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1 EXECUTION STRATEGY

The original contract award date of the Muskrat Falls Civil Works contract, CH0007 was delayed from 31 July 2013 to 29 November 2013 thus a total delay of 4 months while the milestones and key dates of exhibit 9 remained unchanged. Only the Spillway completion date of 15 February 2015 has been split into 2 milestones; M4A and M4B to be completed respectively on 15 February 2015 and 31 July 2015 instead of having one completion of 15 February 2015.

In addition to that, many areas where given to Astaldi.Canada inc. with restricted access close to the winter harsh weather.

This 4 months delay represents a challenge for Astaldi Canada inc. in meeting the contractual milestone dates.

1.1 Workweek

The basis for the workweek will be 20hrs a day and 7 days a week and a rotation of 14/7 system.

Construction activities will be performed by Astaldi Canada inc. in night and day shifts.

1.2 Calendars

The planning group has created 6 calendars:

- A 5 days calendar with statutory holidays of NL, used for all engineering and procurement activities during the early works phase.
- A 7 days calendar with no statutory holidays of NL and a 2 weeks shutdown for Christmas period used for construction activities and all activities preceding a lift construction in order to keep them grouped. (20 hours a day)
- A 7 days calendar with no statutory holidays of NL and a 2 weeks shutdown for Christmas period used for construction activities and all activities preceding a lift construction in order to keep them grouped. (24 hours a day) (assigned to the tailrace and draft tube pours for group 1 and 2 and for the SSB)
- A 7 days calendar, no holidays used for milestones and key dates in order to match the dates.
- A winter calendar for outdoor concreting activities from 1 December to 31 March.(20 hours per day)
- A winter calendar for outdoor concreting activities from 1 December to 31 March.(24 hours per day) (assigned for the spillway activities related to M4A)

1.3 Weather Constraints

The Powerhouse and Intake will be partially built under cover until we are ready to erect the Powerhouse permanent steel structure from elevation 15.50 of the Intake side and 6.50 of the Tailrace side.

Astaldi Canada inc. is not planning to perform any concreting in winter North Transition dam, Center Transition dam, South Transition dam, Separation, Retaining wall and phase 1 of Discharge Channel and walls.

The only winter work Astaldi Canada inc. will perform is on the Spillway and in order to meet the 1st Milestone date of 15 February 2015. Also, part of the Rollways lifts will be performed under cover for rollway 1 and 2 & 4.

2 BASIS FOR SCHEDULE DEVELOPMENT

2.1 NALCOR Approval Cycles

All NALCOR approval activities have been set to 3 weeks (21 working days) on the schedule, tough the contractor will ask the client that to change the 21 days to 10 days approval at max. All official documents transmittal are done via the ACONEX system.

Currently, only the manhours resources and concrete volumes are considered for tracking and the engineering resources are for demonstration purposes only and will be adjusted in more efficient way to improve the schedule update process.

2.2 Documents Used

The following documents / information were used to develop the schedule:

- NALCOR WBS;
- General layouts and discipline drawings;
- Scope of work exhibit 1;
- Procurement Strategy put forward by Astaldi Canada inc.;
- Current equipment lead times as provided by vendors when available or estimated from past experience of similar equipment / Material;
- Bid recommendations and quantities from BOQ
- Major key dates issued by NALCOR;
- Proposal Schedule and
- Input from Engineering, Procurement and mainly Construction

2.3 Curing time

Astaldi Canada inc. used a minimum duration of 6 days for structural concrete using cement type LH-M. The adiabatic study is in the progress and this duration of 6 days might by optimized, for future revisions.

A lag of 7 days is put between steel erection and concrete pours.

3 PLANNING BASIS AND STRATEGY

3.1 SPILLWAY

Spillway Slabs and Piers

The Spillway Base slab will be poured starting with the four corners, then the cross slabs and last the middle section to allow us to prioritize the upper piers related to the Milestone M4A. Astaldi Canada inc. plan to work on all piers simultaneously but priority given to the upstream and middle sections. Astaldi optimized the sequence to get back the schedule on track and is planning a 24 hours work on the Spillway either two shifts of 12 hours or 3 shifts of 8 hours in order to maintain the date of the M4A milestone. In addition, Astaldi is planning to maintain a good production under winter conditions and trying to pre-assemble the bridges pieces.

For the grouting Portion in the Spillway Astaldi is aiming to get it done before this winter if we will be able to finalize the package and the necessary preparation to perform this operation. Otherwise, a coordination with the Hydro-mechanical contractor to access beneath the bridge will be needed.

North Transition dam

The North Transition dam will start end of September 2014 with the clean-up activity as well as the foundation treatment and will be completed in July 2015. The start of the 1st lift of the North Transition dam will depend on the Spillway North and middle Piers to reach above the rock level, we assumed the 3rd lift of the upstream section and the 3rd lift of middle section of the North Pier will be above the rock level.

Center Transition dam, monoliths 1 and 2

The monoliths 1 and 2 are part of the milestone M4B due on 31 July 2015. The balance of the monoliths construction is due for Milestone M54 due on 13 August 2016.

Construction will start with monolith 2 since monolith 1 has to wait for the Spillway South Pier to reach above the rock level before we can start work on monolith 1.

Separation wall

The construction of the separation wall monoliths will start in September and will be staggered but construction of monolith 1 will have to wait until the 3rd lift of Monoliths 1 and 2 of the Center transition dam are completed. So construction will start from the monoliths 2, 4 and then 3. Monolith 5 and 6 will be done when the access to the spillway is not needed anymore.

Retaining wall

The construction of the retaining wall slab and walls will be staggered. Construction will start early April 2015.

