

**From:** [scotto'brien@lowerchurchillproject.ca](mailto:scotto'brien@lowerchurchillproject.ca)  
**To:** [Scott O'Brien](mailto:Scott O'Brien)  
**Subject:** Fwd: CH0032 Background info  
**Date:** Wednesday, December 18, 2013 10:39:41 PM  
**Attachments:** [.png](#)  
[CH0032 Technical Executive Summary March 6 2013.pptx](#)

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Sent from my iPhone

Begin forwarded message:

**From:** "Bruce Drover" <[BruceDrover@lowerchurchillproject.ca](mailto:BruceDrover@lowerchurchillproject.ca)>  
**To:** "Scott O'Brien" <[ScottO'Brien@lowerchurchillproject.ca](mailto:ScottO'Brien@lowerchurchillproject.ca)>  
**Subject: Fw: CH0032 Background info**

This is something I put together when I first got here but it is still relevant except for any dates.

Bruce Drover P. Eng

Package Leader - Hydro Mechanical Equipment

PROJECT DELIVERY TEAM

Lower Churchill Project

t. 709 778-6657

e. [BruceDrover@lowerchurchillproject.ca](mailto:BruceDrover@lowerchurchillproject.ca)

w. [muskratfalls.nalcorenergy.com](http://muskratfalls.nalcorenergy.com)



# Lower Churchill Project

## CH0032 Package Technical Summary

Boundless Energy



# Introduction

# Package CH0032 Description

- Package CH0032 is for design, supply and installation of all hydro-mechanical equipment and auxiliaries related to flow control through the powerhouse and spillway.
- Budget estimate of 12,000 metric tons of steel
- Critical interfaces with package CH0007 for embedded parts; CH0032 Supervises CH0007's installation of CH0032 supplied primary anchors.
- First major milestone is Delivery of Primary Anchors for Spillway on 4 Dec 2013

# Scope – Main Areas

- Spillway
  - Hydro-mechanical equipment;
  - Spillway electrical building
- Powerhouse
  - Intake hydro-mechanical equipment;
  - Draft tube hydro-mechanical equipment
- Trash cleaning system

