22 00 Landscape Grading

.2 Section 32 92 23 Sodding

.3 Section 32 93 10 Trees, Shrubs and Groundcover Planting

1.2 SCOPE

.1 This section addresses the labour, materials, tools, services and equipment necessary for the supply and installation of Topsoil and Planting Soil.

.2 Provide sufficient topsoil for work of this project. Amend suitable existing site topsoil for reuse or import sufficient topsoil to provide depths as specified herein, and remove any excess topsoil from site after final grading.

1.3 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada

.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment

.1 PN1340-[2005] , Guidelines for Compost Quality.

1.4 DEFINITIONS

.1 Compost:

.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.

.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.

.3 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.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A).

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality control submittals:

.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.

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

.3 Survey:

.1 On completion of finish grading, and before commencing sodding, submit a survey prepared by a registered Ontario Land Surveyor indicating grades. Grades must be verified by the Consultant prior to sodding.

Part 2 Products

2.1 TOPSOIL

.1 Topsoil for sodded areas and as a base for planting soil: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 Native topsoil:

.1 To be amended as per analysis report recommendations to ensure topsoil is within typical guideline range and is suitable for intended use.

.2 Imported Topsoil:

.1 Soil texture based on The Canadian System of Soil Classification, to consist of 45 % sand, 35% silt and 20 % clay, and contain 5 % organic matter by weight.

.2 Imported topsoils or soil blends designed to serve as topsoil may not include the following:

.1 Soils mined from lands with an agricultural conservation easement as defined by the Ontario Ministry of Agriculture, Food and Rural Affairs.

.2 Soils mined from other greenfield sites, unless those soils are a by-product of a construction process.

.3 Contain no toxic elements or growth inhibiting materials.

.4 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.

.5 Consistency: friable when moist.

2.2 PLANTING SOIL

.1 Planting Soil: pH range of 6.5 to 7.5, mixture to be 50% topsoil, 25% peat moss, 25% well rotted manure, and 500g bonemeal per cubic metre of planting soil; screened and free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

.2 Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.3 PLANTING SOIL – HORTICULTURAL GARDEN BEDS

Horticultural Garden Beds: Premium triple mix, suitable for the purpose of growing vegetables for consumption.

Garden Edge: Cleanline XL, 305mm ht., Black Duraflex as manufactured by Permaloc or equivalent

Filter Fabric: Terrafix 270R or equivalent

Drainage Layer: high performance bedding (HPB), 100mm depth

2.4 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, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
- .6 Ph value: [6.5 to 7.5] .

.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 Organic matter: compost Category A, in accordance with CCME PN1340 , unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.

.6 Limestone:

- .1 Ground agricultural limestone.
- .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.7 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.

2.5 SOURCE QUALITY CONTROL

.1 Advise Consultant of sources of topsoil to be utilized with sufficient lead time for testing.

.2 Soil testing to be completed by recognized testing facility for pH, BpH, Total Salts, Organic Matter, Phosphorus, Potassium, Magnesium, Calcium, Sodium, Chloride, sodium absorption ratio, cation exchange capacity, Texture (% Sand, % Silt, % Clay), as well as recommended amendments to ensure topsoil is suitable for intended use.

.3 Testing of topsoil will be carried out by SGS Agrifood Laboratories (T:519-837-1242).

.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

.2 Cost for testing to be included in Contract.

.4 Contractor is responsible for amendments to topsoil, as recommended within testing report to supply viable topsoil, at no additional cost to Owner.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as directed by Consultant after area has been cleared of weeds and grasses and removed from site.

.2 Strip topsoil to depths as indicated .

.1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.3 Stockpile in locations as that will not impede other landscape works.

.1 Stockpile height not to exceed 2m.

.4 Disposal of unused topsoil is to be in an environmentally responsible manner in accordance with municipal and provincial regulations, but not used as landfill.

.5 Protect stockpiles from contamination and compaction.

3.2 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.

.1 If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

.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.

.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

.2 Remove debris which protrudes more than 75 mm above surface.

.3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.

