

**FUNDY OCEAN RESEARCH CENTER FOR ENERGY
HALIFAX, NOVA SCOTIA**

**IN-STREAM TIDAL POWER GENERATING PLANT
INTERTIE SUBSTATION DEVELOPMENT**

**DESIGN, MANUFACTURE, DELIVERY AND ERECTION
OF ONE (1) PRE-ENGINEERED / SITE-ERECTD
SUBSTATION CONTROL BUILDING**

APRIL, 2011

**SPECIFICATION No.
023-478-4-11**

SPECIFICATION


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HALIFAX, NOVA SCOTIA**

**IN-STREAM TIDAL POWER GENERATING PLANT
INTERTIE SUBSTATION DEVELOPMENT**

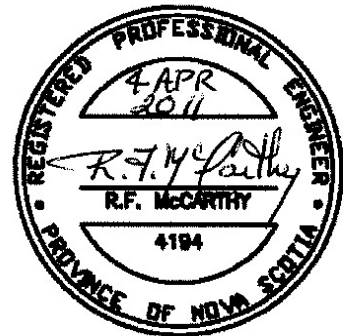
**DESIGN, MANUFACTURE, DELIVERY AND ERECTION
OF ONE (1) PRE-ENGINEERED / SITE-ERECTD
SUBSTATION CONTROL BUILDING**

SPECIFICATION No: 023-478-4-11


SIGNED AND SEALED:



**R. McCARTHY, P. ENG.
SENIOR ELECTRICAL ENGINEER**



SIGNED:



**R. O'FLAHERTY, P. ENG.
QA/QC ENGINEER**

STRUM ENGINEERING ASSOCIATES LTD.

APRIL, 2011

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SPECIFICATION

SECTION A
INFORMATION AND GENERAL REQUIREMENTS

SPECIFICATION

SECTION A

INFORMATION AND GENERAL REQUIREMENTS

1. GENERAL

- 1.1 This Technical Specification, prepared by Strum Engineering Associates Ltd. on behalf of Fundy Ocean Research Center for Energy, consisting of the Information and General Requirements, the Technical Requirements, together with all Schedules, Drawings, and Addenda issued with and subsequent to the "Invitation to Tender", shall become a part of any Contract or Purchase Order to perform the work involved. In case of discrepancies between the work tendered to be performed and the work specified to be performed, the Technical Specification shall be final and binding unless there is mutual agreement to the contrary between Fundy Ocean Research Center for Energy and the Vendor.

2. DESCRIPTION OF PROJECT

- 2.1 This scope of work of this aspect of the project consists of the design, manufacture, delivery to site and erection onto a concrete foundation (by others), one (1) pre-engineered, Site-erected substation control building, as specified herein.

3. DEFINITIONS

- 3.1 The **Owner's Engineer** shall mean:

Strum Engineering Associates Ltd.
80 Eileen Stubbs Avenue
Dartmouth, Nova Scotia, B3B 1Y6

Contact: Mr. Richard McCarthy, P. Eng.

Telephone: (902) 468-7325
Fax: (902) 468-1908
E-Mail: r.mccarthy@strumengineering.ca

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3.2 The Vendor shall mean the Tenderer as defined in Fundy Ocean Research Center for Energy Terms and Conditions.

3.3 The **Owner's** information and contact will be:

Fundy Ocean Research Center for Energy

PO Box 2573

Halifax, Nova Scotia

B3J 3N5

Contact: Mr. Frank LeBlanc, P.Eng.

Telephone: (902) 443-4690

Fax: (902) 468-1908

E-Mail: frank.leblanc@fundyforce.ca

4. ERRORS AND OMISSIONS

4.1 Should any details necessary for a clear and comprehensive understanding be omitted or any errors appear in the tendering documents, it shall be the duty of the Tenderer to obtain clarification from the Engineer before submitting his tender. All additions or corrections to the Technical Specification will be issued in writing to all Tenderers as addenda thereto. Tenderers shall list in their tenders all the addenda that were received and considered when their tender was prepared.

5. MATERIAL AND WORKMANSHIP

5.1 All materials shall be new. Workmanship and material shall be of the best quality.

5.2 Design shall be in accordance with the best engineering practice and shall be such as has been proven suitable for the intended purpose.

5.2 Equipment of the same type shall be interchangeable. Listed spare parts shall be identical and inter-changeable with parts in service that they are intended to replace.

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6. GUARANTEE/WARRANTY

- 6.1 The Vendor shall warrant that all materials, equipment, and workmanship furnished in accordance with the purchase documents shall comply in all respects with the Technical Specification, and shall guarantee in writing that the equipment will give successful and efficient service.
- 6.2 The Vendor shall, to the satisfaction of the Owner, rectify any defects which may appear in the equipment, or of which he shall receive notice from the Owner and for which he may have been responsible in the opinion of the Owner, for a period of twelve months after occupancy or eighteen months after shipment, whichever occurs first.
- 6.3 Any equipment which fails to perform in accordance with the requirements of the Specification during this period may be rejected by the Owner. The Vendor shall proceed at once to make alterations or furnish new equipment, as may be necessary.
- 6.4 Costs of supplying any replacement equipment, or of modifications or alterations to equipment, in order to meet specified requirements shall be borne by the Vendor, including the costs, if any; of any work or materials provided by the Owner, and of any shipping charges incurred by the Owner.
- 6.5 Operation by the Owner of the equipment or any part thereof shall not constitute any waiver of the Owner's rights under this agreement.
- 6.6 The Vendor agrees that the pre-engineered, Site-erected substation control building shall meet the requirements set out in the Specification and all relevant standards listed herein.
- 6.7 The Owner's purchase order terms and conditions shall prevail.