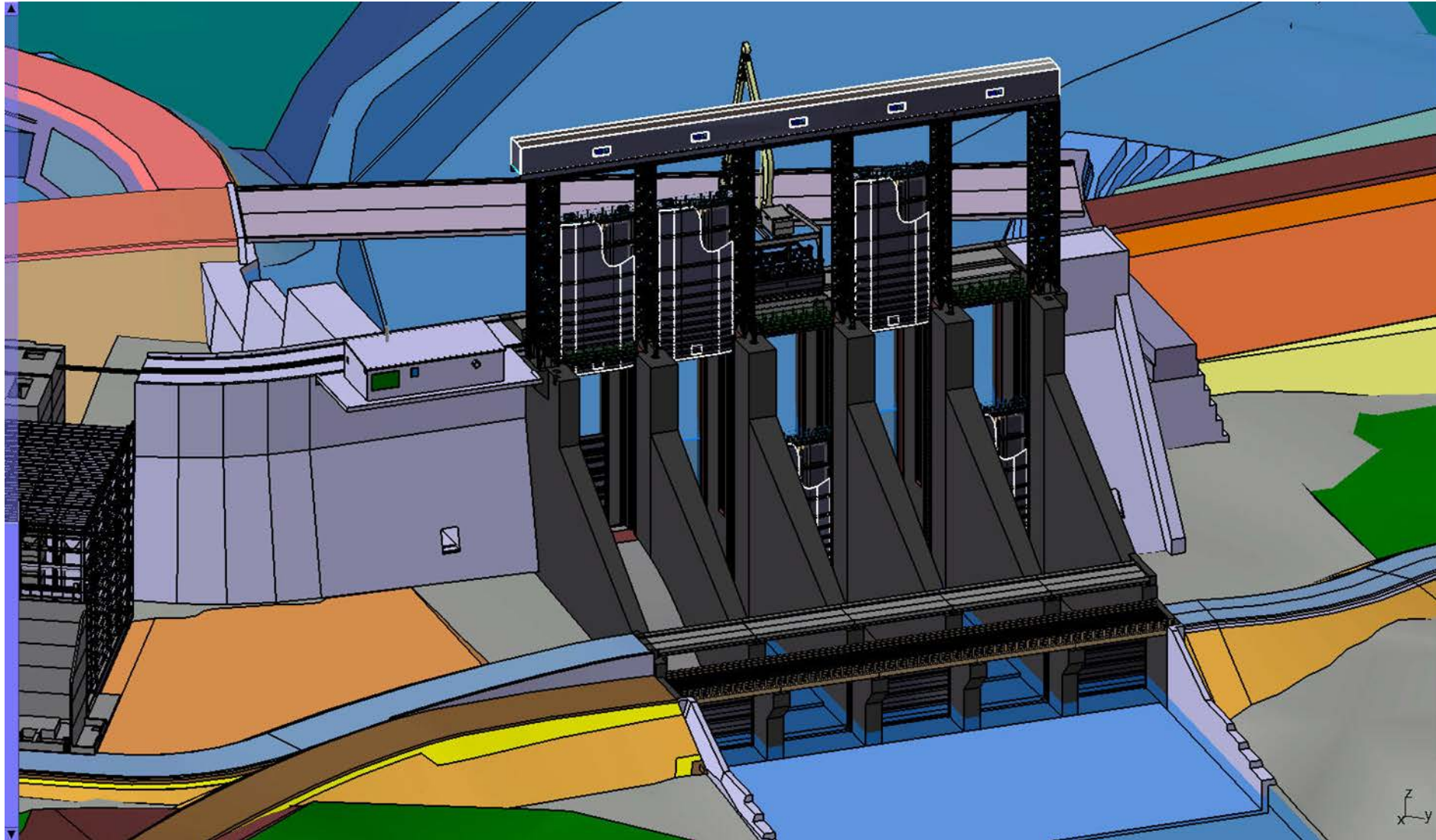
# Spillway

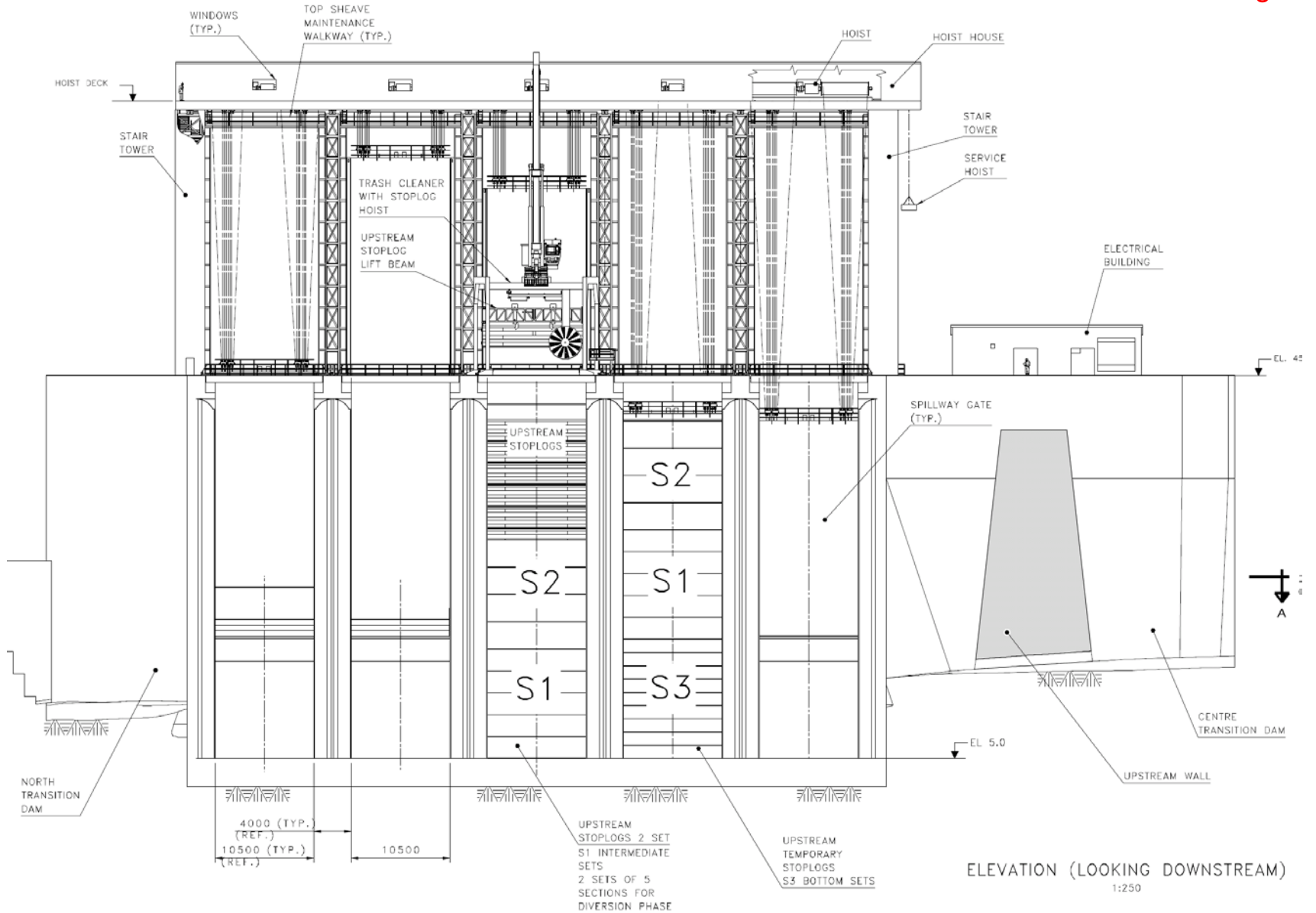
# Spillway Description

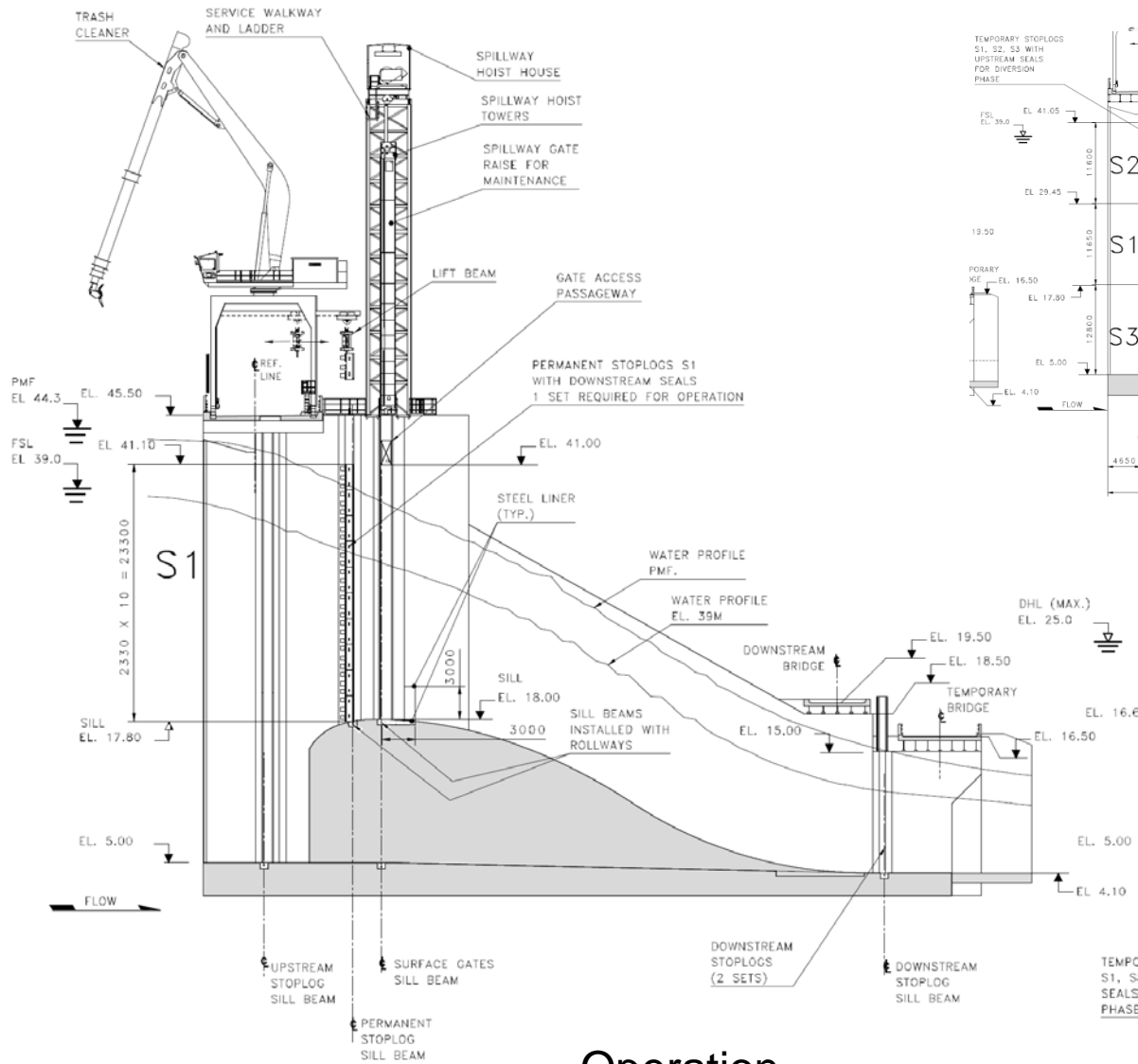
- The Spillway has five bays each with a Spillway Gate and hoist.
- Initially configured without rollways for diversion of the river during construction of the North RCC Dam
- Final Spillway configuration, when combined with overflow discharge at the North RCC Dam, will be able to pass the Probable Maximum Flood for this project, 25,060 m<sup>3</sup>/s.
- Hydro-mechanical components designed for 0.5m overtopping of the gates.