.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.3 PLACING AND SPREADING OF TOPSOIL / PLANTING SOIL

.1 Place topsoil after Consultant 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.

.1 150 mm for sodded areas.

.5 Spread planting soil to following minimum depths after settlement.

.1 300 mm for perennial beds.

.2 500 mm for shrub beds.

.3 800 mm min. for tree pits.

.6 Spread Planting soil to the following minimum depth for horticultural garden beds;

.1 300mm for garden beds for vegetables.

.7 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.4 SOIL AMENDMENTS

.1 Apply and thoroughly mix soil amendments into full specified depth of topsoil at rates recommended within soil testing reports.

3.5 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.

.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Leave surfaces smooth, uniform and firm against deep footprinting.

3.6 ACCEPTANCE

.1 Consultant 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 at no additional cost to Owner.

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 REQUIREMENTS

.1 Section 23 91 19 Topsoil and Finish Grading

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Schedule sod laying to coincide with preparation of soil surface.

.2 Schedule sod installation when frost is not present in ground.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Samples.

.1 Submit:

.1 Sod for each type specified.

.1 Install approved samples in1 square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.

.2 Bio-degradable geotextile fabric.

.3 [0.5] kg container of each type of fertilizer used.

.2 Obtain approval of samples by Consultant.

.3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

.4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.4 QUALITY ASSURANCE

.1 Qualifications:

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

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

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

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

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

.1 Turf Grass Nursery Sod types:

.1 Number One Kentucky Bluegrass Sod - 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 .

.2 Turf Grass Nursery Sod quality:

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

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

.3 Mowing height limit: 35 to 65 mm.

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

.2 Commercial Grade Turf Grass Nursery:

.1 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.

.3 Sod establishment support:

.1 Geotextile fabric: biodegradable, 25mm square mesh

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

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

.4 Water:

.1 Potable.

.5 Fertilizer:

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

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

Part 3 Execution

3.1 INSTALLERS

.1 Use installers who are Member in Good Standing of Landscape Ontario.

3.2 EXAMINATION

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

.1 Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

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

3.3 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 19- Topsoil and Finish Grading. If discrepancies occur, notify Consultant and commence work when instructed by Consultant.

.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 tolerance of plus or minus 15mm, 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.

3.4 SOD PLACEMENT

.1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.

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

.3 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.

.4 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.5 SOD PLACEMENT ON SLOPES AND PEGGING

.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.

.2 Start laying sod at bottom of slopes.

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

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

.2 Not less than 3 pegs per square metre.

.3 Not less than 6 pegs per square metre in drainage structures. Adjust pattern as directed by Consultant.

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

3.6 CLEANING

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

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

3.7 PROTECTION BARRIERS

.1 Protect newly sodded areas from deterioration with temporary chain link fencing as directed by Consultant.

.2 Remove protection a minimum of 6 weeks after installation as directed by Consultant.

3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD

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

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

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

.3 Maintain sodded areas weed free, 95%.

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

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

3.9 ACCEPTANCE

.1 Sodded areas will be accepted by Consultant provided that:

.1 Sodded areas are properly established.

.2 Sod is free of bare and dead spots.

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

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

.5 Temporary protection barriers are removed.

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

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 91 19 Topsoil and Finish Grading

1.2 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada (AAFC).

.1 Plant Hardiness Zones in Canada-[2000] .

.2 Canadian Nursery Landscape Association (CNLA)

.1 Canadian Standards for Nursery Stock-[2006] .

1.3 DEFINITIONS

.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling: obtain approval from Consultant of schedule 7 days in advance of shipment of plant material.

.2 Schedule to include:

.1 Quantity and type of plant material.

.2 Shipping dates.

.3 Arrival dates on site.

.4 Planting Dates.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for [trees, shrubs, ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and mulch] and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Samples:

.1 Submit samples of mulch.

1.6 QUALITY ASSURANCE

.1 Qualifications:

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

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

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

1.7 DELIVERY, STORAGE AND HANDLING

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

.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

.2 Protect plant material from damage during transportation:

.1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.

.2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.