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7. VENDOR INFORMATION

- 7.1 The Vendor shall provide, in the tender submission, the following information in addition to the data provided in the Schedules presented in Section C:
 - 7.1.1 Location of the plant where the building and building materials are manufactured.
 - 7.1.2 Users list including quantities supplied and names of contact personnel.
 - 7.1.3 Design and construction features.
 - 7.1.4 Design test report on the complete pre-engineered, Site-erected substation control building in accordance with ANSI standards. The test report shall show the pre-engineered, ste-erected substation control building to be capable of withstanding the environmental conditions and loads specified.
 - 7.1.5 A typical instruction book and drawings including: outline, plan view, elevations, floor plan, roof details and foundation details.
 - 7.1.6 Paint system.
 - 7.1.7 Deviations, if any, from this Specification.
 - 7.1.8 Inspection and test plan indicating the following as a minimum:
 - 7.1.8.1 products and services subcontracted,
 - 7.1.8.2 where each inspection and test point, including hold points for the customer's inspection, will be located,
 - 7.1.8.3 the characteristics to be inspected and tested at each point,
 - 7.1.8.4 inspection procedure,
 - 7.1.8.5 sampling plan,
 - 7.1.8.6 acceptance criteria.

SPECIFICATION

8. MANUFACTURER'S DRAWINGS

8.1 General

8.1.1 Drawings shall be clear and legible and have a title block including the name of the Project, and the number and title of the drawing.

8.1.2 All drawings shall be prepared on A1 size sheets, 594 mm by 841 mm. Use of other size sheets shall be approved by the Owner's Engineer.

8.2 System of Units

8.2.1 All dimensions shall be in the Metric system.

8.3 Title Block

8.3.1 Drawing title blocks shall include the following information:

.1 Name of the Project as follows:

**IN-STREAM TIDAL POWER GENERATING PLANT
SUBSTATION DEVELOPMENT**

Manufacture, Testing, Delivery, Offloading, Erection and
Warranty of One (1) Pre-engineered, Site-erected
Substation Control Building

Owner's Purchase Order No.

.2 Provide a 100mm x 100mm space to accommodate the Engineer's review stamp.

.3 Issue date and the drawing number.

.4 Space allotted for revisions including the number, description, and date.

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8.4 Review of Drawings

- 8.4.1 Drawings made by the Tenderer or his sub-contractors defining the work shall be provided at appropriate times within the program of work as defined in the Specification.
- 8.4.2 Five (5) prints or the electronic file (ACAD-Version 2005) of each shop drawings shall be submitted to the Owner's Engineer, who shall return, within 14 days after receipt, one copy of the reviewed drawings stamped as follows:

STRUM ENGINEERING ASSOCIATES LTD.	
Date Received: _____ By: _____.	
This drawing has been reviewed for the sole purpose of determining conformance with the general requirements of the Contract Documents.	
The Contractor shall remain responsible for all damages resulting from errors and/or omissions contained in this drawing and shall satisfy all obligations and liabilities connected therewith and with the Contract Documents.	
Reviewed - Manufacturing May Proceed.	()
Reviewed - Submit Final Drawing. Manufacturing May Proceed.	()
Reviewed - Make Changes As Noted. Submit Final Drawing.	()
Manufacturing May Proceed.	
Reviewed - Correct and Resubmit.	()
Review Not Required - Manufacturing May Proceed.	()
Date Review Completed: _____ By: _____.	

All drawings checked other than, "Reviewed - Manufacturing May Proceed", shall be corrected and recycled for review within 14 calendar days, and this procedure continued until final review is obtained.

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8.4.3 Before proceeding with construction, submit for review to the Owner's Engineer, assembly drawings, foundation and base plate details, layout and drilling details, drawings covering construction and other pertinent data for the equipment under consideration. Do not start construction until instructed by the Owner's Engineer.

8.4.4 Do not revise those drawings or portions of drawings which have been reviewed and stamped during the review process unless these drawings or portions are affected by comments made or revisions requested.

8.5 Final Drawings

8.5.1 These drawings shall incorporate any changes made during the construction and testing stages of the work, shall be exact drawings of the equipment as supplied, and shall be of such quality to enable electronic scanning without loss of detail.

8.5.2 Do not revise drawings that have been reviewed and stamped "Reviewed – Manufacturing May Proceed" by the Engineer except by his prior written consent.

8.5.3 Submit six (6) prints and the electronic ACAD file (xxx.dwg format) of each final drawing.

9. OPERATION AND MAINTENANCE MANUALS

9.1 Prepare comprehensive instruction manuals describing in detail the construction and recommended procedures for assembling, dismantling, maintaining and operating all equipment and listing all replacement parts. These shall include copies of all pertinent bulletins and instructions prepared by the manufacturers of component parts of the equipment, properly catalogued for easy reference.

9.2 Two (2) copies of the manuals shall be submitted in draft form to the Owner's Engineer for review at least one (1) month before the equipment is to be delivered. Five (5) copies of the approved manual shall be submitted at the time the equipment is shipped.

