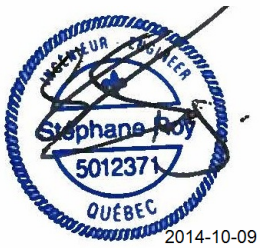
Parks Canada
Mauricie Park

Technical
Specifications

October 09 2014

Project : 167011343
Révision : 0
Issue for tender

The following Seal of the Electrical and Landscape Architect Consultants refer to specific Sections of the Specification designated by symbols and listed in Table of Contents. For all other specifications see Architectural and Mechanical drawings.



2014-10-09

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Parks Canada - Mauricie Park
Rehabilitation and electrification loops
Project number: 167011343

TENDER FORM

Item	Description	Units	Estimate Qty	Unit Rates	Amount
	GENERAL REQUIREMENTS				
	Rivière à la Pêche - Loop A				
1.1	Mobilization and General Requirements	lump sum	1		
				General costs - Loop A - Subtotal 1	
	Rivière à la Pêche - Loop D				
1.2	Mobilization and General Requirements	lump sum	1		
				General costs - Loop D - Subtotal 1	
	Rivière à la Pêche - Loop E				
1.3	Mobilization and General Requirements	lump sum	1	$ 1.00	
				General costs - Loop E - Subtotal 1	
				General Costs, Subtotal 1	
	REMOVALS				
	LANDSCAPE ARCHITECTURE				
	Mistagance -Loop A				
2.1	Clearing and Grumbing: grumbed 500mm below existing grades removed from site. Tree to be cutted into logs of 1.2 meter long to be stored on site, branches and small trees under 125mm to be mulched on site (estimate quantity: 607 m2)	lump sum	1		
2.2	Removal of existing granular base of 300mm depth (stockpiled and relay for the new sub-base preparation (estimate quantity: 204 m3)	lump sum	1		
				Landscape removal -Loop A Subtotal 2	
	Rivière à la Pêche -Loop D				
2.3	Clearing and Grumbing: grumbed 500mm below existing grades and removed from site. Tree to be cutted into logs of 1.2 meter long to be stored on site, branches and small trees under 125mm to be mulched on site (estimate quantity: 2401 m2)	lump sum	1		
2.4	Removal of existing granular base of 300mm depth (stockpiled and relay for the new sub-base preparation (estimate quantity:467 m3)	lump sum	1		
				Landscape removal -Loop D Subtotal 2	
	Rivière à la Pêche -Loop E				
2.5	Clearing and Grumbing: grumbed 500mm below existing grades removed from site. Tree to be cutted into logs of 1.2 meter long to be stored on site, branches and small trees under 125mm to be mulched on site (estimate quantity:3068 m2)	lump sum	1		
2.6	Removal of existing granular base of 300mm depth (stockpiled and relay for the preparation of the new sub-base (729 m3)	lump sum	1		
				Landscape removal -Loop E Subtotal 2	
				Landscape removal Total 2	
	ELECTRICAL				
	Mistagance -Loop A				
2.7	Demolition of electrical equipment (loadcenters, direct buried installation, transformers, terminals, safety switches, trenches, etc.)	lump sum	1		
2.8	Removal of asphalt	m2	1		
				Electrical removal -Loop A Subtotal 2	
	Rivière à la Pêche -Loop D				
2.9	Demolition of electrical equipment (loadcenters, direct buried installation, transformers, terminals, safety switches, trenches, etc.)	lump sum	1		
2.10	Removal of asphalt	m2	12		
				Electrical removal -Loop D Subtotal 2	
	Rivière à la Pêche -Loop E				
2.11	Demolition of electrical equipment (loadcenters, direct buried installation, transformers, terminals, safety switches, trenches, etc.)	lump sum	1		
2.12	Removal of asphalt	m2	1		
				Electrical removal -Loop E Subtotal 2	
				Electrical removal total 2	
				Electrical removal total 2	
	MECHANICAL				
	Mistagance -Loop A				
2.13	Demolition of mechanical installation (Plumbing)	lump sum	1		
				Mechanical removal -Loop A Subtotal 2	
	Rivière à la Pêche -Loop D				
2.15	Demolition of mechanical installation (Plumbing)	lump sum	1		
				Mechanical removal -Loop D Subtotal 2	
	Rivière à la Pêche -Loop E				
2.16	Demolition of mechanical installation (Plumbing)	lump sum	1		
				Mechanical removal -Loop E Subtotal 2	
				Mechanical removal Subtotal 2	
	NEW CAMP SITES				
	LANDSCAPE ARCHITECTURE				
	Mistagance - Loop A = total 5 sites				
3.1	Imported new granular base material type B (0-150mm) for subbase preparation (installation and compaction)	m3	63		
3.2	Imported granular type "A" (0-25mm) 250mm thick including installation and compaction for campsite base	m3	273		
3.3	Installation of geotextile membrane below granular base A . Product: Green Geotextile' , Product # GN300, manufactured by American Engineering Fabrics Inc distributed by: Geosynthetic systems or approved equivalent	m2	1091		
3.4	Slope stabilisation granular (100 to 200mm) for site # 9.	m3	26		
3.5	Reforestation bed preparation 300mm dept of imported planting soil.	m3	50		

TENDER FORM

Item	Description	Units	Estimate Qty	Unit Rates	Amount
3..6	Installation of re-used prefabricate concrete curb (2 curb per site) total 5 sites	each	10		
		Landscape New sites - loop A Subtotal 3			$ -
	Rivière à la Pêche - Loop D = total 14 sites				
3.7	Imported new granular base material type B (0-150mm) for subbase preparation (installation and compaction)	m3	627		
3.8	Imported granular type "A" (0-25mm) 250mm thick including installation and compacted for campsite base	m3	793		
3.9	Installation of geotextile membrane below granular base A . Product: Green Geotextile' , Product # GN300, manufactured by American Engineering Fabrics Inc distributed by: Geosynthetic systems or approved equivalent	m2	3171		
3.10	Slope stabilisation granular (100 to 200mm) for site # 13.	m3	14.5		
3.11	Reforestation bed preparation 300mm dept of imported planting soil.	m3	225		
3.12	Installation of re-used prefabricate concrete curb (2 curb per site) total 14 sites	each	28		
		Landscape New sites-Loop D Subtotal 3			
	Rivière à la Pêche -Loop E = total 22 sites				
3.13	Imported new granular base material type B (0-150mm) for subbase preparation (installation and compaction)	m3	409		
3.14	Imported granular type "A" (0-25mm) 250mm thick including installation and compacted for campsite base	m3	1240		
3.15	Installation of geotextile membrane below granular base A . Product: Green Geotextile' , Product # GN300, manufactured by American Engineering Fabrics Inc distributed by: Geosynthetic systems or approved equivalent	m2	4956		
3.16	Slope stabilisation granular (100 to 200mm) for sites #3-#7.	m3	28		
3.17	Reforestation bed preparation 300mm dept of imported planting soil.	m3	146		
3.18	Installation of re-used prefabricate concrete curb (2 curbs per site)	each	44		
		Landscape New sites-Loop E Subtotal 3			
		LANDSCAPE NEW SITES TOTAL			
	ELECTRICAL				
	Mistagance - Loop A				
3.19	New electrical distribution and equipment related to electrical buildings	lump sum	1		
3.20	New branch centers	lump sum	1		
3.21	New distribution centers	lump sum	1		
3.22	New direct buried installation	lump sum	1		
3.23	New Hydro-Quebec related works	lump sum	1		
3.24	New trenches related works	lump sum	1		
		Electrical New sites - Loop A Subtotal 3			
	Rivière à la Pêche - Loop D				
3.25	New electrical distribution and equipment related to electrical buildings	lump sum	1		
3.26	New branch centers	lump sum	1		
3.27	New distribution centers	lump sum	1		
3.28	New direct buried installation	lump sum	1		
3.29	New Hydro-Quebec related works	lump sum	1		
3.30	New trenches related works	lump sum	1		
		Electrical New sites - Loop D Subtotal 3			
	Rivière à la Pêche - Loop E				
3.31	New electrical distribution and equipment related to electrical buildings	lump sum	1		
3.32	New branch centers	lump sum	1		
3.33	New distribution centers	lump sum	1		
3.34	New direct buried installation	lump sum	1		
3.35	New Hydro-Quebec related works	lump sum	1		
3.36	New trenches related works	lump sum	1		
		Electrical New sites - Loop E Subtotal 3			
		ELECTRICAL NEW SITES TOTAL 3			
		ELECTRICAL NEW SITES TOTAL 3			
	MECHANICAL				
3.37	New mechanical installation (Plumbing)	lump sum	1		
3.38	New mechanical installation (Ventilation)	lump sum	1		
		Mechanical New sites- Loop A Subtotal 3			
	Rivière à la Pêche - Loop D				
3.39	New mechanical installation (Plumbing)	lump sum	1		
3.40	New mechanical installation (Ventilation)	lump sum	1		
		Mechanical New sites- Loop D Subtotal 3			
	Rivière à la Pêche - Loop E				
3.41	New mechanical installation (Plumbing)	lump sum	1		
3.42	New mechanical installation (Ventilation)	lump sum	1		
		Mechanical New sites- Loop E Subtotal 3			
	MECHANICAL NEW SITES TOTAL 3	**NICAL NEW SITES TOTAL 3**			
	ARCHITECTURE				
	Mistagance -Loop A				
3.43	New electrical building	lump sum	1		
		Architectural New sites- Loop A Subtotal 3			
	Rivière à la Pêche -Loop D				
3.44	N/A	N/A	N/A	N/A	N/A
		Architectural New sites- Loop D Subtotal 3			$

Parks Canada - Mauricie Park
Rehabilitation and electrification loops
Project number: 167011343

TENDER FORM

Item	Description	Units	Estimate Qty	Unit Rates	Amount
	Rivière à la Pêche -Loop E				
3.45	New electrical building	lump sum	1		
	Architectural New sites- Loop E Subtotal 3			**ew sites- Loop E Subtotal 3**	
		ARCHITECTURAK NEW SITES TOTAL 3			
				SUBTOTAL - LOOP A	
				SUBTOTAL - LOOP D	
				SUBTOTAL - LOOP E	
				SUBTOTAL	
				GST (5%)	

END OF SECTION

1 General

1.1 CONSTRUCTION CONTRACT

.1 "Contract Documents" consist of The Executed Agreement between the Region and the Contractor, Addenda, Special Provisions, Information for Tenderers, Contract Drawings, Supplementary Specifications, Standard Specifications, Form of Tender, Supplementary General Conditions, General Conditions of the Contract and any other such documents as provided for in the tender documents, including amendments made in writing pursuant to the provisions of the Contract and agreed upon between the parties.

.2 The specification of all trades shall be carefully read by the Contractor so that they may make themself acquainted with the extent and nature of the work of other trades.

.3 Provide all labour and materials required to complete the work. Misinterpretation of any requirements of either drawings or specifications shall not relieve the Contractor of responsibility to complete the work. Where required, written confirmation to be obtained from the Owner prior to submitting tender.

1.2 PROJECT ORGANIZATION

.1 The successful bidder will enter into a direct contract with the Owner or the Owner's Agent.

.2 The Electrical Contractor is designated as the overall project's Prime Contractor, General Contractor, Technical Coordinator and Construction Coordinator of all the other Contractors/Trades, including architectural, structural, mechanical, landscaping, and civil. This Contractor is to provide and ensure that all other Contractors/Trades are familiar and abide with the general provisions and instructions to bidders noted in this document.

.3 The Contractor is responsible for provision of qualified Subcontractors as required to perform the work.

.4 All other Contractors/Trades to cooperate and provide all information and assistance to the Electrical Contractor throughout the entire construction period to facilitate the delivery of a fully coordinated final project.

.5 The Electrical Contractor, in the capacity of the overall project's Prime Contractor/ General Contractor, shall assemble the bid submission without exclusion to include all trades and specialties and shall not be limited to architectural, structural, mechanical and electrical disciplines/trades.

.6 Maintain at the job site at all times qualified personnel and supervisory staff with proven experience managing, testing and commissioning projects of comparable size, nature and complexity. Any individual deemed to be unsatisfactory by the Owner/Consultant shall be replaced by the contractor.

1.3 DESCRIPTION OF WORK

.1 Work under this Contract takes place at Parcs Canada – Parc de la Mauricie as indicated in the accompanying drawings and specifications. The scope of work includes but is not limited to the following:

a. Rivières-à-la-Pêche
    1. Demolition of the existing electrical infrastructure feeding the loops D and E (Electrical power supply 120/240V, direct buried cables in the ground, junction boxes, pulling boxes, branches center, etc.)
    2. Replacement of the existing 120/240V electrical power entry that feeds only the loop D
    3. New 120/240V electrical power supply that feeds only yhe loop E
    4. New 7.2kV-120/240V-167kVA aerials transformers provided by Hydro-Québec (Demand supply, connections, coordination with Hydro-Québec, etc.)
    5. New exterior distribution centers including : transformer, electrical panel and terminals for the supply of the branch centers
    6. New branch centers for the camping sites to feed the electrical power of the recreational vehicles
    7. The work on site for the installation of new electrical infrastructure including civil works.

b. Mistagance
    1. Demolition of the existing electrical infrastructure feeding the loops A (Electrical power supply 120/240V, direct buried cables in the ground, junction boxes, pulling boxes, branches center, etc.)
    2. Remplacement de l'entrée électrique 120/240V existante qui desservira uniquement la boucle A
    3. New 7.2kV-120/240V-167kVA aerials transformers provided by Hydro-Québec (Demande supply, connections, coordination with Hydro-Québec, etc.)
    4. New exterior distribution centers including : transformer, electrical panel and terminals for the supply of the branch centers
    5. New branch centers for the camping sites to feed the electrical power of the recreational vehicles
    6. The work on site for the installation of new electrical infrastructure including civil works.

.2 Work not included in Contract is noted as 'N.I.C.'

1. Coordinate and enforce environmental measures applicable in Parks Canada are required on site.

1.4 CODES

.1 Perform work in accordance with Quebec Building Code and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Meet or exceed requirements of:
- .1 contract documents,
- .2 specified standards, codes and referenced documents.

.3 Perform all work in accordance with WHMIS regulations.

1.5 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each of following:
- .1 Contract drawings.
- .2 Specifications.

.3 Addenda.
.4 Reviewed shop drawings.
.5 Change orders.
.6 Other modifications to Contract.
.7 Copy of approved work schedule.
.8 Manufacturers' installation and application instructions.
.9 Record As- Built mark-ups.

1.6 WORK SCHEDULE

.1 The Electrical Contractor, in the capacity of the overall project's Prime Contractor/ General Contractor, shall produce a work schedule within one (1) week of notification of their successful bid. The work schedule shall be presented in a manner acceptable to the Owner/Owner's Representative and shall show the activities of all trades indicating start and end dates, duration, shop drawing submissions, equipment delivery, testing, commissioning, etc.

.2 This project takes place in a Federal Park. The electrical contractor has to work a flexible schedule and be able to do the work in any section that is accessible to that time and, before the end of 2014.

1.7 PARTIAL OCCUPANCY

.1 Some parts of the existing building will be occupied during construction. The Contractor shall cooperate with the owner in order to avoid harm to its business.

1.8 COST BREAKDOWN

.1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Consultant and aggregating contract price. After approval by Consultant cost breakdown will be used as basis for progress payment. Contract breakdown to separately list material and labour for each item as listed herein:

.1 Panelboards, Distribution Panels, Transformers and Misc. Electrical Distribution Equipment
.2 Distribution centers
.3 Terminal connections
.4 Conduits, boxes and cables
.5 Civil works
.6 Testing / Commissioning
.7 O&M Manual / As-built Drawings
.8 Permits / Inspections
.9 Miscellaneous (specify what is included)

1.09 CONTRACTOR'S USE OF SITE

.1 Use of site: exclusive and complete use of affected areas for execution of work.

.2 Store equipment and material on site as directed by Owner. Do not unreasonably encumber site with materials or equipment. The Owner shall accept no responsibility for any goods retained on site. Deliveries will not be accepted unless previously arranged with the Owner.

.3 Contractor to use elevators for person and minor tools only unless written permission is obtained. If elevators are not working, must use stairs.

.4 Construction debris shall be removed daily from site. Contractor can use elevator after hours for debris removal, if it is in service.

1.10 PROJECT MEETINGS

.1 Organize and chair bi-weekly project meetings as required during the construction period.

.2 Notify participants of meetings.

.3 Record minutes of meetings, and distribute to participants within (72) hours of meeting.

1.11 SETTING OUT OF WORK

.1 Contractor to lay out work, do all necessary leveling and measuring. Figures, full size and detail drawings to take precedence over scale measurements of drawings. No plea as to action or direction other than provided by the Owner will be admitted in justification of any error in construction where departure is made from the drawings, specifications or contract. Contractor is responsible to take their own measurements for work.

.2 Correct work completed contrary to the intent of the drawings and specifications and bear all costs for same. Where intent of the drawings and specifications is not clear, obtain clarification from the Owner before proceeding with work. Provide prompt installation of work when coordinating with other trades as in advance of concrete pouring or similar work. Provide sleeves and locate them for contractor.

.3 Where equipment supplied by one Contractor must be built-in with work of other trades, supply equipment to be built-in or measurements to allow necessary openings to be left so as not to hold up work.

.4 Contractor to be responsible for any damage caused by improper location or carrying out of their work.

.5 Consult with electrical, mechanical, structural and architectural trades in setting out locations for conduit runs, panel assemblies, etc., so that conflicts are avoided and symmetrical even spacing is maintained.

.6 Layouts shown for mechanical rooms are for estimating purposes only. Coordinate installation of equipment, outlets and equipment with final room equipment layout as established on site.

1.12 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Consultant of impending installation and obtain their approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.13 CONCEALMENT

.1 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.14 CUTTING, AND PATCHING

.1 All necessary cutting and patching of work for all trades shall be done by the Contractor. Contractor is to coordinate and schedule related subtrades prior to pouring of concrete, laying up of masonry, installing of finishes to ensure that sub-trades routing, installation of services, finishes, etc. are in place prior to installing.

.2 Execute cutting, fitting and patching required to make work fit properly together and as necessary for the installation or alteration of new and existing materials.

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

.4 Make good any damage resulting from work of this contract.

.5 Obtain Consultant's approval before cutting, boring, or sleeving load bearing members or structural components.

.6 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly. Tradesmen qualified in the work being cut and patched shall be employed to ensure that works are correctly done.

.7 Cut holes in areas after being located by the Trade concerned

.8 Wherever it becomes necessary to cut or interfere in any manner with existing services or apparatus, do so at such times as approved by the Consultant.

.9 Coordinate work of all sections, taking into account existing installations to ensure best arrangement of components in available space. For critical locations, consult with Consultant prior to commencing work.

.10 Where existing items are designated for relocation or removal, relocate or remove these items unless specified to be done by other sections of the Specification.

.11 Make good all surfaces and finishes in areas from which items have been removed or in which items are relocated. Cap off all existing services required to be severed to affect the alterations and do all other work necessary to make good such areas to Consultant's satisfaction.

.12 Core drill holes in concrete floors for piping where not previously sleeved. Do not use mechanical hammers or drills without prior approval in writing.

.13 Cutting and removal of terrazzo shall extend back to nearest divider strip and patching shall include entire panels.

.14 Masonry shall be saw cut and patching shall be toothed in to match existing adjacent finish.

.15 Any cutting / patching required after completion of new works shall be done by the Electrical Contractor at the sub-trade's expense.

1.15 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to occupants, public and normal use of premises. Arrange with Consultant to facilitate execution of work.

.2 Where security has been reduced by work of Contract, provide temporary means to maintain security.

.3 Provide temporary dust screens, barriers, warning signs in locations where renovation and alteration work is adjacent to areas used by public or staff.

.4 Electrical and Mechanical tie-ins to be carried out outside of normal business hours. Coordinate with the Owner for acceptable times.

1.16 ADDITIONAL DRAWINGS

.1 Consultant may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.

1.17 CORING AND SCANNING

.1 All coring to be the responsibility of the Contractor.

.2 Prior to coring existing floor slabs, scan all locations to establish if any existing conduits or re-bar is present in core locations. Locate work to avoid such items found prior to proceeding with coring. Provide all scans to the consultant for review prior to coring.

1.18 BUILDING SMOKING ENVIRONMENT

.1 No smoking on ALTCH property.

1.19 ASBESTOS DISCOVERY

.1 Notify the Consultant and Owner immediately if asbestos is discovered on site.

1.20 SITE AND DOCUMENTS EXAMINATION

.1 The Contractor and Sub Contractor shall carefully examine the existing site, the bid documents, and all other conditions affecting the work.

.2 All questions about the tender shall be submitted to the Region. Refer to Division 0 for contact information and cut-off date for questions.

.3 Claims for extra payments that could have been foreseen during site examination while in the bidding period will not be considered.

1.21 ALTERNATE OF PRODUCTS SPECIFIED

.1 Material of products specified by name of manufacturer, brand, trade name or catalogue reference shall be the basis of the bid and furnished under the contract. Changes for alternate of products specified may be granted by the Consultant in writing during the bidding period only. When two or more products or materials are specified the Contractor shall choose the product or material they wish to use, and a complete list of such selections shall be submitted with the proposed project schedule within 5 days of the contract execution.

1.22 CO-ORDINATION AND CO-OPERATION

.1 The Electrical Contractor shall supervise and direct the work of all sub-trades and be solely responsible for all construction means, methods, techniques, sequences and procedures.

.2 The responsibility as to which trade provides or builds in the required materials or article rests with the Electrical Contractor.

.3 Each trade shall carry out their work with care and co-operation with all concerned so that their work will marry with works of other trades to provide a clean finished product.

.4 Each trade shall report to the Contractor any defects in surfaces or work prepared by other trades, which affects their own. Commencement of work shall deem acceptance of condition of other trade's work.

1.23 DETAILS AND MEASUREMENTS

.1 Check and verify all dimensions wherever referring to the work. Verify all dimensions when pertaining to the work of other trades with the Sub Contractor concerned. Check dimensions and the actual material to be used on the work and any details before work commences. Report any variations to the Consultant for adjustment of required.

.2 In the event of substantial revisions to the work the Consultant will issue revised drawings to the Contractor. Only the latest issues of the Contract Documents are to be kept on site.

1.24 EQUIPMENT INSTALLATION

.1 The Contractor shall submit to the Consultant and Owner, for approval a plan showing the proposed new transport electrical equipment in the park methods.

1.25 ACCESS, STORAGE AND PARKING

.1 Access routes for labour and materials to occupied areas will be to the approval of the owner.

.2 The contractor's personnel will not be allowed to use any access routes other than those designated, and any areas not contained within those access routes will be off limits.

.3 Storage space on site is limited. Any space that may be offered by the owner to the contractor may not be sufficient. Accordingly, the contractor is to make suitable alternate arrangements.

.4 Comply with the owner's security protocol for access to site and work locations including issuance of key/card access, third party security checks, and available parking spaces.

1.26 DEFECTIVE WORK

.1 The Contractor shall rectify, in a manner acceptable to the Owner and the Consultant, all defective work and deficiencies throughout the Work, whether or not they are specifically identified by the Consultant.

.2 The Contractor shall prioritize the correction of any defective work which, in the sole discretion of the Owner, adversely affects the day to day operation of the Owner.

1.27 SHOP DRAWINGS AND OTHER SUBMITTALS

.1 Submit an email copy of shop drawings / product data as specified. Catalog sheets are acceptable provided they contain necessary information.

.2 Information required: Manufacturer, model, dimensions, construction details, accessories, installation details, capacities, performance data, finishes. Include wiring single line and schematic diagrams where applicable.

.3 Label each shop drawing with designation used on drawings and in specifications (e.g. Unit Heater UH-1).

.4 Install no equipment until its shop drawing has been approved.

.5 When submitted, shop drawings/product data must bear Contractor's stamp representing that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data or will do so and that he has checked and coordinated each shop drawing with requirements of work and of drawings and specifications.

.6 Engineer will review for conformity to design concept and for general arrangement only and such review shall not relieve Contractor of responsibility for errors or omission in shop drawings or of responsibility for meeting all requirements of Contract Documents unless a deviation on shop drawings has been approved in writing by Engineer.

1.28 EXCAVATION AND BACKFILLING

.1 Provide all excavation, sand leveling and bedding for electrical installation.

.2 Supervise all backfilling of electrical services and underground conduit runs.

.3 All concrete work directly related to the electrical installation including the generator pad is the responsibility of this contractor.

1.29 ACCESS DOORS

.1 Number of access doors to be kept to an absolute minimum and to be used only with permission of the Owner. Electrical Contractor to supply all access doors required for access to electrical components or boxes.

.2 Access doors to be installed by trades into whose work the doors are to be located in, otherwise, this contractor is responsible for the installation.

.3 Where access is required to pullboxes and junction boxes, these boxes to be located in removable type ceiling areas where possible or adjacent to recessed luminaires.

.4 Where it is absolutely impossible to service certain equipment through removable type ceilings or recessed luminaires and where special permission has been obtained from the Owner, Electrical Contractor to supply and install access doors required for servicing of such work. Access doors to be complete with necessary frames and hinged doors held closed with captive type studs. Access panels to be of not less than 14 gauge steel, prime coated and painted on the job to match the wall or ceiling finish.

.5 Access doors to be ULC fire rated where installed in fire rated assemblies.

.6 Minimum size to be 610 mm by 610 mm.

1.30 BACKBOARDS

.1 All wall or channel mounted backboards required for electrical equipment mounting in electrical or mechanical rooms will be supplied by this Contractor. Plywood backboard shall be a ULC listed fire rated product.

.2 Install all plywood backboards with ULC label facing outwards. Provide all required supports for plywood backboards.

1.31 PAINTING

.1 Contractor to paint all exposed areas affected within this scope of work. Type and colour of paint to match existing.

1.32 INTERRUPTIONS

.1 This project involves interrupting power to some of the existing services such as the servery panels, heating panels, cooling tower, heat pumps, etc. These interruptions shall be scheduled during non-peak hours and where possible shall avoid meal times such that the facility can remain in normal operation during the entire construction period.

1.33 CASH ALLOWANCES

.1 The Electrical Contractor will allow the specified lump sums for the supply and installation of the following:
.1 N/A

2 Products

2.1 NOT USED

3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work defined in this specification relates to the construction of an electrical service building. All work that is included in this contract is detailed in the drawings prepared by Stantec Expert-Copnseils Ltée.

1.2 CONTRACT METHOD

.1 Construct Work under stipulated price contract.

1.3 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Consultant.

.2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Consultant, in writing, any defects which may interfere with proper execution of Work.

1.4 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

.3 Maintain fire access/control.

1.5 CONTRACTOR USE OF PREMISES

.1 Unrestricted use of site until Substantial Performance.

.2 Co-ordinate use of premises under direction of Consultant.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.5 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 EXISTING SERVICES

.1 Notify, Consultant and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Consultant 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Carry out work at times as directed by governing authorities

.3 Establish location and extent of service lines in area of work before starting Work.

.4 Submit schedule to and obtain approval from Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.5 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.6 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.7 Record locations of maintained, re-routed and abandoned service lines.

.8 Construct barriers as required.

1.7 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspecting and testing by inspecting firms or testing laboratories designated by Client.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

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

1.4 APPOINTMENT AND PAYMENT

.1 Consultant will appoint and pay for services of testing laboratory except follows:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under the supervision of Consultant.
- .6 Additional tests specified in the following paragraph.
- .7 Test analysis for imported soil of reforestation bed

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

1.5 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:

- .1 Provide access to Work to be inspected and tested.
- .2 Facilitate inspections and tests.
- .3 Make good Work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

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

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Health and safety considerations required to ensure that PWGSC shows due diligence towards health and safety on construction sites, and meets the requirements laid out in PWGSC/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 23 17 - Rock Removal.

1.4 REFERENCES

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

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

.1 Material Safety Data Sheets (MSDS).

.3 Province of Alberta

.1 Occupational Health and Safety Act, R.S.A. 1980.

.4 Province of British Columbia

.1 Workers Compensation Act, (Occupational Health and Safety) Amendment, WCB. Reg. 185/99.

.5 Province of Manitoba

.1 Workplace Safety and Health Act, R.S.M. 1987.

.6 Province of New Brunswick

.1 Occupational Health and Safety Act, S.N.B. 1983.

.7 Province of Newfoundland and Labrador

.1 Occupational Health and Safety Act, R.S.N. 1990.

.8 Northwest Territories and Nunavut

.1 Safety Act, R.S.N.W.T. 1988.

.9 Province of Nova Scotia

.1 Occupational Health and Safety Act, S.N.S. 1996.

.10 Province of Ontario

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990 June 2002.

.11 Province of Prince Edward Island

.1 Occupational Health and Safety Act, R.S.P.E.I. 1988.

.12 Province of Quebec

.1 An Act Respecting Occupational Health and Safety, R.S.Q. 1997(updated 1 June 2003).

.2 Safety Code for the Construction Industry R.Q. S-2.1, r.6 1997(updated 26 November 2002).

.13 Province of Saskatchewan

.1 Occupational Health and Safety Act, 1993, S.S. 1993.

.14 Yukon Territory

.1 Occupational Health and Safety Act, R.S.Y. 1986.

1.5 SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit once a week copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant and or authority having jurisdiction.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Consultant will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 2 days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant within 2 days after receipt of comments from Consultant.

.7 Consultant's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to

commencement of Work, and submit additional certifications for any new site personnel to Consultant.

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.6 FILING OF NOTICE

.1 File Notice of Project with authorities prior to beginning of Work.

1.7 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.8 MEETINGS

.1 Schedule and administer Health and Safety meeting with Consultant prior to commencement of Work.

1.9 REGULATORY REQUIREMENTS

1.10 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Heavy equipment circulation.

1.11 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

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

1.12 RESPONSIBILITY

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

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

1.13 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act, General Safety Regulation, Alberta Reg. .

.2 Comply with Workers Compensation Act, Occupational Health and Safety Regulation, B.C. Reg.

.3 Comply with Workplace Safety and Health Act, Workplace Safety Regulation, Manitoba Reg.

.4 Comply with Occupational Health and Safety Act, General Regulation, N.B. Reg.

.5 Comply with Occupational Health and Safety Act, Occupational Health and Safety Regulations, C. Nfld. Reg.

.6 Comply with Safety Act, General Safety Regulations, R.R.N.W.T. .

.7 SPEC NOTE: Use the following paragraph for projects in Province of Nova Scotia.

.8 Comply with Occupational Health and Safety Act, Occupational Safety General Regulations, N.S. Reg.

.9 Comply with Ontario Health and Safety Act and Regulations for Construction Projects, R.S.O..

.10 Comply with Occupational Health and Safety Act, Occupational Health and Safety Act Regulations, P.E.I. .

.11 Comply with Occupational Health and Safety Act, Industrial and Commercial Establishments Regulation, R.R.Q..

.12 Comply with Occupational Health and Safety Regulations, 1996.

.13 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.

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

1.14 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.

1.15 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have minimum 2 years' site-related working experience specific to activities associated with similar types of construction project.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.16 POSTING OF DOCUMENTS

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

1.17 CORRECTION OF NON-COMPLIANCE

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

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

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

1.18 BLASTING

.1 Blasting or other use of explosives is not permitted [without prior receipt of written instruction by Consultant.

.2 Do blasting operations in accordance with Section 31 23 17 - Rock Removal.