.3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

.2 Storage and Handling Requirements:

.1 Immediately store and protect plant material which will not be installed within on working day in accordance with supplier's written recommendations and after arrival at site.

.2 Protect stored plant material from frost, wind and sun and as follows:

.1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in topsoil and watering to full depth of root zone.

.2 For pots and containers, maintain moisture level in containers.

.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

.3 Store and manage hazardous materials in accordance with manufacturer's written instructions.

1.8 WARRANTY

.1 Plant material as itemized on plant list to include the 12 months warranty period from time of acceptance. Plant material that is planted after leaf drop will be reviewed for acceptance the following spring, after leaf-out.

.2 Contractor hereby warrants that plant material as itemized on plant list will remain free of defects, in healthy and vigorous growing condition, for 1 full growing season, providing adequate maintenance has been provided.

.3 End-of-warranty inspection will be conducted by Consultant.

.4 Consultant reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

Part 2 Products

2.1 PLANT MATERIAL

.1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.

- .1 Source of plant material: grown in Zone 5
- .2 Plant material must be planted in zone specified as appropriate for its species.
- .3 Plant material in location appropriate for its species.

.2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.3 Trees: with straight trunks, well and characteristically branched for species.

.4 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

2.2 WATER

.1 Potable and free of impurities that would inhibit plant growth.

2.3 STAKES

.1 T-bar, steel, 40 x 40 x 5 x 2440 mm.

2.4 GUYING WIRE

.1 Type 2: Green Arbortie or equivalent, secured to stake.

2.5 MULCH

.1 Shredded wood: varying in size from 25 to 125 mm in length, from cedar trees.

2.6 FERTILIZER

.1 Synthetic commercial type as recommended by manufacturer or soil test report.

- .1 Ensure new root growth is in contact with mycorrhiza.
- .2 Use mycorrhiza as recommended by manufacturer's written recommendations.

.2 Product: Root Rescue Transplanter as manufactured by Root Rescue Environmental Products or equivalent.

2.7 ANTI-DESICCANT

.1 Wax-like emulsion to provide film over plant surfaces reducing evaporation but permeable enough to permit transpiration.

2.8 FLAGGING TAPE

.1 Fluorescent, orange

2.9 SOURCE QUALITY CONTROL

.1 Obtain approval from Consultant of plant material prior to planting.

2.10 ADDITIONAL PLANT MATERIAL QUALIFICATIONS

.1 Plant material obtained from areas with milder climatic conditions from those of site acceptable only when moved to site prior to the breaking of buds in their original location and heeled-in, in a protected area until conditions suitable for planting.

.2 Use trees and shrubs must have been root pruned regularly, but not later than one growing season prior to arrival on site.

.3 Cold storage: written request and approval required for plant material which has been held in cold storage.

.4 Container-grown stock: acceptable if containers large enough for root development. Shrubs must have grown in container for minimum of one growing season but not longer than two. Root system must be able to "hold" soil when removed from container. Plants that have become root bound are not acceptable. Container stock must have been fertilized with slow releasing fertilizer.

.5 Balled and burlapped: coniferous and broad-leafed evergreens over 500mm. tall must be dug with soil ball. Deciduous trees in excess of 3m height must have been dug with large ball. Root balls must include 75% of fibrous and feeder root system. This excludes use of native trees grown in light sandy or rocky soil. Secure root balls with burlap and heavy twine, rope or a wire basket.

.6 Collected plant material: will not be permitted.

.7 Substitutions to plant material as indicated on planting plan not permitted unless written approval has been obtained as to type, variety and size. Plant substitutions must be of similar species and of equal size as those originally specified.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

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

3.2 PRE-PLANTING PREPARATION

.1 Proceed only after receipt of written acceptability of plant material from Consultant.

.2 Remove damaged roots and branches from plant material.

.3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

.4 Locate and protect utility lines.

.5 Notify and acquire written acknowledgement from utility authorities before beginning excavation of planting pits for trees and shrubs.

3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 Preparation of planting beds in accordance with Section 32 91 19 - Topsoil and Finish Grading.