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10. PACKAGING AND SHIPPING

- 10.1 All parts shall be thoroughly cleaned to remove oil, grease, dust, and other foreign material and all equipment openings shall be capped to prevent entry of foreign materials or damage.
- 10.2 Equipment shall be suitably prepared and packed so as to prevent damage occurring during storage, transportation, and unloading operations and to ensure that the equipment is in perfect working condition, has suffered no damage, and that all parts are intact on arrival at the destination.
- 10.3 Packaging and crating of items shipped loose shall include suitable weather protection, moisture control, temporary bracing, blocking straps, skids, etc.

11. SIGNING AND SEALING OF MANUFACTURER'S DRAWINGS

- 11.1 Execute design under the supervision of a licensed Engineer. The Engineer shall sign and seal:
 - 11.1.1 Shop fabrication drawings and specifications;
 - 11.1.2 Site erection drawings and specifications; and,
 - 11.1.3 Assembly, schematic and wiring diagrams.

12. CORRESPONDENCE

- 12.1 In view of the urgency attached to this project, the tender submission shall be by courier or electronic mail (E-Mail). All other correspondence shall be by courier, facsimile or E-Mail.
- 12.2 The Vendor shall allow for this requirement in the prices quoted herein.

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13. SCHEDULE

- 13.1 The Substation Control Building and all components associated with this Specification are required on site not later than 15 July, 2011. Erection of the Control Building shall be complete not later than 1 August 2011. Refer to Schedule No. 5, Page C-7, for the specific schedule requirements.

14. DRAWINGS

- 14.1 Strum Engineering Drawing No. 023-478-E-1131, Rev. A01, entitled “Control Building Foundation – Plans and Sections” indicates the concrete foundation dimensions.
- 14.2 Strum Engineering Drawing No. 023-478-D-3031, Rev. A01, entitled “Control Building Layout and Misc Structural Details”, indicates the proposed building dimensions and interior wall requirements.

SPECIFICATION

SECTION B
TECHNICAL REQUIREMENTS

SPECIFICATION

SECTION B

TECHNICAL REQUIREMENTS

1. SCOPE OF WORK

- 1.1 Design, manufacture, deliver to the Fundy Ocean Research Center for Energy Substation Site at Black Rock, Nova Scotia (approximately 10km west of Parrsboro, Nova Scotia), erect onto a concrete foundation (concrete foundation by others) and provide a written warranty for one (1) pre-engineered, site-erected substation control building.

2. SERVICE CONDITIONS

2.1 Application

- 2.1.1 The substation control building shall be designed to be secured on a concrete foundation (concrete foundation to be supplied by others) which shall be located inside a fenced substation yard at the Fundy Ocean Research Center for Energy Substation site in Black Rock, Nova Scotia.

2.2 Environmental Data

- 2.2.1 Design and manufacture the substation control building to be suitable for operation under the following environmental conditions:

Elevation above sea level	m	65
Maximum ambient temperature	°C	40
Minimum ambient temperature	°C	-40
Maximum continuous wind speed	km/h	120
Average yearly precipitation	mm	620

- 2.2.2 The pre-engineered, site-erected substation control building will be installed in a sea coast marine, high humidity environment, containing salt elements. The manufacturer shall give due consideration to this in the selection of material for hardware and components.

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3. STANDARDS

- 3.1 Unless otherwise specified herein, manufacture and install the substation control building and associated building services in accordance with the latest issue of the following standards:

National Building Code of Canada (including supplements)

Nova Scotia Building Code Regulations (including amendments) made under Section 4 of the Building Code Act

CSA C22.1-09 Canadian Electrical Code; Part 1, Safety Standard for Electrical Installations

CSA S16 Steel. Structures for Buildings

CSA S136 Design of Light Gauge Steel Structural Members

Canadian Sheet Steel Building "Code Standard Practices for Pre-Engineered Metal Buildings"

MBMA Metal Building Manufacturers "Metal Building Systems Manual of Design Practices"

AISC "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings"

AISI "Specifications for the Design of Light Gage Cold Formed Steel Structural Members".

- 3.2 Apply all reference publications and amendments listed within the above standards.
- 3.3 In case of conflict between any of the publications listed above, the governing standard shall be one which requires the highest quality of work and materials and afford the highest degree of safety to personnel as interpreted by the Engineer.
- 3.4 Other alternative standards may be used if approved by the Owner's Engineer.

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4. EQUIPMENT, APPARATUS AND MATERIAL SUPPLIED BY OTHERS

- 4.1 The Owner will be installing electrical equipment in the interior of the pre-engineered, site-erected substation control building, including a 125Vdc station battery, battery charger and protection, control and communication panels.
- 4.2 Steel supports of plywood backboards and sufficient floor space shall be provided to allow for the installation of the Owner supplied equipment, as indicated on the drawings.

5. SUBSTATION CONTROL BUILDING TECHNICAL INFORMATION

5.1 Dimensions and Design Ratings

- 5.1.1 The overall dimensions of the substation control building shall be as specified on the building layout Drawing No. 023-478-D-3031.
- 5.1.2 The substation control building structure shall be designed by a registered or licensed Professional Engineer. Design calculations and drawings shall be submitted to the Owner bearing the seal of said Professional Engineer.

5.2 Grounding

5.2.1 General:

- 5.2.1.1 An extension to the underground 4/0 AWG bare copper ground grid will be supplied and installed on the outside perimeter of the substation control building concrete slab, by others.
- 5.2.1.2 4/0 AWG bare copper pigtailed will be tapped from the ground grid copper conductor and will rise (in PVC sleeves) through the concrete building slab and into the substation control building for connection to each of the building's steel support columns and at selected electrical equipment items, by others.
- 5.2.1.3 Maintain an access point to each support column so that grounding connections can be made and inspected after the building installation is completed.