1.19 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from Consultant.

1.20 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 FIRES

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

.2 Where fires or burning permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved. Restore, clean and return to new condition stained or damaged work.

.3 Provide supervision, attendance and fire protection measures as directed.

1.3 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.

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

1.4 DRAINAGE

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.5 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties where indicated.

.2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by Consultant.

1.6 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material or debris in waterways.

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

.6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

.7 Do not blast under water or within 100 m of indicated spawning beds.

1.7 POLLUTION CONTROL

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

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

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

.5 Equipment and system adjust and balance.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.4 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-1994, Stipulated Price Contract.

1.5 INSPECTION

.1 Refer to CCDC 2, GC 2.3.

.2 Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.

.4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.5 Client may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. [If such Work is found in accordance with Contract Documents, client shall pay cost of examination and replacement.

1.6 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Consultant or the Client for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Client.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Client. Pay costs for retesting and re-inspection.

1.7 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.8 PROCEDURES

.1 Notify appropriate agency Consultant in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.9 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Consultant.

1.10 REPORTS

.1 Submit 4 copies of inspection and test reports to Consultant.

.2 Provide copies to Subcontractor of work being inspected or tested manufacturer or fabricator of material being inspected or tested.

1.11 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

.2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Consultant and may be authorized as recoverable.

1.12 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in all locations acceptable to Consultant as specified in specific Section.

.3 Prepare mock-ups for Consultant's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, [Engineer] [Consultant] will assist in preparing a schedule fixing dates for preparation.

.6 Remove mock-up at conclusion of Work or when acceptable to Consultant.

.7 Mock-ups may remain as part of Work.

.8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.13 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.14 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Final cleaning.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED SECTION

.1 Section 31 05 17 Aggregate Materials

1.4 NOT APPLICABLE

.1 Not applicable

1.5 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 11 - Cleaning.

.7 Remove waste material and debris from site and deposit in waste container at end of each working day.

.8 Dispose of waste materials and debris at designated dumping areas off site.

.9 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

.10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.6 FINAL CLEANING

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris other than including that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Clean lighting reflectors, lenses, and other lighting surfaces.

.8 Sweep and wash clean paved areas.

.9 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

Remove snow and ice from access to building.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Methods for removal of existing asphalt pavement.

1.2 RELATED SECTIONS

.1 Section 01 74 11 - Cleaning.

1.3 MEASUREMENT PROCEDURES

.1 Removal of existing asphalt pavement will be measured in square metres of surface actually removed regardless of depth removed or number of operations required.

.2 Payment under this item will include operations involved in removing, hauling and stockpiling designated pavement and cleaning of remaining pavement surface.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 74 11 - Cleaning.

.2 Divert unused asphalt materials from landfill to local facility approved by Client.

Part 2 Products

2.1 EQUIPMENT

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

Part 3 Execution

3.1 PREPARATION

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

3.2 PROTECTION

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

3.3 REMOVAL

.1 Remove existing asphalt pavement to lines and grades as indicated by Consultant in field.

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

.3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.4 Provide for suppression of dust generated by removal process.

3.4 STOCKPILING OF MATERIAL

.1 Dispose of removed asphalt pavement by stock-piling in location designated by Consultant.

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

3.5 FINISH TOLERANCES

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

3.6 SWEEPING

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

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 The Scope of Work shall include the supply and installation of form work to construct the concrete slab as per the drawings prepared by Stantec.

1.2 RELATED SECTIONS

.1	Concrete Reinforcing	Section 03 20 00
.2	Cast-in-Place Concrete	Section 03 30 00

1.3 REFERENCE STANDARDS

.1 Perform all work in accordance with the following standards, except where specified otherwise. All standards to be latest issue at time of tender.

.1 Quebec Construction Code 2005

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1-04/CSA-A23.2-04, “Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete”.

.2 CSA-A23.3-04, “Design of Concrete Structures”.

.3 CSA B111-1974 (R2003), “Wire Nails, Spikes and Staples”.

.4 CSA-S269.1-1975 (R2003), “Falsework for Construction Purposes”.

.5 CAN/CSA-S269.3-M92 (R2003), “Concrete Formwork, National Standard of Canada”.

1.4 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the CSST and other applicable acts administered by the authority having jurisdiction apply to the work of this section.

1.5 SAFETY

.1 Carry out work in accordance with the current Occupational Health and Safety Act and construction safety regulations.

1.6 QUALITY CONTROL

.1 The Contractor is not to assign the responsibility of coordination of forming, placing reinforcing steel, placing other required material and placing concrete. Ensure a full-time qualified superintendent representing the Contractor is in attendance to inspect and check all phases of this work.

Part 2 Products

2.1 FORMWORK MATERIALS

.1 Plywood:

.1 Douglas fir conforming to CSA-O121 or softwood conforming to CSA-O151 or CSA-O153 as required to resist design loads imposed upon the forming system. Regular grade select tight face. Sound, undamaged sheets with clean, true finish.

.2 Lumber: SPF species, No. 2 Grade or better, conforming to CSA-O141 and to the design requirements of CAN/CSA-O86.1 to resist applied loads required of the forming system.

.3 Anchorage devices (including nails, bolts, spikes and lag screws): Sized to ensure all formwork loadings are adequately resisted. Form ties for all concrete below grade or exposed to weather:

.1 Wood cement composites:

.2 Rigid insulation board: to CAN/ULC-S701

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

Part 3 Execution

3.1 FABRICATION AND ERECTION

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

.2 Verify lines, levels and centres before proceeding with formwork. Ensure that dimensions agree with drawings.

.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 Construct formwork, shoring and bracing accurately to meet design and code requirements so that resultant finished concrete conforms to shapes, lines, levels and dimensions indicated on drawings.

.5 Provide bracing to ensure stability of formwork as a whole. Prop or strengthen all previously constructed elements liable to be overstressed by construction loads.

.6 Arrange and assemble formwork so as to permit easy dismantling and stripping so that concrete is not damaged during its removal.

3.2 CLEANING FORMS

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

3.3 INSERTS/EMBEDDED PARTS/OPENINGS

.1 Provide formed openings/chases or slots where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.

.2 Refer to architectural, mechanical, and electrical for sleeves and openings required through structural components. These are not to reduce the structural capacity.

.3 Accurately locate and set in place all items that are to be cast directly in concrete.

.4 Coordinate work of other sections and cooperate with the trade involved in forming and/or setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts. Do not perform work unless specifically indicated on drawings or approved prior to installation.

.5 Do not place anchor bolts, sleeves and inserts into freshly placed concrete. Tie firmly into place prior to placing concrete.

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

.7 Install all concrete accessories in accordance with drawings and manufacturer's recommendations, straight, level and plumb. Ensure adequate support to prevent movement during concrete placement.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 The Scope of Work shall include the supply and installation of the steel reinforcing bars and welded wire mesh that is required for the concrete slab.

1.2 RELATED WORKK

.1	Concrete Forming and Accessories	Section 03 10 00
.2	Cast-in-Place Concrete	Section 03 30 00

1.3 REFERENCE STANDARDS

.1 Perform all work in accordance with the following standards, except where specified otherwise. All standards to be latest issue at time of tender.

.1 Quebec Construction Code 2005

.2 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004

.1 ACI 315-99, “Details and Detailing of Concrete Reinforcement”.

.2 ACI 315R-04, “Manual of Structural and Placing Drawings for Reinforced Concrete Structures”.

.3 Canadian Standards Association (CSA International)

.1 CSA-A23.1-04/CSA-A23.2-04, “Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete”.

.2 CSA-A23.3-04, “Design of Concrete Structures”

.3 CAN/CSA-G30.18-M92 (R2007), “Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada”.

.4 CSA-W186-M1990 (R2007), “Welding of Reinforcing Bards in Reinforced Concrete Construction”.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC 2004, “Reinforcing Steel Manual of Standard Practice”.

1.4 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to crossing and public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the CSST and other applicable acts administered by the authority having jurisdiction apply to the work of this section.

1.5 SAFETY

.1 Carry out cast-in-place concrete work in accordance with the current Occupational Health and Safety Act and construction safety regulations.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver all materials to the site in bundles easily identified and properly marked.

.2 Store and handle all material on site in a manner to prevent damage and contamination.

.3 Do not straighten or re-bend any reinforcement.

.4 Do not use any reinforcement that has been kinked or bent on site.

.5 Store epoxy-coated reinforcement on timbers or other non-abrasive cribbing to prevent sagging, and store away from long term direct sunlight. Cover as required.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Consultant.

.2 Reinforcing steel for straight reinforcing bars only: To CAN/CSA-G30.18,

.3 Reinforcing steel for welded and bent reinforcing bars: To CAN/CSA-G30.18

.4 Welded steel wire fabric: To CSA-G30.5 flat sheets.

.5 Welded deformed steel wire fabric: To CSA-G30.15 to CAN/CSA-G164 flat sheets.

.6 Chairs, bolsters, bar supports, spacers to meet requirements of CSA-A23.1/A23.2: Adequate for strength and support of reinforcing. Where concrete is exposed to view, exposed to elements or where rust is possible; use plastic or non-corrosive material, or precast concrete made from concrete of equal strength and durability of concrete to be placed. Chairs used are not to result in voids or unacceptable appearance in exposed concrete surfaces.

.7 Slab on grade chairs and bar supports: Precast concrete, plastic chairs, or subject to approval concrete masonry block or brick of correct height. Metal pipe, stone or wood are not acceptable. Chairs shall be compatible with void form where applicable.

.8 Tie wire: Minimum 1.6 mm type or patented system approved by the Consultant.

2.2 FABRICATION

.1 Fabricate reinforcement hooks, bends, laps and similar details to CSA-A23.1, ACI Detailing Manual 315 and Metric Supplement of the Reinforcing Steel Institute of Canada (RISC) Manual of Standard Practice and in accordance with the drawings and specifications and the reviewed shop drawings.

.2 Verify dimensions of existing work prior to commencing fabrication.

.3 Verify all drawing dimensions and conditions prior to commencing fabrication.

.4 Bend all reinforcement cold unless otherwise approved by the Engineer.

.5 Lap adjacent sheets of welded steel wire fabric to provide an overlap of at least one cross wire spacing plus 50 mm.

Part 3 Execution

3.1 FIELD BENDING

.1 Do not field bend weld reinforcement except where indicated or authorized by Consultant.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel in accordance with CSA-A23.1/A23.2.

.2 Place and secure all reinforcement in its correct position prior to placing any concrete. Do not adjust or place reinforcement in freshly placed concrete.

.3 Supply chairs to support temperature reinforcing or mesh to maintain minimum covers specified.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

- .1 ASTM C260-01, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 ASTM C330-04, Standard Specification for Lightweight Aggregates for Structural Concrete.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-51.34-M88, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA International)

- .1 CSA-A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A283-003, Qualification Code for Concrete Testing Laboratories.
- .3 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.

1.2 SUBMITTALS

.1 Submit testing results and reports for review by Consultant.

.2 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples

.3 Concrete hauling time: submit for review by Consultant deviations exceeding maximum allowable time of 120 min for concrete to be delivered to site of Work and discharged after batching.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

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

Part 2 Products

2.1 MATERIALS

.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Water: to CSA-A23.1

.3 Aggregates: to CAN/CSA-A23.1/A23.2

.4 Admixtures:

.1 Air entraining admixture: to ASTM C260.

2.2 MIXES

.1 Provide concrete mix to meet following hard state requirements:

.1 Minimum compressive strength at 28 days: 32MPa.

.2 Air entrainment: 5-8%.

.3 Slump: 80mm ±30mm

.4 Surface texture: non-skid finish

.2 Provide quality management plan to ensure verification of concrete quality to specified performance.

.3 Concrete supplier's certification.

Part 3 Execution

3.1 PREPARATION

.1 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing

.2 During concreting operations:

.1 Development of cold joints not allowed.

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

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

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

.5 Protect previous Work from staining.

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

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

3.2 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with 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 approval of modifications from Consultant before placing of concrete.

.2 Check 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 under supervision of appropriate trade prior to placing concrete.

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

.4 Finishing and curing:

.1 Finish concrete in accordance with CSA-A23.1/A23.2.

.2 Provide float finish unless otherwise indicated.

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

3.3 SURFACE TOLERANCE

.1 Concrete tolerance in accordance with CSA-A23.1/A23.2 straightedge method

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct following test and submit report.

.1 Concrete pours.

.2 Slump tests.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Consultant for review in accordance with CSA-A23.1/A23.2

.1 Ensure testing laboratory is certified in accordance with CSA A283.

.3 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Insulation.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

- .1 ANSI A208.1-1999, Particleboard, Mat Formed Wood.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA)

- .1 CSA B111-1974, Wire Nails, Spikes and Staples.
- .2 CSA O112 Series-M1977, CSA Standards for Wood Adhesives.
- .3 CSA O121-M1978, Douglas Fir Plywood.
- .4 CAN/CSA-O141-91, Softwood Lumber.
- .5 CSA O151-M1978, Canadian Softwood Plywood.
- .6 CAN/CSA-O325.0-92(R1988), Construction Sheathing.
- .7 CAN3-O437 Series-93, Standards on OSB and Waferboard.

.4 National Lumber Grades Authority (NLGA)

- .1 Standard Grading Rules for Canadian Lumber 2000.
- .2 CAN3-O437 Series-93, Standards on OSB and WaferboardNational Lumber Grades Authority (NLGA

.5 Truss Design and Procedures for Light Metal Connected Wood Trusses, Truss Plate Institute of Canada.

1.3 QUALITY ASSURANCE

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

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Do not burn scrap at the project site.

.2 Fold up metal banding, flatten, and place in designated area for recycling.

Part 2 Products

2.1 FRAMING AND STRUCTURAL MATERIALS

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

- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", Truss Plate Institute of Canada.

.3 Structural Composite Lumber (SCL) in accordance with ASTM D5456.

.4 Framing and board lumber: in accordance with NBC,

.5 Furring, blocking, nailing strips, grounds, rough bucks, and fascia backing:

- .1 Board sizes: "Standard" or better grade.
- .2 Dimension sizes: "Standard" light framing or better grade.
- .3 Post and timbers sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

.1 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.0.

.2 Douglas fir plywood (DFP): to CSA O121, standard construction.

.3 Mat-formed structural panelboards (OSB wafer): to CAN3-O437.0.

2.3 ACCESSORIES

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32 single ply

.2 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick.

.3 Roll roofing: to CSA A123.2, Type S.

.4 Air seal: closed cell polyurethane or polyethylene.

.5 General purpose adhesive: to CSA O112 Series.

.6 Nails, spikes and staples: to CSA B111.

.7 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.8 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.9 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

2.4 FASTENER FINISHES

.1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for exterior work.

Part 3 Execution

3.1 INSTALLATION

.1 Comply with requirements of Quebec Construction Code 2005 Part 9 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Install OSB and plywood wall sheathing in accordance with manufacturer's printed instructions.

.4 Install roof trusses and roof furring in accordance with requirements of NBC.

.5 Install furring and blocking as required to wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.

.6 Install furring to support siding applied vertically where sheathing is not suitable for direct nailing.

.7 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.8 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.9 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.2 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 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.3 SCHEDULES

.1 Exterior and interior wall sheathing:

.1 Plywood, ship lapped, one good side, 19 mm thick.
.2 OSB, 16 mm thick.
.3 Construction sheathing product: end use mark [W24].

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Material and installation for prefabricated wood trusses.

.2 Related Sections:

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA O80 Series-97(R2002), Wood Preservation.

.2 CAN/CSA-O86-01, Engineering Design in Wood.

.3 CAN/CSA-O141-91(R1999), Softwood Lumber.

.4 CSA S307-M1980(R2001), Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings.

.5 CSA S347-99(R2004), Method of Test for Evaluation of Truss Plates Used in Lumber Joints.

.6 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.2 National Lumber Grades Authority (NLGA)

.1 NLGA-03, Standard Grading Rules for Canadian Lumber.

.3 National Research Council (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC)

.1 CCMC-2014, Registry of Product Evaluations.

.4 Truss Plate Institute of Canada (TPIC)

.1 TPIC - 1996 (R2001), Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses (Limit States Design).

1.3 DESIGN REQUIREMENTS

.1 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for wood truss chords and webs in accordance with engineering properties in CAN/CSA-O86.

.2 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for truss joint designs to test engineering properties in accordance with CSA S347 and listed in CCMC Registry of Product Evaluations.

.3 Design trusses, bracing bridging in accordance with CAN/CSA-O86.1 for building locality as ascertained by NBC, Climatic Information for Building Design in Canada.

.4 Limit live load deflection to 1/360th of span where plywood ceilings are hung directly from trusses.

.5 Limit live load deflections to 1/180th of span unless otherwise specified or indicated.

.6 Provide camber for trusses as indicated.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Fabricator for trusses to show evidence of quality control program such as provided by regional wood truss associations, or equivalent.

.2 Fabricator for welded steel connections to be certified in accordance with CSA W47.1.

1.5 SUBMITTALS

.1 Product Data:

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

.2 Shop Drawings:

.3 Each shop drawing submission to be signed and stamped by professional engineer registered or licensed in Quebec, Canada.

.4 Indicate special structural application and specification as according to local authorities having jurisdiction.

.5 Indicate TPIC Truss Design Procedure and CSA O86 Engineering Design in Wood and specific CCMC Product Registry number of the truss plates

.6 Indicate species, sizes, and stress grades of lumber used as truss members. Show pitch, span, camber, configuration and spacing of trusses. Indicate connector types, thicknesses, sizes, locations and design value. Show bearing details. Indicate design load for members.

.7 Show location of lateral bracing for compression members.

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

1.6 DELIVERY, STORAGE AND HANDLING

.1 Storage and Protection:

.1 Store trusses on job site in accordance with manufacturer's instructions. Provide bearing supports and bracings. Prevent bending, warping and overturning of trusses.

Part 2 Products

2.1 MATERIALS

.1 Lumber: to meet Quebec Construction Code requirements, with maximum moisture content of 19% at time of fabrication and to following standards:

.1 CAN/CSA-O141.

.2 NLGA (National Lumber Grading Association), Standard Grading Rules for Canadian Lumber.

.2 Fastenings: to CAN/CSA-O86.

2.2 FABRICATION

.1 Fabricate wood trusses in accordance with approved shop drawings.

.2 Provide for design camber and roof slopes when positioning truss members.

.3 Connect members using plywood gussets.

2.3 SOURCE QUALITY CONTROL

.1 Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 ERECTION

.1 Erect wood trusses in accordance with shop drawings.

.2 Handling, installation, erection, bracing and lifting in accordance with manufacturers instructions.

.3 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.

.4 Install permanent bracing in accordance with approved shop drawings, prior to application of loads to trusses.

3.3 CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment on completion of installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ASTM C208-95(2001), Specification for Cellulosic Fiber Insulating Board.

.2 ASTM C591-01, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

.3 ASTM C1126-[04], Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.

Part 2 Products

2.1 SUSTAINABLE REQUIREMENTS

2.2 INSULATION

.1 Extruded polystyrene (XPS) to CAN/ULC-S701.

.1 Type: 4.

.2 Compressive strength: 30 psi.

.3 Thickness: 150 mm.

.4 Edges: butt joints, with staggered joints.

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 WORKMANSHIP

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 Offset both vertical and horizontal joints in multiple layer applications.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ASTM C553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 ASTM C665-01e1, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.3 ASTM C1320-05, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.Products

1.2 INSULATION

.1 Batt and blanket mineral fibre: to CAN/ULC S702.

.1 Type: 1.

.2 Thickness: as indicated.

1.3 ACCESSORIES

.1 Attic roof-space baffles to prevent blanket insulation from blocking air circulation at the eaves.

Part 2 Execution

2.1 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.

2.2 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

2.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S705.1-01, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Material Specification.

.2 CAN/ULC-S705.2-02, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Installer's Responsibilities-Specification.

1.2 SAFETY REQUIREMENTS

.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:

.1 Workers must wear gloves dust masks, long sleeved clothing, eye protection when applying foam insulation.

.2 Workers must not eat, drink or smoke while applying foam insulation.

1.3 ENVIRONMENTAL REQUIREMENTS

.1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

Part 2 Products

2.1 MATERIALS

.1 Insulation: spray polyurethane to CAN/ULC-S705.1.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

Part 3 Execution

3.1 APPLICATION

.1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions. Use primer where recommended by manufacturer.

.2 Apply sprayed foam insulation in thickness to fill rough-stud openings for the door frame and window frame.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

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

Part 2 Products

2.1 SHEET VAPOUR BARRIER

.1 Polyethylene film: to CAN/CGSB-51.34, 0.15 mm thick.

2.2 ACCESSORIES

.1 Joint sealing tape: air resistant pressure sensitive adhesive tape, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

.2 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer. Staples: minimum 6 mm leg.

.3 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install sheet vapour retarder on warm side of exterior wall, ceiling, and floor assemblies prior to installation of concrete and plywood to form continuous retarder.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.2 EXTERIOR SURFACE OPENINGS

.1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

3.3 PERIMETER SEALS

.1 Seal perimeter of sheet vapour barrier as follows:

.1 Apply continuous bead of sealant to substrate at perimeter of sheets.

.2 Lap sheet over sealant and press into sealant bead.

.3 Install staples through lapped sheets at sealant bead into wood substrate.

.4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.4 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour barrier as follows:

.1 Attach first sheet to substrate.

.2 Apply continuous bead of sealant over solid backing at joint.

.3 Lap adjoining sheet minimum 150 mm and press into sealant bead.

.4 Install staples through lapped sheets at sealant bead into wood substrate.

.5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 ELECTRICAL BOXES

.1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:

.1 [Install moulded box vapour barrier] [Wrap boxes with film sheet providing minimum 300 mm perimeter lap flange].

.2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

3.6 CLEANING

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Requirements for the installation of wood shingles on roofs.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

- .1 CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.
- .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3 CSA O118.2-M1981(R2002), Eastern White Cedar Shingles.
- .4 CAN/CSA-Z808-96, A Sustainable Forest Management System: Guidance Document

.2 Cedar Shake and Shingle Bureau (CSSB).

- .1 CSSB-97, Cedar Shake and Shingle Grading Rules.
- .2 CSSB New Roof Construction Manual for Roof Application Details 2002.

1.3 DEFINITIONS

.1 Shingle: tapered slice of wood sawn from block with taper in direction of grain or axial direction.

1.4 SUBMITTALS

.1 Product Data:

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

.2 Samples:

- .1 Submit samples

.3 Manufacturer's Instructions:

- .1 Submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

- .1 Deliver, handle, store and protect materials
- .2 Remove only in quantities required for same day use.

.2 Storage and Protection:

- .1 Provide and maintain dry, off-ground weatherproof storage.

1.6 UNUSED MATERIALS

.1 Unused shingles remain property of owner.

.2 Label packages to identify product, quantity and manufacturer/supplier.

Part 2 Products

2.1 MATERIALS

.1 White cedar shingles: to CSA O118.2, 400 mm length, random width, square pattern, B (Clear) Grade

.2 Roofing felt: to CSA A123.3, perforated asphalt felt; No.15 unless otherwise specified.

.3 Nails: to CSA O118.1, Appendix E.

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 APPLICATION

.1 Do wood shingle work in accordance with NBC and CSA O118.1, Appendix C

.2 Install shingles over open strapping.

.3 Space shingles and from 6 to 10 mm.

.4 Stagger joints minimum of 40 mm in succeeding courses. Ensure that in any 3 courses no two joints are in alignment.

.5 Use two nails per shingle. Space nails 20 mm from edge and 40 mm above butt line of following course.

.6 Drive nails flush but do not crush shingles.

3.3 SHINGLE ROOFING

.1 Eave protection:

- .1 Install 2-ply Type No.15 roofing felt system.
- .2 Underlayment:
  - .1 Install 450 mm wide strip of No.15 asphalt-saturated felt underlayment over wood shakes after applying each course.

.2 Double shingles at eaves, projecting butts 40 mm from [bottom strapping. Project shingles 19 mm minimum at gable ends.

.3 Lay shingles with grain perpendicular to eaves.

.4 Saw shingles parallel to valley centre line. Do not break joints into valley.

.5 Install bottom step flashing (soaker base flashing) interleafed between shingles at vertical junctions.

3.4 CLEANING

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

.2 Remove roofing nails that have fallen on ground using high powered, earth magnets or other collection devices.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Requirements for installation of cedar siding.

1.2 RELATED SECTIONS

.1 Section 07 62 00 - Sheet Metal Flashing and Trim.

.2 Section 07 92 00 - Joint Sealing.

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB).

- .1 CAN/CGSB-11.3-M87, Hardboard.
- .2 CAN/CGSB-11.5-M87, Hardboard, Precoated, Factory Finished, for Exterior Cladding.
- .3 CAN/CGSB-11.6-M87, Installation of Exterior Hardboard Cladding.
- .4 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.2 Canadian Standards Association (CSA International).

- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O121-M1978(R1998), Douglas Fir Plywood.
- .3 CSA O151-M1978(R1998), Canadian Softwood Plywood.
- .4 CAN/CSA-Z808-96, A Sustainable Forest Management System: Guidance Document.

.3 National Lumber Grades Authority (NLGA).

- .1 NLGA Standard Grading Rules for Canadian Lumber 2003.

1.4 SUBMITTALS

.1 Product Data:

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

.2 Samples:

- .1 Submit samples to consultant for approval.

.3 Manufacturer's Instructions:

- .1 Submit manufacturer's installation instructions.

Part 2 Products

2.1 MATERIALS

.1 Lumber siding: to NLGA Standard Grading Rules for Canadian Lumber.

- .1 Rustic Channel siding: western red cedar, grade: STK, grain: saw texture.

.2 Plywood siding:

.1 Plywood panel siding: to CSA O121, 19 mm thick, one good side.

.3 Accessories: exposed trim, closures, cap pieces of manufacturer's standard as required.

.4 Fasteners: nails to CSA B111, hot galvanized steel, sized as required, smooth shank with flat finishing head.

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 siding to CGSB11-GP-6M and manufacturers' instructions.

.2 Install sill flashings, wood starter strips, inside corner flashings, edgings and flashings over openings.

.3 Fasten wood siding in straight, aligned lengths to furring at 400 mm on centre maximum using two nails at each fixing location.

.4 Fasten plywood siding so that edges are supported. Maintain 1.5 mm wide gap between sheets. Nail at 300 mm on centre along intermediate supports.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 The Aluminum Association Inc. (AA)

.1 Aluminum Sheet Metal Work in Building Construction-2000.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.2 CAN/CGSB-93.1-[M85, Sheet Aluminum Alloy, Prefinished, Residential.

Part 2 Products

2.1 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated prefinished steel.

2.2 EAVES TROUGHS AND DOWNPIPES

.1 Form eaves troughs and downpipes from prefinished aluminum sheet metal.

.2 Sizes and profiles as indicated.

.3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.

Part 3 Execution

3.1 INSTALLATION

.1 Install sheet metal work in accordance with standard practice.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.

.4 Lock end joints and caulk with sealant.

3.2 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at 750 mm on centre with eaves trough spikes through spacer ferrules. Slope eaves troughs to downpipes as indicated. Seal] joints watertight.

.2 Install downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps at 1800 mm on centre; minimum two straps per downpipe.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials, preparation and application for caulking and sealants.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.2 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).

.3 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.4 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Urethanes One Part.

.1 Self-Leveling to CAN/CGSB-19.13, Type 1, colour: to be determined.

.2 Silicones One Part.

.1 To CAN/CGSB-19.13.
.2 Mildew resistant

.3 Preformed Compressible and Non-Compressible back-up materials.

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
.1 Extruded closed cell foam backer rod.
.2 Size: oversize 30 to 50 %.

.2 Bond Breaker Tape.
.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Seal interior perimeters of exterior openings: Silicone

.2 Perimeters of interior frames: Silicone

.3 Window and door frames with cedar siding: One part Urethane

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

Part 3 Execution

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant.

- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.

- .1 Cure sealants in accordance with sealant manufacturer's instructions.

.3 Cleanup.

- .1 Clean adjacent surfaces immediately and leave Work neat and clean.
- .2 Remove excess and droppings, using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 08 71 10 - Door Hardware - General.

1.2 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).

.1 Quality Standards for Architectural Woodwork [1998].

.2 Canadian Standards Association (CSA International).

.1 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.

.2 CSA Certification Program for Windows and Doors.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:

.1 Protect door from dampness. Arrange for delivery after work causing abnormal humidity has been completed.

.2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.

.3 Protect doors from scratches, handling marks and other damage.

Part 2 Products

2.1 WOOD FLUSH DOORS

.1 Solid core: to CAN/CSA-O132.2.1.

.1 Construction:

.1 Solid wood core

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 doors and hardware in accordance with manufacturer's printed instructions.

.2 Adjust hardware for correct function.

3.3 ADJUSTMENT

.1 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

3.4 CLEANING

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

.2 Remove traces of primer, caulking; clean doors and frames.

.3 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 0 92 10 - Joint Sealing: caulking of joints between frames and other building components.

.2 Section 07 21 19 - Foamed-in-Place Insulation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA) International

.1 CSA-A440/A440.1 Windows / Special Publication A440.1, User Selection Guide to CSA Standard A440-, Windows.

Part 2 Products

2.1 MATERIALS

.1 Materials: to CSA-A440/A440.1 supplemented as follows:

.2 Sash: wood.

.3 Main frame: wood.

.4 Wood species: for paint finish.

.5 Glass: 6mm tempered glass.

2.2 WINDOW TYPE AND CLASSIFICATION

.1 Type:

.1 Fixed: with single pane tempered glass.

2.3 FABRICATION

.1 Fabricate unit square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.2 Face dimensions detailed are maximum permissible sizes.

.3 Brace frames to maintain squareness and rigidity during shipment and installation.

2.4 GLAZING

.1 Glaze windows in accordance with CSA-A440/A440.1.

2.5 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with site installed air barrier material for sealing to building air barrier as follows:

Part 3 Execution

3.1 WINDOW INSTALLATION

.1 Install in accordance with CSA-A440/A440.1.

.2 Arrange components to prevent abrupt variation in colour.

3.2 SILL INSTALLATION

.1 Secure sills in place with anchoring devices located at ends and evenly spaced 600 mm on centre in between.

3.3 CAULKING

.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

.2 Apply sealant in accordance with Section 07 92 10 - Joint Sealing.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 08 14 16 - Flush Wood Doors.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-69.17-M86(R1993), Bored and Preassembled Locks and Latches.
.2 CAN/CGSB-69.18-M90/ANSI/BHMA A156.1-1981, Butts and Hinges.
.3 and Latches.
.4 CAN/CGSB-69.29-93/ANSI/BHMA A156.13-1987, Mortise Locks and Latches.
.5 CAN/CGSB-69.30-93/ANSI/BHMA A156.14-1991, Sliding and Folding Door Hardware.
.6 CAN/CGSB-69.33-M90/ANSI/BHMA A156.17-1987, Self-closing Hinges and Pivots.
.7 CAN/CGSB-69.34-[93]/ANSI/BHMA A156.18-1987, Materials and Finishes.

1.3 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

1.4 DOOR HARDWARE

.1 Locks and latches:

.1 Bored and preassembled locks and latches: to CAN/CGSB-69.17
.2 Knob : plain design.
.3 Escutcheons : square.
.4 Normal strikes: box type, lip projection not beyond jamb.
.5 Cylinders: key into keying system.

.2 Butts and hinges:

.1 Butts and hinges: to CAN/CGSB-69.18.

.3 Door Closers and Accessories:

.1 Door controls (closers): to CAN/CGSB-69.20.
.2 Closer/holder release devices: to CAN/CGSB-69.31SPEC NOTE: CAN/CGSB-69.26 and CAN/CGSB-69.35 specify various components for automatic swinging and sliding doors such as sensing devices, guard rails and door operators.

.4 Architectural door trim: to CAN/CGSB-69.22

.1 Door protection plates: kick plate type, 1.27 mm thick aluminum

.5 Thresholds: full width of door opening, extruded aluminum mill finish, plain surface, with thermal break of rigid PVC.

.6 Weatherstripping:

.1 Head and jamb seal:

.1 Extruded aluminum frame and hollow closed cell neoprene, clear anodized finish.

.2 Door bottom seal:

.1 Extruded aluminum frame and closed cell neoprene, clear anodized finish.

.7 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.8 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.9 Exposed fastening devices to match finish of hardware.

.10 Use fasteners compatible with material through which they pass.

1.5 KEYING

.1 Door to be master keyed with the existing building.

.2 Provide three masterkeys.

Part 2 Execution

2.1 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.

.2 Furnish wood door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Furnish manufacturers' instructions for proper installation of each hardware component.

2.2 INSTALLATION

.1 Install hardware to standard hardware location dimensions in accordance with standard practises.

2.3 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to provide tight fit at contact points with frames.

2.4 CLEANING

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

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions.

.3 Remove protective material from hardware items where present.

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

2.5 SCHEDULE

.1 Doors A1:

.1 3-1/2 pr butts hinges

.2 1 lockset.

.3 1 kickplate 203 mm high 630.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Moisture testing of substrates.

.2 Material and installation of site applied paint finishes to new interior and exterior surfaces.

.3 Surface preparation of substrates as required for acceptance of paint, including cleaning, small crack repair, patching, caulking, and making good surfaces and

1.2 SUBMITTALS

.1 Submit product data and manufacturer's installation/application instructions for paints and coating products to be used.

.2 Upon completion, submit records of products used. List products in relation to finish system and include the following:

.1 Product name, type and use (i.e. materials and location).
.2 Manufacturer's product number.
.3 Colour code numbers.
.4 MPI Environmentally Friendly classification system rating.
.5 Manufacturer's Material Safety Data Sheets.

1.3 EXTRA MATERIALS

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

.2 Deliver and store where directed by contractor.

1.4 SITE REQUIREMENTS

.1 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test existing painted concrete floors for moisture using a simple "cover patch test".
.2 Do not perform repainting work when maximum moisture content of substrate exceeds:
.1 15% for wood.

.2 Application Requirements:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind conditions are such that airborne particles will affect quality of finished surface.
.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.
.3 Do not apply paint when:
.1 Temperature is expected to drop below 10^{o}C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.4 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are 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.

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project.

.2 Paints and coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).

.3 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.

2.2 COLOURS

.1 Exterior Colours P2 Black, P3: Sico super Latex, Base: 266-304, colour 3096-64

.2 Interior Colours: P1: White, P4: Epoxy paint grey

.3 First coat in a two coat (Premium) paint system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 EXTERIOR PAINTING SYSTEMS

.1 REX 6.3 - Dressed Lumber: (doors, door and window frames, casings, battens, smooth fascias, etc.)

.1 REX 6.3L - Latex Flat Finish on Doors.

.2 REX 6.4 - Wood Panelling: (plywood siding, fascias, soffits, etc.).

.1 REX 6.4G – Latex, matte.

2.4 INTERIOR PAINTING SYSTEMS

.1 Concrete horizontal surfaces: floors:

.1 INT 3.2C - Epoxy finish.

.2 Dressed lumber: including doors, door and window frames, casings, mouldings:

.1 INT 6.3T - Latex egg-shell finish (over latex primer).

.3 Wood paneling and casework: partitions, panels, shelving, millwork:

.1 INT 6.4R - Latex egg-shell finish over latex primer.

Part 3 Execution

3.1 GENERAL

.1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting requirements except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.2 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces.

.2 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas.

3.3 CLEANING AND PREPARATION

.1 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Manual requirements.

.2 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects from previously painting (e.g. runs, sags, etc.) that are visible from a distance up to 1000 mm.

3.4 APPLICATION

.1 Apply paint by method that is best suited for substrate being repainted using brush or roller. Conform to manufacturer's application instructions unless specified otherwise

.2 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 to be free of roller tracking and heavy stipple.

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

.3 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access.

.4 Apply paint coats in a continuous manner and allow surfaces to dry and properly cure between coats for minimum time period as recommended by manufacturer. Minimum dry

film thickness of coats shall not be less than that recommended by the manufacturer. Repaint thin spots or bare areas before next coat of paint is applied.

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

.6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.7 Finish to doors shall include all edges including top and bottom edges. Surfaces concealed by door hardware shall also be repainted unless otherwise pre-approved.

3.5 CLEAN-UP

.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

.2 Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

.3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

.4 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction and as noted herein.

3.6 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on affected exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 This Section covers items common to all sections of Division 26 and is intended only to supplement the requirements of Division 1.

.3 Conform to requirements of Contract Documents.

1.2 INTERRUPTION OF EXISTING SERVICES AND WORK IN EXISTING BUILDING

.1 Protect and maintain in operation all existing services and systems.

.2 Perform all required shutdowns outside of normal working hours at no increase in cost if requested by Owner.

.3 Obtain written permission of Owner at least two working days in advance of any shut down required for tie-in of new construction systems. Written request for shut down permission must clearly identify exact extent of system(s) affected, time and duration.

.4 Work in existing portions of building must be performed at time in accordance with construction schedule as authorized by Owner.

.5 Where new equipment is required to match existing systems it shall match existing manufacturer characteristics and quality and be compatible in all respects.

.6 A completely new fire alarm system is specified for the buildings. The existing fire alarm system is to remain in operation in each area until the new fire alarm system is complete and verified. After verification when the unqualified report has been sent to and reviewed by the Consultant and with the concurrent of the Consultant the existing fire alarm system shall be completely removed throughout the duration of the project, at end of each workday the fire alarm system shall be operating.

.7 To aid contractor in performing renovations one copy of original building electrical documents will be made available to the successful Tenderer by Owner. These documents are to be maintained at site office throughout the duration of project for reference purposes. These drawings do not accurately reflect the existing installation in some instances and the contractor must verify in place the as-installed conditions. No extras or consideration of any kind will be granted due to the inaccuracy of these documents or the Contractor’s failure to adequately survey.

.8 Where conduit and wire panelboard feeders must be extended replace entire cable length. Joints will not be permitted.

.9 Circuit numbers indicated for existing panels are for grouping purposes only. Rearrange breaker positions to suit space available. Provide new breakers for all new loads.

.10 Tenderers shall review documents of all trades and the site to ascertain complete extent of removal of existing electrical equipment, conduit and wiring. This contractor is responsible for removing and making safe all conduit and wiring (power and communication) within ceiling space, partitions being removed and as noted. Remove all existing conduit, wiring and equipment rendered redundant by this renovation.

.11 Tenderers must abide by the Construction schedule in all respects.

.12 This contractor is responsible for removal and reinstallation of electrical coverplates or devices to allow for new finishes. Realign boxes flush with new finish as required.

.13 Store removed equipment intended for reuse at location designated by Owner.

.14 Tenderers must be completely familiar with architectural details, wall and ceiling finishes. Where ceiling finishes or spaces are removed reroute electrical installation so as to be concealed within finished areas. Tenderers are cautioned that available routings for conduits, etc. throughout project will not be "shortest path". Align all devices and ceiling mounted items with final finish. Proper allowances must be carried within stipulated price and no will be considered in this regard.

.15 Certain portions of existing building will remain in operation, occupied, and / or open to the public throughout duration of project. Work in these areas must be performed only at times authorized by Owner. Allow in tender price for this work to be performed outside hours in which the building is open to the public. Refer to Division 1 for additional requirements.

.16 Do not reuse or reconnect to AC-90 type cables (BX) which do not include a copper ground wire. Where new work must interface with existing replace non code conforming wiring.

.17 Certain areas of the building are to be finished without ceilings leaving the structure exposed. Refer to architectural drawings for extent and location. In these areas do not run electrical services except as required to serve devices within area. Where areas have exposed structure required electrical services must be run with special care in terms of alignment and symmetry and co-ordination with other building elements and services.

.18 Submit a detailed co-ordination layout drawing for each such area for architectural consultant review prior to commencing installation.

1.3 DEMOLITION

.1 This contractor is required to disconnect systems, isolate and make safe as required all existing electrical work and wiring rendered redundant by this renovation. Remove wiring and conduit back to panel and revise panel directories. Remove all associated conduits and hangers. Remove all electrical equipment, luminaires, devices, etc. considered redundant by this renovation.

.2 All existing material on site is the property of the Owner. This contractor shall remove from site all electrical items unless instructed otherwise by the Owner.

.3 Prior to removal procedures, contractor must co-ordinate with general contractor and Owner to generate a list of electrical equipment being removed.

.1 List must itemize the following:

.1 Equipment designated for handover to Owner.

.2 Equipment Designated for relocation.

.3 Equipment designated for disposal from site.

.4 Do not disconnect or remove any tenant or service provider owned equipment without prior written approval.

.5 This contractor to allow in base tender the cost to provide all temporary services required to maintain operation of systems and services.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 SCOPE

.1 Remove all the conduits, all equipment and all existing cables became redundant due to renovations.

1.3 REFERENCE STANDARDS

.1 Unless otherwise specified, carry out demolition work in accordance with CSA S350-M1980, Code of Practice for Safety in Demolition of Structures.

1.4 EXISTING CONDITIONS

.1 Visit and examine the site and note all characteristics and irregularities affecting the work of this Section.

1.5 DEMOLITION

.1 Protect and maintain in operation all existing services and systems as required.

.2 Perform all required shutdowns outside of normal working hours at no increase in cost if requested by Owner.

.3 Work in existing portions of building must be performed at time in accordance with construction schedule as authorized by Owner.

.4 Tenderers shall review documents of all trades and the site to ascertain complete extent of removal of existing electrical equipment and wiring. This contractor is responsible for removing and making safe all wiring (power and communication) within ceiling space, partitions being removed and as noted. Remove all wiring and equipment rendered redundant by this renovation.

.5 Tenderers must abide by the Construction schedule in all respects.

.6 Store removed equipment intended for reuse at location designated by Owner.

.7 This contractor is required to disconnect, isolate and make safe as required all existing electrical work and wiring rendered redundant by this renovation.

.8 Contractor to disconnect and make safe all services to building to allow for complete demolition of building. Services to be disconnected at property line.

.9 Contractor to coordinate with all utilities prior to disconnecting all services to building.

.10 Contractor to coordinate for removal of all utility owned equipment with utilities prior to disconnecting and removal of equipment.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 This Section covers items common to all sections of Division 26 and is intended only to supplement the requirements of Division 1.

.3 Conform to requirements of Contract Documents.

1.2 ACCESS PANELS AND DOORS

.1 In general electrical work is to be laid out in a manner to avoid the necessity of access panels and/or doors within finished areas.

.2 Where permitted provide access panels and doors wherever required for access to junction boxes or equipment.

.3 Supply all panels, doors and frames to the appropriate Division for installation at the cost of this Division.

.4 Indicate all access panels and doors on construction drawings. Do not install any access panels or doors without prior approval of Consultant. Indicate location of all access panels and doors on Record Drawings.

.5 Minimum sizes shall be 150 mm x 150 mm (6" x 6") for hand access, 600 mm x 600 mm (24" x 24") for person access.

.6 Supply access doors with fire rating equal to the surfaces in which installed.

.7 Supply details of doors and floor plans showing each proposed door to consultant for review prior to installation.

.8 Mark all lay-in tiles that are used for access in a manner approved by the Consultant.

.9 Use ULC labelled rated access doors in all fire rated assemblies.

1.3 ABBREVIATIONS AND DEFINITIONS

.1 The following abbreviations apply to this Division. Any abbreviations not listed will be as defined by ASHRAE.

.1	CSB	-	Canadian Government Specification Board
.2	CSA	-	Canadian Standards Association
.3	dB	-	Decibel
.4	Degrees C	-	Degrees Celsius
.5	Degrees F	-	Degrees Fahrenheit

.6	EEMAC	-	Electrical & Electronic Manufacturers' Association of Canada
.7	FM	-	Factory Mutual
.8	ft	-	Foot or Feet
.9	hp	-	Motor Horsepower
.10	IAOC	-	Insurance Advisory Organization of Canada
.11	in	-	Inch or Inches
.12	kW	-	Kilowatt
.13	mm	-	Millimetre
.14	m	-	Metre
.15	m/s	-	Metres Per Second
.16	NBC	-	National Building Code
.17	NBS	-	National Bureau of Standards
.18	NC	-	Noise Criterion as Defined by ASHRAE
.19	NEMA	-	National Electrical Manufacturer's Association
.20	NFPA	-	National Fire Protection Association
.21	PUC	-	Public Utilities Commission
.22	rpm	-	Revolutions per Minute
.23	UL	-	Underwriters' Laboratories
.24	ULC	-	Underwriters' Laboratories of Canada
.25	W	-	Watt

.2 Notwithstanding definitions in Document CCDC-2, the following definitions apply to this division:

.1 Supply - shall mean supply only.

.2 Install - shall mean install only.

.3 Provide - shall mean to supply and install and pay for.

.4 Product - shall mean all materials, equipment, tools, machinery, fixtures and ancillaries.

.5 Division 26 Work - shall mean the total installation to achieve complete and operating systems, including all products, labour costs and services.

.6 Tender documents - shall mean all documents issued with this package, and itemized accordingly.

.7 Tender documents - shall mean all drawings and specifications; revisions to the drawings and specifications, all instructions to bidders, bid forms and contracts.

.8 Defect shall mean an item of work required by the Contract which has been installed but requires repair and/or replacement at a specific time.

.9 Deficiency shall mean an item of Work required by the Contract which has not been installed or put into operating condition.

.10 Warranty item shall mean an item of Work, installed under the Contract which the manufacturer or installer agrees to maintain in, or restore to perfect condition for a

specific period of time, after the Owner's acceptance of the Work as being substantially completed.

1.4 ALTERNATIVES AND SUBSTITUTIONS

.1 Products that are substituted must be electrically and mechanically interchangeable with the product specified. Samples of the proposed substitutions must be submitted prior to approval. Only written approval of substitutions will be allowed. Any substitutions without written approval are done at the risk of the contractor. Unacceptable substitutions will be rejected without explanation or appeal.

.2 The contractor shall be responsible for the performance and extra cost or liability of all substitutions and alternatives including engineering review fees which will be charged to the contractor on a time and material basis and drawing/specification modification fees.

.3 In the event that a specified product cannot be supplied by a manufacturer, written confirmation is required prior to an alternative being considered.

1.5 CERTIFICATION

.1 Provide manufacturer's written certification of the installation and operation of all systems and major equipment.

1.6 CLEANING

.1 Clean all tubs and electrical equipment surfaces. Remove all debris from site in a timely manner.

.2 Do final cleaning of all electrical components.

.3 At time of final cleaning, clean lighting reflectors, lenses, lamps and other lighting surfaces that have been exposed to construction.

.4 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.5 Clean, prime and paint exposed hangers, racks, fastenings to prevent rusting.

.6 At completion of project remove all tools from the site.

1.7 COLOUR CODING AND FINISHES

.1 Shop finish all metal equipment and enclosures. Use standard ASA 61 grey unless otherwise specified.

.2 Each individual system will be separately colour coded throughout the building with a colour unique to the system.

.3 Paint the inside of each outlet box, surface junction box, pull box, where recessed mounted and paint the box if located above the finished ceiling.

.4 Feeders shall be colour coded with coloured tape wrapped at each end.

.1 Red - Phase A.

.2 Black - Phase B.

.3 Blue - Phase C.

.4 White – Neutral.

.5 Green – Ground.

.5 Emergency Power - International Orange #F65E37.

.6 Fire Alarm – Red.

.7 UPS - Solid Gold Tristar.

.8 Motor Feeders – Grey.

.9 Auxiliary Systems

.1 Security – Orange.

.2 Telephone and Data – Purple.

.3 Intercom – Magenta.

.4 Assistive Hearing System – Lavender.

.5 Sound Reinforcement – Blue.

.6 Closed Circuit T.V. – Brown.

1.8 CONCEALMENT

.1 All conduit and cables are to be concealed within architectural finishes except mechanical and electrical rooms.

.2 Where finishes do not permit the concealment of electrical installation obtain the consultant's direction before proceeding.

1.9 CONCRETE, EXCAVATION & BACKFILL (BY OTHERS)

1.10 CONNECTION OF EQUIPMENT

.1 Provide all connections required by the equipment supplied by this Division.

.2 Provide all connections required by equipment supplied by the Owner or by other Divisions unless otherwise stated. Examine all Drawings and Specifications and identify all requirements.

.3 Provide all necessary accessories to make connections, including flexible connectors, etc.

.4 Electrical connections to all vibration - isolated equipment including transformers should be made with flexible conduit and not less then 3 feet (1m) length and installed in a slack ‘U’ shape.

1.11 CONSULTANT FIELD REVIEW

.1 The consultant shall:

.1 Make periodic visits to the site to determine, on a rational sampling basis, the progress and whether the work is in general conformity with the plans and specifications for the building with particular attention to life safety systems and other items governed by the building code.

.2 Record deficiencies found during site visits and provide brief written reports of the deficiencies, progress and the actions that must be taken to rectify the deficiencies.

.3 Review the reports of independent inspection and testing companies called for in the plans and specifications and which pertain directly to the work being reviewed.

.4 The Consultant may order any portion or portions of the Work to be examined to confirm that such work is in accordance with the requirements of the Contract Documents. If the work is not in accordance with the requirements of the Contract Documents, the Contractor shall correct the work and pay the cost of examination and correction. If the work is in accordance with the requirements of the Contract Documents, the Owner shall pay the cost of examination and restoration.

.5 Review shop drawings and samples submitted by the contractor for consistency with the intent of the plans and specifications.

.2 Neither the Owner's representatives, nor the Consultant will be responsible for the issue of extensive lists of deficiencies. Contractor assumes prime responsibility for ensuring that all items shown on Drawings and described in Specifications are completely and properly installed. Any inspections to approve Certificates of Substantial Performance will be immediately cancelled if it becomes obvious that extensive deficiencies are outstanding or work is incomplete.

.3 Every effort shall be made to ensure that both defects and deficiencies are made good prior to final inspection.

1.12 COORDINATION AND INTERFERENCE

.1 Examine the work of other Divisions upon which the work of this Division depends for proper completion and report any defect or interference to the Consultant prior to the commencement of the work of this Division.

.2 Confer and cooperate with other trades to avoid interference and to ensure the best use of available space.

.3 Prepare interference or detail drawings where necessary to ensure that all electrical equipment and materials can be installed and maintained in the space shown without interference with work of other Divisions.

.4 Particular attention must be paid to the proximity of electrical conduit and cable to mechanical piping and equipment.

.5 Electrical conduits shall not touch or be supported on pipe or duct walls.

.6 Each section shall confine itself to installing all materials in the spaces shown without encroaching upon space for materials installed under other sections or divisions. Where the space allocated to another section or division is encroached upon, the materials shall be relocated to their proper space allocation in such a manner to complete the work using space allocated to the various sections and divisions. Relocation of materials and work involved shall be paid for by the section responsible for the encroachment at no extra cost to the Owner.

.7 Supply all items to be built-in in ample time for rapid progress of work. Proceed with work determined by the construction schedule.

.8 Prepare interference and equipment placing drawings where necessary to ensure that all components will be properly accommodated within the spaces provided.

.9 Prepare drawings to indicate coordination and methods of installation of a system with other systems. Ensure that all details of equipment, apparatus, and connections are coordinated.

.10 Ensure that clearance required by authorities and for proper maintenance are indicated on drawings.

.11 Remove and replace work installed in error which is unsatisfactory for subsequent work.

1.13 CUTTING AND PATCHING

.1 Advise other Divisions and provide the necessary information so that the required openings and chases are left for the installation of the electrical equipment and materials.

.2 Should any cutting or repairing of either finished or unfinished work be required, the Subcontractor shall arrange for the particular trade involved to do such work and shall have the surfaces repaired by qualified tradesmen, at no extra cost to the Owner.

1.14 DRAWINGS, CHANGES AND INSTALLATION

.1 The drawings shall be considered to show the general character and scope of the work and not the exact details of the installation. The installation shall be complete with all accessories required for a complete and operative installation.

.2 The location, arrangement and connection of equipment and material as shown on the drawings represent a close approximation to the intent and requirements of the contract. The right is reserved by the Consultant to make reasonable changes required to accommodate conditions arising during the progress of the work, at no extra cost to the Owner. Allow for location adjustments up to 3m (10'-0") prior to rough-in at no change in contract price.

.3 Certain details indicated on the drawings are general in nature and specific labelled detail references to each and every occurrence of use are not indicated, however, such details shall be applicable to every occurrence on the drawings.

.4 The actual location of receptacles, switches, etc. shall be reviewed by the Consultant before installation.

.5 The location and size of existing services shown on the drawings are based on the best available information. The actual location of existing services shall be verified in the field before work is commenced. Particular attention shall be paid to buried services.

.6 Changes and modifications necessary to ensure coordination and to avoid interference and conflicts with other trades, or to accommodate existing conditions, shall be made at no extra cost to the Owner.

.7 Leave areas clear of piping and ducts where space is indicated reserved for future equipment, and equipment for other trades.

.8 Adequate space and provisions shall be left for servicing of equipment, with minimum inconvenience to the operation of systems.

.9 Where equipment is shown to be 'roughed-in only' obtain accurate information from the Consultant before proceeding with the work.

.10 Before roughing-in for installation, make certain that such items can be installed as shown on the drawings without interfering with the structure or the work of all other trades. Any problems that cannot be solved in agreement with the other trades affected, shall be submitted for decision. If equipment is prefabricated or installed prior to the investigation and reaching of a solution to possible interference problems, necessary changes in such prefabricated or installed items shall be made at no extra cost to the Owner.

.11 Location of light fixtures, devices and all other equipment shown on plans is diagrammatic. Layout of each device in finished areas is critical in terms of symmetry and location. Refer to Architectural Drawings and to site instructions in all regards. Any work not installed in correct location (at the sole discretion of the Architectural Consultant) shall be remedied by this Contractor at his expense. This Contractor is responsible for mark-out of his work, fully coordinated with all other trades, in sufficient time for review by Architectural Consultant prior to rough-in.

.12 Install all products and services to follow building planes. Installation shall permit free use of space and maximum headroom to the satisfaction of the Consultant.

.13 Confirm the exact location of fixtures, outlets and connections. Confirm location of connection points for equipment supplied under other Divisions.

.14 Install metering and / or sensing devices to provide accurate readings of quantities being measured and in a location that permits easy observation.

.15 Provide all hangers including vibration type to suit equipment weight, supports and fasteners such that no undue stresses are imposed on the structure and systems. Ensure that the load onto structures does not exceed the maximum loading as shown on structural drawings.

.16 Install all products and services in accordance with the manufacturer's recommendations.

.17 Explosive activated tools shall not be used.

1.15 EQUIPMENT NAMEPLATES

.1 Identify all existing and new electrical equipment with labels as follows:

.2 Nameplates:

.1 Lamicoid 3mm thick plastic engraving sheet, black face, white core, mechanically attached unless specified otherwise.

.1 Nameplate Sizes

.1	Size 1:	10 x 50mm	1 line	3mm high letters
.2	Size 2:	12 x 70mm	1 line	5mm high letters
.3	Size 3:	12 x 70mm	2 lines	3mm high letters
.4	Size 4:	20 x 90mm	1 line	8mm high letters

.5	Size 5:	20 x 90mm	2 lines	5mm high letters
.6	Size 6:	25 x 100mm	1 line	12mm high letters
.7	Size 7:	25 x 100mm	2 lines	6mm high letters
.8	Size 8:	50 x 200mm	3 lines	12mm high letters

.3 Labels:

.1 Lamicoid labels with 6mm high letters unless specified otherwise.

.2 Labels to name item, voltage and source of power.

.3 Labels (lamicoid nameplates) to have all edges bevelled.

.4 Where labels are not practically, mechanically attached, within the Consultant's authorization, may be adhesively affixed, using 2-sided affixatif adhesive tape, fully covering the back side of the nameplate label.

.4 Wording on nameplates and labels to be approved prior to manufacture.

.5 Labels to be provided on panels, disconnects, splitters, transformers, starters, motor control centres, dimmer boards and major system components.

.6 Identification shall be in English.

.7 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.8 Co-ordinate names of equipment and systems with Division 25 to ensure that identical names are used.

.9 Co-ordinate room names and numbers with final room names and numbers to be advised by Owner.

.10 On the inside face of each outlet or junction box coverplate, identify what the system is or circuit number(s) with a felt marker.

1.16 EXAMINATION OF SITE AND CONDITIONS

.1 Before submitting tenders examine site, and ensure that all trades performing work related to site conditions has examined it, so that all are fully informed on all particulars which affect project work (thereon and at the place of the building, and in order that construction proceeds competently and expeditiously).

.2 Ensure by examinations that all physical features at the work, and working restrictions and limitations which exist are known, so that the Owner is not restricted in his use of the premises for his needs.

1.17 EXISTING SERVICES

.1 Disconnect and remove all existing systems that are indicated to be removed. Cut and cap conduits below finished surfaces.

.2 Maintain electrical services as required to protect the building and equipment or to provide continuing operation.

.3 Keep all fire and life safety protection services in operation at all times.

.4 Allow for all work necessary to complete the rerouting, alterations and/or repositioning of existing services and equipment, and all the interconnections between new and existing systems.

.5 Maintain the existing building lighting systems operational during the construction period and complete all modifications required.

1.18 EXPEDITING

.1 Expedite delivery of all materials and equipment required for the successful execution of the work.

.2 Inspect at the source of manufacturer, if required or requested by consultant to confirm status, and submit an itemized flow chart of equipment order and delivery dates.

.3 Continuously monitor and ensure that the necessary information is communicated to all parties involved.

.4 Inform the Consultant immediately in writing of any anticipated delays.

1.19 INSPECTIONS

.1 Prior to substantial performance the contractor shall conduct an inspection of the work and correct all deficiencies.

.2 Notify the consultant, in writing of satisfactory completion of the contractor's inspection and request a consultant's final inspection. The inspection team shall consist of all design consultants, the contractor and the owner representatives.

.3 Include with the written request a comprehensive deficiency list itemizing each item of work not yet completed.

.4 Do not submit the written request until:

.1 All required maintenance and operations manuals have been submitted and accepted as complete and satisfactory.

.2 Final cleaning has been performed.

.3 All as-built drawings have been completed, submitted and accepted as complete and satisfactory.

.4 All required test reports have been submitted and accepted as satisfactory.

.5 All nameplates, directories and other identification are in place.

.6 All required spare parts have been turned over to the Owner and a list signed by the Owner's representative and included in maintenance manuals.

.5 Provide a Statutory Declaration@ certifying that all sub-contractors, manufacturers and suppliers are paid in full.

.6 The consultant will only perform a single final review. Additional reviews will be at sub-trades' cost and invoiced at $1,200.00 per day plus out-of-pocket expenses.

.7 During the inspection, a decision will be made as to which elements must be completed at a later date due to uncontrollable circumstances. Defects must be rectified before the building can be accepted and which defects are to be treated as incomplete work.

.8 Deficiencies shall be made good before the Contract is considered complete.

.9 Complete all deficiencies in a timely manner and advise the Owner in writing as deficiencies are remedied in order that the Owner's forces may reinspect.

1.20 FIRESTOPPING

.1 Where cables or conduits pass through floors and fire rated walls, pack space between wiring and sleeve full with an approved compound to meet required fire separation of the Quebec Building Code.

.2 Fire stop material when tested as per CAN 4-S115-M "Standard method of fire tests of Fire Stop Systems" have an FT rating not less than that of the fire separation.

.3 In occupied buildings, do not leave the site at the end of the day unless all penetrations have been filled.

.4 Acceptable products are 3M "Fire Dam 150 Caulk", 3M "Fire Barrier 2000" for conduit and cable penetrations and 3M "Interram E-5 Series Mat" for bus ducts and cable trays.

.5 Correct any defects or deficiencies as they are reported during the performance of the Work.

1.21 HOUSEKEEPING PADS (BY OTHERS)

.1 Provide 100 mm (4") high reinforced concrete housekeeping pads below all large floor mounted electrical equipment. Size the pad area to extend beyond the supported equipment plus its vibration isolators.

1.22 INSTALLATION DRAWINGS

.1 Provide insert location and sleeving drawings showing all openings in the structure with all required dimensions. Submit drawings for structural review prior to drilling, cutting or sleeving.

.2 Provide installation drawings of all work with dimensions drawn to scale of 1:100 (1/8" = 1'-0"), 1:50 (1/4" = 1'-0") and coordinate with all trades and Divisions. These drawings shall show the actual equipment installed, all outlets and conduit runs. Completely dimension all openings, recesses and sleeves. Maintain as-built drawings during the performance of the work for periodic inspection of the consultant.

.3 Submit all drawings prior to commencement of the work well in advance of construction of work incorporating built-in work. Submit copies of drawings to all Divisions for co-ordination to avoid interference and delays in construction.

.4 Submit drawings as part of Project Record Drawing information at completion of project on AutoCAD 'drawing files' to suit the Client’s CADD Standards.

.5 Provide structural loads with all details necessary for the installation of inserts. Co-ordinate and distribute the loads to suit structural capacities.

.6 The Contractor, sub-contractor shall maintain a record of all electrical installation acceptable to the inspection department in any public building, commercial or industrial establishment, apartment house, or other building in which the public safety may be involved, and shall produce this record to any inspector at any time and from time to time upon request, as specified the Consultant.

1.23 INSTRUCTIONS TO OWNERS

.1 Prior to final inspection demonstrate operation of each system to Owner, and Consultant.

.2 Instruct Owner's personnel in operation, adjustment and maintenance of equipment and systems, using operation and maintenance data provided as the basis of for instructions. Such instructions and training shall include a sufficient number of demonstrations of all modes of operation of the specialized systems and items of equipment to properly and completely demonstrate that each system and item of equipment is operating as required.

.3 Contractor and responsible personnel from the manufacturer or sub-contractor whose Work is being demonstrated shall be present at these demonstrations.

.4 Provide a minimum of two weeks' written notification of demonstration to all parties.

.5 Issue a report as a record of the instruction to the Owner on when, who and which systems the Owners were instructed in. Report shall include date, duration and signature of all attendees.

1.24 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Ensure that the load is balanced between the three phases within 15% of each phase.

1.25 MAINTENANCE MANUALS

.1 Provide 3 complete sets of hardcover, index, manuals containing the following:

.1 List of manufacturers and suppliers names and phone numbers.

.2 Lamp list cross referenced by fixture type.

.3 Catalogue description of each of the following systems (including comprehensive replacement stock part numbers):

.1 Luminaires.

.2 Wiring Devices.

.3 Safety switches with/without fuses

.4 Breakers

.5 Fuses

.6 Terminals connections

.4 Written one year warranty.

.5 Wiring, schematic diagrams and performance curves.

.6 List of items turned over to Owner.

.7 Copy of Fire Alarm Verification Certificate.

.8 Issue a report as a record of the instruction to the Owner on when, who and which systems the Owners were instructed in. Report shall include date, duration and signature of all attendees.

.9 Panelboard directories (typewritten showing load served and room numbers).

.2 Provide full size laminated as-built electrical single line diagram to be mounted in the following rooms:

.1 Electrical building #1A (Riviere-à-la-Pêche)

.2 Electrical building #1B (Riviere-à-la-Pêche)

.3 Electrical building #2 (Mistagance)

1.26 MANUFACTURERS AND CSA LABELS

.1 Manufacturer’s nameplates and CSA labels shall be visible and legible after equipment is installed.

.2 In public areas no manufacturer's nameplates or symbols shall be visible on equipment.

1.27 METRIC CONVERSIONS

.1 Particular care shall be taken with imperial versus S.I. metric conversions. This applies to all services including, but not limited to, equipment, pipes and site services in both new and existing installations.

.2 When converting from one form of measure to the other, do not round-off numbers.

1.28 PLYWOOD BACKBOARDS

.1 Provide 20 mm (3/4") FIR good one side, exterior grade plywood as approved by local authorities.

.2 Where plywood backboards are indicated they shall be 2440 mm (8'-0") high and mounted vertically, starting 150 mm (6") above finished floor.

.3 Plywood backboards for telecom rooms shall be complete with cutouts to suit cabling and as detailed on drawings.

.4 All wood products shall be FSC certified. Refer to www.certifiedwood.org.

1.29 PREMIUM TIME

.1 Provide in the Tender price any costs for premium time outside of normal working hours to complete the work on schedule and to maintain all electrical systems in operation.

1.30 PRODUCTS

.1 Products shall be new and free from all defects.

.2 All products shall bear the seal of approving agencies as required by the authorities having jurisdiction.

.3 All products of one type shall be by the same manufacturer.

1.31 PROJECT RECORD DRAWINGS

.1 Submit project record drawings with application for certificate of total performance. Final acceptance of the work will be predicated on receipt and approval of record drawings. Coordinate preparation of and approval of record drawings. Coordinate preparation of record drawings as described in Division 1, Section 01300.

.2 Record, as the work progresses, work constructed differently than shown on contract documents. Record all changes in the work caused by site conditions; by Owner, Consultant, Contractor and Subcontractor originated changes; and by site instructions, supplementary instructions, field orders, change directives, addendums, correspondence, and directions of jurisdictional authorities. Accurately record location of concealed electrical services, piping, valves, conduits, pull boxes, junction boxes and similar work not clearly in view, the position of which is required for maintenance, alteration work, and future additions. Do not conceal critical work until its location has been recorded.

.3 Dimension location of concealed work in reference to building walls, and elevation in reference to floor elevation. Indicate at which point dimension is taken to concealed work. Dimension all terminations and offsets of runs of concealed work.

.4 Make records in a neat and legibly printed manner.

.5 Identify each record drawing as "PROJECT RECORD COPY". Maintain drawings in good condition and do not use them for construction purposes.

.6 After completion of the work, purchase a complete set of AutoCAD electrical drawing files from the Consultant and transfer the information recorded on the white prints accurately. Return these electronic drawing files plus two additional sets of full size plots from electronic files to the Consultant for review. Any subsequent changes found by the Consultant shall remain the responsibility of the Contractor and a set will be issued for these changes and re-submitted back to the Consultant at the expense of the Contractor. Throughout the duration of the project the Consultant will periodically review the status of project record drawings.

.7 The cost of the AutoCAD files above is $500.00 per set, plus G.S.T.

.8 N.B.: The final certificate shall not be issued until the Consultant receives the full and final payment.

.9 After review and approval of project record drawings the Contractor to re-label them 'Record Drawing' and submit 3 sets of drawings and compact disk when applying for total performance.

1.32 PROTECTION

.1 Protect all equipment from weather and construction debris.

.2 All concrete pours shall be made only when under direct supervision of electrical contractor's qualified personnel.

1.33 PROVISION FOR FUTURE

.1 Where a space is indicated as being reserved for future equipment or for a future extension to the building, such space shall be left clear.

.2 Raceways and equipment shall be installed in such a manner that necessary connections can be made to the future apparatus or building in a manner acceptable to the Consultant.

.3 Terminations for such services shall be properly identified at the site and on record drawings.

1.34 REGULATIONS, CODES AND FEES

.1 All work shall be done to the requirements of the authorities having jurisdiction. These are minimum requirements only and the tender documents are intended as a supplement.

.2 Comply with ESA electrical bulletins in force at time of tender submission. While not identified and specified by number of this division, they are to be considered as forming part of related ESA Part II standard. In no instance shall the standards established by the drawings and specifications be reduced by any of the codes referred to above or in other sections of these specifications.

.3 Submit to the ESA the necessary number of drawings and specifications for examination and approval prior to commencement of work and pay all fees. The Consultant will not review or consider any payment to this contract without the submissions of all required permits pertaining to this division within two (2) weeks of awarding this contract.

.4 Submit to ESA any requested additional information such as show drawings, detailed cable specifications, test results etc., as may be requested by the Authority.

.5 Apply, obtain and pay for all permits, fees, connections, inspections, licenses, certificates or charges necessary to complete the work of this division.

.6 Report to the Consultant any changes requested by the authorities. Carry out any changes that do not require extra labour and/or materials without cost to the Owner.

.7 Provide all additional documentation requested by the Authorities.

.8 Furnish certificate of acceptance from inspection and authorities having jurisdiction.

.9 Conform to Quebec Building Code) made under the Building Code Act, hereafter referred to as the "Code". Where Quebec building code or tender documents do not cover a particular requirement which is covered by the National Building Code, conform to the requirements of NBC including its related supplements. Where drawing and specification exceed code requirements, provide such additional requirements.

.10 Where a material designed on drawings or in the specifications for a certain application, unless otherwise specified, that material shall conform to standards designed in the Quebec Building Code. Similarly unless otherwise specified, installation methods and standards of workmanship shall also conform to standard by the code. Where no particular material is specified for a certain use, the bidder shall select from the choice offered in the code in each case.

.11 Where the Code or this specification does not provide all information necessary for complete installation of an item, then the manufacturer's instruction for first quality workmanship shall be strictly complied with.

.12 In the event of any conflict between these standards and any other related documents including the specifications and drawings more stringent requirements shall apply.

1.35 SALVAGE MATERIALS

.1 Unless noted otherwise, obtain permission from the Owner and remove from the site all materials which are not to remain or be reused.

1.36 SCOPE

.1 Provide all labour, equipment, materials and services necessary for complete and operating systems as indicated in the Tender Documents.

.2 Allocate the scope of work of each supplier and trade as required to achieve complete and operating systems.

.3 If differences occur within the Tender Documents, the maximum condition shall be allowed for in the tender. The Consultant will decide which condition to incorporate.

.4 All work shall be carried out only after receiving written instructions from Utilities, Manufacturer and/or Suppliers, in accordance with established procedures by tradesmen skilled in work of particular service.

1.37 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Submit shop drawings in accordance with the requirements specified in General Conditions and Supplementary Conditions.

.2 Manufacturer’s printed product data sheets are acceptable in place of shop drawings for standard production items.

.3 Submit eight (8) bound sets of manufacturer’s data sheets with typed schedules listing manufacturer’s and supplier’s name and catalogue model number for items as valves, flexible joints, pipe hangers and electrical items.

.4 Shop drawings and product data to show:

.1 Dimensioned outlines of equipment.

.2 Dimensioned details showing service connection points.

.3 Elevations illustrating locations of visible equipment such as gauges, pilot lights, breakers and their trip settings.

.4 Description of operation.

.5 Single line diagrams.

.6 Mounting and fixing arrangements.

.7 Operating and maintenance clearances.

.8 Access door swing spaces.

.5 Shop drawings and product data to be accompanied by:

.1 Detailed drawings of bases, supports and anchor bolts.

.2 Sound and power data, where applicable.

.3 Performance curve marked with point of operation.

.6 Note each shop drawing with following information:

.1 Manufacturer's and supplier's name.

.2 Catalogue model number.

.3 Name of trade supplying item.

.4 Project identification number.

.5 Number identifying item on contract drawings and / or specifications.

.6 Number of contract drawing on which item appears.

.7 Name of electrical consultant.

.7 Shop drawings shall indicate clearly the materials and/or equipment actually being supplied, all details of construction, accurate dimensions, capacities, weights and electrical performance characteristics. Each shop drawing shall give the identifying number of the item for which it was prepared together with the appropriate specification number.

.8 Where applicable, include wiring, single line and schematic design.

.9 Include wiring diagrams showing interconnection with work of other sections and for trade divisions of work.

.10 Each shop drawing for non-catalogue items shall be prepared specifically for this project. Shop drawings and brochures for catalogue items shall be marked clearly to show the items being supplied for this project.

.11 Each shop drawing or catalogue sheet shall be stamped and signed by the Consultant or Owner to indicate that the drawings have been checked for conformance with all requirements of the contract documents, that the equipment concerned has been co-ordinated with other equipment to which it is attached and/or connected, and that all dimensions have been verified to ensure the proper installation of the equipment within the available space and without interference with the work of other trades. Ensure that electrical and all other co-ordination is complete before submission of drawings.

.12 Installation or manufacture of any product shall not start until after review of shop drawings.

.13 When requested, shop drawings shall be supplemented by data explaining the theory of operation, which is to be added to the maintenance and operating manual.

.14 Provide a schedule of shop drawings to the requirements of the Consultant within two weeks of submission of successful tender indicating submission, required dates and required lead time for delivery of equipment from/and after receipt of reviewed drawings.

.15 Provide samples of items as requested by the consultant.

.16 Shop drawings required:

.1 Wiring devices.

.2 Distribution equipment.

.3 Luminaires including lamps and ballasts.

.4 Fire Alarm.

.5 Diesel Generator System.

.17 The Consultant will review and take appropriate action upon such Contractor's submittals as shop drawings, Product data, and samples as provided in the Contract Documents.

.18 Faxed copies will not be accepted.

1.38 SPRINKLERPROOFING

.1 All new and existing electrical equipment exposed to sprinklers to be sprinklerproof (e.g. panels, starters, disconnects transformers, switchboard, etc.).

.2 All of the building will be sprinklered.

.3 Provide equipment and materials necessary to ensure existing, and new equipment is sprinklerproof.

1.39 STATEMENT OF PRICES

.1 To form a basis for progress payments the successful bidder shall submit a statement of his estimated prices for the various portions of the work, including both labour and materials. The total price of all portions of the work shall equal the total price of the work covered under this Division.

.2 The successful bidder shall provide the Consultant with the breakdown of work for this contract. As a guide a few items of a breakdown are as follows (Note: labour and material for each item must be shown):

.1 Set-up/storage/tools.

.2 Local Utilities permit (fees).

.3 Distribution panels / switchboards.

.4 Lighting fixtures.

.5 Fire alarm equipment.

.6 Feeder conduit / wiring.

.7 Branch conduit / wiring.

.8 Wiring devices.

.9 Construction layout and as-built drawings, project manuals.

.10 Communication system conduits and cable trays.

.11 Testing.

.12 Job close-out.

.13 Security system conduit.

.14 Miscellaneous auxiliary systems.

1.40 TENDER

.1 Submit with tender, all information called for on the Electrical Tender Form. Tenders not completed in full, may, at the discretion of the Consultant be rejected.

.2 Show separate and unit prices for optional equipment or systems called for as additions to, or deductions from the tender amount.

.3 Where only one name appears in the specification, the tender shall include for the specified equipment.

.4 Any alternate and/or substitute equipment listed shall be equal in performance and quality to that specified. If space, power, structural or any other requirements are different from the equipment specified, the cost of any changes shall be included for in the price shown on the Electrical Tender Form.

1.41 DEFECTIVE WORK

.1 The Contractor shall promptly remove from the Place of the Work and replace or re-execute defective work that has been rejected by the Consultant as failing to conform to the Contract Documents whether or not the defective work has been incorporated in the Work and whether or not the defect is the result of poor workmanship, use of defective products, or damage through carelessness or other act or omission of the Contractor.

.2 The Contractor shall make good promptly other contractors' work destroyed or damaged by such removals or replacements at the Contractor's expense.

.3 If in the opinion of the Consultant it is not expedient to correct defective work or work not performed as provided in the Contract Documents, the Owner may deduct from the amount otherwise due to the Contractor the difference in value between the work as performed and that called for by the Contract Documents. If the Owner and the Contractor do not agree on the difference in value, they shall refer the matter to the Consultant for a determination.

1.42 VALUATION OF CHANGES

.1 All price submissions for extra work requested under this Division shall be accompanied by a complete and detailed breakdown as follows, for each item.

.1 Quantities of all major items of equipment included in price.

.2 Trade costs for material per item less 20%.

.3 Labour units per item in 2014 CECA Manual of Labour Units.

.4 Manhours.

.5 Unit prices where applicable.

.6 Labour costs.

.7 Separate cost of each item to be supplied and installed by another Subcontractor or the General Contractor.

.8 Subcontractor's overhead and profit.

.9 Contractor's overhead and profit.

.10 No labour factor.

.2 The Owner reserves the right to employ other electrical contractors on the project on any item(s) of work.

1.43 RELOCATION OF ELECTRICAL ITEMS

.1 The Owner and the Consultant reserve the right to relocate electrical outlets at a later date, but prior to installation, without additional cost to Owner, assuming that the relocation per outlet does not exceed 3000mm (10'-0") from the original location. No credits will be anticipated where relocation per outlet of up to an including 3000mm (10'-0") reduces materials, products and labour.

.2 Should relocations per outlet exceed 3000mm (10'-0")from the original location the Contract Price will be adjusted in accordance with the provisions for changes in the Contract Documents.

.3 Alter the location of conduits and other equipment, without additional cost to the Owner, if approved, provided the change is made before installation.

.4 Make necessary changes, due to lack of co-ordination, as required and when approved, at no additional cost, to accommodate structural and building conditions.

1.44 WARRANTY

.1 Provide written warranty for one year (including all materials and labour) on total installation including labour. Warranty to commence upon completed project, or portions of completed work as commissioned into service, prior to the “completed project”. Such items having been service-requested by either the Consultant or the Owner.

.2 Defects or deficiencies which evident during the warranty period shall be promptly repaired or replaced at no cost.

.3 Equipment producing excessive noise or vibration shall be replaced without delay at any cost.

.4 All warranty work shall be carried out outside of normal school operation hours at times acceptable to the Owner, all at no extra costs to the Owner.

1.45 WORKMANSHIP

.1 Conform to the standards of excellence and good practice for each respective trade. Applicable regulations and codes represent the minimum acceptable standards.

.2 Throughout the construction of the work, a properly qualified Electrical Superintendent must be available at all times.

.3 The Superintendent who starts the work must not be changed unless requested by the Consultant, or by the Trade Contractor with written permission from the Consultant.

.4 Provide proper office supervision of the work. The person responsible for office supervision shall visit the site as often as necessary, to ensure work is properly performed, and attend meetings when so requested.

1.46 WARNING SIGNS

.1 Provide warning signs as specified or to meet requirements of O.E.S.C. inspection department and Consultant.

.2 Use prefabricated signs, minimum 175 x 250 mm (8" x 10") in size.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide wire and box connectors for cable types used.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Demolition/Construction Waste Management and Disposal.

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

.3 Collect and separate for disposal paper/plastic/polystyrene/corrugated cardboard] packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wiring materials from landfill to metal recycling facility as approved by Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Cable Connectors:

.1 For armoured TECK/ACWU cables, T & B Series #10000 watertight, malleable iron with open compounded head.

.2 For armoured BX cables, T & B 'Tite-Bite' steel with nylon insulated throat.

.2 Building Wire Connectors:

.1 For wire sizes #12 to #6 AWG rated for 105 deg. C or less:

.1 Ideal 'wing nut'.

.2 For wire sizes #4 AWG and larger:

.1 At studs and bus bars - Burndy QQA (cu/al).

.3 Lugs, terminals, screws used for termination of wiring shall be suitable for either copper or aluminum (nual) conductors.

.4 Insulation Tapes (up to 750 volts):

.1 Exposed splices for all circuitry in wet and dry locations for wire rated 105 deg. C (220 deg. F) and less - insulate with scotch brand No. 99 Vinyl tape.

.5 Clamps or connectors for armoured cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2. No. 65-03.

.3 Install fixture type connectors and tighten. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y-2-1961.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide building wires to suit requirements of individual systems as specified herein.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction/Demolition Waste Management and Disposal, and with Waste Reduction Workplan.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.5 Fold up metal banding, flatten and place in designated area for recycling.

.6 Collect, package and store expired motors for either recycling or rebuilding and return to recycler or rebuilder.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Conductor material (wire in conduit): annealed commercial grade, 98 percent conductivity, copper. #18 To #10 AWG solid #8 and larger -stranded.

.1 Insulation: R90 (Note: wire sizes indicated on drawings are based on R90 insulation characteristics.

.2 Colour Coding:

.1 Two conductor, 1 phase: 1 black, 1 white.

.2 Three conductor, 1 phase: 1 black, 1 red, 1 white.

.3 Three conductor, 3 phase: 1 black, 1 red, 1 blue.

.4 Four conductor, 3 phase: 1 red, 1 black, 1 blue, 1 white.

.5 Ground wires: green, insulated.

.2 Low voltage armoured cables (branch circuits)

.1 Type: AC-90 (BX) - multi-conductor.

.2 Conductor material: annealed solid commercial grade 98 percent conductivity tinned copper.

.3 Size: #12 to #10 only cross-linked polyethylene with R90, 600 volt rating.

.4 Colour Coding:

.1 Two conductor, 1 phase: 1 black, 1 white.

.2 Three conductor, 1 phase: 1 black, 1 red, 1 white.

.5 Grounding: uninsulated, solid copper.

.6 Separator: impregnated paper.

.3 Building Wire

.1 Minimum wire size shall be #12 AWG, unless otherwise stated. Home runs shall not exceed 25 M for circuits, protected by a 15A over-current device.

.2 Maximum voltage drop between the furthest outlet of a fully loaded circuit and the panel to which it is connected shall not exceed 2%.

.4 Teck/ACWU Cable

.1 Teck cable constituted of:

.1 Grounding conductor copper/aluminum.

.2 Circuit conductors copper/aluminum annealed, class B, compressed electrolytic sized as indicated.

.2 Insulation

.1 Chemically cross-linked thermosetting polyethylene rated type RW90 1000V.

.3 Inner jacket: non-hygroscopic material to fill void.

.4 Armour: aluminum.

.5 Overall covering: thermoplastic polyvinyl chloride material.

.5 Mineral-insulated Cables

.1 Conductors: solid bare soft-annealed copper, size as indicated.

.2 Insulation; compressed powdered magnesium oxide to form compact homogeneous mass throughout entire length of cable.

.3 Overall covering; annealed seamless sheath, Type M1 rated 600 V, 250oc.

.4 Overall covering: annealed seamless copper sheath type lWM1 rated 300 V, 250oc.

.5 Connectors: to manufacturers specifications.

.6 Termination kits: to manufacturers specifications.

.6 Control Cables

.1 All control cables 300V and 600V cables have a wide range of types of insulation, coverings, shielding, sheaths and jackets. All shall be manufacturer to CSA C21.1 and CSA C21.2 and shall be as recommended by system manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install wiring as follows:

.1 General:

.1 In conduit systems in accordance with corresponding Section.

.2 In cable troughs in accordance with corresponding Section.

.3 In wireways and auxiliary gutters in accordance with corresponding Section.

.4 All wire and cables shall be marked using approved wire markers as manufactured by Thomas & Betts / Partex or approved equal.

.2 Low Voltage Armoured Cables (Power):

.1 Do not directly bury in or below concrete slabs or walls.

.2 Where several cables are routed together, they shall be supported on trays, ladders, channels or inserts.

.3 Single conductors of a three or four wire circuit shall be run with uniform spacing of 150 mm or not less than one cable diameter throughout the feeder length.

.4 Use approved cable clamps to ensure proper and uniform cable spacing.

.5 Where cables are installed on walls, provide mechanical protection over them. Using a 12 gauge U section steel cover.

.6 Cable connections to all enclosures, boxes and panels shall be by means of a watertight malleable aluminum connector.

.7 Caution - do not encircle single conductor cable with ferrous metal.

.8 Make final connection to mechanical equipment using seal tight flexible conduit c/w ground wire.

.3 Low Voltage Armoured Cables AC90(BX) - (Branch Circuits):

.1 These cables must be run concealed and be used only for the following purposes:

.1 Final connection from a ceiling outlet box above accessible ceiling to a lighting fixture. (Limit maximum length to be 1.5 m (5'-0").

.2 Final connection from a ceiling outlet box to a utility pole.

.3 Drop from a ceiling outlet box to a drywall (gypsum board) partition outlet. (Limit maximum length to 5 m (15'-0").

.4 Use only approved connectors and anti-short sleeves at all dressed ends.

.4 Building Wire:

.1 The wiring of the following circuits and systems shall be run in separate conduit system:

.1 Normal power to lighting fixtures.

.2 Normal/emergency power to lighting fixtures at 120 volt.

.3 Normal/emergency power to lighting fixtures at 347 volt.

.4 Normal power to receptacle outlets at 120 volt.

.5 Normal/emergency power to special receptacle outlets at 120 volt.

.6 Exit lighting system wiring.

.7 Life safety system wiring.

.8 Security system wiring.

.9 Telephone system wiring.

.10 Other auxiliary systems.

.2 Provide pigtails at all outlets for fixtures and wiring devices. All neutrals and branch circuits shall be connected in each outlet box to avoid a break in the neutral or the circuit wire when fixture or wiring device is disconnected.

.3 The current carrying capacity of the feeders, subfeeders and branch circuit conductors shall be equal to or better than shown on the drawings.

.4 All branch circuit connections shall be made with Ideal Wingnut Series connectors. Marrette connectors are not acceptable.

.5 Do not use stranded conductors for any of the auxiliary systems.

.6 All control conductors shall be colour coded and records of colour coding submitted with the record drawings.

.7 All power and control cables shall be identified at each piece of equipment with electrovert strip wiring clips having suitable identification markings.

.8 The wiring of the life safety systems shall be terminated on coded terminal blocks at all junction points. Prepare composite record drawings, in riser form, identifying all colour and number codes.

.9 The number of wires indicated for lighting and power, motor and motor control, alarm, signal communication, and all other auxiliary systems is intended to show the general scheme only. The required number and type of wires shall be installed in accordance with the manufacturer's diagrams and requirements, and with the requirements of the installation.

.10 Run a green insulated ground wire in all conduit throughout project. Ground wire to be sized in accordance with Table 16 of O.E.S.C. At each junction or outlet box make a 360 degree loop of the stripped uncut conductor under the ground screws. At panelboards terminate ground cables in appropriate lugs bonded to enclosure.

.11 Each dimmer circuit shall have a separate neutral. Shared neutrals are not to be used on dimming circuits.

.12 On circuits feeding electronic ballasts, receptacle outlets or other high frequency electronic switching device the neutral conductor shall be increased in size one size (minimum #10 AWG) to allow for harmonic currents. For example for a 15 Amp 3 phase 4 wire circuit, the phase conductors may be #12 AWG while the neutral conductor shall be #10 AWG.

.5 Teck/ACWU Cable:

.1 Install cables as indicated.

.2 Group cables wherever possible on channels.

.3 Terminate cables in accordance with manufacturer's written instructions.

.4 Run separate #3/0 AWG bare stranded copper ground conductor with each circuit.

.6 Installation of Mineral-insulated Cables:

.1 Run cables exposed or concealed as indicated, securely supported by straps.

.2 Make cable terminations by using factory-made kits.

.3 At cable terminations use thermoplastic sleeving over bare conductors.

.4 Where cables are buried in cast concrete or masonry, sleeve for entry and/or exit of cables.

.5 Do not splice cables.

.6 Do not use aluminum sheathed cable in cast concrete or masonry construction.

.7 Installation of Control Cables:

.1 Install control cables, as indicated, in conduit cable troughs.

.2 Ground control cable shield.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 MECHANICAL/ ELECTRICAL RESPONSIBILITIES

.1 All starters, motor control centres etc., along with input and output power wiring will be by division 26. This is with the exception of packaged units.

.2 Packaged units will have integral starters and only power feeders need be provided. The packaged unit starters will be by Division 25.

.3 Division 26 to provide all remote disconnect switches.

.4 All control wiring (including BAS) except fire alarm shall be by Division 25 regardless of voltage.

.5 Voltages for motors 2 HP and larger will be 600V 3 phase. Anything smaller will be 120V single phase or 208V 1 or 3 phase as coordinated with the electrical consultant.

.6 All multi speed motors to be consequent pole.

.7 All motors shall be by Division 25.

.8 No two speed double winding motors are to be used unless prior notice is given by Division 25 to Division 26.

.9 Division 25 requires thermistor protection to be provided on motors 30 HP and larger using approved thermistors.

.10 Thermistors shall be provided by Division 25.

.11 Division 26 to provide manual reset devices for motor starters for thermistor interface. (Only for starters that are provided by Division 26).

.12 All fire alarm work to be done by Division 26. Division 26 will provide all relays for interface to control wiring for fan shutdown etc.

.13 Division 25 to wire smoke dampers with end switches.

.14 All end switches will be by Division 25.

.15 Division 26 to wire EP switches for smoke damper control. Life safety control wiring and relays to interface to general control wiring to be by Division 26.

.16 All relays required for Division 25 will be by Division 25.

.17 Division 25 to provide all pressure switches, supervisory valves, flow switches, dry pipe alarm valves, etc. for interface to fire alarm system.

.18 All wiring of these items shall be by Division 26.

.19 All electric tracing will be by Division 25 with power connections by Division 26. All electric tracing will be 120V.

.20 All electric tracing will be self limiting type of cable. Division 25 to provide loads of circuits to Division 26.

.21 All electrical heaters and domestic hot water tanks will be supplied by Division 25 and wired by Division 26. Division 25 to provide any formwork for recessed heaters.

.22 All level switches for sump pumps will be wired by Division 25.

.23 Variable speed motor drive controllers and motors shall be specified and installed by Division 25.

.24 The controller should be specified as a PWM inverter (pulse width modulation) type (frequency controller); with the following characteristics:

.1 Line side voltage distortion not to exceed 5%.

.2 Line side current distortion not to exceed 10%.

.3 Line and load sides to be provided with chokes to prevent any transient or harmonic distortion to the backfed into the main power supply.

.4 It is recommended that Division 25 specifies that the drive be mounted in a NEMA 12 enclosure (due to dust). It is possible to have them mounted on the wall.

.5 It is recommended that Division 25 specifies that a separate line side and insolation contactor be specified and interconnected to the integral drive fault relay

.6 Power for the VSD control circuit should be taken from the line side contactor, but after the line side choke for the drive fault relay.

.7 It is recommended that the drive be specified with a power bypass feature, so that the drive can be isolated from the circuit and serviced.

.8 Wiring between VSD and Motor shall be by the VSD manufacturer or Div. 25.

.25 Division 25 to provide Transient Voltage Surge Suppressor for all of their microprocessor based equipment i.e. BAS, etc.

.26 Division 25 to provide Division 26 with locations where power circuits are required for mechanical control systems i.e. BAS panels, etc.

PART 2 - PRODUCTS

2.1 N/A

PART 3 - EXECUTION

3.1 N/A

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Refer to Drawings and provide grounding as indicated.

1.3 STANDARDS

.1 Do grounding work to CSA C22.3 No. 2 except where specified otherwise.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Rod electrodes: copper clad steel, 19 mm (3/4") diameter by 3 m (10') long, or plate, as indicated.

.2 Conductors: bare stranded, un-tinned soft annealed copper wire, size No. 3/0 AWG for ground bus, electrode interconnections, transformers, switchgear, ground connections.

.3 Conductors: bare, un-tinned soft annealed copper wire, size No. 6 AWG for grounding cable sheaths, raceways, pipe work, screen guards, potential transformers.

.4 Conductors: PVC insulated coloured green, stranded un-tinned soft annealed copper wire No. 10 AWG for grounding meter and relay cases.

.5 Conductors: No. 3/0 AWG extra flexible 425 strands copper conductor for connection of vault and electrical room doors.

.6 Accessories: non-corroding, necessary for complete grounding system, type, size, material as indicated, including:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Approved type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

.7 Wire connectors and terminations: to Section 26 05 20.

PART 3 - EXECUTION

3.1 GROUNDING

.1 Install continuous grounding system, including electrodes, conductors, connectors, accessories, as indicated and to requirements of local authority having jurisdiction.

.2 Install connectors to manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections and connections to electrodes, structural steel work, using copper welding by thermic process.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Use No. 4/0 AWG bare copper cable for main ground bus and No. 4/0 AWG bare copper cable for taps on risers from main ground bus to equipment.

.7 Do not use bare copper conductors near unjacketed lead sheath cables.

3.2 ELECTRODE INSTALLATION

.1 Install ground rod electrodes or plates as required to suit ground resistance. Refer to soil report.

.2 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections as indicated to equipment, including metallic watermain, non-current carrying parts of transformers and generators, raceways, pipe work screen guards, switchboards, potential transformers, meter and relay cases, any exposed building metal within or forming part of transformer and electrical/generator room enclosure.

.2 Ground hinged doors to main frame of electrical equipment enclosures with flexible jumper.

.3 Connect metallic piping (water, oil, air, etc.) inside any electrical room to main ground bus at several locations.

3.4 NEUTRAL GROUNDING

.1 Connect transformer neutral and distribution neutral together using 1000 V insulated conductor to one side of ground test link, the other side of the test link being connected directly to main station ground. Ensure distribution neutral and neutrals of potential transformers and service banks are bonded directly to transformer neutral and not to main station ground.

.2 Interconnect electrodes and neutrals at each grounding installation.

3.5 CABLE SHEATH GROUNDING

.1 Bond single conductor metallic sheathed cables together at one end only. Break sheath continuity by inserting insulating sleeves in cables.

.2 Use No. 6 AWG flexible copper wire soldered, not clamped, to cable sheath.

.3 Connect bonded cables to ground with No. 2/0 AWG.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide a system grounded in accordance with the Safety Code of Québec's electricity, the requirements of the local authority and those of this document.

1.3 STANDARDS

.1 Do grounding work to CSA C22.2. No. 0.4-04.

.2 Copper grounding conductors to: ASA G7.1-1964.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Clamps for grounding of conductor, size as required to electrically conductive underground water pipe.

.2 Rod electrodes, copper clad steel 19 mm diameter by 3 m long.

.3 System and circuit, equipment, grounding conductors, bare stranded copper, un-tinned, soft annealed, un-armoured, size #3/0 AWG. Use #4/0 AWG for grounding to rod electrodes.

.4 Insulated grounding conductors to Section 26 05 21 – Wire and Cables (0-1000V).

.5 Ground bus: copper, size 6 mm x 50 mm x 300 mm long as supports, fastenings, connectors.

.6 Non-corroding accessories necessary for grounding system, type, size material as required, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Mechanical type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

.1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including, electrodes, conductors, connectors, accessories, as indicated to conform to requirements of local authority having jurisdiction over installation.

.2 Install connectors to manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper mechanical pressure, tool applied, or approved connectors.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Do not use soldered joints for connections.

.7 Install bonding wire for flexible conduit, connected at both end to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit, using approved wire ties.

.8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.9 Install separate insulated ground conductor, to each outdoor lighting standards and outlet.

.10 Connect building structural steel and metal siding to ground by welding copper to metal.

.11 Make grounding connections in radial configuration only, with connections terminating at street side of water pipe. Avoid loop connections.

.12 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.

.13 Provide a separate green circuit insulated ground conductor in every branch circuit in conduit and every power feeder conduit.

3.2 ELECTRODES

.1 Make ground connections to continuously conductive underground water pipe on street side of water meter.

.2 Install water meter shunt.

.3 Install rod electrodes and make grounding connections as required.

.4 Bond separate, multiple electrodes together.

.5 Make special provision for installing electrodes that will give resistance to ground value specified, where rock or sand terrain prevails; refer to soils reports.

3.3 SYSTEM AND CIRCUIT GROUNDING

.1 Provide system and circuit grounding connections to neutral and secondary 600V or 120/240V system following the case.

3.4 EQUIPMENT GROUNDING

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

3.5 GROUNDING BUS

.1 Install copper grounding bus mounted on insulated supports on perimeter wall of all electrical rooms.

.2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections size 4/0 AWG.

3.6 COMMUNICATION SYSTEMS

.1 Install grounding connections for telephone, sound, fire alarm, intercommunication systems and other auxiliary systems.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide all labour, equipment, materials and services for fastening and supporting electrical equipment.

1.3 RELATED WORK

.1 Metal support systems: Division 9, Section 09100.

.2 Expandable inserts to secure equipment to hollow masonry.

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, single channel (hot dip galvanized) to suit load to be carried, surface-mounted, suspended, set in poured concrete walls and ceilings as indicated or required.

2.2 FITTINGS AND ACCESSORIES

.1 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.2 Provide s-hooks and chains for independent support of all lighting fixtures installed in acoustical tile ceilings.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with approved anchors.

.2 Secure equipment to poured concrete with self-drilling expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Fasten exposed conduit or cables to building construction or support system using straps or channels.

.1 One-hole steel straps to secure surface conduits 50 mm (2") and smaller.

.2 Two-hole steel straps for conduits larger than 50 mm (2").

.3 Beam clamps to secure conduit to exposed steel work.

.5 Suspended support systems:

.1 Support individual cable or conduits runs with 12 mm (2") diameter threaded rods and spring clips.

.2 Support two (2) or more cables or conduits on channels supported by threaded rod hangers where direct fastening to building construction is impractical.

.3 Support suspended luminaires using two (2) or more lengths of weldless 'single jack', bright zinc plated steel, Canadian standard #10 gauge, 13 links per foot.

.6 For surface mounting of two or more conduits use channels at 900 mm (3') OC spacing.

.7 Provide metal brackets, frames, hangers, clamps and related types of support structures as required to support conduit and cable runs and electrical equipment.

.8 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.9 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.10 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trades and approval of architect and/or consultant.

.11 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

.12 Fasteners requiring explosive assisted tools are not acceptable and not to be used anywhere on the project.

.13 Support equipment mounted on T-bar ceilings independent of T-bar support.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Drawings do not show all splitters, junction and pull boxes and cabinets.

.2 Provide the necessary splitters, junction, pull boxes and terminal cabinets required to make systems complete and operational.

1.3 STANDARDS

.1 Splitters are based on CSA C22.2 No. 76. Junction and pull boxes are based on CSA C22.2 No. 40.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Demolition/Construction Waste Management and Disposal, and with the Waste Reduction Workplan.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.3 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 SPLITTERS

.1 Sheet metal enclosures, welded corners and formed hinged cover suitable for locking in closed position. (Weatherproof where installed in a wet sprinkler environment).

.2 Connection bars to match required size and number of incoming and outgoing conductors.

.3 At least three (3) spare terminals on each set of lugs in splitters less than 400A.

.4 Minimum length 1220 mm (4'-0").

2.2 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting. Minimum size: 150 mm x 150 mm (6" x 6").

.2 Covers with 25 mm (1") minimum extension all around for flush mounted pull and junction boxes.

.3 PVC 'Scepter' type junction and pull boxes shall be PVC moulded type equal to Scepter JB series.

2.3 CABINETS

.1 Type 'E': sheet steel, hinged door and return flange overlapping sides, handle and catch, for surface mounting.

.2 Type 'T': sheet steel with hinged door, latch, lock, two (2) keys, containing 19 mm (3/4") fire resistant fir plywood backboard for surface or flush mounting. Use for all fire alarm and voice communication wiring terminations.

PART 3 - EXECUTION

3.1 SPLITTER INSTALLATION

.1 Install splitters vertically or horizontally as indicated and mount plumb, true and square to the building lines.

.2 Extend splitters along the full length of the equipment arrangement.

3.2 JUNCTION, PULL BOXES AND CABINET INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations. Provide access panels where required.

.2 Mount cabinets with top not higher than 2 m (6') above finished floor.

.3 Install terminal block in Type 'T' cabinets.

.4 Only main junction and pull boxes are indicated. Provide pull boxes so as not to exceed 30 m (100') of conduit run between pull boxes.

3.3 IDENTIFICATION

.1 Install legible identification labels indicating system name, voltage and phase, power supply point, etc.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide the necessary outlet boxes, floor boxes, pull and junction boxes.

.2 Drawings do not show all outlet boxes, pull and junction boxes required. Those shown are the minimum required to convey intent.

.3 Indicate all pull and junction boxes on 'as-built' drawings.

1.3 STANDARDS

.1 Outlet boxes, conduit boxes and fittings are based on CSA C22.2 No. 18.

.2 Size boxes in accordance with CEC 2009, Sect. 12-3036.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Demolition/Construction Waste Management and Disposal, and with the Waste Reduction Workplan.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 OUTLET AND CONDUIT BOXES - GENERAL

.1 102 mm (4") square or larger outlet boxes as required for special devices, complete with single or two gang plaster ring to suit application.

.2 Gang boxes where wiring devices are grouped.

.3 Blank cover plates for boxes without wiring devices.

.4 Combination boxes with barriers where outlets for more than one system are grouped.

.5 PVC moulded junction boxes for Sceptor conduit in concrete or where exposed to corrosion.

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel, single and multi-gang flush device boxes for flush installation, minimum size 76 X 50 X 38 mm (3" X 2" X 1-1/4"), 102 mm (4") square outlet boxes when more than one conduit enters one side, with extensions and plaster rings as required.

.2 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.

.3 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi-gang MBD boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

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

2.5 FLOOR BOXES

.1 Concrete tight, electro-galvanized, deep formed steel floor boxes with adjustable finishing rings to suit floor finish with brass faceplate. Device mounting plate to accommodate short or long ear duplex receptacles.

.2 Adjustable, watertight, concrete tight cast floor boxes with openings drilled and tapped for 12 mm (2") and 19 mm (3/4") conduit. Minimum size, 76 mm (3") deep.

2.6 CONDUIT BOXES

.1 Cast FS or FD feralloy boxes with factory-threaded hubs and mounting feet for all outlet boxes connected to surface mounted conduit.

2.7 PVC BOXES

.1 Use Scepter type F and FSS series boxes in special corrosive areas, such as planters and in poured concrete.

2.8 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Conduit outlet boxes for conduit up to 32 mm (1-1/4") and pull boxes for larger conduits.

.3 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 For flush installations, mount outlets flush with finished wall using plaster rings to permit wall finish to come within 12 mm (2") of opening.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

.2 Provide the necessary embedded and surface-mounted conduit required to make systems safe, complete and to size required.

1.3 CODES

.1 The Code permits combustible piping and nonmetallic raceways in noncombustible buildings.

.1 The following is a brief summary of the restrictions that apply to these materials.

.1 Combustible piping or conduit is permitted without any restrictions if they are encased totally within a concrete slab or wall.

.2 Totally enclosed nonmetallic raceways (i.e. not open cable trays) are permitted in a noncombustible buildings provided they are not more than 625 mm2 in cross-sectional area and comply with an FT4 rating when tested in accordance with Clause 6.16 of CSA C22.2 No. 211.0-m, “General Requirements and Methods of Testing for Nonmetallic Conduit”. The Code does not restrict the quantity or spacing of such nonmetallic raceways (See Article 3.1.5.19).

.3 Combustible piping is permitted in a noncombustible building provided it has a flame spread rating not more than 25. If the piping or conduit is used within a concealed space used as a plenum within a floor or roof assembly, and if the concealed space contains combustible ducts or other combustible materials, there is a further restriction that the piping has a smoke developed classification not more than 50. Note the term “plenum” has been interpreted to only apply to a concealed space that is used as an air duct system. A ceiling space in of itself is not necessarily a plenum.

.4 Totally enclosed nonmetallic raceways are permitted to penetrate an assembly (floor or wall) without being incorporated in the assembly at the time of testing provided the overall diameter of the raceway is not more than 25 mm.

.5 Where combustible piping or conduit (nonmetallic raceway that is greater than 25 mm in diameter) is permitted in a ceiling space and penetrates a

floor or wall separation, the piping or conduit must be fire stopped as per Sentence 3.1.9.1.(1) or 3.1.9.4.(4).

PART 2 - PRODUCTS

2.1 CONDUITS

.1 Electrical metallic tubing (EMT): with couplings, size as indicated shall be minimum size 19 mm (3/4 inch diameter), unless otherwise indicated).

.2 Rigid steel conduit: for surface mounting where exposed to weather conditions.

.3 Flexible metal conduit and liquid-tight flexible metal conduit: size as indicated.

.4 Rigid PVC (scepter) conduit for outside services to light standards and other buried services, to the approval of the Consultant and CEC.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50mm (2") and smaller. Two hole steel straps for conduits larger than 50 mm (2").

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type unistrut supports for two or more conduits at 1500 mm (5') OC.

.4 12 mm (½)" diameter or larger threaded rods to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings for raceways: CSA C22.2 No. 18.3-04 and CSA C22.2 No. 18.4-04.

.2 Fittings manufactured for use with conduit specified.

.3 Factory 'Ells' where 90 Deg. bends are required for 25 mm (1") and larger conduit.

.4 Set screw (insulated throat type) connectors and couplings for EMT.

2.4 FISH CORD

.1 Polypropylene to suit weight of cable being pulled.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Use Electric Metallic Conduit EMT on surface and in all poured concrete.

.2 Use rigid steel conduit for surface mounting and exposed to damage and where exposed to weather conditions.

.3 Use liquid-tight flexible metal conduit for final connection to motors, transformers and other vibrating equipment.

.4 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.5 Install polypropylene fish cord in all empty conduits.

.6 Where conduits become blocked, remove and replace blocked section; abandon if necessary and run new.

.7 Dry conduits out before installing wire.

.8 Use rigid steel bends for all conduit elbows, in and out of slabs, are required.

3.2 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with a heavy coat of bituminous paint.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 16, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide cables and make all necessary terminations as indicated on drawings and as specified herein.

1.3 RELATED WORK

.1 Concrete encased duct banks and manholes - Section 26 05 45 - Concrete Encased Ductbanks and Manholes.

.2 Wires and cables 0-1000 Volts. Section 26 05 21 - Wires and Cables 0 - 1000V.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Concrete type cable markers as indicated, with words: "cable", "joint" or "conduit" impressed in top surface, with arrows to indicate change in direction of cable runs.

PART 3 - EXECUTION

3.1 CABLE INSTALLATION IN DUCTS

.1 Install cables in ducts as indicated.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in ducts simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal ducts ends with duct sealing compound.

.8 Install all cables according to manufacturer's recommendation, the cable shall be pulled by means of the conductor, aided where feasible with a grip over the outer jacket.

3.2 MARKERS

.1 Mark cables every 150 metres along runs and changes in direction.

.2 Install concrete cable markers within 3 metres from definable centre line.

3.3 TESTING

.1 Perform tests in accordance with Section 16010 - Basic Electrical Requirements.

.2 Perform tests using necessary instruments and equipment with qualified personnel.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Pre-Acceptance Tests:

.1 After installing cable but before splicing and terminating, perform insulation test with 1000V. Megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Acceptance Tests:

.1 Ensure that terminations and accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.3 High potential hi-pot testing:

.1 Conduct hi-pot testing at 133% of original factory test voltage in accordance with manufacturer's recommendations.

.7 Provide Consultant with list of test results showing location at which each test was made, circuit tested and result of each test.

.8 Remove and replace entire length of cable if cable fails to meet any of the test criteria.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 16, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide concrete encased duct banks, manholes and pull rooms as indicated on Drawings and as specified herein.

1.3 RELATED WORK

.1 Refer to Division 1 for all earthwork, concrete forms, concrete reinforcement and cast in place concrete.

1.4 DRAWINGS

.1 Submit construction layout drawings in accordance with Section 01 00 00 and 26 05 01 for duct bank and manhole(s) configuration profile, indicating depth and relation to new and existing underground services.

.2 Relate same to grid lines and elevation data.

1.5 CONCRETE & BACKFILL

.1 Arrange for and include in Tender for all required excavation, concrete and backfill for this Division.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Plastic underground power cable ducting: to CSA standards C22.2, No. 134, 135 and B196.1-1972 respectively.

.2 PVC Ducts (Scepter or Approved Equal)

.1 Rigid ducts encased in reinforced concrete, size as indicated.

.3 PVC Duct Fittings

.1 Rigid PVC opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors as required to make complete installation.

.2 Expansion joints as required.

.3 Rigid 5° angle couplings as required.

2.2 CABLE PULLING EQUIPMENT

.1 Pulling iron made of galvanized steel rods, size and shape as indicated.

.2 6 mm (1/4") stranded polypropylene pull rope, tensile strength 5 kN continuous throughout each duct run with 3 m (10') spare rope at each end.

2.3 MARKERS

.1 Mark location of duct runs under hard surfaced areas with railway spike at 1.5 m (5 ') intervals driven flush in finish of pavement directly over run. Place concrete duct marker at ends of such duct runs.

.2 Place high voltage tape over the entire length of ductwork run.

2.4 GROUNDING

.1 Provide rods grounding in Section 26 05 27 and 26 05 28 as applicable to the grounding cable trays.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Prior to starting work, consult the Supply Authority and make all arrangements for service entrance.

.2 Install reinforced concrete encased underground duct banks, including formwork, concrete and reinforcing, to approval of Structural Consultant.

.3 Build duct bank on undisturbed soil or on well compacted granular fill not less than 150 mm (6") thick, compacted to 95% of maximum proctor dry density.

.4 Prior to laying ducts, construct mud slab not less than 75 mm (3") thick.

.5 Install ducts at elevations and with slope as required and at minimum slope of 1 in 400.

.6 Install base spacers at maximum intervals of 1.5 m (5') levelled to grades indicated for bottom layer of ducts.

.7 Lay PVC ducts with configuration and reinforcing as indicated with preformed interlocking, rigid plastic intermediate spacers to maintain spacing between ducts at not less than 75 mm (3") horizontally and vertically. Stagger joints in adjacent layers at least 150 mm (6") and make joints watertight. Encase duct bank with 75 mm (3") thick concrete cover.

.8 Make transpositions, offsets and changes in direction using 5° bend sections. Do not exceed a total of 20° with duct offset.

.9 Use rigid steel conduit at duct terminations and final connections to equipment.

.10 Use conduit to duct adaptors when connecting to conduits.

.11 Terminate duct runs with a duct coupling set flush with the end of the concrete envelope when dead ending duct bank for future extension.

.12 Cut, rim and taper ends of ducts in field to manufacturer's recommendations so that duct ends are fully equal to factory made ends.

.13 Allow concrete to attain 50% of its specified strength before backfilling.

.14 Use anchors, ties and trench jacks as required to secure ducts to prevent moving during pouring of concrete. Tie ducts to spacers with twine or other non-metallic material. Remove weights or wood braces before concrete has set and fill voids.

.15 Clean ducts before laying. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

.16 Immediately after pouring of concrete, pull through each duct a steel mandrel not less than 300 mm (12") long and of a diameter 6 mm (1/4") less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Avoid disturbing or damaging ducts where concrete has not set completely. Pull stiff bristle brush through each duct immediately before pulling in cables.

.17 Install four (4), 3 m (10') lengths of 15M reinforcing rods, one in each corner of duct bank, when connecting duct to manholes or buildings. Wire the rods to 15M dowels at manhole or building and support from than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Avoid disturbing or damaging ducts where concrete has not set completely. Pull stiff bristle brush through each duct immediately before pulling in cables.

.18 Install four (4), 3 m (10') lengths of 15M reinforcing rods, one in each corner of duct bank, when connecting duct to manholes or buildings. Wire the rods to 15M dowels at manhole or building and support from ends of cable carrying ducts shall be adequately sealed against water entry.

.19 Unless otherwise specified, minimum concrete strength and specific’s equal to 4,000 lb., 3/4" aggregate, 3" slump, 50% vibration, 2" air entrainment.

3.2 INSPECTION

.1 Advise Consultant ten (10) days in advance so that he may inspect ducts prior to pouring.

.2 Notify the Inspection Authority 48 hours before concrete is poured to permit inspection of duct installation.

END OF SECTION

1 General

1.1 **NOT USED**

1.2 **PAINTING AND FINISHES**

.1 All electrical fittings, supports, hanger rods, pullboxes, channel frames, conduit racks, outlet boxes, brackets, clamps, etc. to have galvanized finish or enamel paint finish over corrosion resistant primer.

.2 All panelboards, transformers, etc., to be factory finished in alkyd high gloss enamel applied over corrosion resistant primer. Matte or flat type finish paint not acceptable. Factory finished units that are scratched or marked during installation or shipping to be touched up with matching spray-on air dry lacquer or, if required to provide a satisfactory job, completely refinished.

.3 Colour Schedule to match the existing scheme or in its absence the following:

Voltage/System	Colour	Man. & Colour Chip Number
120/208V	ASA 61 Grey	N/A
347/600V	ASA 61 Grey	N/A

All 347/600 volt equipment including pullboxes and raceways to be finished in grey.

.4 All 120/208 volt equipment including pullboxes and raceways to be finished in grey.

.5 Transformer enclosures to be finished in accordance with primary voltage colour as outlined above.

.6 Fire alarm pullboxes and junction boxes to be finished in red.

.7 Low voltage switching terminal cabinets and pullboxes to be finished in black enamel.

.8 All electrical equipment within exposed areas to be painted and finished to match the existing base building standard. Coordinate with the Owner for the colour of each patient care receptacle panel.

1.3 **NAMETAGS**

.1 Clearly identify main distribution centre, sub-distribution panels, power panels, lighting panels, disconnect switches, starters, contactors, motor control centres, terminal cabinets, junction boxes, On/Off switches, receptacles, and transformers by permanent labels described below.

.2 Nametags to be of 3-layer laminated plastic, black/white/black (red/white/red for emergency) with etched lettering giving white letters on black background where called for on the drawings or in the specifications. Size of lettering as indicated below:

Device	Lettering
Receptacle, etc.	3 mm
Panelboards	9 mm
Transformers	12 mm
Distribution Centres	12 mm
MCC Cells	9 mm
Disconnects	9 mm
Main Distribution	25 mm

Nameplates for exterior installation shall be UV stabilized or stainless steel.

.3 At Main Distribution Centre lamacoid nameplate to identify year of Installation, Building name and name of the Consultant.

.4 In terminal cabinets for control wiring, low voltage relays, fire alarm, etc., identify terminal strips, etc., utilizing 9 mm roll adhesive back embossed type nametags.

.5 Panels: identify panels as shown on the drawings and indicate voltage. Nametags to be attached to outside of panel door.

.6 Transformers: identify as shown on drawings, showing capacity, primary and secondary voltages.

.7 Disconnect switches, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pullboxes: indicate system and voltage.

.9 On/Off switches: indicate areas being served.

.10 Standard duplex receptacles:
above each receptacle provide lamacoid nametag self-adhesive with 3 mm high white lettering on black background (red background for emergency receptacles) indicating circuit breaker number and panel designation. On all other receptacles, provide lamacoid nametag indicating voltage, phase, amps, circuit and panel designation.

.11 Fire alarm end-of-line resistors: identify zone numbers.

.12 Fire alarm modules: identify address and function.

.13 Fire alarm monitor control modules, etc: identify address and device monitored or controlled.

1.4 CONDUIT IDENTIFICATION

.1 All conduit for electrical systems to be colour coded. Colour coding of conduit to consist of paint applied to couplings and connectors in colours identified so as to provide easy identification, to satisfaction of the Consultant.

.2 Colour coding to be in accordance with item 1.2 in this section.

1.5 BOX IDENTIFICATION

.1 Above Removable Ceilings: in areas where pullboxes, junction boxes, and/or cabinets are located above removable ceilings, finish to be in colour specified both on outside and inside. Coverplates to be painted on both sides in the colour specified. Provide panel and circuit numbers or appropriate low tension system identification on coverplate with 12 mm letters in indelible ink. Indicate “Emergency “ where applicable.

.2 Non-removable Ceilings: where pullboxes, junction boxes, and/or cabinets are located on or in non-removable ceilings, the interior only shall be finished in the colour specified. Interior faces of coverplates to be painted to match box interior finish.

1.6 COLOUR CODING OF CONDUCTORS

.1 Conductors to be colour coded throughout the building with the same colour applying to the same phase throughout. Colour coding to be by insulation colour or permanently applied colour banding at all distribution centres and panels. Colour coding to be as follows:
- .1 Equipment grounding conductor – green.
- .2 Neutral conductor – white.
- .3 120/208 volt phase wires – red, black and blue.
- .4 347/600 volt phase wires – orange, brown and yellow.

.2 At all distribution centres, pullboxes, wireways, etc., feeder conductors of each feeder group to be neatly laced or clipped into a feeder group with each conductor identified as to load fed. At all pullboxes, junction boxes and device outlet box locations identify each conductor as to panel and circuit, i.e., Panel 2A circuit 23 – identify 2A-23. Similar to system proposed for power, conductor identification to be provided for all systems at all pullbox, junction box and device locations.

.3 All conductors for fire alarm system to be colour coded with separate colour used for each of the following systems: smoke detector box circuits; trouble circuits; auxiliary control circuits; gong circuits, etc. Provide bead markers identifying zones at each device location, junction box, annunciators and panels.

1.7 **GENERATOR SYSTEM**

.1 Provide a minimum 3” high letter identifying systems – generator, ventilation system, fuel system, cooling system, electrical distribution system, etc. associated with the new generator unit.

END OF SECTION

1 General

1.1 **SUMMARY**

.1 The scope of the study will include new electrical power supply (Hydro-Québec) and any electrical equipment that is downstream.

1.2 **PRODUCTS**

.1 NOT USED

2 Execution

2.1 **GENERAL**

.1 This contract includes the provision of new electrical power supply to serve feed distribution centers dedicated to branch centers for camping sites.

.2 Contractor shall include in the contract price the preparation of a complete Coordination Study and Short Circuit Study of the new and modified electrical distribution systems.

.3 Contractor shall visit the site and obtain all required information with respect to the existing system.

.4 Coordination Study:

.1 The manufacturer will make the study of short circuits, draw curves electrical coordination, establish the settings of circuit breakers and make the right selection of fuses. All costs incurred for this work by the Manufacturer shall be included in the contract by Electrical Contractor. Manufacturer's product curves to be submitted with approved shop drawings for use in the Coordination Study.

.2 Coordination curves shall comply with the following:

Protective device coordination study:

.1 Provide symmetrical fault current rating for key bussing including utility and large motor contribution.
.2 Provide transformer damage curves or ANSI points for power transformers and major distribution transformers.
.3 Provide damage curves.
.4 Provide relay information, manufacturer and type, sensor ratings and tap setting, relay pickup and delay settings.
.5 Provide settings for all breakers having adjustable solid state trips or thermal magnetic trips
.6 Provide single line of system illustrated on curves.
.7 All curves to be justified using upstream and downstream conditions.
.8 All curves to be sealed by a practicing professional engineer for the Province of Québec.

.5 Submit a complete set of coordination curves produced by the manufacturer of the switchboards. Coordination curves must be submitted prior to selection of circuit breaker trip settings and ground fault relay pick-up and time delay settings.

.6 Coordination curves must be plotted on a 600V base on log-log graph paper and shall be accomplished by individual time current trip curves of each device in order to enable the Engineer to verify the ratings and settings selected.

.7 Submission and approval will verify the ratings and settings of all protective devices. Approval will not eliminate the responsibility of the contractor to provide proper coordination.

.8 Prior to final inspection and system energization and start-up, contractor to check all settings to ensure they are in accordance with coordination study values.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 16, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 RELATED WORK

.1 Excavation and Backfilling - Section 02223 (Excavating, Trenching and Backfilling).

PART 2 - PRODUCTS

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC ducts for direct burial: size as indicated with minimum wall thickness at any point of 3.0 mm. Nominal length: 3 m plus or minus 12 mm.

.2 Rigid PVC split ducts as indicated.

.3 Rigid PVC couplings, reducers, bell end fittings, plugs, caps, adaptors as required to make complete installation.

.4 Rigid PVC 90° and 45° bends as required.

.5 Rigid PVC 5° angel couplings as required.

.6 Expansion joints every 30 m and as required.

2.2 SOLVENT WELD COMPOUND

.1 Solvent weld compound for PVC duct joints.

2.3 FIBREGLASS DUCTS

.1 Fibreglass reinforced epoxy underground cable duct: watertight type, size as indicated.

.2 Couplings, reducers, plugs, caps, adaptors, and supports as required to make a complete installation.

.3 Expansion joints every 3m and as required.

2.4 PLASTIC POLYETHYLENE PIPES

.1 Rigid plastic polyethylene pipe with approved couplings and fittings required to make a complete installation as indicated.

2.5 TRANSITE DUCTS

.1 Asbestos cement ducts: thick walled for direct burial type, size as indicated.

.2 Couplings, reducers, adaptors, connections, spacers, plugs and caps as required to make a complete installation.

2.6 CABLE PULLING EQUIPMENT

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.7 MARKERS

.1 Concrete type cable markers: as indicated, with words: "cable", "joint" or "conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

.2 Cedar post type markers: as indicated, [89 x 89] mm square, [1.5] m long, pressure treated with coloured, [_____] or copper napthenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing duct.

.3 Nameplate: aluminum anodized 89 x 125,. 1.5 mm thick mounted on cedar post with mylar label 0.15 mm thick with words "Cable" "Joint" "Conduit" with arrows to indicate change in direction.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install as indicated and in accordance with manufacturer's instructions.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5m throughout duct length.

.4 Slope ducts as indicated with 1 to 400 minimum slope.

.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

.6 Pull through each duct a steel mandrel not less than 300 mm long and of a diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

.8 Install markers as required.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 REFERENCE

.1 Read and be governed by Section 26 05 01 – Common Work Results - Electrical.

1.3 RELATED WORK

.1 Comply with relevant Sections of this and other Divisions of this Specification.

.2 Co-ordinate with the Contractor and be present during his commissioning period to assist with their Division 26 requirements necessary for their work.

1.4 DESCRIPTION

.1 Include in work of this Section the testing and commissioning of all new electrical and component systems.

.2 Include any specific testing of equipment required by the Hydro Québec or Supply Authorities.

.3 The complete costs of the site and factory testing and commissioning witnessing of Electrical Equipment.

.4 Inform manufacturers of all factory and site testing requirements.

1.5 SCOPE

.1 Include factory testing and approved certification where required.

.2 Co-ordinate with the equipment manufacturer, notify the Electrical Consultant in writing, 10 (ten) working days before any factory testing to confirm Consultant's desired presence, and be present for all site testing.

1.6 COMPLETION OF WORK

.1 All electrical systems and equipment shall be totally commissioned and operating before date of "Substantial Completion".

.2 Co-ordinate with other trades for work which affects the operation of the electrical systems, before submitting request for testing and commissioning. Failing to comply, bear all costs including Consultant's time cost, incurred for re-testing and re-commissioning.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Provide all tools, equipment, labour and materials required to perform electrical testing and commissioning as specified. Provide the test results report(s).

PART 3 - EXECUTION

3.1 GENERAL

.1 Perform site testing and commissioning only after all equipment is installed and operational.

.2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.3 Submit to the Consultant ninety (90) days prior to the schedule "date of Substantial Completion", a comprehensive installation / start-up testing schedule identifying all activities to take place. Include draft forms to demonstrate intended performance for each and every system. Information will include but not be limited to the following:

.1 Date of test.

.2 Individual involved.

.3 System being tested.

.4 Description of functionality of the system.

.5 Demonstration of proper operation.

.4 Revise the draft forms to the Consultant's satisfaction.

.5 Provide two (2) copies of certificates of all factory and site testing in complete detail bearing in each case the seal of the Engineer responsible for the tests.

.6 Submit all test results for Consultant's review.

.7 All equipment or system deficiencies identified by factory or site testing procedures, to be corrected by the Contractor prior to obtaining a "Certificate of Substantial Completion".

3.2 TESTING AND INSPECTION EQUIPMENT AND SYSTEMS

.1 General

.1 The Contractor shall be responsible for all tests detailed in the specification Section 26 and those tests required by a manufacturer as part of their installation requirements.

.2 The Contractor shall only utilize electricians licensed to conduct tests with previous experience in the testing procedures. The Contractor shall inform the Consultant, in writing, who they intend to use with a list of experience and projects completed.

.3 The Contractor shall hire manufacturers technicians who will conduct tests on their equipment.

.4 The Contractor shall co-operate with the Independent Testing Contractor to provide assistance during the testing procedures.

.5 The Contractor shall schedule all tests and provide a minimum of 48 hours prior to testing commencing. Tests may be witnessed by the Consultant.

.2 Switchgear Testing

.1 Barriers, bus insulators, bushings, etc. shall be inspected and cleaned to remove any accumulated construction dust or dirt.

.2 All debris shall be removed from all compartments.

.3 Insulators should be inspected for evidence of contaminated surface or physical damage, such as cracked or broken segments.

.4 The Contractor shall submit to the consultant results of the factory insulation resistance tests including HiPot & BIL tests, metering tests and circuit breaker tests.

.5 The Contractor shall conduct an inspection of the equipment on site to verify the operation of the breakers under no load conditions.

.6 The Contractor shall conduct a site insulation resistance test including HiPot and BIL tests.

.7 The Contractor shall document the results of the tests on the associated forms. The forms shall be forwarded to the consultant for verification.

.8 When the Contractor has completed these tests and the results have been verified by the consultant the Independent Testing Contractor shall conduct the co-ordination study tests.

.9 Ensure paint finishes are unblemished and uniform.

.10 Check ground bus connections.

.11 Operate operable components. Confirm alignment, phase rotation and verify correct functioning of tripping mechanisms.

.12 Verify fuse, breaker and instrument settings.

.13 Exercise relays and breakers trip mechanism.

.14 Ensure breaker lubrication.

.15 Set and calibrate relays and trips.

.16 Load switchgear to rated full load current and do temperature rise tests to CSA C22.2 No. 31.

.17 For metering instruments:

.1 Perform simulated operation tests with metering, instruments disconnected from permanent signal and other electrical sources.

.2 Verify correctness of connections, polarities of meters, instruments, potential and current transformers, transducers, signal sources and electrical supplies.

.18 Perform tests to obtain correct calibration. Test for 24 (twenty four) consecutive hours:

.1 Primary and secondary voltage at no load.

.2 Primary and secondary voltages at normal load once per hour.

.3 Primary and secondary current in each phase once per hour.

.4 kW and kVA once per hour.

.5 Reconnect loads as necessary to achieve satisfactory phase balance.

.19 Inspect phase barriers for tracking and tightness.

.20 For indoor load interrupter switches, operate switch on line under normal load conditions ten (10) times in presence of consultant and prove operating functions.

.3 Insulation Testing

.1 Megger all lighting and power circuit feeders and bus ducts. If ground resistance on any circuit is less than that required by CSA or other governing regulations, such circuits are to be considered defective and must be replaced.

.2 For circuits up to 350V, use 500V instrument. For 350V to 600V, use 1000V instrument. Check resistance to ground before energizing.

.3 Conduct voltage tests at the completion of the installation in the presence of the Owner's representative and carry out such corrective measures as may be required.

.4 Infra-Red Survey

.1 Hire an independent contractor to do a thermographic survey of accessible items of all new and existing distribution equipment using an infrared imaging system to detect any 'hot spot' locations which could lead to failure or the initiation of a fire. Provide a report outlining the details of all problem locations and containing thermograms of any suspect areas, as well as comments to probable cause and recommendations for repair.

.2 Do two thermographic surveys, once at substantial completion and once just prior to expiration of 1 year warranty.

.3 The Contractor shall co-operate with the independent contractor.

.5 Harmonic Content

.1 Measure and chart the current magnitude of the base condition and the third to thirteenth harmonic and total harmonic distortion present at the following locations:

.1 Power feeders (at switchboard).

.2 Lighting feeders (at switchboard).

.3 Elevator feeders in Machine Room.

.4 Emergency generator(s) terminals.

.5 Chiller feeder terminal(s).

.6 Harmonic filter equipment terminals.

.2 Ensure that all electrical equipment supplied under this Division, for this project, has an individual harmonic content of less than 5% and that the total harmonic content for the building is less than 3%.

.3 If necessary, install harmonic filters to meet the above requirements.

.6 H.V. Cable Testing

.1 Check phase rotation and ensure that each phase conductor of each feeder has been identified.

.2 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.3 After installing cable but before splicing and terminating, perform insulation resistance test with 5000V megger on each phase conductor. Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.4 Conduct D.C. HiPot testing in accordance with manufacturer's recommendations, after ensuring that terminations and accessory equipment are disconnected.

.5 For leakage current testing, raise voltage in steps from zero to maximum values as specified by ICEA manufacturer for type of cable being tested, then hold maximum voltage for specified time period by manufacturer and record leakage current at each step.

.6 Provide a list of test results showing location at which each test was made, circuit tested and result of each test.

.7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

.7 Ground Fault Protection Systems

.1 Inspect relays visually for condition and clean where necessary.

.2 Check all connections for tightness.

.3 Inspect contacts and burnish where necessary.

.4 Apply settings to each relay as specified in the short circuit, protection, co-ordination study and test operation by means of a relay test set.

.5 Verify each protective system by means of primary current injection through the zero phase sequence transformer. This will provide correct operation of both the transformer and relay as well as proper functioning of the circuitry through to the breaker tripping elements.

.8 Grounding

.1 Perform grounding test before energizing electrical system, and disconnect ground fault indicator during tests.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of consultant and local authority having jurisdiction.

.3 Retain services of specialty grounding study consultant, and provide a report and calculation as required in Section 35 of the CEC.

.4 The study should include building H.V. transformer equipment grounding requirements.

.5 Submit report to consultant in triplicate, and include additional copy in operation and maintenance manual.

.9 Heating Cable

.1 Field test cables with a 2500V megger to test cables for continuity and 200 megohms (minimum) insulation value and record readings as follows:

.1 On cable reel, upon receipt of cable.

.2 Before installation.

.3 After installation.

.4 Before topping pouring.

.5 During topping pouring at 5 minute intervals.

.6 24 hours after pouring.

.10 Load Balance

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to obtain readings with 2% of rated voltage of equipment.

.3 Submit, at completion of work, a report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test. Test period shall be for a 48 hour duration. Submit strip chart as for record purposes.

.11 Power Transformers

.1 Ensure factory tests are carried out to CSA C9.

.2 Submit production test certificates for:

.1 Voltage ratio.

.2 Polarity or angular displacement.

.3 No-load losses.

.4 Full load losses.

.5 Impedance voltage.

.6 Dielectric withstand, applied and induced.

.7 Exciting current.

.8 Resistance (transformers above 500 kVA).

.9 Submit type test certificates for:

.1 Temperature rise.

.2 Sound level.

.3 Radio influence voltage.

.4 Partial discharges (corona).

.5 Basic insulation impulse level.

.10 At the site, energize transformers and apply incremental loads:

.1 11% for first hour.

.2 25% for next two hours.

.3 50% for next three hours.

.4 full load.

.3 At each load change, check winding temperatures.

.12 Adjust any Cooling fan controls if required.

.13 Generator

.1 Prepare data sheets in duplicate with spaces to record:

.1 Date.

.2 Generator set serial No.

.3 Engine, make, model, serial No.

.4 Alternator, make, model, serial No.

.5 Voltage regulator, make and model.

.6 Rating of generator set, kW, kVA, V, A, r/min, Hz.

.7 The manufacturer's engineers and consultants signature shall be on the completed forms to indicate concurrence in results of test, and that same equipment is at site, that was factory tested.

.2 Initial Installation Performance Tests

.1 General

.1 Upon completion of the installation of the emergency power supply system, the installation shall be tested to ensure conformity to the requirements of the CAN/CSA-C282-M89 standard.

.3 Operational Test

.1 With the engine in a "cold start" condition and the emergency load at its normal operating level, a power failure shall be simulated by opening all switches or breakers that supply the normal power to the building or facility. The test load shall be that load which is normally served by the emergency power system.

.2 The operational test shall be continued for 1h, after which normal power shall be restored to the building or facility and satisfactory transfer of the load shutdown of the emergency generating set shall be demonstrated.

.3 The following data shall be observed and recorded:

.1 time delay on start.

.2 the cranking time until the engine starts and runs.

.3 the time required to come up to operating speed.

.4 the time required to achieve a steady-state condition with all switches transferred to the emergency position.

.5 the voltage, frequency, and amperes at start-up and at any observed change in load.

.6 the engine oil pressure, water temperature where applicable and battery charge rate at 5 min intervals for the first 15 minutes and at 15 minute intervals thereafter.

.7 the time delay on retransfer for each transfer switch.

.8 the time delay on engine cooldown and shutdown.

.4 Full Load Test

.1 Following the test prescribed in Clause 3.2.13.3, the emergency generator set shall be subjected to a 4h 100% load test, followed by a 1h test at 110% of full load.

.2 The building load may serve as part or all of the test load if it is continuous, supplemented by a load bank if required. Full load shall equal the nameplate kW rating of the emergency generator set less the applicable derating factors for site conditions. A unity power factor is acceptable for onsite testing, provided that rated load tests at the rated power factor have been performed by the manufacturer of the emergency generator set prior to shipment.

.3 The full load test may be initiated by any method that will start the engine and, immediately upon reaching its rated speed, pick up the full load in one step.

.4 The data listed in Clause 3.2.31.3.3., shall be recorded at first load acceptance and every 15 min thereafter until the completion of the test period.

.5 Cycle Crank Test

.1 The engine shall be prevented from running by utilizing any method recommended by the manufacturer. The control switch shall then be placed in the "run" position to cause the engine to crank.

.2 The crank cycle specified in Clause 6.6 shall be observed and recorded.

.3 The crank cycle shall be repeated a second time to demonstrate that the batteries or compressed air have sufficient capacity for a total cranking time of 60 s as specified in clauses 6.7.1.1. and 6.7.2.1. of the standard.

.4 The time required to recharge the batteries or the compressed air shall be demonstrated to meet the requirements of Clauses 6.7.1.3 and 6.7.2.3. of the standard as appropriate.

.6 Safety Shutdown and Alarms

.1 The emergency supply shall be tested as recommended by the manufacturer to ensure that all safety shutdowns and alarms respond.

.7 Ventilation

.1 During the tests described in clauses 3.2.13.3. and 3.2.13.4., it shall be demonstrated that the ventilating system will maintain the room temperature within the allowable tolerances specified in clauses 5.7. and 5.8 of the standard.

.2 At the end of the testing check the battery voltage to demonstrate the battery charger has returned batteries to fully charged state.

.3 Refill fuel tank to full capacity.

.8 Manual of Operating and Maintenance Instructions

.1 A manual containing mechanical and electrical drawings and instructions for the operation and maintenance of the supplied emergency generating equipment shall be provided. It shall cover all elements affecting the reliable operation of the emergency electrical power system, including the engine-generator set and associated accessories, the generator control panel, the protective devices, and the transfer switch(es).

.2 The manual shall be in English or French, or both. At least two copies shall be provided.

.14 Automatic Transfer System (for each Automatic Transfer Switch)

.1 Set selector switch in 'Test' position to ensure proper standby start, running, transfer, retransfer. Return selector switch to 'Auto' position to ensure standby shutdown.

.2 Set selector switch in 'Manual' position and check to ensure proper performance.

.3 Set selector switch in 'Engine Start' position and check to ensure proper performance. Return switch to 'Auto' to stop engine.

.4 Set selector switch in 'Auto' position and open normal power supply disconnect. Standby generator should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 10 minutes, then close main power supply disconnect. Load should transfer back to normal power supply and standby generator should shutdown.

.15 Motor Control Centre Testing

.1 The Contractor shall submit to the consultant the factory tests which shall include insulation resistance tests, disconnect switch operation, starter operation and overload trip tests.

.2 The Contractor shall conduct an inspection of the equipment on site to verify equipment data, fuse ratings and overload ratings. This data shall be documented on the equipment verification forms.

.3 The Contractor shall conduct an insulation resistance test.

.16 Power Panel Testing

.1 The Contractor shall conduct an inspection of the equipment on site to verify equipment data and breaker ratings. This data shall be documented on the equipment verification forms.

.2 The Contractor shall conduct an insulation resistance test.

.17 Receptacle Panel Testing

.1 The Contractor shall conduct an inspection of the equipment on site to verify equipment data and breaker ratings. This data shall be documented on the equipment verification forms.

.2 The Contractor shall conduct insulation resistance tests.

.18 Lighting Panels Testing

.1 The Contractor shall conduct an inspection of the equipment on site to verify equipment data and breaker ratings. This data shall be documented on the equipment verification forms.

.2 The Contractor shall conduct an insulation resistance test.

.19 General Testing

.1 With the system completely connected and lamped, perform the following tests:

.1 Control and switching - all circuits shall be tested for the correct operation of devices, switches and controls.

.2 Polarity tests - all sockets shall be tested for correct polarity.

.3 Voltage test - a voltage test shall be made at the last outlet of each circuit. The maximum drop in potential permitted will be 2% on 120 and 208V branch circuits and 2% on 208/600V feeder circuits. Any deficiency in this respect shall be corrected.

.4 Phase balance - measure the load on each phase at each switchboard, splitter, distribution panelboard and lighting and power panelboard and report the results in writing to the consultant. Rearrange phase connections as necessary to balance the load on each phase as instructed by the consultant, with the re-arrangement being restricted to the exchanging of connections at the distribution points mentioned in this paragraph. After making any such changes, make available to the consultant drawings or marked prints showing the modified connections.

.5 Supply voltage - measure the line voltage of each phase at the load terminals of the main breaker and report the results in writing to the consultant. This test shall be carried out with the majority of electrical equipment in use.

.6 Motor loading - measure the line current of each phase of each motor operating under load and report results in writing to the consultant. Upon indication of any imbalance or overload, thoroughly examine the electrical connections and rectify any defective parts or wiring. If electrical

connections are correct, overloads due to defects in the driven machines shall be reported in writing to the architect.

.7 General operations - energize and put into operation each and every electrical circuit and item. Necessary repairs, alterations, replacements, tests and adjustments required shall be made for complete and satisfactory operating systems.

.20 Fire Alarm System

.1 For factory and site testing, ensure that Testing Engineer is a member in good standing of Canadian Fire Alarm Association (CFAA).

.2 Be present and witness factory testing of all hardware and software components of the system.

.3 Prepare data sheets in duplicate with spaces to record:

.1 Date.

.2 Manufacturer's name and system number.

.3 Control panel serial number.

.4 Data gathering panel (DGP) serial number(s).

.5 Annunciator serial number(s).

.6 Testing methodology, results of tests and remedial work undertaken.

.7 Signatures of testing and manufacturer's Engineers indicating concurrence with results of tests, and that some equipment is at site that was factory tested.

.4 Conform with latest issue CAN/ULC -S537 "Standard for the Verification of Fire Alarm System Installations".

.5 At the completion of the installation of all system equipment and devices and after the connection to all elevators, motors, fans, ventilation and smoke controls, test and verify the entire system using the supervisory services of the manufacturer.

.6 After the testing and verification task is completed, and all deficiencies rectified, notify the electrical consultant and the Fire Department, and in their presence demonstrate the proper functioning of the entire system.

.7 Provide upon completion of the verification procedures, an approved certificate of verification to the electrical consultant. Display one copy near the control panel, and retain a copy with the system documentation. Provide an equipment schedule listing each device and showing confirmation that it was verified.

.8 Inspect and test the wiring to every device to verify that removal of the device or breaking the wire will cause the trouble signals to operate on open circuit, short circuit, ground fault or the removal of any plug-in component. Inspect wiring to

ensure that individual terminations have been provided for all conductors and that where applicable correct polarities have been observed.

.9 Inspect all equipment installed as part of the system for visible damage or tampering which might interfere with its intended operation.

.10 Test devices which are field adjustable to ensure that their settings are acceptable under ambient conditions at the location of installation.

.11 Operate each and every manual initialing device to verify their proper operation.

.12 Use a heat source to test the operation of each and very resettable or self-restoring heat detector. For non-resettable type, simulate the detectors operation by shorting terminals on the detector base.

.13 For each and very area type smoke detector, test detector sensitivity according to the manufacturer's recommendations. Test detector operation by introducing recommendations. Test detector operation by introducing "smoke" into the detector. For duct smoke detectors check field sensitivity against air velocity to establish the correct relationship as required by the manufacturer.

.14 Test flame detectors as per manufacturer's recommendation.

.15 Test all audible signal appliances for acceptable operation. Determine that the signal is audible throughout the building above normal ambient noise, and verify that adequate power is available from both normal and standby sources under the maximum system load.

.16 Make installation of additional signals or revisions to power sources to ensure audibility prior to completion of the inspection before a certificate of verification can be issued.

.17 Test annunciators to ensure proper operation, voltage, zoning and visibility of all legends.

.18 Inspect the system power supply to ensure that it is properly fused, locked away from unauthorized interruption, adequate to meet system requirements and separated from auxiliary device power source such that a fault in such circuit cannot affect fire alarm system control unit power.

.19 Inspect battery units for protection from accidental damage and for adequate ventilation. Connect batteries permanently to a properly fused charging circuit dedicated to the alarm system batteries.

.20 Simulate ground, shorts and breaks on alarm and signalling circuits to ensure proper operation of trouble signals.

.21 Test all control equipment for acceptable operation. make an inspection and test of all cable terminals, plug connectors, plug-in circuits, lamp sockets and controls to confirm that their mechanical and electrical connections and mounting are acceptable, and where applicable to confirm their electrical supervision.

.22 Verify that field wiring is terminated on a single conductor per terminal basis.

.23 Test all lamps and indicators for acceptable operation. Operate all control functions to verify correct response. Perform simulation of open circuits, short circuits and ground fault on all relevant components to confirm proper trouble circuit response.

.24 Test ancillary equipment connections for proper operation. Inspect such equipment to ensure that faults in it will not interfere with alarm system operation.

.25 Test the firehall and City Hall connections for acceptable operation.

.26 Test elevator controls for acceptable operation.

.27 Test damper controls and annunciation for acceptable operation.

.28 Test fan shutdown and smoke mode systems for acceptable operation.

.29 Test sprinkler flow switches, supervisory valves and pressure switches for acceptable operation.

.30 Inspect and test interconnections between control panels, and annunciators for continuity.

.31 Test signals from generator and engine for "trouble" and "running", signals from fire pump(s) for "power off" and "running", and signals to any security, fire alarm, intercom, music and dimming systems for correct operation.

.32 On completion of all tests and verification provide the consultant with a certificate of test and verification and proof of liability insurance for tests and verification.

3.3 SECURITY

.1 Testing shall be performed as soon as possible after each major part of the Security System is mechanically and electrically completed, and the appropriate software modules have been deemed by the Contractor to be functioning as specified.

.2 At the discretion of the Consultant, final acceptance testing shall be carried out at the following defined levels: per point basis; per system basis; software function basis; total system basis; and power load basis.

.3 Test and verify the entire system using the assistance of supervisory services of the equipment manufacturer.

.4 Inspect and test the wiring to every device to verify that removal of the device or breaking wire will cause the trouble signal to operate properly. Verify that trouble signals operate on open circuit, short circuit, ground fault or the removal of any plug-in component. Inspect wiring to ensure that individual terminations have been provided for all conductors and that where applicable, correct polarities have been observed.

.5 Inspect all equipment installed as part of the system for visible damage or tampering which might interfere with its intended operation.

.6 Test devices which are field adjustable to ensure that their settings are acceptable under ambient conditions at the location of installation.

.7 Operate each and every initiating device to verify their proper operation.

.8 Inspect the system power supply to ensure that it is properly fused, locked away from unauthorized interruption, adequate to meet system requirements and separated from auxiliary device power source such that a fault in such circuit cannot affect the security system control unit power.

.9 Inspect battery units for protection from accidental damage and for adequate ventilation. Connect batteries permanently to a properly fused charging circuit dedicated to the alarm system batteries.

.10 Test all control equipment for acceptable operation. Make an inspection and test of all cable terminals, plug connectors, plug-in circuits, lamp sockets and controls to confirm that their mechanical and electrical connections and mounting are acceptable, and where applicable to confirm their electrical supervision.

.11 Verify that field wiring is terminated on a single conductor per terminal basis.

.12 Test all lamps and indicators for acceptable operation. Operate all control functions to verify correct response. Perform simulation of open circuits, short circuits and ground fault on all relevant components to confirm proper trouble circuit response.

.13 Test ancillary equipment connections for proper operation. Inspect such equipment to ensure that faults in it will not interfere with alarm system operation.

.14 On completion of all tests and verification, provide a certificate proof of liability insurance.

3.4 LIGHTING

.1 Verify correct lamp position lamp type, colour temperature and operation of all luminaires.

.2 With all lighting in operation, and at night, measure the "average" illumination on the floor or tread (by establishing the maximum and minimum) level in the following locations, using a portable, illuminance photometer, cosine corrected, static or optical lensed, digital readout, tested, calibrated an certified accurate to within 2%, or video camcorder, together with suitable software for illuminance measurements data to be obtained:

.1 Every exit, public corridor, corridor providing access to exit for the public, electrical equipment room, main electrical room and hoistway pit.

.2 Rooms and spaces used by "the public", including storage rooms, service rooms, service hallways and stairways.

.3 Elevator machine rooms.

.3 With just emergency lighting in operation, and at night, measure the "average" illumination on the floor or tread (by establishing the maximum and minimum) level in the following locations, using a portable, illuminance photometer, cosine corrected, static or optical lensed, digital readout, tested, calibrated an certified accurate to within 2%, or video camcorder, together with suitable software for illuminance measurements data to be obtained.

.1 Exits.

.2 Principal routes providing access to exit in an open floor area, or in a 'suite'.

.3 Corridors used by 'the public'.

.4 Underground walkways.

.5 Floor areas or parts thereof where "the public" may congregate in:

.1 Group A, Division 1 occupancies

.2 Group A, Division 2 and 3 occupancies having an occupant load of 60 persons or more.

.4 Plot all lighting results on CAD disks or on a set of reproducible sepia drawings for review by the Consultant and submission to the Building Inspection Authorities.

.5 Submit photometer technical, testing and calibration data.

.6 Batteries

.1 Check battery voltage and specific gravity of each cell in accordance with manufacturer's instructions.

.2 Float charge battery to ensure battery fully charged and in stable condition.

.3 Discharge battery at rated load for 2 hour.

.4 Then, check battery voltage and specific gravity of each cell.

.7 Battery Chargers

.1 Energize battery charge and operate until battery shows full charge.

.2 Discharge battery to full discharge condition.

.3 Recharge battery, recording DC voltage and current once per hour for 8 hours. Test battery to ensure it has reached at least 95% full charge.

.4 Continue charging to ensure charger changes from equalize rate to float charge rate.

.5 Demonstrate that automatic timer controls charging and correctly transfers from equalize to float charge after selected period.

.6 Simulate faults to demonstrate that alarm lights and audible alarms are performing as designed.

.7 At end of tests with battery in fully charged condition, operate charger on "float" for minimum period of 24 hours to ensure stable condition is reached and held.

3.5 COMMUNICATION CABLES/SYSTEMS

.1 Ensure cable and terminal identification is as required.

.2 Test for continuity of each conductor, shorts between conductors or between conductors and shield, power reflectance, attenuation, impedance, cross talk and noise.

.3 Ensure correct operation of any shorting bars.

.4 Ensure all terminal connections are unbroken and continuity exists between the terminal pins at each end of the cable run.

3.6 UNINTERRUPTIBLE POWER SUPPLY (UPS)

.1 Prepare data sheets in duplicate with spaces to record:

.1 Date

.2 UPS, make, model, serial No.

.3 Voltage input and output. Confirm it matches building voltage.

.4 Rating of UPS kW, kVA, P.F. Confirm it matches engineer's specification.

.5 The manufacturer's engineers and consultant's signature shall be on the completed forms to indicate concurrence in results of test, and that same equipment is at site, that was factory tested.

.2 Verify that there is adequate space to service the equipment.

.3 Inspect equipment for damage and repair, replace or repaint as required.

.4 Confirm air filters are new and in place.

.5 Inspect interior and insure it is free from dirt, dust, debris and check for loose connections and components.

.6 Verify the rating and integrity of the following:

.1 Input power cables

.2 Input fuses

.3 Harmonic filter, if equipped

.4 DC bus input cables

.5 Bypass panel cables

.6 Output power cables

.7 Neutral and chassis ground bonded at one point

.8 Chassis ground is present and ground straps between cabinets have been installed

.9 Output fuse connections.

.7 UPS batteries are to be inspected and checked for:

.1 Visible indication of container damage, cracks, deformation, etc.

.2 Visible indication of leakage.

.3 Check for ground faults in the battery rack

.1 check resistance between (+) terminal and rack

.2 check resistance between (-) terminal and rack

.4 Check all battery cable terminations.

.8 Measure input and bypass voltage to ensure it is within specifications.

.9 Verify phase sequence is ABC.

.10 Verify battery charger DC voltage and voltage polarity are correct.

.11 Start up UPS and verify load is protected on UPS power.

.12 Stop inverter and verify load has been transferred to by phase.

.13 With the unit running on protected UPS power open main feeder to the UPS and verify load operates on battery.

.14 Operate EPO button and verify loss of power from the UPS output terminals.

.15 Test operation of placing UPS on maintenance bypass and back to protected UPS power.

.16 Use control panel to obtain the following readings:

.1 Input voltage VBC, BVC and VCA

.2 Bypass voltage VAN, VBN and VCN

.3 Bypass voltage VAB, VBC and VCA

.4 Inverter voltage VAN, VBN and VCN

.5 Inverter voltage VAB, VBC and VCA

.6 Load voltage VAN, VBN and VCN

.7 Load voltage VAB, VBC and VCA

.8 Input current 11, 12 and 13

.9 Bypass current 11, 12 and 13

.10 Inverter current 11, 12 and 13

.11 Load current 11, 12 and 13

.12 Load Crest Factor 11, 12 and 13

.13 Frequency INP, BYP, and INV

.14 Load kW P1, P2, and P3

.15 Load kVA P1, P2 and P3

.16 Power Factor

.17 Battery UBAT, IBAT, T □BAT

.18 Operate unit at 25°C for four hours at full load using appropriate load bank.

.19 Perform battery drain test to confirm batteries perform as specified.

3.7 CO-ORDINATION STUDY

.1 Co-ordination study to be prepared on time current log sheets and to include the following information:

.1 Maximum fault level available on building service.

.2 Fault Level available through protective devices from incoming service to panelboards and largest motor and to a typical 15amp receptacle circuit.

.2 Retain an approved independent testing company who specializes in this type of work to prepare an equipment co-ordination study and schedule for all protective devices in the system in co-operation with suppliers of all pertinent switchgear, and the existing equipment and include the cost of his services in the tender price.

.3 The firm of testing specialists shall be responsible for checking, adjusting, calibration and setting up of all protective devices in accordance with the values shown in the approved co-ordination study under this contract.

.4 Co-ordinate the breakers and fuses to provide selective tripping or blowing. Co-ordinate the breakers, fuses, protective relaying and ground fault protection so that the breaker or fuse immediately ahead of a fault will trip or blow clearing the fault and leaving the system ahead of the tripped or blown protective device in the normal operating conditions. The co-ordination schedule shall be drawn up and submitted in the form of sepia shop drawings for review by the Consultant.

.5 The curves shall be accompanied by the individual time current curves of each device to enable the Consultant to verify the ratings and settings used. These co-ordination curves shall be reviewed by the Consultant and the various ratings and settings shall be made by the manufacturers before the equipment is shipped. Review of these co-ordination curves will not eliminate the responsibility of the contractor for Division 16 to provide correct co-ordination.

.6 Co-ordination curves shall be submitted as part of a report outlining the co-ordination procedures, final breaker and relay settings and fuse ratings for the entire power distribution system.

.7 Provide protective devices in accordance with the requirements of the approved co-ordination study.

.8 On completion of the calibration and testing a full report shall be prepared by the testing specialists and submitted to the Consultant for review, comments and approval.

.9 The report shall confirm that all protective devices have been adjusted and set in accordance with the co-ordination study and that the protective systems provide the necessary degree of selective protection.

.10 The report shall include tabulation of settings and/or rating of all protective devices.

.11 Each protective device shall be labelled with the proper setting for the device. Labels shall be installed or marked on the protective device behind glass windows. Fusible devices shall be labelled showing the size, type and current rating of the fuse element.

3.8 SHOP DRAWINGS

.1 Submit six (6) copies of standard catalogue sheets plus a reproducible, to the approval of the Consultant.

.2 Shop drawings shall indicate clearly the materials and/or equipment actually being supplied, all details of construction, accurate dimensions, capacities, weights and electrical performance characteristics. Each shop drawing shall give the identifying number of the item for which it was prepared.

.3 Where applicable, include wiring, single line and schematic design.

.4 Include wiring diagrams showing interconnection with work of other sections and for trades.

.5 Each shop drawing for non-catalogue items shall be prepared specifically for this project. Shop drawings and brochures for catalogue items shall be marked clearly to show the items being supplied.

.6 Each shop drawing or catalogue sheet shall be stamped and signed by the contractor to indicate that the drawings have been checked for conformance with all requirements of the contract documents, that the equipment concerned has been co ordinated with other equipment to which it is attached and/or connected, and that all dimensions have been verified to ensure the proper installation of the equipment within the available space and without interference with the work of other trades. Ensure that electrical and all other co ordination is complete before submission of drawings.

.7 Installation or manufacture of any product shall not start until after review of shop drawings.

.8 When requested, shop drawings shall be supplemented by data explaining the theory of operation, which is to be added to the maintenance and operating manual.

.9 Provide a schedule of shop drawings to the requirements of the General Contractor indicating submission, required dates and required lead time for delivery of equipment from/and after receipt of reviewed drawings. Provide an integrated construction schedule.

.10 Provide samples of items as requested by the Consultant.

.11 Shop drawings required:

.1 Wiring devices.

.2 Distribution equipment.

.3 Luminaires.

.4 Fire Alarm.

.5 Slewing & routing of feeders.

.6 Grounding.

3.9 PROJECT RECORD DRAWINGS

.1 Submit project record drawings with application for certificate of total performance. Final acceptance of the work will be predicated on receipt and approval of record drawings. Co-ordinate preparation of record drawings as described in Division 1.

.2 Record, as the work progresses, work constructed differently than shown on contract documents. Record all changes in the work caused by site conditions; by Owner, Consultant, Contractor and Subcontractor originated changes; and by site instructions, supplementary instructions, field orders, change orders, addendums, correspondence, and directions of jurisdictional authorities.

.3 Accurately record location of concealed electrical services, piping, valves, conduits, pull boxes, junction boxes and similar work not clearly in view, the position of which is required for maintenance, alteration work, and future additions. Do not conceal critical work until its location has been recorded.

.4 Dimension location of concealed work in reference to building walls, and elevation in reference to floor elevation. Indicate at which point dimension is taken to concealed work. Dimension all terminations and offsets of runs of concealed work.

.5 Make records in a neat and legibly printed manner with a non-smudging medium.

.6 Identify each record drawings as "PROJECT RECORD COPY". Maintain drawings in good condition and do not use them for construction purposes.

.7 After completion of the work, purchase a complete set of mylar prints from the Consultant and transfer the information recorded on the white prints accurately, neatly in ink with dimensions, as applicable. Return these marked-up as-built mylar prints plus two additional sets of white prints to the Consultant for review. Any subsequent changes found by the Consultant shall remain the responsibility of the Contractor and new mylar prints will be issued for these changes and re-submitted back to the Consultant at no charge to the Owner. Throughout the duration of the project the Consultant will periodically review the status of project record drawings.

3.10 OPERATION AND MAINTENANCE MANUALS

.1 Provide three (3) sets of operation and maintenance manuals. Provide separate vinyl covered binders for Fire Alarm and Security Systems.

.2 Include the following information in the Operations and Maintenance manuals:

.1 Catalogue description of each of the following systems:

.1 Devices.

.2 Luminaires.

.3 Distribution equipment.

.4 Fire alarm system.

.5 Security system.

.2 Names and address of local suppliers for the items included.

.3 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.

.4 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical description of items, and parts lists. Advertising or sales literature is not acceptable.

.5 The Consultants reviewed shop drawings.

.6 Review information provided in the maintenance instructions and manuals with the Owner's operating personnel to ensure a complete understanding of the electrical equipment and systems and their operation.

.7 The contractor shall prepare and submit the operating and maintenance data detailed in 3.7.4. to the Consultant six weeks prior to the beginning of training.

.8 The contractor shall re-submit the data should the consultant find deficiencies. Training shall not begin until the data has been accepted by the Consultant.

.9 The sections shall be divided into the following subsections:

.1 Shop Drawings (reduced to 8 2 x 11).

.2 As Built Drawings (reduced to 8 2 x 11).

.3 As Built Riser Diagrams (reduced to 8 2 x 11).

.4 Operating Procedures.

.5 Maintenance Procedures.

.6 Spare parts List.

.7 Trouble Shooting Guide.

.8 Equipment Lists.

.9 Certification Forms.

.10 The operating procedures shall be the recommended manufacturers operating procedures for the equipment.

.11 The maintenance procedures shall include scope of work, frequency of activity, parts required, and necessary documentation.

.12 The spare parts list shall be the manufacturers recommended list for maintenance purposes.

.13 The trouble shooting guide shall be the manufacturer's recommendation for the equipment.

.14 The equipment list shall include make, model, serial number, electrical characteristics.

.15 The systems operating manual shall be prepared by contractor.

.16 The systems operating manual shall be sub-divided into system sections. Each system section shall contain:

.1 The electrical design intent.

.2 The system location and areas served by that system.

.3 Equipment included in that system.

.4 Operation of the system in the normal and emergency modes.

.5 Operator parameters.

.6 Trouble shooting recommendations.

.7 System schematic.

3.11 TAKE-OVER PROCEDURE

.1 CERTIFICATION OF SUBSTANTIAL PERFORMANCE

.1 The Certificate of Substantial Performance is to be prepared in the form required by the Construction Lien Act, 1983. When issued it is to have attached a normal progress certificate showing the statement of account to date and is to be sub-titled "SUBSTANTIAL PERFORMANCE". It is also to be accompanied by the Final Change Order, sub-titled "FINAL", on which all expenditures from cash allowances are consolidated.

.2 Submit as-built record drawings with application for Certificate of Substantial Performance. Final acceptance of the Work will be predicated on the receipt and approval of the record drawings.

.2 DEFECT AND DEFICIENCY

.1 A defect is an item of Work required by the Contract which has been installed but requires repair and/or replacement at a specific time.

.2 A deficiency is an item of Work required by the Contract which has not been installed or put into operating condition.

.3 A warranty item is an item of Work, installed under the Contract which the manufacturer or installed agrees to maintain in, or restore to perfect condition for a

specific period of time, after the Owner's acceptance of the Work as being substantially completed.

.4 When, in the Construction Manager's opinion, the Work under the Contract is substantially complete, and prior to the final inspection by the Owner, a preliminary inspection shall be made at which time all defects and deficiencies shall be listed, taking care to distinguish between the two.

.3 DEFICIENCY LISTS

.1 Neither the Owner's representatives, the Construction Manager nor the Consultant will be responsible for the issue of extensive lists of deficiencies. Contractor assumes primer responsibility for ensuring that all items shown on Drawings and described in Specifications are completely his. Any inspections to approve Certificates of Substantial Performance will be immediately cancelled if it becomes obvious that extensive deficiencies are outstanding.

.2 Every effort shall be made to ensure that both defects and deficiencies are made good prior to final inspection.

.3 During the inspection, decision will be made as to which defects must be rectified before the building can be accepted and which defects are to be treated as warranty items.

.4 Deficiencies shall be made good before the Contract is considered complete.

.4 SYSTEM DEMONSTRATION

.1 Prior to final inspection demonstrate operation of each system to Owner, Construction manager and Consultant.

.2 Instruct Owner's personnel in operation, adjustment and maintenance of equipment and systems, using operation and maintenance data provided as the basis for instructions.

.3 Contractor and responsible personnel from the Subcontractors whose work is being demonstrated shall be present at these demonstrations.

.5 FINAL INSPECTION FOR COMPLETION OF CONTRACT

.1 When Contractor is satisfied that the entire work is completed, and after making his own inspection, he shall make written request for a final inspection by construction manager who in turn will notify the owner. This inspection shall be carried out and completed within 10 calendar days of the request, and shall constitute the inspection precedent to the issuance of the final certificate of payment.

.2 If there are any further deficiencies determined by this inspection, they shall be listed by Construction Manager and provided to Contractor. This list shall be recognized as the final deficiency list for purposes of acceptance of the work under the contract.

.3 Such deficiencies shall be corrected by a date mutually agreed upon between Construction Manager and the Contractor, unless a specific date is required by the Contract, and a reinspection by the Construction manager shall be called for by the

Contractor following his own inspection to take place within 7 calendar days from date of request.

.4 The Contractor shall thereafter submit his invoice for final payment.

.6 END OF WARRANTY PERIOD INSPECTION

.1 At the beginning of the 12th month after substantial performance of the contract in accordance with GC41, this Contractor along with the Construction Manager shall carry out a complete inspection of building and its systems to determine which deficiencies are to be rectified under the warranty.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide transformers indicated on plans and as specified herein.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 01, 26 05 20, 26 05 21 and 26 05 22.

1.4 STANDARDS

.1 Dry type transformers to CSA C22.2 No. 47-M90, CSA C9 C1981 and CSA C802.2.

PART 2 - PRODUCTS

2.1 TRANSFORMERS

.1 Use transformers of one manufacturer throughout project.

.2 Design:

.1 Type: ANN (air cooled, natural circulation) as indicated.

.2 Transformers shall have copper primary and secondary windings.

.3 T-connected winding type are not acceptable.

.4 115°C temperature rise insulation system.

.5 Enclosure: construction proof of splash or weatherproof (cast in epoxy) either, detachable front panel metal.

.6 Finish: grey.

.7 Sound ratings:

.1 10 to 50 kVa - 45 dB.

.2 75 to 150 kVa - 50 dB.

.3 225 to 300 kVa - 52 dB.

.3 Transformer Taps:

.1 2-9KVA @ 5%.

.1 1 FCAN.

.2 1 FCBN.

.2 15-750KVA @ 2.5%

.1 2 FCAN.

.2 2 FCBN.

.3 H.V. Connectors:

.1 2/500 MCM - Long barrel compression type.

.4 L.V. Connectors - 4/600 MCM - long barrel type.

.5 Conductor entry plate if required.

2.2 LIST OF MANUFACTURERS AND SUPPLIERS

.1 Transformer

.1 Delta

.2 Hammond

.3 Bemag

PART 3 - EXECUTION

3.1 MOUNTING

.1 Mount dry type transformers up to 75 KVA on wall or suspended on spring isolators from slab.

.2 Mount dry type transformers above 75 KVA on 4" (100 mm) high, concrete housekeeping pad on floor.

.3 Provide special hangers to suspend transformers of 112-1/2 kVa or larger sized to suit weight of transformer.

.4 Ensure adequate clearance around transformer for ventilation.

.5 Provide isolation pad between floor mounted transformer and housekeeping pad.

3.2 CONNECTIONS

.1 Make primary and secondary connections with flexible metal conduits.

.2 Energize transformers soon after installation is completed.

.3 Utilize elbow type connectors to reduce radius of cable connections.

3.3 EQUIPMENT IDENTIFICATION

.1 Provide label stating: e.g. Transformer 1TA - 45KVA fed from Power Panel No. 1, serving splitter No. SP-1.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 16, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 CO-ORDINATION WITH POWER SUPPLY AUTHORITY

.1 Co-ordinate and meet requirements of power supply authority. Ensure availability of power when required.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Underground ducts: to Section 26 05 45 - Direct Buried Underground Cable Ducts, type EB-2, size as indicated.

.2 Rigid steel galvanized conduit and fittings: to section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.3 Conductors: aluminum, type ACWU, to Section 23 05 21, size and number of conductors as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install cables in trenches and in ducts in accordance with Section 26 05 44 - Installation of Cables in Trenches and in Ducts.

.2 Allow adequate conductor length for connection to supply by power supply authority.

.3 Install concrete pad for the transformer provided by Hydro-Quebec and conduits .

.4 Allow adequate conductor length for connection to service equipment.

.5 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide all panelboards indicated and scheduled.

.2 Refer to Composite Panel Schedule.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 26 05 01.

.2 Drawings shall include electrical detail of panel, branch breaker type or fusible switch type as appropriate, quantity, ampacity and enclosure dimensions.

.3 Table format is not acceptable.

.4 Panelboards shall be product of one manufacturer.

1.4 STANDARDS

.1 Panelboards based on CSA C22.2 No. 29.

1.5 PLANT ASSEMBLY

.1 Breaker Type Panelboards

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements, manufacturer's nameplate shall show fault current that panel, including breakers, has been built to withstand.

.2 Switch and Fuse Type Panelboards

.1 Assemble panelboard interior before shipment.

.2 In addition to CSA requirements, manufacturer's nameplate shall show fault current that panelboard has been built to withstand.

PART 2 - PRODUCTS

2.1 PANELBOARDS

.1 Breaker Type Panelboards

.1 250 volt and 600 volt panelboards: bus and breakers rated for symmetrical interrupting capacity as indicated.

.2 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.

.3 Panelboards: mains, number of circuits and number and size of branch circuit breakers as indicated.

.4 Provide three (3) keys for panelboards and key panelboards alike.

.5 Copper bus with full size neutral.

.6 Mains suitable for bolt-on breakers.

.7 Finish trim and door baked grey enamel.

.8 Suitable for sprinkler protected equipment.

.2 Switch and Fuse Type Panelboards

.1 Panelboards and custom built panelboard assemblies: to CSA C22.2 No. 29-1955.

.2 Fuse holder assemblies: to CSA C22.2 No. 39-1972.

.3 Fuses: to Section 26 24 18.

.4 Copper bus with full size neutral.

.5 Panelboard mains suitable for bolt-on fusible disconnect sections.

.6 Trim and door finished baked grey enamel.

.7 Fusible pull-outs or door-operated type switches shall not be acceptable.

.8 Fuse clips shall be suitable for type of fuses specified for each unit.

.9 Fuses: sizes as indicated.

.10 Enclosure shall be sprinkler proof construction.

2.2 BREAKERS

.1 Breakers - General

.1 Bolt-on moulded case circuit breaker, quick make, quick break type for manual and automatic operation.

.2 Common trip breakers with single handle for multiple applications.

.3 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting.

.2 Thermal Magnetic Breakers

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping under overload conditions and instantaneous magnetic tripping for short circuit protection.

.3 Main Breaker

.1 Main breaker shall be separately mounted on top or bottom of panel to suit cable entry.

.4 Built-in Contactor

.1 Provide built-in contactor separately mounted on top or bottom of panel to suit installation requirements.

.5 Breakers Feeding Fluorescent Lighting

.1 All breakers feeding fluorescent lighting shall be suitable for switching duty and shall be marked 'SWD'.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification sized to suit wording and equipment size.

.2 Provide on face of each panelboard, to be engraved, indicating room location number, source of power and load controlled.

.3 Nameplate for each circuit and distribution panelboards, engraved as indicated.

.4 Complete circuit directory with typewritten legend, showing location and load of each circuit, by room number.

2.4 LIST OF MANUFACTURERS SUPPLIERS

.1 Panelboards

.1 Square D

.2 Eaton

.3 Siemens.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces.

.2 Install surface-mounted panelboards on plywood backboards. Where indicated group panelboards on common backboard, and provide backboards.

.3 Mount panelboards to maximum height of 2 m (6'-6") or as indicated.

.4 Loads connected to circuits indicated are for general use only; do not exceed number of outlets on circuits indicated.

.5 Connect neutral conductors to common neutral bus with respective neutral identified. Balance loads across each phase of each panelboard.

.6 Install lock-on devices on all circuits feeding exit lights, fire alarm, communication systems, mechanical equipment. Supply 20 spare devices.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and / or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide all wiring devices as indicated on drawings and as specified herein.

1.3 REFERENCES

.1 Latest edition of Canadian Standards Association (CSA International) Standards.

.1 CSA-C22.2 No. 42, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CSA-C22.2 No. 42-1, Cover Plates for Flush-Mounted Wiring Devices (Bi-National Standard, with UL 514D).

.3 CSA-C22.2 No. 55, Special Use Switches.

.4 CSA-C22.2 No. 111, General-Use Snap Switch (Bi-National Standard, with UL 20, Twelfth Edition).

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit Shop Drawings and product data in accordance with Section 26 05 01 – Common Work Results - Electrical

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Demolition/Construction Waste Management and Disposal.

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

.3 Collect and separate for disposal paper/plastic/polystyrene/corrugated cardboard packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Engineer.

PART 2 - PRODUCTS

2.1 SWITCHES

.1 Modular switches equal to Pass & Seymour - Sierra Plex.

.1 Framed rocker switch, compact shallow body, heavy gauge rust resistant steel mounting strap, silver-cadmium oxide contact, full-rated current capacity with fluorescent, tungsten and resistive loads.

.2 Rated for 120-277 V.

.3 20 ampere capacity.

.4 Terminals suitable for No. 10 AWG wire.

.5 Colour: white.

.6 Cover plate: stainless steel #4 finish.

2.2 RECEPTACLES

.1 Receptacles

.1 Specification Grade Modular receptacles equal to Pass & Seymour - Sierra Plex.

.1 Grounding type.

.2 Duplex receptacles shall have break off link to allow split wiring, side and backwired, backed out terminal screws to accept up to no. 12 Conductors, heavy duty double-wipe contacts.

.3 Duplex, 15A, 120V, 2-pole, 3-wire.

.4 Colour: white.

.5 Cover plates stainless steel #4 finish.

2.3 SPECIAL WIRING DEVICES

.1 GFI receptacles, 15A, 125V, 3 wire, grounding type suitable for no. 10 AWG for installation in a flush outlet box or key-locked weatherproof cover, equal to Pass & Seymour #1591-FID.

.2 GFI receptacles shall be white with stainless steel cover plate.

.3 Other receptacles.

2.4 COVER PLATES

.1 Cover plates shall be of one manufacturer throughout project, as specified for individual area of use.

.2 Stainless steel vertically brushed 1 mm (0.040") Thick cover plates for wiring devices mounted in a flush mounted outlet box.

.3 Die cast aluminum cover plates for wiring devices mounted in surface mounted FS or FD type conduit boxes, equal to Pass & Seymour No. 4512.

.4 Weatherproof double lift spring-loaded cast aluminum cover plates complete with gaskets for duplex receptacles as indicated.

.5 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 General

.1 All devices shall be of one manufacture throughout project.

.2 Switches

.1 Install single throw switches with handle in 'up' position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches 1200 mm (47") above finished floor to centre.

.3 Receptacles

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles 400 mm (16") above finished floor to the centre of the device unless otherwise indicated or as required for millwork or counters.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Cover Plates

.1 Protect stainless steel cover plate finish with paper of plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface mounted boxes.

.5 Mounting Heights

.1 Any mounting height not specifically mentioned herein shall be confirmed in writing by the Consultant prior to rough-in.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide fuses as specified.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 74 19 and Section 26 05 01 – Common Work Results - Electrical.

.2 Submit fuse melting and clearing time-current characteristics for each fuse type and size above 200A.

.3 Provide three spare fuses of each type and size installed.

PART 2 - PRODUCTS

2.1 FUSES - GENERAL

.1 Plug and cartridge fuses: to CSA C22.2 No. 59.1-M1987.

.2 HRC fuses: to CSA C22.2 No. 106-1953 (R1967) to have interrupting capability of 200,000A symmetrical.

.3 Firm I, HRC fuses Class J.

.1 Type J1, time delay, capable of carrying 500% rated current for 10 second minimum.

.2 Type J2, fast acting.

.4 Fuse Storage Cabinet.

.1 Provide 4'-0" x 4'-0" x 1'-0" fuse storage cabinet c/w adjustable internal shelving for all spare fuses.

.2 Mount on wall in main electrical switchgear room.

.3 Provide lamicoid nameplate on cabinet door.

2.2 LIST OF MANUFACTURERS / SUPPLIERS

.1 Gould Shawmut.

.2 Bussman.

PART 3 - EXECUTION

3.1 DELIVERY AND STORAGE

.1 Ship fuses in original containers.

.2 Do not ship installed fuses in switchboard.

.3 Store fuses in original containers in storage cabinet.

3.2 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to assigned electrical circuit.

.3 Follow co-ordination curves to ensure correct fuse is placed in proper device.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide ground fault type circuit breakers for duplex receptacles as indicated on Drawings.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Section 26 05 01 – Common Work Results - Electrical.

1.4 SYSTEM DESCRIPTION

.1 System No.1 : Branch center feeded by a 50A-120A from a distribution center without GFI breaker. The branch center has a GFI 30A-120V for a 30A receptacle and a GFI 20A-120V for a 20A receptable.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Ground fault circuit interrupters Class 'A' to CSA Electrical Bulletin No. 752.

2.2 SYSTEM N0 1

.1 Autonomous complete devices with protection against ground fault detection breaker including a 30A-120V and 20A-120V built in the branch center:

.1 Automatic shunt trip circuit breaker.

.2 Zero sequence transformer.

.3 Facilities for testing and reset.

.4 CSA Enclosure 1, surface mounted or in panelboard as indicated.

.5 Remote "emergency stop button" as indicated on drawings.

2.3 SYSTEM NO. 3

.1 Self-contained ground fault protector unit with 15 A, 120 V circuit interrupter and duplex receptacle, complete with:

.1 Solid state ground sensing device.

.2 Facility for testing.

.3 Weatherproof spring loaded cover when located outdoors.

.4 Coverplate and device style to match adjacent devices.

PART 3 - EXECUTION

3.1 GROUNDING

.1 Neutral must not be grounded on load side of ground fault relay.

.2 Connect supply and load wiring to equipment as indicated and in accordance with manufacturer’s recommendations.

3.2 INSTALLATION

.1 Install and test each system as indicated, provide written verification report listing each device per room and/or location.

.2 Connect supply and load wiring to equipment as indicated, to manufacturer's recommendations.

.3 Submit reports of test to Consultant and a certificate that system as installed meets manufacturers published criteria.

.4 Demonstrate simulated ground fault tests, as directed by the Consultants, for such items as: main breaker in switchgear, tub room protected circuits, etc.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 – Submittal and Section 26 05 01.

.2 Include time-current characteristic curves for breakers with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

PART 2 - PRODUCTS

2.1 BREAKERS - GENERAL

.1 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 deg. C ambient.

.2 Common-trip breakers: with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.4 Circuit breakers with interchangeable trips as indicated.

2.2 THERMAL MAGNETIC BREAKERS [DESIGN A]

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 SOLID STATE TRIP BREAKERS [DESIGN D]

.1 Moulded case circuit breaker to operate by means of a solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and [long time] [short time] [instantaneous] tripping for [phase] [ground] fault short circuit protection.

2.4 OPTIONAL FEATURES

.1 Include:

.1 Shunt trip.

.2 Auxiliary switch.

.3 Motor-operated mechanism complete with time delay unit.

.4 Under-voltage release.

.5 On-off locking device.

.6 Handle mechanism.

.2 ENCLOSURE

.1 "Specify enclosure for individually mounted breakers."

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install circuit breakers in panelboards as indicated.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 The work included under this section covers the supply and installation of disconnect switches up to 600 volts.

1.3 SUBMITTALS

.1 Submit product data in accordance with 01 33 00 – Submittal and Division 26, Section 26 05 01 – Common Work Results - Electrical.

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES

.1 Provide heavy duty, quick-make quick-break, load break type Class 'S' industrial rated disconnect switches only.

.2 Interlock door and switch so that door cannot be opened with the switch in the closed position.

.3 Provide switches of the fused, or unfused type as required.

.4 Provide a non-automatic moulded case circuit breaker as a disconnecting device in lieu of a disconnect switch where recessed mounting is required.

.5 Provide EEMAC II enclosure for all disconnect switches to suit location.

.6 Provide EEMAC-3 type weatherproof enclosure where exposed to the weather.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install disconnect switches with fuses as required by Code and as indicated.

.2 Mount disconnect switches on common fire retardant plywood backboard.

.3 Label each disconnect to indicate service being fed and from where.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 This Section covers items common to all sections of Division 26, Instructions to Bidders, any Supplements and/or Addenda thereto form an integral part of this Specification and must be read in conjunction herewith.

.2 Conform to requirements of Contract Documents.

1.2 WORK INCLUDED

.1 Provide and install all lighting fixtures and lamps shown on the Drawings and scheduled herein.

1.3 SUBMITTALS

.1 Shop Drawings:

.1 Submit shop fabrication drawings as defined in Section 26 05 01 – Common Work Results - Electrical for the following equipment:

.1 Lighting fixtures.

.2 Ballasts.

.3 Lamps.

.2 Submit to the Consultant illustrations of each fixture that is to be supplied, complete with descriptive data, dimensions, finish, light distribution, lamp specification. Do not release fixture products until reviewed by the Consultant.

.3 In addition to the fixture cuts to be submitted, when the Consultant requests a production run sample of any of the lighting fixtures, supply all samples for demonstration lamped ready for energization. Modify as requested by the Consultant at no extra cost. Pay for all samples requested.

.4 Any manufacturer wishing to submit a tender based on a substitute fixture shall obtain prior approval for same by submitting drawings and samples at least three (3) working days prior to tender closing. A quotation shall be entertained by the electrical contractor only after written acceptance is confirmed by the Consultant.

.5 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.

.6 Photometric data to include total input watts, candlepower summary, candela distribution zonal lumen summary, luminaire efficiency, CIE type, coefficient of utilization, lamp type and lumen rating in accordance with IESNA testing procedures.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01355 - Waste Management and Disposal.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Disposal of fluorescent lamps.

.5 Disposal of old PCB filled ballasts (if still existing) on renovation jobs.

PART 2 - PRODUCTS

2.1 LAMPS

.1 Lamps shall be as specified for each individual luminaire type.

.2 Incandescent Lamps:

.1 Lamps shall be suitable for operation in any position.

.2 Lamps shall be rated for 130 volt.

.3 Reflector lamps shall be rated of 6,000 hours.

.4 Unless noted otherwise conventional filament incandescent lamps shall have minimum life of 1,000 burning hours at rated voltage unless otherwise noted.

.5 Tungsten halogen lamps shall have minimum life of 6,000 burning hours at rated voltage, unless otherwise noted.

.6 MR-16 tungsten halogen lamps shall have minimum life of 5,000 burning hours at rated voltage, unless otherwise noted, CGE or equal.

.3 Fluorescent Lamps:

.1 Lamps shall be 3500K programmed rapid start T8 36,000 hour, with a minimum correlated colour rendering index of 85.

.4 High Intensity Discharge Lamps:

.1 Lamps shall be suitable for burning position of luminaire.

.2 Mercury vapour lamps shall, have rated life of 24,000 hours, be CGE deluxe white phosphor coated or approved equal.

.3 High pressure sodium lamps shall, have rated life of 24,000 hours, be coated CGE Lucalox diffuse or (no equal). Lamp shall be clear where noted on lighting fixture schedule.

.4 Colour corrected high pressure sodium lamps shall have rated life of minimum 10,000 hours, be CGE Deluxe Lucalox or (no equal).

.5 Metal halide lamps shall, have rated life of 15,000 hours, be coated Sylvania Metalarc or approved equal. Lamp shall be clear where noted on lighting fixture schedule.

2.2 BALLASTS

.1 Ballasts shall be as specified for each individual luminaire type.

.2 Fluorescent Ballasts:

.1 Shall be integrated circuit programmed rapid start electronic unless otherwise noted.

.2 Shall be remote mounted in suitable ventilated enclosures where noted in lighting fixture schedule.

.3 Shall be suitable for low temperature operation where noted in lighting fixture schedule.

.4 Magnetic rapid start ballasts shall be CBM certified, sound rating A, totally encased and designed for 40 deg. C ambient temperature. Power factor to be minimum 90% with 95% of rated lamp lumens. Capacitor shall contain no PCB's, be thermally protected and non-resettable, voltage rating to match circuiting.

.3 Electronic Fluorescent Ballasts:

.1 Electronic fluorescent ballasts for two 32 Watt T-8 lamps shall meet the following minimum standards.

.1 Maximum total ballast watts: 66W

.2 Standards certification: CSA

.3 Transient protection meets ANSI spec.C62.41: Pass lab test

.4 EMI/RFI emissions meet FCC CFR 47 part 18 subpart C Class A: Pass FCC certified lab test, Class A

.5 Sound level rating: Class A

.6 Minimum starting temperature: 10 deg. C

.7 Total current harmonic distortion: <10%

.8 Minimum power factor: 95%

.9 Minimum ballast factor, unrecoverable light loss: 85%

.10 Lamp current crest factor (ANSI spec test): <1.7

.11 Programmed rapid start qualification, cathode heating voltage, starting V, continuous V: meets ANSI C82.1; 3.1V

.12 Starting delay interval: >500 ms

.13 Glo-Arc transition: <100 ms

.14 MFR's rated lamp life: 20,000 hrs

.15 Lamp operating frequency: 20-60 kHz

.16 Operation in failed lamp mode: Ballast failed shuts off OR operates remaining lamp at <32% TDH, 85% PF

.17 Full replacement warranty: 3 years minimum

.18 Approved by Ontario Electric Safety Code in combination with lamp supplied.

.4 Mercury Vapour Ballasts:

.1 Ballasts shall be totally encased and designed for 40 degrees C ambient temperature, to ANSI C82.4-1985. Power factor shall be minimum of 95% with 95% of rated lamp lumens. Unit shall be constant wattage auto-transformer type with non-PCB thermally protected capacitor. Input voltage range shall be plus or minus 10% of rated voltage. Minimum starting temperature of minus 34 degrees C at 87% of line voltage.

.2 Ballasts shall be single lamp type, voltage rating to match circuit.

.5 High Pressure Sodium Ballasts:

.1 Ballasts shall be totally encased and designed for 40 degrees C ambient temperature, to ANSI C82.4-1985. Power factor shall be minimum of 95% with 95% of rated lamp lumens. Unit shall be reactor type with mating igniter as recommended by manufacturer. Capacitor shall contain no PCB's. Input voltage range shall be plus or minus 10% of rated voltage. Minimum starting temperature of minus 34 degrees C at 90% of line voltage.

.2 Ballasts shall be single lamp type, voltage rating to match circuit.

.3 Ballasts must be certified by CGE as suitable for use with colour corrected lamp.

.6 Metal Halide Ballasts:

.1 Ballasts shall be totally encased and designed for 40 degrees C ambient temperature. Power factor shall be minimum of 95% with 95% of rated lamp lumens. Unit shall be constant wattage auto-transformer type with non-PCB thermally protected capacitor. Input voltage range shall be plus or minus 10% of rated voltage. Minimum starting temperature of minus 29 degrees at 90% line voltage. Maximum crest factor of 1.8.

.2 Ballasts shall be single lamp type, voltage to match circuit.

2.3 PLASTIC LENSES

.1 All plastic lenses and diffusers shall meet the flame spread, smoke development ratings, as well as other characteristics stated under the Building Code.

.2 100% Virgin colourless acrylic.

.3 Not less than 0.125" (3.18 mm) thick.

.4 Prisms as indicated.

.5 Yellowness factor shall not exceed 3 as tested in a certified independent test laboratory.

2.4 GLASS

.1 Transmittance shall not be less than 88%.

.2 Glass shall be crystal clear, free of imperfections which may interfere with the optical performance.

2.5 FINISHES

.1 Baked Enamel Finish:

.1 Conditioning of metal before painting:

.1 For corrosion resistance conversion coating to CGSB 31-GP-103M.

.2 For paint base, conversion coating to CGSB 31-GP-105M, CGSB 31-GP-106Aa.

.2 Metal surfaces of luminaire housing and reflectors finished with high gloss baked synthetic enamel, polyester powdercoat or alzak aluminum to give smooth, uniform appearance, free from pinholes or defects.

.3 Reflector and other inside surfaces finished as follows:

.1 White, minimum reflection factor 85%.

.2 Colour fastness: yellowness factor not above 0.02 and after 250 h exposure in Atlas fade-ometer not to exceed 0.05.

.3 Film thickness, not less than 0.03 mm average and in no areas less than 0.025 mm.

.4 Gloss not less than 80 units as measured with Gardner 60 degrees gloss meter.

.5 Flexibility: withstand bending over 12 mm mandrel without showing signs of cracking or flaking under 10 times magnification.

.6 Adhesion: 24 mm square lattice made of 3 mm squares cut through film to metal with sharp razor blade. Adhesive cellulose tape applied over lattice and pulled. Adhesion satisfactory if no coating removed.

.2 Alzak Finish:

.1 Aluminum sheet fabricated from special aluminum alloys and chemically brightened, subsequently anodically treated to specifications established by Alcoa, to produce:

.2 Finish for mild commercial service, minimum density of coating 7.8 g/m , minimum reflectivity 83% for specular, 80.5% for semi-specular and 75% for diffuse.

.3 Porcelain enamel finished shall be smoothly applied not less than 0.2 mm thick non-yellowing white vitreous porcelain. Minimum reflective 85%.

.4 Anodized aluminum coatings shall be not less than 1 mg per square cm.

2.6 FIXTURE WIRES

.1 Copper #14 AWG with insulation type A-18, flame retardant, heat and moisture resistant, rated 600 V, 90°C to CSA C22.2 No. 28-1973.

.2 Fixtures suitable for tungsten halogen sources shall have wiring rated for 250 deg. C.

2.7 PENDANT FIXTURES

.1 Install pendant fixtures on stems with canopies unless otherwise noted.

.2 Install plumb at a height as directed by Consultant.

.3 Provide aligner canopies as required where pendant fixtures are mounted on sloped surfaces.

.4 Pendant fixtures shall be mounted at the same height measured from the finished floor elevation.

2.8 INCANDESCENT SOCKETS

.1 Sockets shall be heavy duty glazed high grade porcelain.

2.9 FIXTURE HARDWARE

.1 Cadmium plated hardware shall be used on steel or aluminum bodies.

.2 Stainless steel hardware shall be used on stainless steel bodies.

.3 Stainless steel or bronze hardware shall be used on bronze bodies.

2.10 GENERAL

.1 Fluorescent fixtures with lay-in lenses shall include the following:

.1 Lens supported on all four sides by a lip on the fixture.

.2 Lens alignment ensured through the use of spot welded slips or stamped depressions, two on each side of the fixture.

.2 The manufacturer of all fluorescent fixtures shall be required to guarantee that the maximum ballasts case temperature will not exceed 90 degrees C based on the following test conditions.

.1 Room ambient temperature of 29 degrees C.

.2 Nominal design voltage plus 2%.

.3 Dimensions of coves, valances and strips as indicated on the Drawings are diagrammatic only. Exact dimensions shall be job measured. Provide strip bodies to completely fill space available.

.4 Catalogue reference numbers given for individual fixture types may not necessarily be correct, but are intended as a guide when read with the description of the fixtures.

.5 The catalogue reference shall be verified with the description and co-ordinated with the installation conditions, with particular regard to ceiling construction details, type and finish, before ordering the fixtures.

.3 Lenses, louvers, cones, baffles and trims shall be easily removable, but positively held.

.4 Fixtures shall be constructed so that electrical components are readily accessible and replaceable without removing adjacent finishes or the fixture.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install fixtures accurately and carefully aligned complete with all mounting hardware. Ensure suspension rods are vertical.

.2 All lighting fixtures shall be supplied with accessory items such as yokes, plaster rings, frames, supports, etc. where required for proper installation of fixtures.

.3 Division 26 shall confirm the compatibility of lighting fixtures specified with ceiling types throughout the project.

.4 Connect from the power junction box in the ceiling space to fixture in armoured, grounded cable (BX).

.5 Install fixtures in equipment rooms after equipment ductwork and piping are installed. Suspend fixtures below piping and ductwork.

.6 Do not install lamps until directed by the Consultant.

.7 Install all lamps as directed by luminaire and lamp manufacturers so as not to void any warranties.

.8 Mount luminaires located where insulation material is being applied, on appropriate spaces, e.g. "Unistrut" to suit thickness of insulation.

.9 Light leaks around trims of recessed fixtures will not be accepted.

3.2 SUSPENDED CEILING SUPPORTS

.1 For suspended ceiling installations support fluorescent luminaires independent from ceiling grid in accordance with ESA requirement and local by-laws to suit conductors.

.2 Support all HID fixtures from structure independent of ceiling.

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

.3 Align lamps within horizontally lamped recessed PL or incandescent downlights in a like direction.

.4 Carefully orientate wall washer trims in correct perpendicular relationship to vertically illuminated surface.

3.4 LOCATION

.1 Electrical Drawings are diagrammatic only and do not indicate exact mounting locations.

.2 Refer to reflected ceiling Drawings and Details.

.3 Install fixtures in service areas (such as Mechanical Telecommunications & Electrical rooms) after installation of equipment. Locate fixtures to best advantage clear of obstructions. Provide additional miscellaneous metal supports to clear ductwork, etc. where required. Locate fixtures so as to create no shadows on equipment which needs servicing.

3.5 PROTECTION

.1 During construction Division 16 is responsible for protection of all lighting elements. Replace all elements blemished, scratched or damaged at no additional cost.

.2 Do not install fixture trims, baffles, cones, lenses, louvres and aperture plates, until after final painting and cleaning.

3.6 CLEANING

.1 Before installing lamps, wipe down luminaires with damp cloth soaked in mild, oil-free detergent.

.2 At the time of final acceptance of the work, under this contract, by the Owner, all fixtures, lenses, louvres and lamps must be clean and the lamps illuminated.

3.7 ADJUSTABLE FIXTURE AIMING

.1 Adjustable lighting fixtures shall be aimed, focused, locked, etc., by the Contractor. All aiming and adjusting shall be carried out after the entire installation is complete. Furnish all ladders, scaffolds, etc. required. As aiming and adjusting is completed, locking setscrews and bolts and nuts shall be tightened securely. Where possible, units shall be focused

during the normal working day. However, where daylight interferes with seeing, aiming shall be accomplished at night.

3.8 WARRANTY

.1 Warranty on any lamp or ballast shall commence only when the installation has been completely accepted by the Owner.

.2 All warranties shall be inclusive of parts and labour.

.3 All fluorescent and HID lamps shall be guaranteed for a period equal to the rated lamp life from the date of acceptance of the work, under this contract, by the Owner. Supply free of charge to the Owner all materials and labour for any replacement lamp installed during the warranty period.

.4 Incandescent lamps shall be guaranteed for the rated life of the lamp.

.5 All fluorescent and HID ballasts shall be guaranteed against defects for a period equal to the published guarantees of the manufacturer. This guarantee period shall not be shorter than 12 months from the date of acceptance of the work, under this contract, by the Owner. Date stamp all replacement ballasts installed during the warranty period. Supply, free of charge to the Owner, all materials and labour for the replacement ballasts during the warranty period.

.6 Where fixtures are being turned over on site for use by others, warranty period to begin from date of acceptance of the work.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.2 REGULATIONS

.1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with Provincial and Municipal regulations whichever is more stringent.

1.3 TESTS AND INSPECTIONS

.1 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by Consultant.

1.4 BURIED SERVICES

.1 Before commencing work verify the location of all buried services on and adjacent to the site.

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

1.5 PROTECTION

.1 Protect excavations from freezing.

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

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

.4 Protect buried services that are required to remain undisturbed.

Part 2 Products

2.1 MATERIALS

.1 Granular A.

.2 Crushed Granular 20-0 to CCDG14.02.

Part 3 Execution

3.1 Site Preparation

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

3.2 CLEARING AND GRUBBING

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

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

.3 Dispose of cleared and grubbed material off site daily to disposal areas acceptable to authority having jurisdiction.

3.3 EXCAVATION

.1 Topsoil stripping:

.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

.2 Strip topsoil to depths as indicated

.3 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.

.4 Stockpile in locations as directed by Departmental Representative.

.5 Dispose of topsoil [as directed by Departmental Representative.

.2 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces.

3.4 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 specified for fill. Fill excavated areas with selected subgrade material gravel 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: 95%.

.2 Base courses: 100%.

.3 Elsewhere: 90%.

.6 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

3.5 GRADING

.1 Grade so that water will drain away from buildings, Grade to be gradual between finished spot elevations shown on drawings.

3.6 SHORTAGE AND SURPLUS

.1 Supply all necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.

.2 Dispose of surplus material off site.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 74 11 - Cleaning.

.2 Section 01 33 00 - Submittal Procedures.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 SAMPLES

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

.2 Allow continual sampling by Consultant during production.

.3 Provide Consultant with access to source and processed material for sampling.

.4 Install sampling facilities at discharge end of production conveyor, to allow Consultant to obtain representative samples of items being produced. Stop conveyor belt when requested by Consultant to permit full cross section sampling.

.5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

.6 Provide water, electric power and propane to Consultant laboratory trailer at production site.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused granular materials from landfill to local quarry or facility as approved by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed five times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Natural sand.

.2 Manufactured sand.

.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.

.2 Gravel [and crushed gravel] composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

.1 Inform Consultant of proposed source of aggregates and provide access for sampling at least 2 weeks prior to commencing production.

.2 If, in opinion of Consultant, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Advise Consultant 2 weeks in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 PREPARATION

.1 Aggregate source preparation

.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Consultant or approved by authority having jurisdiction.

.2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.

.3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provides drains or ditches as required preventing surface standing water.

.5 Trim off and dress slopes of waste material piles and leave site in neat condition.

.2 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Consultant.

.3 Wash aggregates, if required to meet specifications. Use only equipment approved by Consultant.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

.3 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.4 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Consultant. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet Project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Consultant within 48 h of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Max 1.5 m for coarse aggregate and base course materials.

.2 Max 1.5 m for fine aggregate and sub-base materials.

.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

.1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.2 Leave any unused aggregates in neat compact stockpiles as directed by Consultant.

.3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

Partie 1 Généralités

1.1 SECTIONS CONNEXES

.1 Section 01 74 11 – Nettoyage.

.2 Section 01 33 00 - Documents et échantillons à soumettre.

1.2 RÉFÉRENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 ÉCHANTILLONS

.1 Soumettre les échantillons requis conformément à la section 01 33 00 - Documents et échantillons à soumettre.

.2 Prendre les mesures nécessaires en vue du prélèvement continu d'échantillons de granulats par le Consultant, au cours de leur production.

.3 Assurer au Consultant, en vue de l'échantillonnage, l'accès à la source d'approvisionnement et aux matériaux préparés.

.4 Monter des postes d'échantillonnage à la sortie du convoyeur servant à la préparation des granulats pour que le Consultant puisse y prélever des échantillons représentatifs. Arrêter le convoyeur, à la demande du Consultant, pour permettre à ce dernier de prélever un échantillon de part en part du matériau transporté.

.5 Payer les frais de l'échantillonnage et des essais des granulats si ces derniers ne sont pas conformes aux exigences prescrites.

.6 Assurer, sur les lieux de production même, l'alimentation en eau, en électricité et en gaz propane du laboratoire mobile du Consultant.

1.4 GESTION ET ÉLIMINATION DES DÉCHETS

.1 Acheminer les granulats inutilisés vers une carrière ou une installation de traitement locale approuvée par le Consultant.

Partie 2 Produits

2.1 MATÉRIAUX

.1 Caractéristiques des granulats : de bonne qualité, durs, résistants, exempts de plaquettes, d'aiguilles, de particules molles ou lamellées, de matériaux organiques, de mottes d'argile, de minéraux ou d'autres substances pouvant nuire à l'utilisation prévue.

1. Pour la fondation granulaire : Matériel granulaire pierre sédimentaire de type B (0-150mm) de calibre

2. Pour la base pour le site de camping : Matériel granulaire de pierre sédimentaire de type A et de calibre (0-3/4 po.) (0-19mm)

3. Pour la stabilisation de la pente. À disposer au pourtour de l'aire de camping afin de rencontrer les niveaux existants en périphérie : Matériel granulaire de pierre sédimentaire de calibre (100-200mm).

.2 Les plaquettes et les aiguilles, dans le cas des gros granulats : selon les indications de la norme ASTM D4791.

.1 Éléments dont la plus grande face est au moins cinq fois plus grande que la plus petite.

.3 Les granulats fins répondant aux exigences de la section pertinente doivent être constitués d'un des matériaux suivants ou d'un mélange de ceux-ci :

.1 sable naturel;

.2 sable artificiel;

.3 criblures provenant du concassage de blocs de carrière, de blocs rocheux, de gravier ou de laitier.

.4 Les gros granulats répondant aux exigences de la section pertinente doivent être constitués d'un des matériaux suivants ou d'un mélange de ceux-ci :

.1 roche concassée;

.2 gravier [et gravier concassé] constitué[s] de particules naturelles de pierre;

.3 granulat léger, y compris le laitier et le schiste expansé.

2.2 CONTRÔLE DE LA QUALITÉ À LA SOURCE

.1 Informer le Consultant de la source d'approvisionnement proposée pour les granulats et lui permettre d'y accéder aux fins d'échantillonnage au moins 4 semaines avant le début de la production.

.2 Si le Consultant est d'avis que les matériaux provenant de la source d'approvisionnement proposée ne satisfont pas aux exigences prescrites ou ne peuvent raisonnablement être préparés pour y répondre, trouver une autre source d'approvisionnement ou démontrer que les matériaux en question peuvent être préparés de manière à répondre aux exigences prescrites.

.3 Aviser le Consultant 2 semaines avant tout changement de source d'approvisionnement en granulats.

.4 Un matériau accepté à sa source d'approvisionnement peut néanmoins être refusé par la suite s'il ne satisfait pas aux exigences spécifiées, si la qualité ou les propriétés du matériau livré ne sont pas uniformes ou encore si la performance de ce dernier sur le chantier n'est pas satisfaisante.

Partie 3 Exécution

3.1 PRÉPARATION

.1 Préparation de la source d'approvisionnement

.1 Avant d'entreprendre les travaux d'excavation en vue de la production des granulats, défricher et essoucher la zone d'excavation et dépouiller la surface des matériaux impropres. Évacuer les débris provenant des travaux de défrichement, les souches et les matériaux impropres selon les directives du Consultant et coordonner d'une manière approuvée par l'autorité compétente.

.2 S'il est nécessaire d'effectuer des travaux de défrichement, laisser un écran de verdure entre la zone défrichée et les routes adjacentes, selon les directives.

.3 Avant d'entreprendre les travaux d'excavation ou d'abattage en carrière, défricher, essoucher et décaper la surface du sol sur une aire suffisamment grande pour prévenir la contamination des granulats par des matières nuisibles.

.4 Une fois les travaux d'excavation terminés, dresser les parois de l'excavation suivant une pente nominale de 1.5 : 1 et, au besoin, creuser des canaux de drainage ou des fossés afin d'empêcher l'accumulation des eaux de ruissellement dans la zone d'excavation.

.5 Dresser les pentes des tas de matériaux de rebut, et laisser un chantier propre et ordonné.

.2 Préparation des granulats

.1 Préparer les granulats de manière uniforme, en ayant recours à des méthodes qui préviennent leur contamination, leur ségrégation et leur dégradation.

.2 Au besoin, mélanger les granulats afin d'obtenir la granulométrie, les formes de particules ou le pourcentage de particules concassées prescrits. N'employer que des méthodes et du matériel approuvés par le Consultant.

.3 Au besoin, laver les granulats de sorte qu'ils soient conformes aux exigences du devis. N'utiliser que du matériel approuvé par le Consultant.

.4 En présence de dépôts stratifiés, utiliser du matériel et des méthodes d'excavation qui permettront d'obtenir des granulats homogènes et uniformes.

.3 Manutention

.1 Transporter les granulats et les manutentionner de manière à prévenir la ségrégation, la contamination et la dégradation.

.4 Mise en tas

.1 À moins d'indications contraires du Consultant, mettre les granulats en tas sur le chantier, aux endroits indiqués. Ne pas mettre de granulats en tas sur des surfaces revêtues en dur.

.2 Entasser suffisamment de granulats pour être en mesure de respecter le calendrier des travaux.

.3 Les granulats doivent être mis en tas sur des terrains de niveau et bien drainés, ayant une portance et une stabilité suffisantes pour supporter les matériaux mis en tas ainsi que le matériel de manutention.

.4 À moins que les matériaux ne soient mis en tas sur une surface stabilisée acceptable, la base du tas doit être constituée d'une couche de sable compacté ayant au moins 300 mm d'épaisseur afin de prévenir la contamination des granulats. Mettre les granulats en tas sur le sol, mais ne pas incorporer à l'ouvrage la couche de matériaux de 300 mm d'épaisseur à la base du tas.

.5 Pour éviter les mélanges de granulats, espacer suffisamment les tas de granulats différents ou les séparer au moyen de cloisons robustes et pleine hauteur.

.6 Il est interdit d'utiliser des matériaux mélangés ou contaminés. Enlever et éliminer les matériaux rejetés dans les 48 heures qui suivent leur refus, selon les directives du Consultant.

.7 Mettre les matériaux en tas en formant des couches uniformes dont l'épaisseur sera conforme aux prescriptions suivantes :

.1 dans le cas des gros granulats et des matériaux pour couche de base : pas plus de 1.5 m;

.2 dans le cas des granulats fins et des matériaux pour couche de fondation : pas plus de 1.5 m;

.3 dans le cas de tous les autres matériaux : pas plus de 1.5 m.

.8 Décharger en monceaux uniformes les granulats amenés au tas par camion et façonner les tas conformément aux prescriptions.

.9 Il est interdit de monter des tas en cône ou de faire débouler des matériaux de chaque côté des tas.

.10 Ne pas utiliser de convoyeurs empileurs.

.11 Au cours des travaux exécutés en hiver, empêcher la glace et la neige de se mélanger aux matériaux mis en tas ou extraits du tas.

3.2 NETTOYAGE

.1 Nettoyer l'endroit où les granulats ont été mis en tas de manière à laisser un terrain propre, bien drainé et exempt de toute accumulation d'eau stagnante.

.2 Mettre soigneusement les granulats inutilisés en tas compacts, conformément aux directives du Consultant.

.3 Lors de son abandon temporaire ou définitif, la source d'approvisionnement en granulats doit être remise en état à la satisfaction des autorités compétentes.

FIN DE LA SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 35 43 - Environmental Procedures.

.2 Section 32 93 45 - Tree Pruning.

.3 Section 31 23 10 - Excavation, Trenching and Backfilling.

.4 Section 31 23 17 - Rock Removal.

.5 Section 32 01 91 - Tree and Shrub Preservation.

1.2 MEASUREMENT PROCEDURES

.1 Measure following items in hectares within limits as indicated:

.1 Clearing.

.2 Grubbing 500mm below existing grades (removed from site)

.3 Close cut clearing (log to be cut into 1.2 m in length). To be stored on site as per directed by the client.

.4 Underbrush clearing. Branches and trunk under 125mm dia. to be mulched on site. To be stored on site as per directed by the client.

1.3 DEFINITIONS

.1 Clearing consists of cutting off trees and brush vegetative growth to not more than a specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.

.2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.

.3 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter, mulching and disposing of all fallen timber and surface debris.

.4 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.5 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than a specified depth below existing ground surface.

1.4 STORAGE AND PROTECTION

.1 Prevent damage to fencing, trees, landscaping, natural features, bench marks existing buildings, existing pavement, utility lines, site appurtenances water courses, root systems of trees which are to remain.

.1 Repair any damaged items to approval of Consultant.

.2 Replace any trees designated to remain, if damaged, as directed by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Not applicable.

Part 3 Execution

3.1 PREPARATION

.1 Inspect site and verify with Consultant, items designated to remain.

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

.3 Notify utility authorities before starting clearing and grubbing.

3.2 CLOSE CUT CLEARING

.1 Close cut clearing to a maximum height of 300 mm above ground surface.

.2 Perform close cut clearing by hand so that existing muskeg is not damaged.

.3 Cut off branches or down trees overhanging area cleared as directed by Consultant.

.4 Cut off unsound branches on trees designated to remain as directed by Consultant.

3.3 ISOLATED TREES

.1 Cut off isolated trees as directed the Client at height of not more than 300 mm above ground surface.

.2 Grub out isolated tree stumps.

3.4 UNDERBRUSH CLEARING

.1 Clear underbrush from areas as indicated to maximum height of 300 mm of ground surface.

3.5 GRUBBING

.1 Grub out stumps and roots to not less than 500 mm below ground surface.

.2 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m^3.

3.6 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials off site to disposal area as indicated by the client.

.2 Cut timber greater than 125 mm diameter, 1200 mm lengths and stockpile as indicated. Stockpiled timber on site, location as per direct the Consultant and approved by the Client.

.3 It is strictly forbidden to burn wood or debris on site.

.4 It is strictly forbidden to bury debris as follow:

- .1 Compacting.
- .2 Covering with minimum 500 mm of mineral soil.
- .3 Level to finishing surface.Mulch and stockpile and spread cleared and grubbed vegetative material on site as directed by Consultant.

.5 Remove diseased trees identified by Consultant and dispose of this material to approval of client.

3.7 FINISHED SURFACE

.1 Leave ground surface in condition suitable for immediate grading operations stripping of topsoil to approval of Consultant.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 31 11 00 - Clearing and Grubbing.

.2 Section 31 23 10 - Excavation, Trenching and Backfilling.

.3 Section 31 23 17 - Rock Removal.

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 Known underground and surface utility lines and buried objects are as indicated on site plan.

.2 Refer to dewatering in Section 31 23 10 - Excavating Trenching and Backfilling.

1.4 PROTECTION

.1 Protect and/or transplant existing fencing, trees, landscaping, natural features, bench marks, building, 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: Type in accordance with of Section 31 23 10 - Excavating, Trenching and Backfilling.

1. Foundation base: Reused existing granular material from dismantled existing campsite bases and if necessary backfill with imported granular materials type “B” (0 to 150mm).

.2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Consultant.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

.1 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.

.2 Commence topsoil stripping of areas as indicated on drawing as directed by Consultant after area has been cleared of brush weeds and grasses and removed from site.

.3 Strip existing camp site granular bases to 300mm in depth as directed by Consultant. Rototill topsoil to break up clumps retain on site. Avoid mixing topsoil with subsoil.

.4 Stockpile in locations as directed by Consultant. Stockpile height not to exceed 2 m.

.5 Dispose of unused topsoil on site or other new sites require more backfill as directed by the Consultant.

3.2 GRADING

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Rough grade to following depths below finish grades:

.1 300 mm for reforestation bed areas.
.2 500 mm for clearing and grubbing.

.3 Slope rough grade away as indicated per drawings.

.4 Grade ditches to depth required for maximum run-off as directed.

.5 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.

.6 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:

.1 85% under landscaped areas.
.2 95 % under paved and walk areas.

.7 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 laboratory designated by ULC. Costs of tests will be paid by the Contractor. Refer to Sections 01 29 83 - Payment Procedures and 01 45 00 - Quality Control.

.2 Submit testing procedure, frequency of tests, testing laboratory as designated by ULC or certified testing personnel to Consultant for approval.

3.4 SURPLUS MATERIAL

.1 Remove surplus material and material unsuitable for fill, grading or landscaping off site as directed by Consultant.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation of polymeric geotextiles used in revetments, breakwaters, retaining wall structures, filtration, and drainage structures under the campsite base purpose of which is to:

.1 Separate and prevent mixing of granular materials of different grading.

.2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 11 - Cleaning

.3 Section 31 23 10 - Excavating, Trenching and Backfilling.

1.3 MEASUREMENT PROCEDURES

.1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

1.4 REFERENCES

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

.1 ASTM D4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.2 ASTM D4595-86(2001), Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.3 ASTM D4716-01, Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.4 ASTM D4751-[99a], Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 No. 11.2-M89(April 1997), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).

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

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

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

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

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

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

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

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

.4 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 1860-March 1998, Material Specification for Geotextiles.

1.5 SUBMITTALS

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

.2 Submit to Consultant following samples at least 4 weeks prior to beginning Work.

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

.2 Minimum of 1 m seam with at least 30] mm of geotextile on both sides of seam.

.3 Submit to Consultant copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.

1.6 DELIVERY, STORAGE AND HANDLING

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 11 - Cleaning

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIAL

Geotextile: product # GN300 ‘Green Geotextile’ manufactured par American Engineering Fabrics Inc distributed by Géosynthetic Systems (613- 733-9585) or approved equivalent

.1 Physical properties:

.1 Thickness: to CAN/CGSB-148.1, No.3, minimum 61mm.

.2 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 2 g/m^2.

.3 Tensile strength and elongation (in any principal direction): to ASTM D4595.

.1 Elongation at break: 50%.

.4 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.

.2 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/$m^2$to CAN/CSA G164.

.3 Factory seams: sewn in accordance with manufacturer's recommendations.

.4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

Part 3 Execution

3.1 INSTALLATION

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

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

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

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

.5 Pin successive strips of geotextile with securing pins as recommended by the manufacturer at mid-point of lap.

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

.7 After installation, cover with overlying layer within 4 h of placement.

.8 Replace damaged or deteriorated geotextile to approval of Consultant.

.9 Place and compact soil layers in accordance with Section 31 23 13 - Excavating Trenching and Backfilling.

3.2 CLEANING

.1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3.3 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 General

1.1 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Granular based material will be providing by the removal existing granular campsites and if there is missing; the contractor will need to supply imported granular “B” from the quarry.

1.2 RELATED SECTIONS

.1 Section 01 74 11 - Cleaning.

.2 Section 31 05 16 - Aggregate Materials.

1.3 MEASUREMENT PROCEDURES

For backfilling of additional Aggregate Materials

.1 Measure hauling granular sub-base material in cubic metre-kilometres, computed by taking product of number of cubic metres of material placed multiplied by haul distance in kilometres. Measure haul distance from source of material to centre of volume of material after placing, measured along shortest route determined by Consultant as being feasible and satisfactory.

.2 Measure water in units of 1000L for water authorized by Consultant and applied.

.3 Measure compaction of granular sub-base in hours for particular compaction units employed including operator, fuel and maintenance as shown on approved recording devices.

1.4 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D422-63(1998), Standard Test Method for Particle-Size Analysis of Soils.

.5 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.6 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).

.7 ASTM D1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.8 ASTM D4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

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

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 11 - Cleaning.

.2 Divert unused granular material from landfill to local [quarry] [facility] as approved by [Engineer] [Consultant].

Part 2 Products

2.1 MATERIALS

.1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.3 Table

Sieve Designation	% Passing			
100 mm	-	-	-	-
75 mm	100	100	100	-
50 mm	-	-	-	100
37.5 mm	-	-	-	-
25 mm	55-100	-	-	60-100
19 mm	-	-	-	-
12.5 mm	-	-	-	38-70
9.5 mm	-	-	-	-
4.75 mm	25-100	25-85	-	22-55
2.00 mm	15-80	-	-	13-42
0.425 mm	4-50	5-30	0-30	5-28
0.180 mm	-	-	-	-
0.075 mm	0-8	0-10	0-8	2-10

.4 Other Properties as follows:

.1 Liquid Limit: to ASTM D4318, Maximum 25.

.2 Plasticity Index: to ASTM D4318, Maximum 6.

.3 Los Angeles degradation: to ASTM C131. Max% Loss by mass: 40%

.4 Particles smaller than 0.02 mm: to ASTM D422, Maximum 3%.

.5 Soaked CBR: to ASTM D1883, Min 40 when compacted to 100% of ASTM D1557.

Part 3 Execution

3.1 PLACING

.1 Place granular sub-base after subgrade is inspected and approved by Consultant.

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow or ice.

.5 Begin spreading sub-base material on crown line or high side of one-way slope.

.6 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.

.8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Consultant may authorize thicker lifts layers if specified compaction can be achieved.

.9 Shape each layer to smooth contour and compact to specify density before succeeding layer is placed.

.10 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Consultant before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

.4 Compact to density of not less than 98% maximum dry density in accordance with ASTM D698 ASTM D1557.

.5 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.6 Apply water as necessary during compaction to obtain specified density.

.7 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Consultant.

.8 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 PROOF ROLLING

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.

.2 Obtain approval from Consultant to use nonstandard proof rolling equipment.

.3 Proof roll at level in sub-base as indicated. If nonstandard proof rolling equipment is approved, Consultant to determine level of proof rolling.

.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.5 Where proof rolling reveals areas of defective subgrade:

.1 Remove sub-base and subgrade material to depth and extent as directed by Consultant.

.2 Replace sub-base material and compact.

.6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.4 SITE TOLERANCES

.1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.5 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Consultant.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Salvaged existing prefabricated concrete border are furniture that will need to be installed (2) per new sites.

1.2 RELATED SECTIONS

.1 Not applicable.

1.3 SUBMITTALS

.1 Not applicable.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Not applicable.

Part 2 Products

2.1 Prefabricate concrete border

.1 Dimensions: approximative .

- .1 Height: 150mm
- .2 Length: 2400mm
- .3 Depth: 200mm.

Part 3 Execution

3.1 INSTALLATION

.1 Install furnishing, true, plumb, anchored firmly supported, as indicated as directed by Consultant.

END OF SECTION

Part 1 General

1.1 MATERIAL SUPPLIED BY THE CONTRACT

.1 The contractor will supply planting topsoil for the preparation of reforestation bed.

1.2 RELATED SECTIONS

.1 Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

.2 Section 01 74 11 - Cleaning

.3 Section 31 11 00 - Clearing and Grubbing.

.4 Section 31 23 13 - Rough Grading.

1.3 MEASUREMENT PROCEDURES

.1 Measure supplying, placing and spreading topsoil in cubic metres as determined from actual surface area covered and depth of topsoil specified. Specified depth of topsoil is 300mm: measured and approved by Consultant after settlement and consolidation as specified.

1.4 DEFINITIONS

.1 COMPOST: A mixture of soil and decomposing organic matter used as a fertilizer, mulch, or soil conditioner. Compost is processed organic matter containing 40% or more organic matter as determined by the Walkley-Black or LOI test. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25, and contain no toxic or growth inhibiting contaminates. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category (A) (B) produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

1.5 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 11 – Cleaning.

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Consultant.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 TOPSOIL

.1 Topsoil for reforestation beds: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.

.2 Contain no toxic elements or growth inhibiting materials.

.3 Finished surface free from:

.1 Debris and stones over 50 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Consistence: friable when moist.

2.2 SOIL AMENDMENTS

.1 Fertilizer:

.1 Fertility: major soil nutrients present in following amounts:

.2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.

.3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.

.4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.

.5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

.6 Ph value: 6.5 to 8.0.

.2 Peatmoss:

.1 Derived from partially decomposed species of Sphagnum Mosses.

.2 Elastic and homogeneous, brown in colour.

.3 Free of wood and deleterious material which could prohibit growth.

.4 Shredded particle minimum size: 5mm.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Organic matter: compost Category A, 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.

2.3 SOURCE QUALITY CONTROL

.1 Advise Consultant of sources of topsoil and to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

.3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

.4 Testing of topsoil will be carried out by testing laboratory designated by Consultant. Soil sampling, testing and analysis to be in accordance with Provincial standards. The Contractor will pay for cost of tests as specified in Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

.1 Commence to removed existing trees, grubbing the area as indicated and as directed by Consultant after area has been cleared of brush and weeds and removed from site.

.2 Strip topsoil to depths as indicate on drawing. Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.3 Stockpile in locations as directed by Consultant. Stockpile height not to exceed 2.0m

.4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Consultant.

.5 Protect stockpiles from contamination and compaction.

3.2 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct. 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. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75mm above surface. Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.3 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 Spread topsoil as indicated to following minimum depths after settlement.

.1 300 mm for Reforestation beds.

3.4 SOIL AMENDMENTS

.1 For planting beds: apply and thoroughly mix soil amendments into full specified depth of topsoil top 50 mm of existing soil with recommendation proportion the as per manufacturer recommendation for the following items:

.1 peatmoss
.2 sand
.3 lime.

3.5 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Consultant. Leave surfaces smooth, uniform and firm against deep foot printing.

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 where directed by Consultant on site.

3.8 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 74 11 - Cleaning.

1.2 MEASUREMENT PROCEDURES

.1 Measure tree pruning for payment per tree.

1.3 REFERENCES

.1 Canadian Nursery Landscape Association (CNLA).

.2 International Society of Arboriculture (ISA)

.3 Ontario Ministry of Agriculture, Food and Rural Affairs.

.1 Pruning Ornamentals #483- 1992.

1.4 QUALIFICATIONS

.1 Staff to possess International Society of Arboriculture Canadian Nursery Landscape Association certification.

.2 Staff to possess safety certificate or equivalent as approved by local hydro utility.

1.5 FIELD SAMPLE

.1 Do sample pruning acceptable to Consultant to identify:

.1 Knowledge of target areas including branch bark ridge and branch collars.

.2 Technique for selection process and pruning used to establish desired form and shape for each species.

.2 Acceptance of Work will be determined by Consultant from field sample.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 11 - Cleaning.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

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

.5 Dispose of unused disinfectant at official hazardous material collections site approved by Consultant.

.6 Do not dispose of unused disinfectant into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

1.7 MAINTENANCE

.1 Tool maintenance:

.1 Ensure that tools are clean and sharp throughout pruning operation. Do not use tools which crush or tear bark.

.2 Disinfect tools before each tree is pruned.

.3 On diseased plant material disinfect tools before each cut.

Part 2 Products

2.1 DISINFECTANT

.1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

Part 3 Execution

3.1 GENERAL

.1 Prune in accordance with Pruning Ornamentals, and as directed by Consultant. Where discrepancies occur between standard and specifications, specifications govern.

.2 Notify immediately Consultant conditions detrimental to health of plant material or operations.

.3 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10^{o}C.

.4 Prune each species when in full leaf.

.5 Retain natural form and shape of plant species.

.6 Do not:

.1 Flush cut branches.

.2 Crush or tear bark.

.3 Cut behind branch bark ridge.

.4 Damage branch collars.

.5 Damage branches to remain.

3.2 PRUNING

.1 Remove dead, dying, diseased and weak growth from plant material designated by Consultant in order to promote healthy growth.

.2 Remove live branches that:

.1 Interfere with healthy development and structural strength including branches crossed or rubbing more important branches.

.2 Are of weak structure including narrow crotches.

.3 Obstruct development of more important branches.

.4 Are broken.

.3 Remove live branches to re-establish natural species form including:

.1 One or more developing leaders.

.2 Multiple growth due to previous topping.

.3 Branches extending outward from natural form.

.4 Undesirable sucker growth.

.4 Remove loose branches, twigs and other debris lodged in tree.

.5 Remove vines.

.6 For branches under 50 mm in diameter:

.1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at angle equal to that formed by line opposite to branch bark ridge.

.2 Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.

.3 Do not cut lead branches unless directed by Consultant.

.7 For branches greater than 50 mm in diameter:

.1 Make first cut on lower side of branch 300 mm from trunk, one third diameter of branch.

.2 Make second cut on upper side of branch 500 mm from trunk until branch falls off.

.3 Make final cut adjacent to and outside branch collar.

.8 Ensure that trunk bark and branch collar are not damaged or torn during limb removal. Repair areas which are damaged, or remove damaged area back to next branch collar.

.9 Remove additional growth designated by Consultant.

3.3 ROOT GIRDLING

.1 For girdling roots one-quarter size of trunk diameter or larger, V-cut girdling root one-half way through at point where root is crossing.

.2 Remove exposed portion of girdling root as directed by Consultant after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

3.4 CARE OF WOUNDS

.1 Shape bark around wound to oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.

3.5 CLEAN-UP

.1 Collect and dispose of compost/recycle whenever applicable pruned material daily and remove from site.

END OF SECTION