.2 For individual planting holes:

.1 Stake out location and obtain approval from Consultant prior to excavating.

.2 Excavate to depth and width as indicated. All pits and beds shall be shaped and prepared as to allow for free drainage from the excavation.

.3 Scarify subgrade surfaces sides of planting hole to a depth of 75mm in areas where planting soil will be placed to produce an even, loose textured surface, free from line weeds, stones, roots, branches and similar materials larger than 50mm.

.4 Dispose of surplus excavated materials off-site.

.5 Remove water which enters excavations prior to planting. Notify Consultant if water source is ground water.

.6 Prevent freezing of bottom of plant pits.

.7 Excavate plant pits to receive frozen root balls while soil is unfrozen, and mulch with straw to protect from freezing until trees are planted.

3.4 PLANTING

.1 Planting shall be done during periods suitable with respect to weather conditions and locally accepted practice.

.2 Handle plants carefully, supporting entire plant while moving.

.3 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.

.1 Do not pull burlap or rope from under root ball.

.4 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.5 Plant vertically in locations as indicated.

.1 Orient plant material to give best appearance in relation to structure, roads and walks and to the approval of Consultant.

.2 Tag specimen trees (over 75mm caliper) in the nursery and install with same north-south orientation on site

.6 For trees and shrubs:

.1 Backfill soil in 150 mm lifts.

.1 Tamp each lift to eliminate air pockets.

.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.

.3 After water has penetrated into soil, backfill to finish grade.

.2 Form earth watering saucer at the base of each plant with a diameter as large as the excavated area.

.7 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.8 Water plant material thoroughly.

.9 After soil settlement has occurred, fill with soil to finish grade.

.10 After plant installation, remove all labels attached by wire or cord.

3.5 TREE SUPPORTS

.1 Stake or guy all plants as shown on drawings for individual materials with all supports, guys and fasteners secure.

.2 Space stake equally around plant and drive into undisturbed soil beneath roots, 150 mm minimum. Ensure stake is secure, vertical and unsplit.

.3 Ensure stakes are placed on prevailing wind side.

.4 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Mounting height not to exceed 2.5 m above grade. Ties to be of sufficient length to encircle tree plus 50 mm space for trunk clearance and loosely installed to prevent uprooting in high winds.

.5 Install flagging tape to guys as indicated.

3.6 PRUNING

.1 After tree supports have been installed, remove broken branches with clean, sharp tools. Do not prune plants except to remove dead or injured branches.

.2 Prune in such a manner as to preserve the natural character of the plants. Do not remove leaders.

3.7 MULCHING

.1 Ensure soil settlement has been corrected prior to mulching.

.2 Spread mulch as indicated.

3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Consultant.

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.2 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.3 Remove weeds monthly.

.4 Replace or respread damaged, missing or disturbed mulch.

.5 For non-mulched areas, cultivate as required to keep top layer of soil friable.

.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Municipal regulations. Obtain product approval from Consultant prior to application.

.7 Remove dead or broken branches from plant material.

.8 Keep trunk protection and guy wires in proper repair and adjustment.

.9 Remove and replace dead plants and plants not in healthy and vigorous growing condition. Make replacements in same manner as specified for original plantings.

3.9 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Consultant 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 Reform damaged watering saucers.

.3 Remove weeds monthly.

.4 Replace or respread damaged, missing or disturbed mulch.

.5 For non-mulched areas, cultivate monthly to keep top layer of soil friable.

.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Municipal regulations. Obtain product approval from Consultant prior to application.

.7 Apply fertilizer in early spring as indicated by soil test.

.8 Remove dead, broken or hazardous branches from plant material.

.9 Keep trunk protection and tree supports in proper repair and adjustment.

.10 Remove trunk protection, tree supports and level watering saucers at end of warranty period.

.11 Remove and replace dead plants and plants not in healthy and vigorous growing condition. Make replacements in same manner as specified for original plantings.

.12 Submit monthly written reports to Consultant 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.

.2 Provide written warranty for 1 year from date of acceptance. Replace any exterior plants which in the opinion of the Consultant, are not in acceptable condition at the end of the warranty period.