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5.3 Structural Performance

- 5.3.1 The design loading for the building shall be in accordance with Part 4 of the latest edition of the National Building Code of Canada. Climatic values used for design shall be those listed in the Supplement to the National Building Code for the specified location. The Vendor shall provide a building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
- 5.3.1.1 Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual." The building system erection drawings shall carry the seal of a professional structural engineer.
 - 5.3.1.2 Design Loads: As required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures", and by 2003 IBC Building Code. For a Category III: Utility Occupancy Structure.
 - 5.3.1.3 Live Loads: Include vertical loads induced by the building occupancy. Include loads induced by maintenance workers, materials, and equipment for roof live loads.
 - 5.3.1.4 Roof Snow Loads: Include vertical loads induced by the weight of snow, as determined by a 100-year, mean-recurrence-interval ground snow load at the project site. Allow for unbalanced and drift loads.
 - 5.3.1.5 Wind Loads: Include horizontal loads induced by a basic wind speed corresponding to a 100-year, mean-recurrence interval at the project site.
 - 5.3.1.6 Roof Collateral Loads: Include additional dead loads other than the weight of the metal building system for permanent items such as mechanical systems, electrical systems, and ceilings. Include an additional dead load to account for cable trays hung from the roof framing.
 - 5.3.1.7 Wall Collateral Loads: Include an additional collateral load supported from the inside face of the finished wall surface for the support of electrical equipment. Allow for additional collateral loads of up to 75kg at any point along the inside perimeter wall.
 - 5.3.1.8 Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

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- 5.3.2 The substation control building shall be weather tight and designed such that proposed electrical or mechanical entry ways do not allow water or wildlife to enter the building. Building – Foundation interface must be gasketed or sealed to prevent moisture from wicking into building.
- 5.3.3 The Vendor shall provide exact anchoring locations and provisions for anchoring the substation control building to the concrete foundation pad.

5.4 Roof and Ceiling

- 5.4.1 The Owner prefers a substation control building with a pitched roof. If the proposed substation control building does not have a pitched roof, the Vendor shall provide supporting documentation to verify the proposed roof will provide a 30 year minimum service life.
- 5.4.2 Install steel roof joists of sufficient quantity and strength to support the roof and Owner supplied interior cable tray and conduit systems, if required. Steel joist selection and spacing shall be determined based on the following load factors:
 - 5.4.2.1 Roof system loading, including allowance for maximum water, snow and ice coverage and live loading by maintenance personnel.
 - 5.4.2.2 Dead-weight load of the steel joist.
 - 5.4.2.3 Dead-weight load of the Owner's cable tray and conduit systems to be supported from the steel roof joists, by others. The design load for each cable tray and conduit system shall be 75.0 lb_f per linear foot. The cable tray and conduit systems shall be assumed to run over the full length of the building, supported at each joist.
- 5.4.3 The roof structure shall be constructed from an integral roof truss or rafter system of 11 gauge (minimum) steel members and shall be supported by the exterior wall. Intermediate bearing columns shall only be allowed within the room separation walls defined on Drawing No. 023-478-D-3031 and then only on the center-line of the center concrete floor support structure as defined on Drawing No. 023-478-D-1131 . The roof system shall be capable of supporting the total maximum load stated in Section 5.4.2.
- 5.4.4 If an alternate roof structure is proposed, the Vendor shall provide details of the roof design.

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- 5.4.5 The exterior roof surface shall be a maintenance-free 18 gauge minimum galvanized steel, standing seam roof panel system with 3” height minimum interlocking ribs designed to be water-tight with minimal air infiltration and provide a 30-year minimum service life. Provide 8” minimum roof overhang on eave walls. If an alternate type of construction is proposed, the Vendor shall provide details on the roof and wall design including wall material and thickness.
- 5.4.6 The interior of the substation control building roof (ceiling) shall be factory-finished, 18 gauge minimum, steel liner panels which are easily removable to facilitate additional equipment in the future. The Vendor may propose their standard ceiling as an alternate for the Owner’s consideration. The colour shall be one of the Vendor’s standard colours to be selected by the Owner.
- 5.4.7 The ceiling/roof insulation shall be 4” thick minimum, solid core, rigid or foam type insulation that will not sag or absorb moisture or 10” thick fiberglass batten insulation, contain a vapor barrier and have a minimum R-value of R30.
- 5.4.8 The Vendor shall design the clearance from finished floor to finished ceiling to be a minimum of 11.5ft (3.5m) to permit unrestricted installation of 90” (2.3m) high control panels, 6” (150mm) deep cable trays, vertical tray clearances and suspended light fixtures.
- 5.4.9 The exterior roof surfaces shall have a low fire hazard rating equal to a Class1 material as defined by Factory Mutual and as tested in accordance with ASTM E-84.

5.5 Walls

- 5.5.1 The walls shall be framed with an interlocking 11 gauge (minimum) steel, structural wall panel system. The Vendor may propose different framing as an alternate for the Owner’s consideration.
- 5.5.2 Prepare wall openings and frames to suit the proposed man entry (pedestrian) doors, equipment doors and ventilation and air-conditioning units.

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- 5.5.3 The exterior wall surface shall be a maintenance-free 18 gauge minimum galvanized steel, vertical rib wall panel system with interlocking ribs designed to be water-tight with minimal air infiltration and provide a 30-year minimum service life. The colour shall be one of the Vendor's standard colours to be selected by the Owner.
- 5.5.4 Exterior wall surfaces shall have a low fire hazard rating equal to a Class 1 material as defined by Factory Mutual and as tested in accordance with ASTM E-84.
- 5.5.5 The wall insulation shall be 50mm thick minimum, solid core, rigid or foam type insulation, or 87mm thick fiberglass batten insulation that will not sag or absorb moisture, contain a vapor barrier and have a minimum R-value of R-20.
- 5.5.6 The interior walls shall be factory-finished, 18 gauge minimum, steel liner panels which are easily removable to facilitate additional equipment or expansion in the future. The Vendor may propose their standard wall finish system as an alternate for the Owner's consideration. The colour shall be one of the Vendor's standard colours to be selected by the Owner. The wall finish behind and adjacent to battery racks shall be an acid resistant epoxy paint extending 1525mm above the floor.
- 5.5.7 The interior perimeter walls shall be of sufficient structural strength to support the mounting of electrical and mechanical equipment (panelboards, transfer switches, ventilation fans, air conditioning units, etc.) which may weigh in the order of 75kg each.
- 5.5.8 The interior walls shall also allow for the surface mounting of electrical building services devices, such as light switches, receptacles and electrical steel conduit.
- 5.5.9 Two (2) duct openings should be made for each of the five (5) air conditioning units at locations indicated on the layout drawing. Each opening shall be properly prepared to prevent moisture from contaminating the wall insulation. Provide structural members around openings to support A/C units. Refer to Drawing No. 023-478-D-3031 for locations and A/C duct opening dimensioning and structural support information.

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5.5.10 Areas identified as requiring plywood backboard shall have studs or vertical structural supports spaced no further than 610mm (24") apart and shall be able to support equipment which may weigh in the order of 75kgs.

5.6 Floor

5.6.1 The substation control building floor shall be the finished top-side of the concrete foundation basement ceiling, supplied and installed by others.

5.7 Doors and Hardware

5.7.1 The substation control building shall be provided with three (3) equipment doors and five (5) man entry door. The doors shall open outward. Each door shall be provided with panic hardware for emergency exit. The doors shall have a 1-hour, fire-rating per the NFPA Standards.

5.7.2 The use of hasps and padlocks on the outside of doors is not an acceptable practice since it could prevent exit through the emergency door in time of need. The door lock shall be a Best Type 77K heavy duty cylinder lock set, for exterior use, with Best "B" cylinder. The operation of the door will be latch bolt by knob from the inside and key from the outside. This lock set is to be fitted after handing over by the Vendor.

5.7.3 Door louvers are not required. The proposed air conditioning systems will provide louvered air ducts for fresh air makeup and exhasust.

5.7.4 The man entry (pedestrian) doors shall be 915 mm wide by 2134 mm high by 45 mm thick, 16 gauge (ASTM A924) hot dipped zinc coated steel with continuously welded seams. It shall be an out-swinging, flush design with polyurethane insulated core chemically bonded to all interior surfaces, with a minimum insulating value of R-10. Reinforcement for locks, latches, hinges, closers and other hardware shall be in accordance with ANSI A115 unless otherwise specified. Finish shall be factory primed and finish coated (both sides of doors). The frame shall be 2" mitered, factory welded cold rolled steel, 16 gauge minimum, reinforcing shall be 8 gauge steel for hinges, 12 gauge for closers and 14 gauge minimum for other hardware. Finish shall be factory primed and finish coated. Hinges shall be 1½ pair of 114 mm by 114 mm ball bearing type stainless steel, butt hinges with dull chrome finish. Hinge pins shall be non-removable type.

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- 5.7.5 The overall dimensions of the large equipment metal doors shall be a minimum of 1830 mm wide by 2438 mm high by 45 mm thick, 16 gauge (ASTM A924) hot dipped zinc coated steel with continuously welded seams. It shall be an out-swinging, active/inactive flush design with polyurethane insulated core chemically bonded to all interior surfaces, with a minimum insulating value of R-10. Reinforcement for locks, latches, hinges, closers and other hardware shall be in accordance with ANSI A115 unless otherwise specified. Finish shall be factory primed and finish painted. The door assembly shall consist of one active leaf 915 mm by 2134 mm, one inactive leaf 915 mm by 2134 mm. The frame shall be 50mm mitered, factory welded cold rolled steel, 16 gauge minimum, reinforcing shall be 8 gauge steel for hinges, 12 gauge for closers and 14 gauge minimum for other hardware for all hardware in accordance with ANSI. Hinges shall be 1½ pair of 114 mm by 114 mm ball bearing type stainless steel, butt hinges with dull chrome finish. Hinge pins shall be non-removable type. Double doors shall be provided with an overlapping T-astragal (Crouder W9 or approved equal).
- 5.7.6 Weather stripping and thresholds shall be provided to give a positive weather seal around all doors. Aluminum exterior thresholds, CT39, as manufactured by Von Duprin Ltd., or equivalent, shall be installed to provide a complete weather seal and track for the vertical rod device. Weather stripping shall be Cat. No. 10795, spring adjustable door weather strip as manufactured by Climaloc or approved equal.
- 5.7.7 Door and door frames shall be mortised, reinforced, drilled and tapped for hardware including surface mounted closers and panic exit devices, and shall be provided with all necessary anchors and rubber silencers.
- 5.7.8 Door closers LCN 4024 H90 SB or approved equal shall be provided for all single man doors and for the active leaf of the double doors.
- 5.7.9 Double doors shall be provided with Von Duprin rim type panic exit devices or approved equal. The panic hardware shall be type 88NL Exit Device with outside trim 780NL-R for the active door and the vertical rod type 8827 with type 1609 strike plate for the inactive doors.