Spillway Discharge Channel phase 1

The Discharge channel base slab and walls will be constructed next year in April in order not to delay the spillway work operation.

3.2 ROLLWAYS

Rollways will be constructed as Astaldi Canada inc. is given access to the areas in the following order:

Rollway 1

Rollway 1 will start in October 2016 and will be completed as per the milestone date M12 planned for 13 March 2017. To achieve this milestone date, Astaldi Canada inc. must work in winter conditions and will use protective shelters.

Rollways 2 & 4

Rollways 2 & 4 will start in November 2017 and will be completed as per the milestone date M13 planned for 17 March 2018. To achieve this milestone date, Astaldi Canada inc. must work in winter conditions and will use protective shelters.

Rollway 3 & 5

Rollways 3 & 5 will start on June 2017 and will be completed as per the milestone date M14 planned 19 September 2017. Work will be performed without shelters.

3.3 SOUTH TRANSITION DAM

Construction will start in August 2014 from monolith 2 and be staggered. However, monolith 3 (attached to the South Service Bay Upstream part) will have to wait for the south service bay upper part lift SBU1A22 to be poured prior to start 1st lift.

3.4 INTAKE

All 4 Intake Milestones M28 for Unit 1, M36 unit 2, M44 unit 3 and M52 unit 4 are difficult to achieve, are split into A and B Milestones, because the hydro-mechanical contractor should start its scope of work way before Astaldi Inc. close the structure and pour the roof deck (more clarifications are needed for those interferences), the 4 new Milestones represent the early dates when the other Contractor could start erecting the lower guides and aligning them then doing the upper guides. Later in collaboration with Astaldi, the other contractor should Install the Hoist structure in order to finalize the full intake scope.

We are assuming that the Hydro-mechanical contractor should access the worst when we complete the upper middle and lower intake parts. Earlier accesses might also be coordinated depending if it is safe with the work taking place.

Unit 1

Intake works will start on the north side to allow the upper shaft to go first. And it is driven by the ICS work.

The same logic applies to the other intake groups, and the slabs are staggered as well as for the lifts and verified by the 3D models to assure no adjacent lifts are taking place. The 4 Milestones M28 A; M36A; M44A and M52A are met ahead of time allowing the other contractor to access.

For the part B Milestones they depend on the other contractor completion dates.

3.5 POWERHOUSE

All the following Powerhouse Unit Milestones will be met:

- Unit 1: M22, M23, M24;
- Unit 2: M30, M31, M32,
- Unit 3: M38, M39, M40
- Unit 4: M46, M47, M48,

The Milestones M26, M34, M42 and M50 are difficult to be met.

Base slab works, in the powerhouse, will start first with the North Draft tube slab 1 simultaneously with South Tailrace slab 1 followed by South Draft tube slab and North Tailrace slab. (Changed from before).

Unit 1

Astaldi Canada inc. will give priority to the Tailrace lifts in order to reach 6.50 as early as possible for the erection of the Steel Structure of the unit 1 which is a predecessor to milestone M26 "Unit 1- Building enclosed and High Bay lighting installed and ready for start of works by others" planned for 30 September 2015.

The draft tube pours are linked to the ICS erection of group 2 and they are forecasted to start by the middle of October. The SSB pours will be first since they are confined pours to the rock.

The walls of the tailrace will be erected first then the draftube formwork can start.

So the draft tube pours are driven by the walls of the tailrace.

The first pours above the draft tube formwork must be merged to have a better formwork stability and to reduce the risk of the draft tube shifting to be confirmed with the engineer.

Once the tailrace slab T1D1A-01 (elevation 6.5 m) is poured and the walls up to elevation 15 m are poured, the dismantling of the ICS starts. The erection of the structural steel should start satisfying that the intake pours till the elevation 15m are completed.

The tailrace structural steel added to the schedule will start with a lag with the powerhouse structural steel then the tailrace deck will be poured followed by the GSU transformer base and the precast wall. The hydro-electrical contractor should install draft tube crane in parallel.

Roof drains activities are assumed to be finish to finish relationship with the roofing since they should be sealed and flashing should be done.

Coordination with the supplier and the contractor installing the overhead crane should happen during the steel erection and after to be used by Astaldi probably for roof drains and highbay lighting (if feasible).

The same logic is applied to all the other units and the following logic is assumed between the groups:

Dismantling of the ICS is a predecessor of the erection of the structural steel of the same group and has a predecessor the steel erection of the previous group because no simultaneous steel erections can take place otherwise two groups will be closed to work on.

Note: the milestones M26 should not include the mezzanines because the intake structures will not be completed and the mezzanines cannot be built.

Adding to that to finalize the roof of unit 1 we need to have the structural steel of unit 2 erected and the decking as well. So, we are assuming M26 and M34 will have the same constraint and M42 and M50 will have the same constraint.

In addition the upper scroll case work is not required to the stayring installation.

Unit 2

Identical to Unit 1, Activities related to the Milestone M34 are directly linked to the ICS of group 3 roofing. Planned to start for the mid to end of November 2014.

Unit 3

Identical to Unit 1, Activities related to the Milestone M42 directly are linked to the ICS of group 4 roofing. Planned to start for the first or second week of January.

Unit 4

Identical to Unit 1, Activities related to the Milestone M50 are directly linked to the ICS of group 4 roofing. Planned to start for the second week of February.

3.6 South Service Bay

The Milestone M18 related to the SSB will be met. The planning of this section was based prioritizing the shafts facing the rocks.

Once the slabs on grade are poured and the shafts are up to level 6.5m, the steel erection should start and be completed before the SSB deck between axis 6 and 7 is poured. Again the coordination should be done with the contractor installing the overhead crane and Astaldi. Inc in order to install the crane and maybe after to use it to build scaffold to install the roof drains and high bay lighting. Those two activities can be done at the same time with the roofing SS lag or finish to finish lag.

In our schedule the upper shaft is not considered as a predecessor for the completion of this milestone otherwise M18 will be delayed by months. So in order to build the mezzanine we need to come up with temporary supports or bracing to make the SSB available on time to other contractors.

A new Milestone called M18B is placed and linked to the completion of the SSB upper work completion portion.

5 PROJECT CRITICAL PATH

On a project of this magnitude and total duration, any activity having a Total Float of one month and less is considered critical. However, the critical path shown below is the critical path with zero total float.

5.1 Main Critical path with Total Float equals less than "28d"

The main critical path of the project runs through the following areas / sub-areas:

General: Approval of the Mix design and the completion of the ICS

Spillway Slabs, Upper Piers and bridge: Approval of the Mix design and the completion of the ICS

North Transition Dam

Centre Transition Dam: Monolith 1, 2 and 5

Intake 1 and 2

Powerhouse

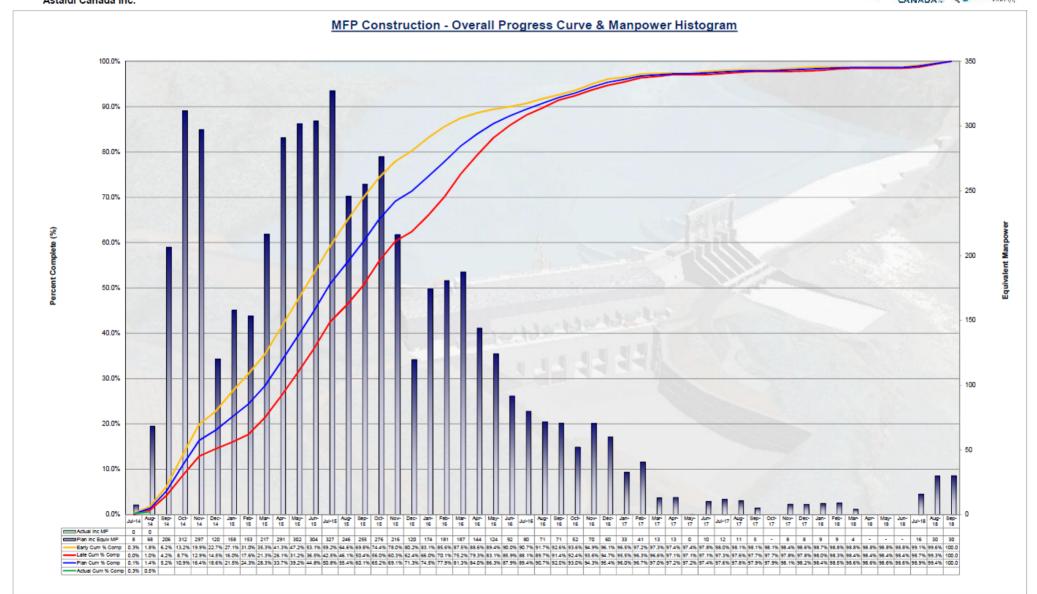
Tailrace and the steel structure

Draft tube of group 1 and group 2

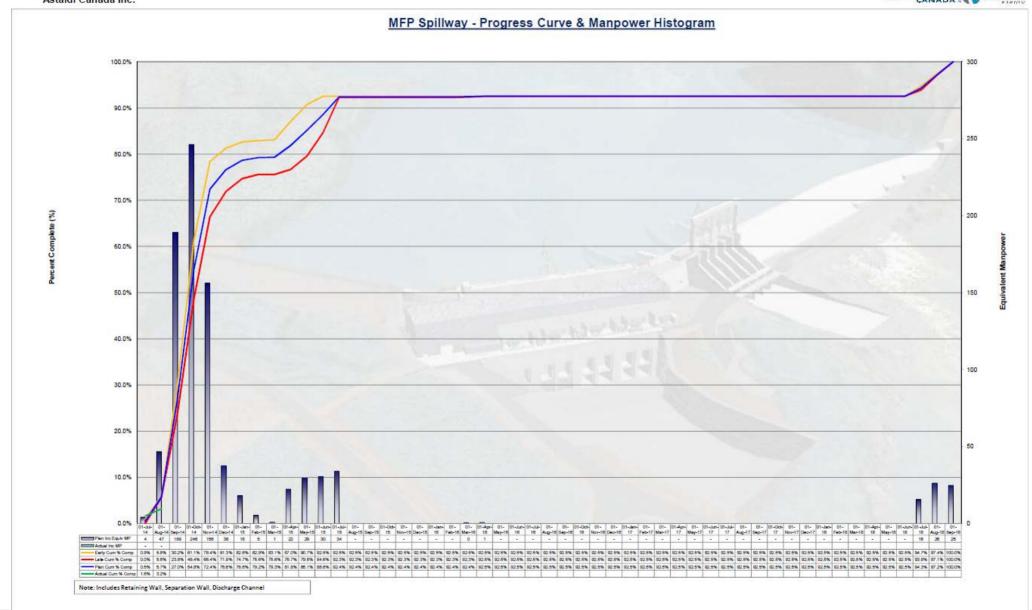
South service bay downstream and Upstream parts

North Service Bay

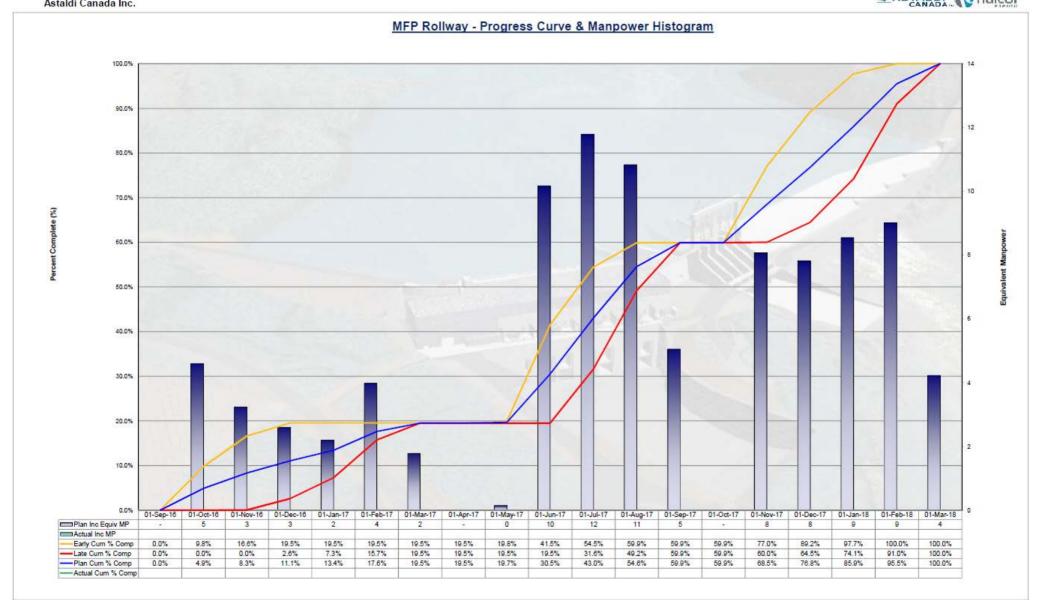




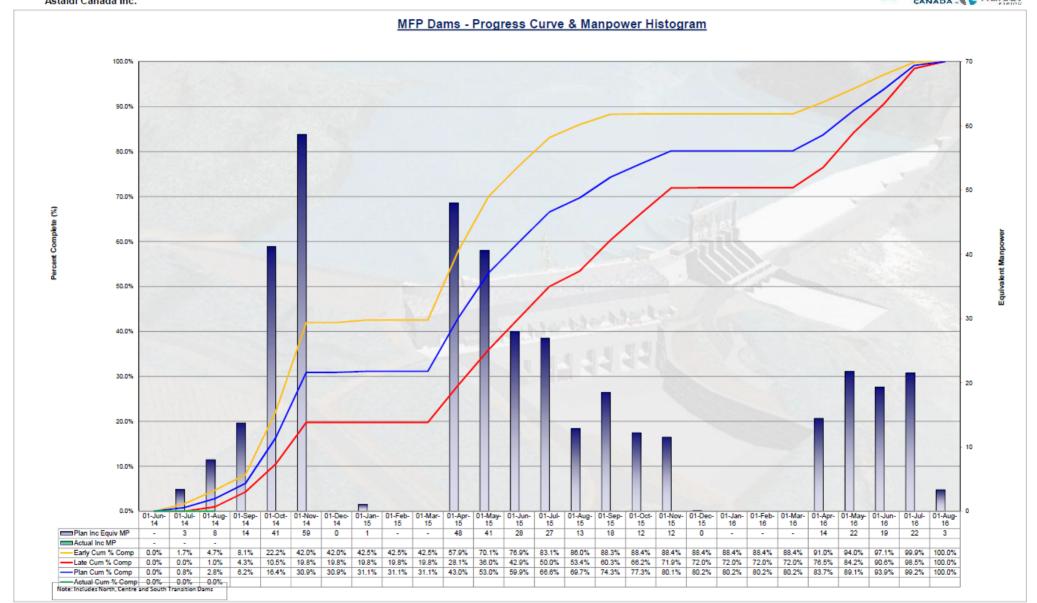




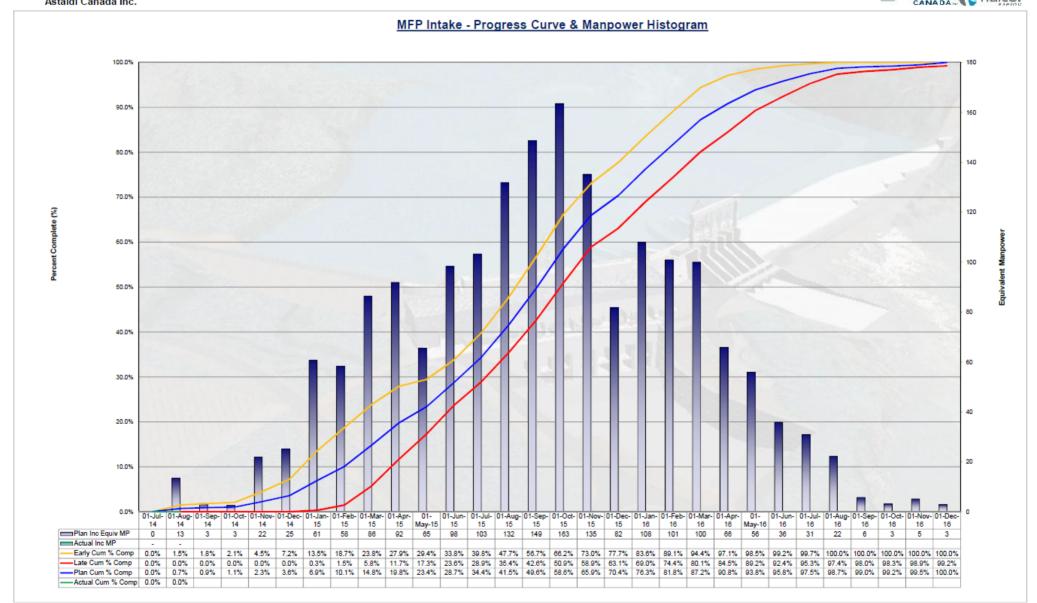




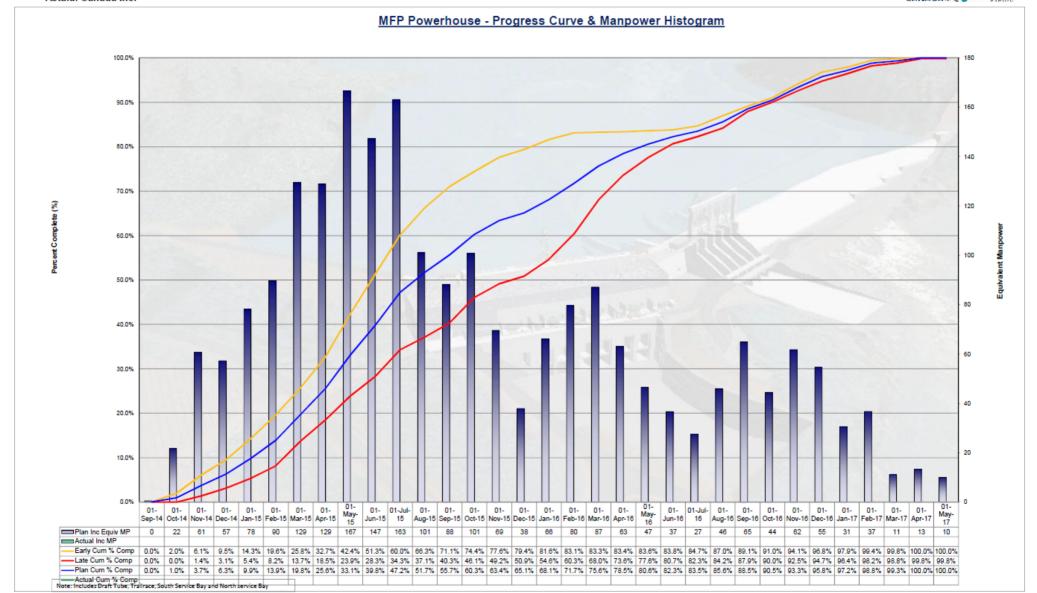




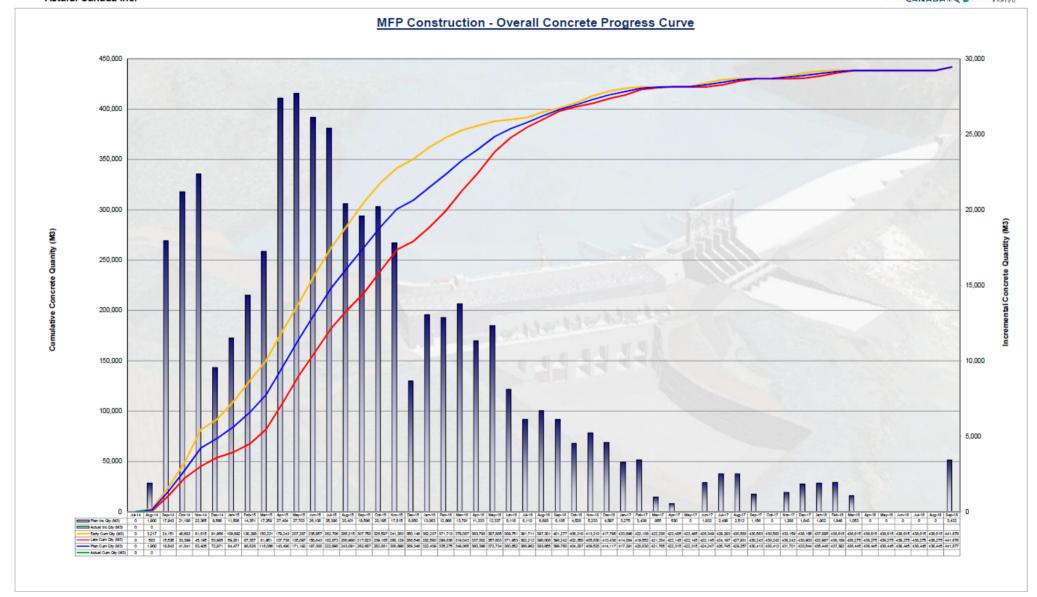




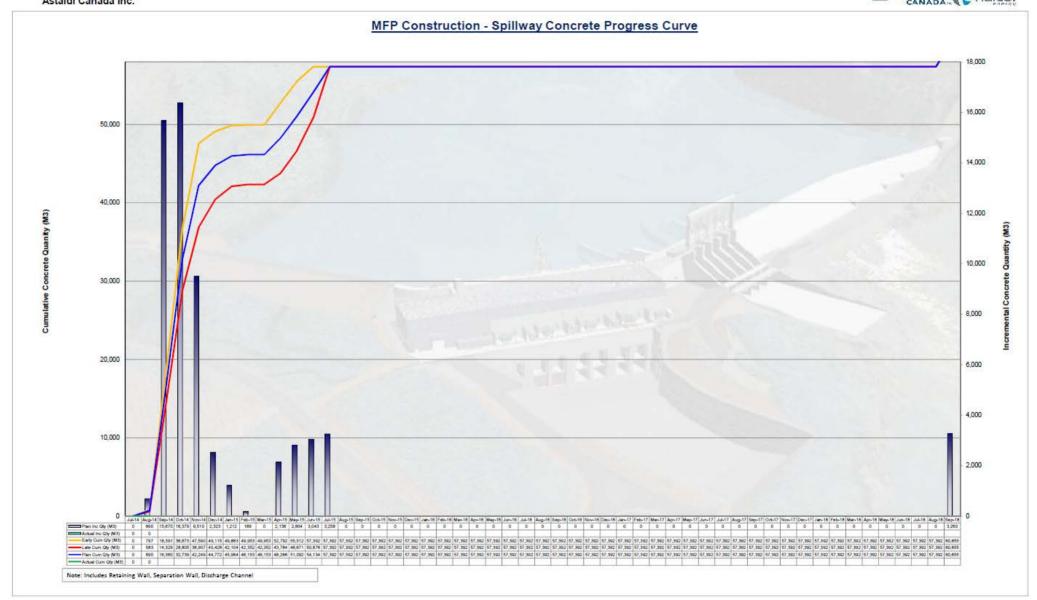




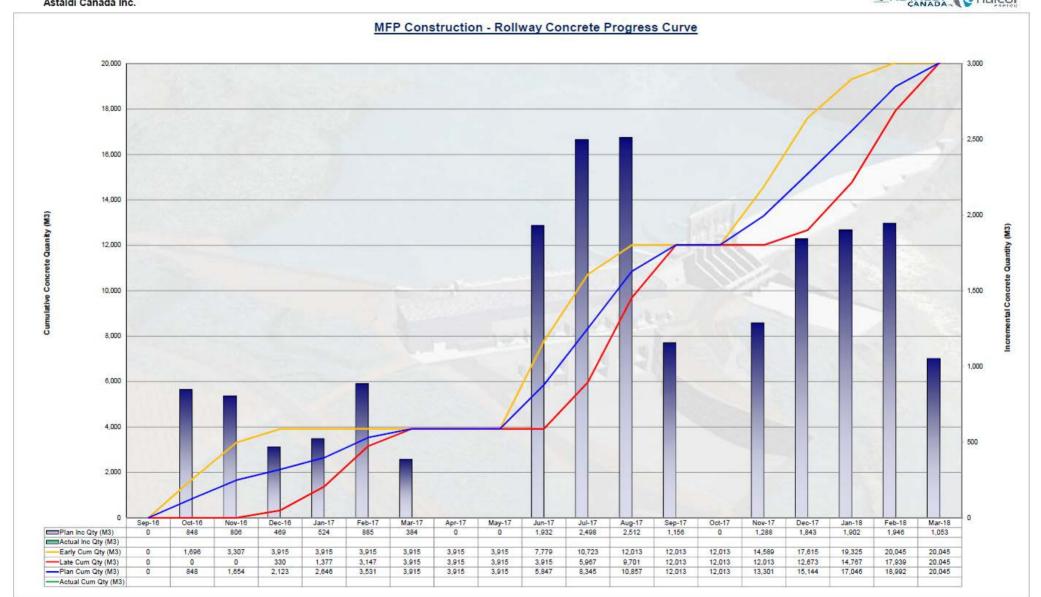




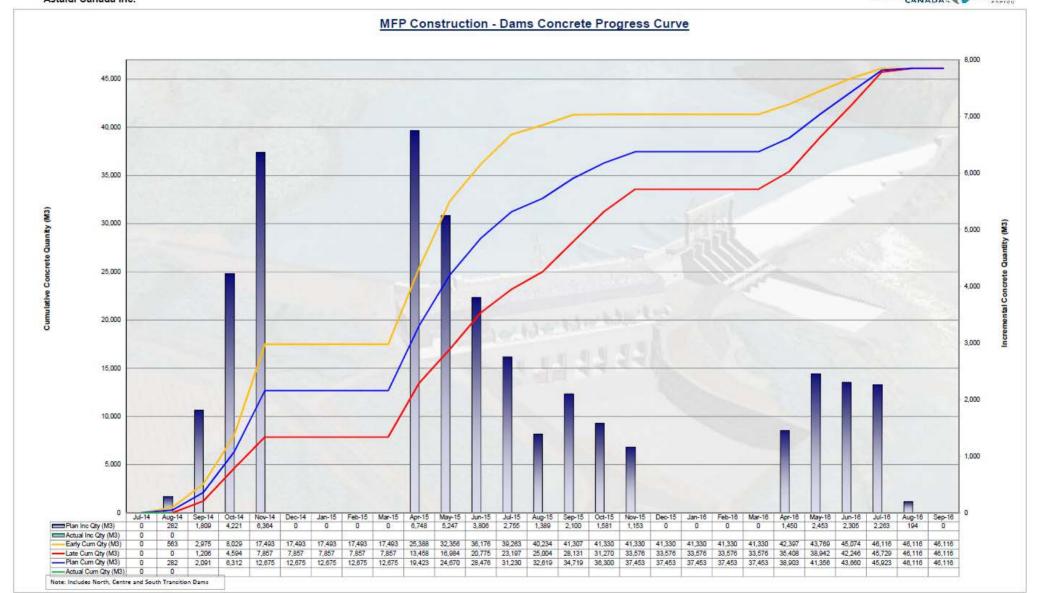




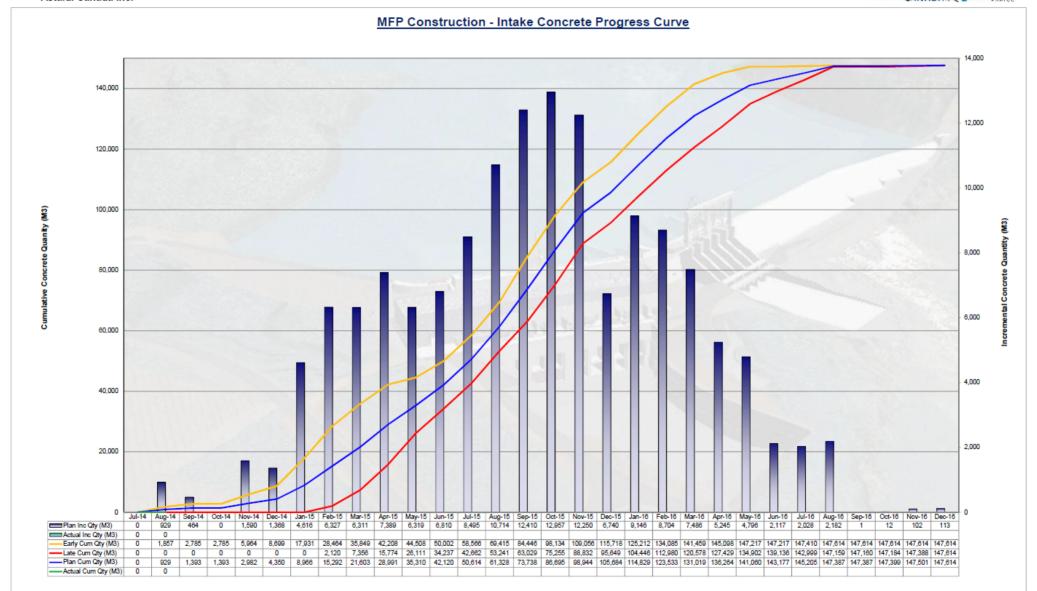




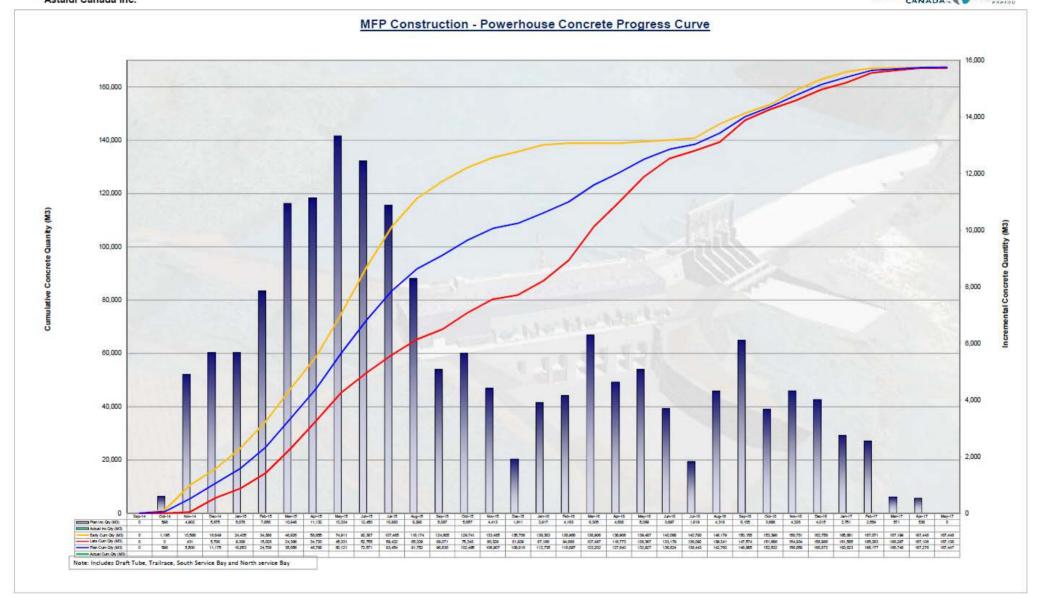












WEEKLY														
Construction Progress % Histogram			27-Jul-13	3-Aug-13	10-Aug-13	17-Aug-13	24-Aug-13	31-Aug-13	7-Sep-13	14-Sep-13	21-Sep-13	28-Sep-13	5-Oct-13	12-Oct-13
Discipline														
Actual % Complete		Progress Base MHrs.												
Powehouse	CUM.	1,238,831	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Powerhouse	INC		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Spillway	CUM.	517,105	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Spillway	INC		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Rollway	CUM.	52,629	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Rollway	INC		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dams	CUM.	226,673	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dams	INC		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Intake	CUM.	1,027,327	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Intake	INC		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Overall % Complete	CUM.	3,062,766	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Overall % Complete	INC		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Construction Quantities Discipline Actual Installed QTY		Progress Base Otys.												
Powehouse	CUM.	167,448	0	0	0	0	0	0	0	0	0	0	0	0
Powerhouse	INC		0	0	0	0	0	0	0	0	0	0	0	0
Spillway	CUM.	60,655	0	0	0	0	0	0	0	0	0	0	0	0
Spillway	INC		0	0	0	0	0	0	0	0	0	0	0	0
Rollway	CUM.	20,045	0	0	0	0	0	0	0	0	0	0	0	0
Rollway	INC		0	0	0	0	0	0	0	0	0	0	0	0
Dams	CUM.	45,115	0	0	0	0	0	0	0	0	0	0	0	0
Dams	INC		0	0	0	0	0	0	0	0	0	0	0	0
Intake	CUM.	147,614	0	0	0	0	0	0	0	0	0	0	0	0
Intake	INC		0	0	0	0	0	0	0	0	0	0	0	0
Total Construction	CUM.	441,878	0	0	0	0	0	0	0	0	0	0	0	0
Total Construction	INC		0	0	0	0	0	0	0	0	0	0	0	0
	INC	441,578	_	0	0	0	0	0	_	_	_	0	0	0
Construction Actual Manpower Discipline	-													
Powerhouse	Cum		0	0	0	0	0	0	0	0	0	0	0	0
Dams	Inc		0	0	0	0	0	0	0	0	0	0	0	0
Dulla	Cum		0	0	0	0	0	0	0	0	0	0	0	0
Spillway	Inc		0	0	0	0	0	0	0	0	0	0	0	0
	Cum		0	0	0	0	0	0	0	0	0	0	0	0
Intake	Inc		0	0	0	0	0	0	0	0	0	0	0	0
	Cum		0	0	0	0	0	0	0	0	0	0	0	0
Rollway	ino			0					0	0	0		0	0

Contract: CH0007 Construction of Intake, Powerhouse, Spillways and Transition Dams Construction Weekly Progress Table

Lower Churchil Project - Muskrat Falls

NALCOR

Current Period End:

09-Aug-14

Astaldi Canada Inc.

Construction Progress Table through Aug 09 2014

ASTALDI CANADA



•	Man-	Man-Hrs.		Actual Progress			
Area	NLCOR	Prog Base	Weight (%)	Cumulative	Incremental	Previous	
Powerhouse (1)	1,238,831	1,238,831	40.45%	0.00%	0.00%	0.00%	
Spillway (2)	517,106	517,106	16.88%	3.96%	0.39%	3.57%	
Rollways	52,629	52,629	1.72%	0.00%	0.00%	0.00%	
Dams (3)	226,873	226,873	7.41%	0.00%	0.00%	0.00%	
Intake	1,027,327	1,027,327	33.54%	0.00%	0.00%	0.00%	
TOTAL CONSTRUCTION	3,062,766	3,062,766	100.00%	0.67%	0.07%	0.60%	

Concrete Quantities

Area	Unit	Total 0	uantity	Actual Quantity			
Alea	Unit	NLCOR	Prog Base	Incremental	Cumulative		
Powerhouse (1)	МЗ	167,448	167,448	0	0		
Spillway (2)	МЗ	57,392	60,655	0	0		
Rollways	МЗ	20,045	20,045	0	0		
Dams (3)	МЗ	45,117	45,115	0	0		
Intake	МЗ	147,514	147,614	0	0		
TOTAL CONSTRUCTION	МЗ	438,616	441,878	0	0		

Construction Manpower

Area	Direct Manpower
	Actual
Powerhouse (1)	0
Spillway (2)	0
Rollways	0
Dams (3)	0
Intake	0
TOTAL	0

⁽¹⁾ Includes Draft Tube, Tailrace, South Service Bay and North Service Bay

⁽²⁾ Includes Retaining Wall, Separation Wall and Discharge Channel

⁽³⁾ Includes South Transition Dam, Centre Transition Dam and North Transition Dam

Contract: CH0007 Construction of Intake, Powerhouse, Spillways and Transition Dams Construction Monthly Progress Table

Lower Churchil Project - Muskrat Fails NALCOR Astaldi Canada Inc. Current Period End: Previous Period End:

ASTALDI Nalcor

01-Aug-14 01-Jul-14

Construction Progress Table through Aug 01 2014

•	Man-Hra		Estimated		Cumulative	Progress (%)		Increments	l Progress this	Month (%)	Previou	s Month Prog	ress (%)
Area	NLCOR	Prog Base	Weight (%)	Plan	Actual	Variance	Porecast	Plan	Actual	Porecast	Plan	Actual	Forecast
Powerhouse (1)	1,238,831	1,238,831	40.45%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Spillerry (r)	517,106	517,106	16.88%	5.71%	3.19%	2.52%	5.71%	5.25%	1.55%	5.25%	0.46%	1.64%	0.46%
Rollways	52,629	52,629	1.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dams (z)	226,873	226,873	7.41%	2.82%	0.00%	2.82%	2.82%	1.98%	0.00%	1.98%	0.84%	0.00%	0.84%
Intoka	1,027,327	1,027,327	33.54%	0.74%	0.00%	0.74%	0.74%	0.73%	0.00%	0.73%	0.01%	0.00%	0.01%
TOTAL CONSTRUCTION	3,062,766	3,062,766	100.00%	1.39%	0.54%	0.85%	1.39%	1.25%	0.26%	1.25%	0.14%	0.28%	0.14%

Cor						

_		Total Quantity		Inst	tailed this Mon	th	Total installed To Date			
Area	Unit	NLCOR	Prog Base	Plan	Actual	Forecast	Plan	Actual	Forecast	
Powerhouse (1)	M3	167,448	167,448	0	0	0	0	0	0	
Spillway (2)	M3	57,392	60,655	690	0	690	690	0	690	
Rollways	M3	20,045	20,045	0	0	0	0	0	0	
Dama (3)	M3	46,117	46,116	282	0	262	282	0	252	
Intake	M3	147,614	147,614	929	0	929	929	0	929	
TOTAL CONSTRUCTION	M3	438,616	441,878	1,900		1,900	1,900		1,900	

Construction Manpower

	Direct Manpower								
Area	Plan	Actual	Forecast						
Powerhouse (1)	0	0	0						
Spillway (2)	47	0	47						
Rollways	0	0	0						
Dama (3)	8	0	8						
Irtako	13	0	13						
TOTAL	68	0	68						

⁽¹⁾ Includes Draft Tube, Talhace, South Service Bay and North Service Bay

⁽²⁾ Includes Relaining Wall, Separation Wall and Discharge Channel

⁽³⁾ Includes South Transition Dam, Centre Transition Dam and North Transition Dam