.3 Any damage to plant materials from any source whatsoever shall be reported in writing to the Consultant and Owner.

3.10 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.11 CLOSEOUT ACTIVITIES

.1 Submit maintenance reports for trees, shrubs, and other plantings.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 The scope of work includes all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of landscape edging materials (also known as "edging") complete as shown on the drawings and as specified herein.

.2 The scope of work in this section includes, but is not limited to, the following;

.1 Precast Maintenance Edge

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C136-[13] , Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

.3 ASTM C936, Standard Specification for Solid Concrete Interlocking Paving Units.

.4 ASTM C979/C979M-[10] , Standard Specification for Pigments for Integrally Colored Concrete.

.5 ASTM C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units

.2 CSA Group

.1 CSA A23.1/A23.2-[09] , Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A179-[04(R2009)] , Mortar and Grout for Unit Masonry.

.3 CSA A231.1/A231.2-[06(R2010)] , Precast Concrete Paving Slabs/Precast Concrete Pavers.

.4 CSA A283-[06(R2011)] , Qualification Code for Concrete Testing Laboratories.

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 precast concrete units and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit full size samples of each paver type, thickness, colour and finish that indicate the range of colour variation and texture expected upon project completion if requested by consultant for approval.

.2 Accepted samples become the standard of acceptance for the product produced.

.4 Test and Evaluation Reports:

.1 Submit following sampling and testing data:

.1 Sieve analysis for gradation of bedding and joint material.

.2 Precast Unit sampling and testing.

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

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in precast concrete paver installations of similar complexity, size and material with 5 documented years of experience.

1.5 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 Store and protect materials free from mud, dirt, and other foreign materials.

.3 Store and protect precast concrete units from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

PART 2 MATERIALS

2.1 CONCRETE UNITS

.1 Concrete units to be manufactured by Unilock or approved equivalent.

.2 Contact: Philip Clark, Philip.Clark@unilock.com

.3 Concrete Unit: Siena Stone Coping

.1 Size: 1200x185x500mm

.2 Colour: Natural

.4 Pavers shall meet the minimum material and physical properties set forth in ASTM C936.

.1 Average compressive strength 8000psi (55 MPa) with no individual unit under 7,200 psi (50 MPa)

.2 Average absorption of 5% with no greater than 7% when tested according to ASTM C140.

.3 Conforming to ASTM C 1645 when tested for freeze-thaw requirements.

.4 Height tolerances +/- 3.2mm.

.5 Pigment in concrete pavers: to ASTM C979/C979M.

.6 Maximum allowable breakage of product is 5%.

2.2 BASE AGGREGATE

.1 Unit Paving Base Aggregate

.1 Provide Base Aggregate materials conforming to ASTM D 2940 and gradation requirements as presented in Table below:

Table – Base Aggregate
Gradation Requirements

ASTM D 2940	
Sieve Size	**Percent Passing**
2 in (50 mm)	100
1-1/2 in (37.5 mm)	95 to 100
3/4 in (19 mm)	70 to 92
3/8 in (9.5 mm)	50 to 70
No. 4 (4.75 mm)	35 to 55
No. 30 (600 µm)	12 to 25
No. 200 (75 µm)	0 to 8

2.3 CLEANING COMPOUND

.1 Clear, organic solvent, designed and recommended by manufacturer for cleaning concrete units of contamination encountered.

.2 Acid based chemical detergent, designed and recommended by manufacturer for removal of contamination encountered on concrete units.

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 precast concrete unit installation in accordance with manufacturer's written instructions and requirements for installation tolerances and other conditions affecting performance prior to placing concrete units.

.1 Precast Concrete Units on Aggregate Base:

.1 Verify that the Base aggregate materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

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

.1 Beginning Paver installation signifies acceptance of base and edge restraint conditions.

3.2 BASE AGGREGATES

.1 Unit Base:

.1 Provide the Base Aggregate material in uniform lifts not exceeding 6 in. (150 mm) over the compacted Subgrade material and compact to at least 98 percent Standard Proctor Density as per ASTM D 698.