SPECIFICATION

SECTION C
SCHEDULES

SPECIFICATION

SECTION C

SCHEDULES

1. INSTRUCTIONS

- 1.1 Complete and submit with the tender and schedules contained in this section.
- 1.2 Incomplete schedules may render the tender inadmissible.

SPECIFICATION

SCHEDULE No. 1

TECHNICAL INFORMATION

1. PRE-ENGINEERED, SITE-ERECTD SUBSTATION CONTROL BUILDING

1.1 General Information:

Manufacturer _____

Model No. / Designation _____

Type of Construction _____

 Roof _____

 Walls _____

 Doors _____

Materials _____

 Roof _____

 Walls _____

 Doors _____

Building Dimensions _____

Quality Control _____

Environment _____

Temperature Range _____

Expandability _____

SPECIFICATION

SCHEDULE No. 1

TECHNICAL INFORMATION (CONT'D)

1. PRE-ENGINEERED, SITE-ERECTD SUBSTATION CONTROL BUILDING (CONT'D)

1.1 General Information (Cont'd):

Finish	_____
Roof	_____
Walls	_____
Doors	_____
Roof Style	_____
Walls	_____
Insulation	_____
Roof	_____
Walls	_____
Doors	_____
Door Hardware	_____

SPECIFICATION

SCHEDULE No. 2

DOCUMENTS TO BE SUBMITTED WITH TENDER

Drawing or Document Ref. No.

Completed Schedules _____

Outline dimensions and layout
of equipment and enclosures _____

Bills of Material _____

Catalogues _____

Instruction Pamphlets _____

Certified "Type Test" Reports
(including list of Type Tests to be performed) _____

List of Recommended Spare Parts
(Include prices for each item)

- readily available _____

- long delivery _____

List of required Special Tools _____

Bar chart progress schedule showing
manufacture, delivery, issue of
drawings, and all phase of the work _____

Transportation method and route
(including details of trailer and wheel loading) _____

SPECIFICATION

SCHEDULE No. 3

TENDERED VARIATIONS FROM THE SPECIFICATION

The Tenderer shall detail hereunder, any variations from the terms and conditions of this Specification:

Signature: _____

Date: _____

SPECIFICATION

SCHEDULE No. 4

ERECTION SUPERVISOR

State the daily rate for the provision of a qualified person to supervise the erection and commissioning of the equipment being supplied.

The daily rate shall cover all costs such as salary, subsistence, local traveling within 30 kilometres of the jobsite, communications and the supply of any special tools he/she requires to properly perform the work.

Daily Rate for Erection Supervisor: \$ _____

Also provide details of any terms and conditions applicable to each supervisor:

SPECIFICATION

SCHEDULE No. 5

COMMENCEMENT AND COMPLETION DATES

	<u>Required Dates</u>	<u>Tendered Dates</u>
1. Issue of Purchase Order	21 April 2011	
2. Submit Bills of Material and Planning Schedule for approval	13 May 2011	
3. Submit assembly drawings, foundation and base plate details, layout and drilling details, and drawings for review	27 May 2011	
4. Submit performance curves and other supporting documentation	27 May 2011	
5. Submit final copies of shop drawings	15 June 2011	
6. Submit draft copies of Operation and Maintenance Manuals	15 June 2011	
7. Delivery of substation control building DDP per Incoterms to Fundy Ocean Research Center for Energy Substation Site, Black Rock, Nova Scotia (10km west of Parrsboro, Nova Scotia)	15 July 2011	
8. Complete erection of substation control building	1 August 2011	

SPECIFICATION

SCHEDULE No. 6

SPARE PARTS LIST

	<u>Recommended Spare Parts</u>	<u>Quantity</u>	<u>Price (Cdn \$)</u>
1.			
2.			
3.			
4.			

Total Price Carried to Schedule 8: \$ _____

SPECIFICATION

SCHEDULE No. 7

ACCESSORIES AND SPECIAL TOOLS LIST

<u>Recommended Accessories and Special Tools</u>	<u>Quantity</u>	<u>Price (Cdn \$)</u>
1.		
2.		
3.		
4.		
5.		

Total Price Carried to Schedule 8: \$ _____

SPECIFICATION

SCHEDULE No. 8

PRICE LIST

<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Price (Cdn \$)</u>
1.	Manufacture, deliver, erect onto a concrete foundation (by others), and provide a written guarantee for one (1) pre-engineered, site-erected substation control building	lot	\$ _____
2.	Accessories and Special Tools (from Schedule No. 7)	lot	\$ _____
Total Equipment Supply (Items 1 & 2)			\$ _____
	Transportation DDP per Incoterms to Fundy Ocean Research Center for Energy Substation Site, Black Rock, Nova Scotia	lot	\$ _____
	Canadian Customs Duty	lot	\$ _____
	Harmonized Sales Tax (HST)	15%	\$ _____
Total Supply & Deliver Fundy Ocean Research Center for Energy Substation Site, Black Rock, Nova Scotia			\$ _____
3.	Tenders shall provide a separate Price for the following optional item:		
	Spare Parts List (from Schedule No. 6)	lot	\$ _____

SPECIFICATION

SCHEDULE No. 9

FORM OF TENDER

Item: One (1) Pre-engineered, site-erected substation control building

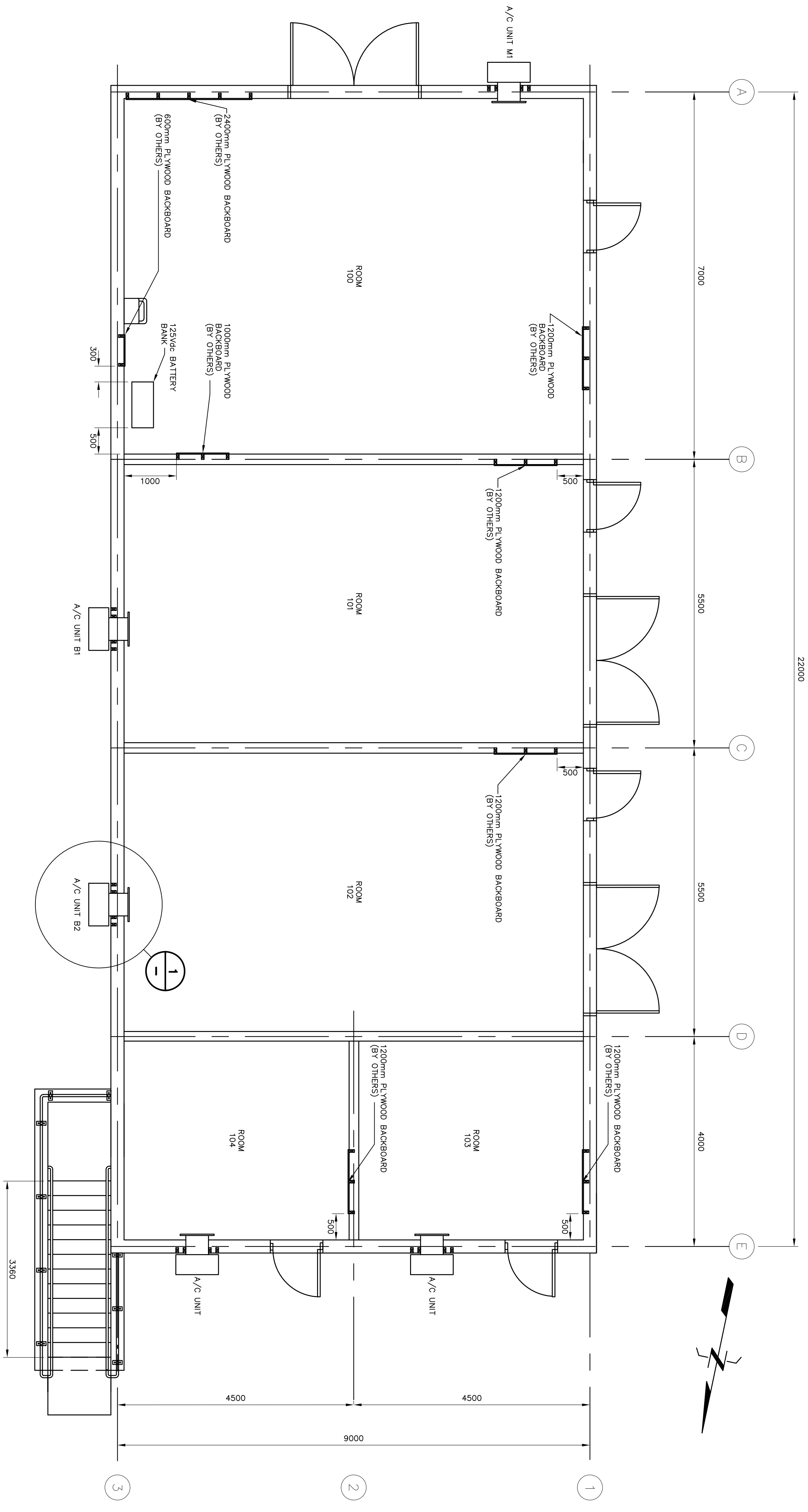
Vendor Ref. No.: _____

1. Total Supply, Delivery & Erection (From Schedule No. 8): \$ _____
2. Terms of Payment: _____
3. Customs Clearance by: _____
4. Point of Shipment: _____
5. Promised Shipping Date: _____
6. INCOTERMS 2000 Definition: _____
7. Recommended Methods of Shipment: _____
8. Estimated No. of Packages: _____
 - Shipping Weight Each Package: _____
 - Shipping Dimensions Each Package: _____
9. Conditions of Guarantee: _____
10. Other: _____

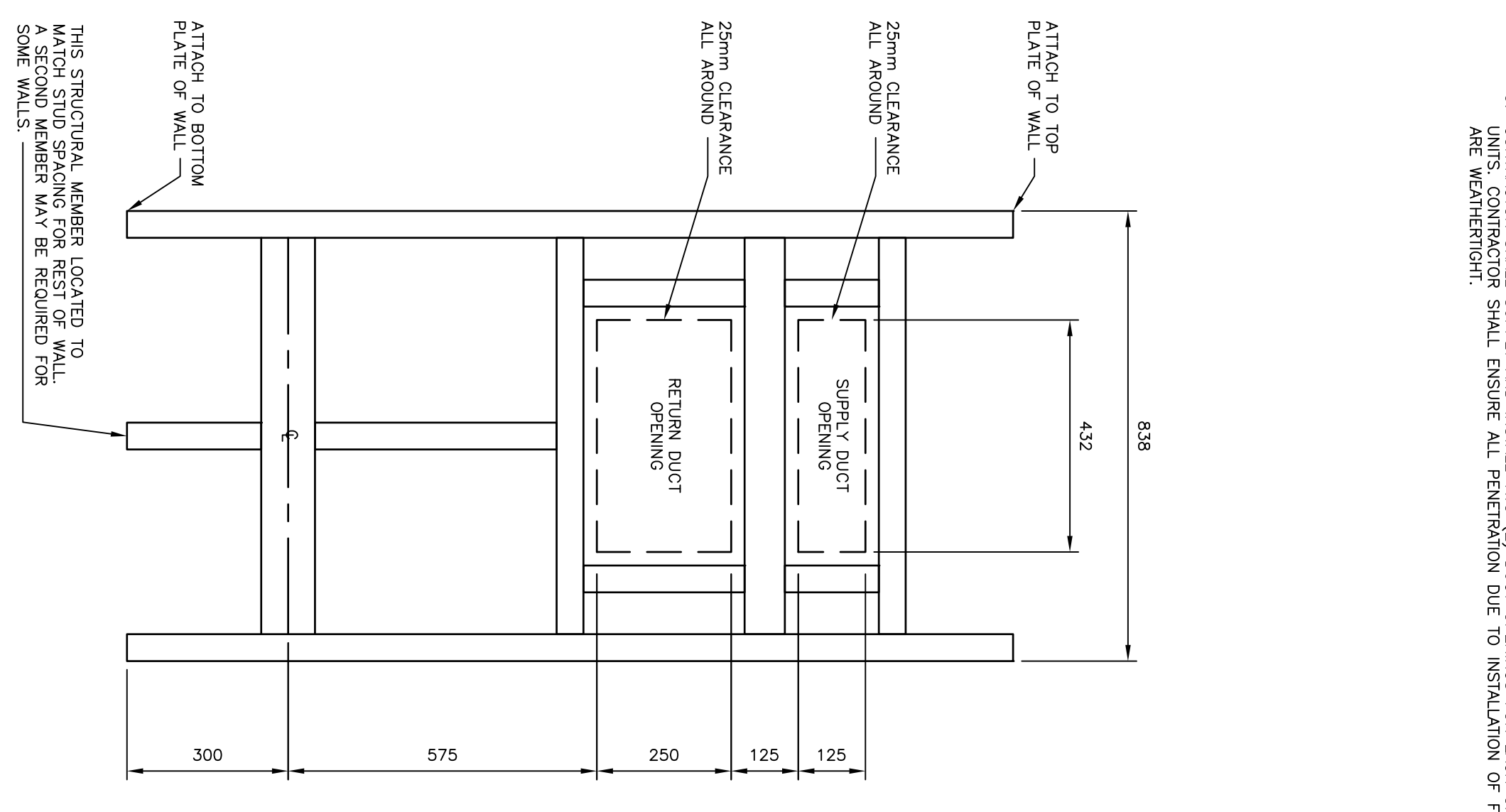
Prepared by: _____

Date: _____

DRAWINGS



CONTROL BUILDING LAYOUT
SCALE = 1:50



1 STRUCTURAL SUPPORT (EXTERIOR VIEW) DETAIL
SCALE = 1:10

- NOTES**
1. CONTRACTOR SHALL SUPPLY AND INSTALL STRUCTURAL SUPPORTS WITH A MAXIMUM SPACING OF 610mm TO FACILITATE THE INSTALLATION OF A PLYWOOD BACKBOARD IN THE AREA IDENTIFIED ON THE DRAWING.
 2. CONTRACTOR SHALL SUPPLY AND INSTALL STRUCTURAL SUPPORTS AS INDICATED IN DETAIL 1 TO FACILITATE THE INSTALLATION OF THE FIVE (5) A/C UNITS.
 3. CONTRACTOR SHALL SUPPLY AND INSTALL TWO (2) DUCT OPENINGS FOR EACH OF THE FIVE (5) A/C UNITS AND SHALL ENSURE ALL PENETRATION DUE TO INSTALLATION OF FIVE (5) A/C UNITS ARE WEATHERTIGHT.

REFERENCE DRAWINGS		DWG. NO.'S	NO.	DATE	LOCATION	REVISIONS	MADE BY	NO.	DATE	LOCATION	REVISIONS	MADE BY	NO.	DATE	LOCATION	REVISIONS	MADE BY	NO.	DATE	LOCATION	REVISIONS	
CONTROL BUILDING FOUNDATION PLANS AND SECTIONS		023-478-E-1131																				
CLIENT		FUNDY OCEAN RESEARCH CENTER FOR ENERGY																				
TITLE		IN-STREAM TIDAL POWER GENERATING PLANT SUBSTATION DEVELOPMENT CONTROL BUILDING LAYOUT AND MISC. STRUCTURAL DETAILS																				
DRAWN		DARTMOUTH & SYDNEY, NOVA SCOTIA																				
CHECKED		J.T.																				
PROJECT MANAGER		SCALE: 1:50																				
DATE (YYYY-MM-DD)		2011-02-25																				
DWG. NO.		023-478-D-3031																				
REV.		A01																				

