

**BC HYDRO SITE C CLEAN ENERGY PROJECT**

**GENERATING STATION AND SPILLWAYS CIVIL WORKS CONTRACT**

for the Site C Clean Energy Project

***Schedule 4***

***Work Program and Schedule***

**GENERATING STATION AND SPILLWAYS CIVIL WORKS CONTRACT**

**SCHEDULE 4**

**WORK PROGRAM AND SCHEDULE**

**TABLE OF CONTENTS**

<b>1</b>	<b>INTERPRETATION.....</b>	<b>1</b>
1.1	Definitions .....	1
<b>2</b>	<b>WORK PROGRAM AND SCHEDULE .....</b>	<b>1</b>
2.1	Consultation Draft .....	1
2.2	Work Program and Schedule.....	1
2.3	Standard for Work Program and Schedule.....	3
2.4	Project Controls Manager .....	3
2.5	Contractor’s Scheduling Capacity and Expertise .....	3
2.6	P6-Base Work Program and Schedule.....	4
2.7	Mobilization Schedule .....	4
2.8	Monthly Progressive Amendments to the Work Program and Schedule .....	4
2.9	Work Program and Schedule Monthly Progress Report.....	5
2.10	Look-Ahead Schedules.....	6
2.11	Additional Schedule Information .....	7
<b>3</b>	<b>COMPLIANCE WITH WORK PROGRAM AND SCHEDULE.....</b>	<b>7</b>
3.1	Perform Work in Accordance with Work Program and Schedule.....	7
<b>APPENDIX 4-1</b>	<b>BC HYDRO PROJECT SCHEDULE</b>	
<b>APPENDIX 4-2</b>	<b>WORK PROGRAM AND SCHEDULE</b>	
<b>APPENDIX 4-3</b>	<b>NOT USED</b>	

# GENERATING STATION AND SPILLWAYS CIVIL WORKS CONTRACT

## SCHEDULE 4

### WORK PROGRAM AND SCHEDULE

#### 1 INTERPRETATION

##### 1.1 Definitions

In this Schedule 4 [Work Program and Schedule], in addition to the definitions set out in Schedule 1 [Definitions and Interpretation]:

“**Lead Scheduler**” has the meaning set out in Section 2.5 of this Schedule 4 [Work Program and Schedule];

“**Mobilization Schedule**” has the meaning set out in Section 2.7 of this Schedule 4 [Work Program and Schedule];

“**Monthly Progress Report**” has the meaning set out in Section 2.9 of this Schedule 4 [Work Program and Schedule];

“**P6-Base Work Program and Schedule**” has the meaning set out in Section 2.6 of this Schedule 4 [Work Program and Schedule]; and

“**Project Controls Manager**” has the meaning set out in Section 2.4 of this Schedule 4 [Work Program and Schedule].

“**Work Program and Schedule**” has the meaning set out in Section 2.2 of this Schedule 4 [Work Program and Schedule].

#### 2 WORK PROGRAM AND SCHEDULE

##### 2.1 Consultation Draft

The Contractor will within 45 days after the Effective Date, or by such other date as the parties' Representatives may agree to in writing, prepare and submit to Hydro's Representative, For Information Only, a complete draft work program and schedule that conforms to the requirements of Section 2.2 of this Schedule 4 [Work Program and Schedule]. Hydro's Representative and the Contractor's Representative, together with the Lead Scheduler and BC Hydro's scheduler(s), will meet over the 30 day period, or such other period as the parties' Representatives may agree to in writing, following delivery of the draft work program and schedule to consult with each other with respect to such draft work program and schedule and the Contractor will cause the Lead Scheduler to revise the draft work program and schedule to address any deficiencies in the draft work program and schedule.

##### 2.2 Work Program and Schedule

The Contractor will cause the Lead Scheduler to prepare each work program and schedule as required under the Contract (each, a “**Work Program and Schedule**”) such that it:

- (a) is a resource loaded Primavera P6 schedule, including details of worker classification, equipment type and materials required to complete each activity, in the version specified by BC Hydro in both PDF and native Primavera xer formats;

- (b) is based on Appendix 4-2 [Work Program and Schedule];
- (c) complies with:
  - (i) Appendix 4-1 [BC Hydro Project Schedule], including all Interface Milestone Dates; and
  - (ii) Appendix 6-4 [IFC Drawing Schedule];
- (d) describes the complete performance of the Work;
- (e) is prepared in accordance with Section 2.3 of this Schedule 4 [Work Program and Schedule]; and
- (f) at a minimum, includes:
  - (i) a comprehensive narrative highlighting work calendars, constraints, assumptions and a narrative that describes the critical path and how information or access required from BC Hydro or an Other Contractor affects that critical path;
  - (ii) detailed equipment and manpower reports/histograms from Primavera P6, showing worker classifications and equipment type;
  - (iii) construction sequencing in six month intervals;
  - (iv) staging drawings as required to support the Work Program and Schedule in PDF and native AutoCAD formats taking into consideration work that has been, or will be, performed by Other Contractors, that may affect the Work;
  - (v) key events, including key dates for decisions;
  - (vi) critical path(s) for the following:
    - (A) the Work as a whole;
    - (B) each of the major elements of the Work; and
    - (C) longest path for the completion of the Work;
  - (vii) coding of activities, following the BC Hydro WBS, a copy of which is included in the Data Room (Data Room ID#1016.Z.01.001.PMO.00005.WBS);
  - (viii) the dates for key BC Hydro review points, including inspections, Hold Points, Witness Points and any steps that require Review or Consent;
  - (ix) the timing for delivery of each IFC Drawing, as set out in Appendix 6-4 [IFC Drawing Schedule];
  - (x) scheduled delivery dates for all major temporary and permanent equipment;
  - (xi) procurement, material ordering, shop assembly and testing, delivery, permitting, construction, and commissioning schedule for all Work activities;
  - (xii) the scheduled date of submission for each Submittal required to be submitted to BC Hydro under the Contract, as shown on the then current Submittal Schedule; and

- (xiii) each Price Item as set out in Appendix 11-1 [Schedule of Prices and Estimated Quantities].

### 2.3 Standard for Work Program and Schedule

The Work Program and Schedule will be:

- (a) prepared in sufficient detail to enable Hydro's Representative to monitor the progress of all elements and aspects of the Work and to enable BC Hydro to resource itself appropriately;
- (b) prepared in compliance with the Association for the Advancement of Cost Engineering's (AACEI) Total Cost Management Framework, guides and recommended practices, and in accordance with Good Industry Practice for a large complex project similar to the Work, which accordingly, given the nature, size and complexity of the Work, will:
  - (i) include no fewer than 1,000 activities;
  - (ii) not include loose-end activities other than Work commencement and Total Completion;
  - (iii) not excessively use lags;
  - (iv) not use negative lags;
  - (v) not use start to finish relationships;
  - (vi) not include activities with negative float;
  - (vii) not include unjustified constraints;
  - (viii) not include activity durations exceeding two reporting cycles;
  - (ix) clearly highlight any activity or information required to be performed by BC Hydro or an Other Contractor to support the Work; and
  - (x) demonstrate how the Contractor will achieve all of the Interface Milestone Dates; and
- (c) capable of achieving at least an 85% "Fuse Schedule Quality Index" when analysed using the most up-to-date Acumen Fuse software.

### 2.4 Project Controls Manager

The Contractor will, as part of the Work, provide a full time, dedicated, project controls manager who has a minimum of 10 years' project controls experience in large complex projects similar to the Work (the "**Project Controls Manager**"). The Project Controls Manager will be a Key Individual and will be primarily responsible for management of the development and implementation of Contract cost and schedule baselines and systems to facilitate on-going tracking, measurement, forecasting, management and reporting of Contract costs and schedule performance. The Project Controls Manager will also be responsible for production of accurate up to date Monthly Progress Reports, in accordance with Section 2.9 of this Schedule 4 [Work Program and Schedule].

### 2.5 Contractor's Scheduling Capacity and Expertise

The Contractor will, as part of the Work, provide a lead scheduler who has a minimum of seven years' scheduling experience with Primavera P6 software and experience in large complex projects similar to

the Work (the “**Lead Scheduler**”), and will cause the Lead Scheduler to prepare the Work Program and Schedule and all amendments and progressions as required by the Contract.

The Lead Scheduler will be based at the Site and will report to the Project Controls Manager. The Contractor will ensure that the Lead Scheduler or another scheduler, who has a minimum of seven years’ scheduling experience with Primavera P6 software and experience in large complex projects similar to the Work, is available on Site during normal business hours to provide BC Hydro with schedules and schedule updates in accordance with the requirements of the Contract. The Lead Scheduler and each of the Contractor’s other scheduler(s) will be fluent in English and will be able to effectively communicate with BC Hydro in English.

## 2.6 P6-Base Work Program and Schedule

The Contractor will within 15 days following the end of the consultation period described in Section 2.1 of this Schedule 4 [Work Program and Schedule], or by such other date as the parties’ Representatives may agree to in writing, prepare and submit to Hydro’s Representative for Consent a comprehensive Work Program and Schedule that is prepared by the Lead Scheduler as required by Section 2.5 of this Schedule 4 [Work Program and Schedule], and meets the requirements of Section 2.2 and 2.3 of this Schedule 4 [Work Program and Schedule] and when Accepted, such Work Program and Schedule will be the reference or “base” schedule (the “**P6-Base Work Program and Schedule**”).

## 2.7 Mobilization Schedule

The Contractor will within 30 days after the Effective Date, or by such other date as the parties’ Representatives may agree to in writing, prepare and submit to Hydro’s Representative for Consent a detailed schedule, covering all aspects of the commencement of the Work and covering all Work activities scheduled to occur within the first 180 days following the Effective Date (the “**Mobilization Schedule**”). The Mobilization Schedule will meet the requirements of Section 2.2 and 2.3 of this Schedule 4 [Work Program and Schedule], to the extent applicable, and include dates for the delivery of Submittals and other documentation required by the Contract to occur within the first 180 days after the Effective Date.

## 2.8 Monthly Progressive Amendments to the Work Program and Schedule

Concurrently with the delivery of the Monthly Progress Report to BC Hydro under Section 2.9 of this Schedule 4 [Work Program and Schedule], the Contractor will, within three Business Days of the first day of each month, or more frequently as reasonably required for BC Hydro to monitor the progress of the Work as described in Sections 2.2 and 2.3 of this Schedule 4 [Work Program and Schedule], prepare and submit an updated Mobilization Schedule or Work Program and Schedule, as applicable, showing progressive amendments from the initial Mobilization Schedule or the P6-Base Work Program and Schedule, as applicable, to Hydro’s Representative for Review (provided that the time for BC Hydro’s review of the updated Mobilization Schedule or Work Program and Schedule, as applicable, under Schedule 5 [Submittals Procedure] will be 14 days), describing the actual progress of the Work current to the last day of the previous month and incorporating any time adjustments that have been granted under the Contract. The Contractor will develop the amendments to the Mobilization Schedule and the Work Program and Schedule using critical path methodology, in PDF format and native Primavera xer format.

The P6-Base Work Program and Schedule and each updated Work Program and Schedule will be capable of achieving at least a 70% rating when analysed using the most up-to-date “US Defense Contract Management Agency 14-point Schedule Assessment”. For the purpose of Sections 2.8 and 2.11 of this Schedule 4 [Work Program and Schedule], the schedule rating will be determined using the Tab S2//Diagnostics, “DCMA 14 Point” setting, with: (i) Ribbon Analyzer Tab 6 “High Float” removed from Tab S2//Diagnostics; and (ii) activities required to be performed by BC Hydro or an Other Contractor to support the Work removed in Tab S1//Projects.

All updates or revisions to:

- (a) the Mobilization Schedule will be based on and referable to the initial Mobilization Schedule;
- (b) the Work Program and Schedule will be based on and referable to the P6-Base Work Program and Schedule; and
- (c) the Work Program and Schedule will match the invoice amounts shown in the applicable Progress Payment Estimate for actual, remaining and the total Contract value, including any Change Orders,

except as both parties may agree in writing, acting reasonably.

## 2.9 Work Program and Schedule Monthly Progress Report

Concurrently with the delivery of any updated Mobilization Schedule or Work Program and Schedule to BC Hydro contemplated under Section 2.8 of this Schedule 4 [Work Program and Schedule], the Contractor will, within three Business Days of the first day of each month, submit to Hydro's Representative a monthly report on the progress of the Work (the "**Monthly Progress Report**") describing the actual progress of the Work current to the last day of the previous month. The Monthly Progress Report will:

- (a) cover all significant aspects of the Work;
- (b) provide a description of the status of Work progressed, including:
  - (i) an executive summary;
  - (ii) a narrative of major events, including:
    - (A) a summary of Work completed by major work area and percent complete of such work areas;
    - (B) percentages complete of all the major components of the Work, in the form specified by BC Hydro, acting reasonably; and
    - (C) the plan for the performance of the Work for the upcoming month;
  - (iii) colour photographs sufficient to record the progress of the Work;
  - (iv) schedules comparing actual progress of the Work to the previous month's Work Program and Schedule, including identification of critical path activities in the Work. The summary schedules will include a narrative describing the variances made from the previous month's Work Program and Schedule. The following information will also be provided:
    - (A) list of new activities added;
    - (B) list of logic changes;
    - (C) list of out of sequence activities; and
    - (D) changes to the critical path;
  - (v) graphs, schematics or other visual aids showing actual progress compared to scheduled progress, such as volumes of excavation and placement and CIPC and Precast Concrete production;

- (vi) actual manpower allocations on Site for the preceding month and a forecast of manpower allocation, on a daily basis, for the next month, including a comparison with the forecast contained in the previous Monthly Progress Report;
  - (vii) actual construction equipment on Site and a forecast for the next month, including a comparison with the forecast in the previous Monthly Progress Report and reports of any significant breakdowns and actions to be taken to repair or replace significant construction equipment which is out of service;
  - (viii) an inventory of construction materials on Site compared to current and forecast consumption;
  - (ix) an inventory of the permanent equipment and any BC Hydro Property, that has been delivered to, or received on, Site, including its current location and storage provisions relative to the storage requirements specified or recommended by the manufacturer or Other Contractor, as applicable;
  - (x) a summary of all Change Directives and Change Orders;
  - (xi) earned value metrics, including cost performance index and schedule performance index, based on hours of work for each work area, showing both monthly and cumulative values in both table and graphical formats. Include a variance explanation for any cost or schedule performance index values  $>.9$  or  $<1.1$ ;
  - (xii) a summary of the planned, actual and forecasted quantities of Work performed for each work area, showing both monthly and cumulative values in both table and graphical formats; and
  - (xiii) Not Used;
- (c) include additional information reasonably requested by Hydro's Representative to demonstrate and document the progress of the Work and compliance of the Work with the requirements of the Contract; and
  - (d) be submitted as one electronic copy in PDF format other than any color photographs required to be submitted in accordance with Section 2.9(b)(iii) of this Schedule 4 [Work Program and Schedule], which photographs will be submitted concurrently with such PDF in one or more separate jpeg files.

The Monthly Progress Report will be submitted for Review (provided that the time for BC Hydro's review of the Monthly Progress Report under Schedule 5 [Submittals Procedure] will be 10 days), in a form satisfactory to Hydro's Representative acting reasonably, and if any part of the Monthly Progress Report is not endorsed by Hydro's Representative as "Accepted" then the Contractor will, before making the next application for payment under Schedule 11 [Prices and Payment], revise and resubmit the Monthly Progress Report with the correct or missing information as described in the endorsement, comments or objections raised by Hydro's Representative in accordance with Schedule 5 [Submittals Procedure].

#### 2.10 Look-Ahead Schedules

The Contractor will within 60 days of the Effective Date, and thereafter every week until Total Completion of the Work, deliver to Hydro's Representative, For Information Only:

- (a) a detailed three week look-ahead schedule based on the then current Work Program and Schedule, amended as required under Section 2.8 of this Schedule 4 [Work Program and Schedule]. Each look-ahead schedule will show:



- (i) the planned submission date of all Submittals during the next-occurring three week period;
- (ii) all aspects of the Work for the next-occurring three week period, including:
  - (A) all planned construction activities;
  - (B) critical path activities;
  - (C) equipment deliveries;
  - (D) estimated quantities of materials to be placed or installed;
  - (E) estimated personnel requirements, broken down by worker classification;
  - (F) safety activities, such as critical lifts, hazardous materials testing; and
  - (G) environmental activities, such as in-river works, permitting activities;
- (iii) the Contractor's actual progress of the Work for the preceding week;
- (b) a summary of any anticipated delays that may adversely affect the performance or completion of any Interface Milestones on or before the applicable Interface Milestone Date; and
- (c) where a critical path activity is behind schedule, a description of the actions taken, or to be taken, by the Contractor to respond.

For clarity, the look ahead schedules and other information provided pursuant to this Section 2.10 will not be considered, and may not be relied upon by the Contractor as, notice of any event or circumstance for which a specific notice is required pursuant to the Contract, including delay under Section 12.8 of Schedule 2 [General Conditions] or notice of a circumstance, condition or event that the Contractor claims entitles it to claim a Change under Section 4.1 of Schedule 12 [Changes].

#### 2.11 Additional Schedule Information

The Contractor will, from time to time during the performance of the Work, and at no extra cost or expense to BC Hydro, provide detailed additional schedule information relating to the Work as BC Hydro reasonably requires to be able to monitor the performance and progress of the Work to the standard as described in Section 2.3 of this Schedule 4 [Work Program and Schedule].

Concurrent with submission of the P6-Base Work Program and Schedule and each updated Work Program and Schedule, the Contractor will submit, For Information Only, a report confirming that the applicable schedule is capable of achieving at least: (i) an 85% "Fuse Schedule Quality Index" in accordance with Section 2.3(c) of this Schedule 4 [Work Program and Schedule]; and (ii) a 70% rating when analysed using the most up-to-date "US Defense Contract Management Agency 14-point Schedule Assessment" in accordance with Section 2.8 of this Schedule 4 [Work Program and Schedule].

### **3 COMPLIANCE WITH WORK PROGRAM AND SCHEDULE**

#### 3.1 Perform Work in Accordance with Work Program and Schedule

The Contractor will:

- (a) commence the Work promptly following the Effective Date; and

- (b) perform the Work:
- (i) diligently without delay or interruption so as to complete each of the Interface Milestones by no later than the applicable Interface Milestone Dates; and
  - (ii) in compliance with the then current Work Program and Schedule. If, for any reason, the performance of the Work falls behind the schedule for the Work set out in the then current Work Program and Schedule, then:
    - (A) if, in accordance with the Contract, the delay is one for which a time adjustment has been granted under the Contract, then the Contractor will include such adjustment in the next Work Program and Schedule as provided under Section 2.8 of this Schedule 4 [Work Program and Schedule]; or
    - (B) if, in accordance with the Contract, the delay is not one for which a time adjustment is permitted under the Contract, then the Contractor will, at no extra cost or expense to BC Hydro, take all such steps as are required to bring the Work back into conformity with the then current Work Program and Schedule.

Failure to comply with the requirements of this Section 3.1 of this Schedule 4 [Work Program and Schedule] will be deemed to be a failure to comply with the requirements of the Contract to a substantial degree, to which the provisions of Section 15.1 of Schedule 2 [General Conditions] will apply.