.2 Compact the Base Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the roller.

.3 Tolerance: Do not exceed the specified surface grade of the compacted Base Aggregate material more than ±3/8 in. (10 mm) over a 10 ft. (3 m) long straightedge laid in any direction.

3.3 INSTALLATION OF CONCRETE UNITS

.1 Replace Concrete Units with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.

.2 Adjust laying pattern at pavement edges such that cutting of edge pavers is minimized. All cut units shall be no smaller than one-third of a whole unit.

.3 Use string lines or chalk lines to hold all pattern lines true.

.4 Set surface elevation of pavers 1/8 in. (3 mm) above adjacent drainage inlets, concrete collars or channels.

.5 Place units hand tight against spacer bars. Adjust horizontal placement of laid units to align straight.

.6 Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.

.7 Cut units with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

3.4 FIELD QUALITY CONTROL

.1 Verify final elevations for conformance to the drawings after sweeping the surface clean.

.1 Prevent final Concrete Unit finished grade elevations from deviating more than ±3/8 in. (±10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.

.2 Paver-to-Paver Lippage:

.1 No greater than 3 mm (1/8 inch) difference in height between adjacent pavers.

3.5 REPAIRING, CLEANING AND SEALING

.1 Remove and replace units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

.2 Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.

.1 Clean Concrete Pavers in accordance with the manufacturer's written recommendations.

3.6 PROTECTION

.1 Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 This Section includes sub drainage systems for planting areas and landscape structures.

1.2 REFERENCES

.1 ASTM International, latest edition:

.1 D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications

.2 D3034, Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe

.3 D4491/D4491M Standard Test Methods for Water Permeability of Geotextiles by Permittivity

.4 F405 Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings.

.5 F667, Standard Specification for Large Diameter Corrugated Polyethylene (PE) Pipe and Fittings

.2 American Association of State Highway and Transportation Officials (AASHTO)

.1 M 252 - Standard Specification for Corrugated Polyethylene Drainage Pipe 3”-10” (75mm to 250mm)

.3 Ontario Provincial Standard Specification

.1 OPSS.PROV 1010 Material Specification for Aggregates – Base, Subbase, Select Grade and Backfill Material

PART 2 PRODUCTS

2.1 PIPES AND FITTINGS

.1 Perforated / Non-Perforated PE Pipe and Fittings: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

.1 Couplings: Manufacturer's standard, band type.

2.2 CLEANOUTS

.1 PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub.

.2 Pipe Plug for Softscape: PVC

.3 Pipe Plug for Hardscape:

.1 Cast Iron plug and housings, flush with surrounding surfaces and suitable for heavy duty exterior applications.

2.3 SOIL MATERIALS

.1 Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 31 Section "Excavation and Fill."

2.4 GEOTEXTILE FILTER FABRICS

.1 Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from to 330 gpm/sq. ft. when tested according to ASTM D 4491.

.1 Structure Type: Nonwoven, needle-punched continuous filament.

.2 Style(s): Flat and sock.

2.5 GRANULAR

.1 Perforated Drainage Pipes: 19mm Clear Stone, 50mm min. pipe surround and minimum 300mm depth to bottom of pipe.

.2 Non-Perforated Drainage Pipes: Granular 'A' to OPSS 1010.

PART 3 EXECUTION

3.1 EARTHWORK

.1 Excavating, trenching, and backfilling are specified in Division 31.

3.2 PIPING APPLICATIONS

.1 Underground Subdrainage Piping:

.1 Perforated PE pipe and fittings, couplings, and coupled joints.

3.3 PIPING INSTALLATION

.1 Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

.2 Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

.3 Install PE piping according to ASTM D 2321.

3.4 CLEANOUT INSTALLATION

.1 Cleanouts for Subdrainage:

.1 Install cleanouts and riser extensions from piping to top of slab or grade. Locate cleanouts at beginning of piping run in soft landscape and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.

3.5 CONNECTIONS

.1 Connect low elevations of subdrainage system to storm drainage system.

3.6 FIELD QUALITY CONTROL

.1 Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.7 CLEANING

.1 Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION