

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

**IN STREAM TIDAL POWER GENERATING PLANT
INTERTIE SUBSTATION DEVELOPOMENT**

**FABRICATION, GALVANIZING, DELIVERY AND OFFLOADING
OF SUBSTATION STRUCTURAL STEEL MEMBERS/COMPONENTS**

MAY, 2011

**SPECIFICATION No.
023-478-6-11**

SPECIFICATION

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HALIFAX, NOVA SCOTIA**

**IN STREAM TIDAL POWER GENERATING PLANT
INTERTIE SUBSTATION DEVELOPOMENT**

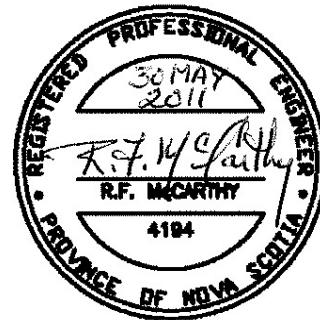
**FABRICATION, GALVANIZING, DELIVERY AND OFFLOADING
OF SUBSTATION STRUCTURAL STEEL MEMBERS/COMPONENTS**

SPECIFICATION No: 023-478-6-11

SIGNED AND SEALED:



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



SIGNED:



**N. STRUM, P. ENG.
QA/QC ENGINEER**

STRUM ENGINEERING ASSOCIATES LTD.

MAY, 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 be mutual agreement to the contrary between Fundy Ocean Research Center for Energy and the Vendor.

2. DESCRIPTION OF PROJECT

- 2.1 The scope of work of this aspect of the substation development project consists of the manufacture, galvanizing, delivery to site, offloading and warranty for structural steel members/components, 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

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

SPECIFICATION

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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.lebanc@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. Tenderer shall list in his tender all the addenda that were received and considered when the 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 start-up 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.
- 6.7 The Owner's purchase order terms and conditions shall prevail.

7. MANUFACTURER'S DRAWINGS

- 7.1 General
 - 7.1.1 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.
 - 7.1.2 All drawings shall be prepared on Metric A1 size sheets, 594mm by 841mm. Use of other size sheets shall be approved by the Engineer.

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7.2 System of Units

7.2.1 All dimensions shall be in the Metric system.

7.3 Title Block

7.3.1 Drawing title blocks shall include the following information:

.1 Name of the Project as follows:

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

Manufacture, Galvanizing, Delivery and Warranty of
Substation Structural Steel Members/Components

Owner's Purchase Order No.

.2 Provide a 100 mm x 100 mm 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.

SPECIFICATION

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7.4 Review of Drawings

- 7.4.1 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.
- 7.4.2 Five prints of all drawings shall be submitted to the 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.

SPECIFICATION

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7.4.3 Before proceeding with manufacturing, submit for review to the Engineer, assembly drawings, foundation and base plate details, layout and drilling details, drawings covering construction, complete control schematic diagrams, and other pertinent data for the equipment under consideration. Do not start manufacturing until instructed by the Engineer.

7.4.4 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.

7.5 Final Drawings

7.5.1 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.

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

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

8. GENERAL ARRANGEMENT DRAWINGS (ISOMETRIC VIEWS)

8.1 The isometric views presented on the drawings have been issued for reference only. The isometric views indicate the assembly and general arrangement of the structural steel support assemblies associated with the Substation Development project.

8.2 Each piece of structural steel has been identified with a Bill of Material Item designation.

9. STEEL COMPONENTS

9.1 All steel components shall be Grade 350W to CAN/CSA-G40.21

SPECIFICATION

10. WELDING, DRILLING AND BOLTING OF STEEL COMPONENTS

- .1 All welding materials shall be CSA W48 Series and certified by the Canadian Welding Bureau.
- .2 All steel welding shall be to CSA W59-03, "Welded Steel Construction (Metal Arc-Welding)".
- .3 All welds shall be fillet welds. The proposed diameter and location of each welded joint is specified on the drawings. Grinding of welded joints shall not be required.
- .4 The selection of the hole diameters shall take into account the reduction in hole diameter which will result following the hot-dipped galvanizing process.

11. HOT-DIPPED GALVANIZING OF STEEL COMPONENTS

- .1 Following the cutting, fabrication, welding and drilling and prior to galvanizing, the structural steel support members shall be assembled in the fabrication shop to ensure proper alignment of holes and connection of components.
- .2 Prior to shipping each steel component shall be hot-dipped galvanized to CAN/CSA G164 with minimum zinc coating of 600g/m³.
- .3 Care has been taken to ensure that the size of individual support assembly members/components will fit into the local galvanizing tanks; however, the fabricator shall confirm that each component meets the galvanizing tank limitations.

12. IDENTIFICATION OF STEEL COMPONENTS

- .1 The Manufacturer shall stamp each structural steel component with the designated Bill of Material Item Number to assist in the site assembly by Others.

SPECIFICATION

13. SIGNING AND SEALING OF MANUFACTURER'S DRAWINGS

- 13.1 Execute design under the supervision of a licensed Engineer. The Engineer shall sign and seal:
 - 13.1.1 Shop fabrication drawings and specifications;
 - 13.1.2 Site erection drawings and specifications.

14. AS-BUILT DRAWINGS

- 14.1 The Contractor shall provide two sets of red-marked construction/fabrication drawings for this project, indicating as-built information to Emera Utility Se

15. PACKAGING AND SHIPPING

- 15.1 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.
- 15.2 Small steel components and hardware shall be suitably prepared and packed so as to prevent damage or loss occurring during storage, transportation, and unloading operations and to ensure that the components have suffered no damage, and that all parts are intact on arrival at the destination.
- 15.3 Packaging and crating shall include suitable weather protection, moisture control, temporary bracing, blocking straps, skids, etc.

16. CORRESPONDENCE

- 16.1 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.
- 16.2 The Vendor shall allow for this requirement in the prices quoted herein.

SPECIFICATION

17. SCHEDULE

- 17.1 All equipment associated with this specification is required on site not later than 5 August 2011. Refer to Schedule No. 5, Page C-7, for the specific schedule requirements.

SPECIFICATION

SECTION B
TECHNICAL REQUIREMENTS

May, 2011

023-478-6-11

SPECIFICATION

SECTION B

TECHNICAL REQUIREMENTS

1. SCOPE OF WORK

- 1.1 Procure, cut, fabricate, weld, drill, galvanize, deliver and offload at the Substation location in Black Rock, Nova Scotia, 10km west of the town of Parrsboro, Nova Scotia, and provide a written warranty for substation structural steel members/components.
- 1.2 The Vendor shall also supply stainless steel hardware as required to fully erect the structural steel members/components.
- 1.3 In the case of the stand-alone steel members, the fabrication drawings shall be sufficiently detailed to fabricate the full steel assembly.
- 1.4 All dimensions have been provided and structural steel members have been identified with unique designations.
- 1.5 Erection will be carried out by Others and does not form part of this Contract.

2. ENVIRONMENTAL DATA

- 2.1 Design and manufacture the structural steel components to be suitable for operation under the following conditions:

Elevation above sea level	m	85
Maximum ambient temperature	°C	40
Minimum ambient temperature	°C	-40
Maximum continuous wind speed	km/h	120
- 2.2 The final location of the structural steel members/components will be a marine, sea-coast environment.

SPECIFICATION

3. STANDARDS

3.1 Unless otherwise specified herein, manufacture the structural steel assemblies and components in accordance with the latest issue of the following standards:

CSA G40.20-04/G20.21-04 General Requirements for Rolled or Welded
Structural Quality Steel/Structural Quality Steel

CSA W48-06 Filler Metals and Allied Materials for Metal Arc
Welding

CAN/CSA G164-M92 Hot Dip Galvanizing of Irregularly Shaped Articles

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 affords the highest degree of safety to personnel as interpreted by the Engineer.

3.4 Other alternative standards may be used if accepted by the Owner's Engineer.

4. FABRICATION

4.1. Fabricate structural steel in accordance with CSA G40.20-04/G20.21-04 and in accordance with the drawings.

5. SURFACE FINISH

5.1. Clean all steel members/components, remove loose mill scale, rust, oil, dirt and other foreign matter.

5.2. Hot-dip galvanize all steel members/components to CAN/CSA G164-M92.

6. MARKING

6.1. Mark each separate steel member/component with a stamped metal tag, fastened to the member with wire. Each tag shall be stamped with the Bill of Materials Item Number.

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7. EQUIPMENT, APPARATUS AND MATERIAL SUPPLIED BY OTHERS

- 7.1 Anchor bolts, formed in the concrete equipment pads, and associated anchor bolt hardware will be supplied and installed by Others in anticipation of the substation structural steel members/components.

8. PACKING AND SHIPPING

- 8.1 Crating for small structural members and stainless steel hardware shall be adequately designed and constructed to permit safe delivery and acceptable receipt of the components.

9. DRAWING LIST

- 9.1 The following tender drawings are issued with, and are considered an integral part of this Specification:

<u>Drawing No.</u>	<u>Rev.</u>	<u>Description</u>
023-478-D-5000	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development Elevation A
023-478-D-5001	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development Elevation B
023-478-D-5002	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development A-Frame Deadend Structure Steel A2, A6, B2, B6 – Sheet 1 of 4

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<u>Drawing No.</u>	<u>Rev.</u>	<u>Description</u>
023-478-D-5003	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development A-Frame Deadend Structure Steel A2, A6, B2, B6 – Sheet 2 of 4
023-478-D-5004	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development A-Frame Deadend Structure Steel R1, R2, R3, R4, R5, R6 – Sheet 3 of 4
023-478-D-5005	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development A-Frame Deadend Structure Steel R7, R8, R9, R10, R11 – Sheet 4 of 4
023-478-D-5006	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development Lightning Arrester & Voltage Transformer Structural Steel B3, B5, C3 and C5
023-478-D-5007	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development Lightning Arrester & Voltage Transformer Structural Steel R1, R2, R3, R4, R5 and R6
023-478-D-5008	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development Lightning (Surge) Arrester (Transformer) Structural Steel G3 and G5

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<u>Drawing No.</u>	<u>Rev.</u>	<u>Description</u>
023-478-D-5009	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development Lightning Arrester & Voltage Transformer Structural Steel XB3,XB5,XC3,XC5,XG3,XG5
023-478-D-5010	A01	Fundy Ocean Research Center for Energy In-Stream Tidal Power Generating Plant Substation Development Lightning Arrester and Voltage Transformer Structural Steel XR1,XR2,XR3,XR4,XR5,XS1,XS2

SPECIFICATION

SECTION C

SCHEDULES

SPECIFICATION

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. STRUCTURAL STEEL MEMBERS/COMPONENTS

.1 Hollow Steel Structures (HSS)

Steel Grade
Size Designations

.2 Steel Channels

Steel Grade
Size Designations

.3 Steel Angles

Steel Grade
Size Designations

.4 Steel Plates

Steel Grade
Size Designations

.5 Stainless Steel Hardware

Steel Grade
Size Designations

SPECIFICATION

SCHEDULE No. 1

TECHNICAL INFORMATION

2. GALVANIZING PROCESS

Galvanizing Material
Coating Thickness
Galvanizing Facility

SPECIFICATION

SCHEDULE No. 2

DOCUMENTS TO BE SUBMITTED WITH TENDER

	<u>Drawing or Document Ref. No.</u>
Completed Schedules	_____
Outline dimensions and layout of structural steel members/components	_____
Bills of Material	_____
Catalogues	_____
Instruction Pamphlets	_____
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	13 June 2011	
2. Submit Bills of Material and Planning Schedule for review	27 June 2011	
3. Submit assembly drawings, foundation and base plate details, layout and drilling details, and drawings for review.	27 June 2011	
4. Submit other supporting documentation	27 June 2011	
5. Submit final copies of shop drawings	8 July 2011	
6. Delivery of Galvanized Structural Steel Members and Components, DDP per INCOTERMS to Fundy Ocean Research Center for Energy Substation Site Black Rock, Nova Scotia (approximately 10km west of Parrsboro, Nova Scotia)	5 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, galvanize, deliver, offload and provide a written guarantee for galvanized structural steel members/ components.	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 (approximately 10km west of Parrsboro, 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: Substation Structural Steel Members/Components

Vendor Ref. No.: _____

1. Total Supply and Deliver (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: _____