<b>Spillway Hydro-Mechanical Equipment - Budget Quantities</b>					
<b>Description</b>	<b>Qty</b>	<b>Units</b>	<b>Weight each (kg)</b>	<b>Weight Subtotal (kg)</b>	
<b>Gates</b>					<b>2,042,500</b>
Fixed wheel surface spillway gates	5	Sets	178,000	890,000	
Surface gates embedded parts	5	Sets	71,000	355,000	
Fixed wire rope hoists for the surface gates	5	Sets	27,500	137,500	
Towers and hoist enclosure for the surface gate hoists	1	Sets	660,000	660,000	
<b>Stoplogs</b>					<b>1,511,500</b>
Upstream temporary stoplogs (19 sections)	2	Sets	260,000	520,000	
Stoplog lifting beam	1	Sets	5,000	5,000	
Stoplogs for downstream water passages (5 sections)	2	Sets	32,000	64,000	
Temporary stoplog's embedded parts	5	Sets	129,000	645,000	
Permanent stoplog's embedded parts	5	Sets	30,500	152,500	
Downstream stoplog's embedded parts	5	Sets	21,000	105,000	
Stoplog storage system	1	Lump Sum	20,000	20,000	
<b>Auxiliaries</b>					
Electrical equipment supply	1	Lump Sum			
Auxiliary Mechanical Systems	1	Lump Sum			
			<b>Total Weight (kg)</b>		<b>3,554,000</b>

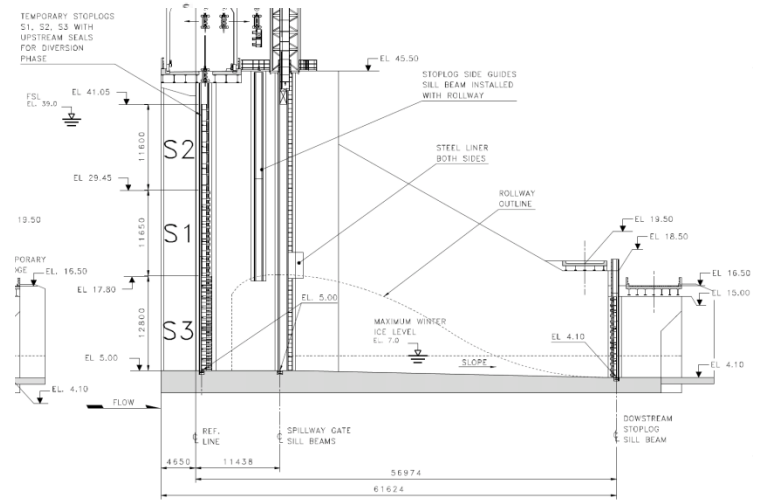








Operation



SECTION D-D (DURING DIVERSION AT FSL EL. 39.0)  
FROM 2400-ME-EL-0001-01  
1:250

Diversion – No Rollway

# Spillway Gates / Guides

- Five gates approx 11m wide x 23m high
  - Fixed wheeled gates with upstream skin plates and seals; estimated mass = 178,000 kg per gate
  - Design constrained by block-outs in 1<sup>st</sup> stage concrete
  - Forced air heated to prevent freezing
- Embedded parts
  - Primary anchors, guides, liners, guide heaters
  - Second stage concrete is Contractor's supply

# Spillway Gates / Guides

- Upper Guides
  - Extend up the hoist towers
  - Permit gate removal
  
- Dogging devices
  - Gate can be suspended at multiple locations for safe inspection and maintenance of each wheel and the upper sheaves.

# Spillway Gate Hoists

- One wire rope hoist per gate; two drums per hoist; two independent wire ropes per drum
- Hoists complete with holding brake and emergency fan brake
- Hoists are supported by steel tower & bridge structure
- Upper gate guides are integrated into the towers
- Hoist house totally encloses bridge deck
- Enclosed stairs for access to hoist house

# Spillway Guides

Each Spillway bay has four sets of gates and stoplog guides. Starting from upstream guides are:

1. Stoplog guides for use after river diversion for spillway rollway construction
2. Stoplog guides for the long-term maintenance of the Spillway after the rollways are constructed;
3. Spillway Gate heated guides to enable year round operation
4. Stoplog guides for use after river diversion for spillway rollway construction and for long-term maintenance.

# Stoplogs

- Permanent and temporary upstream stoplogs to isolate:
  - Two bays during diversion to construct rollways
  - One bay during operation
- Permanent and temporary downstream stoplogs to isolate :
  - Two bays during diversion to construct rollways
  - One bay during operation



# Spillway Electrical Auxiliaries

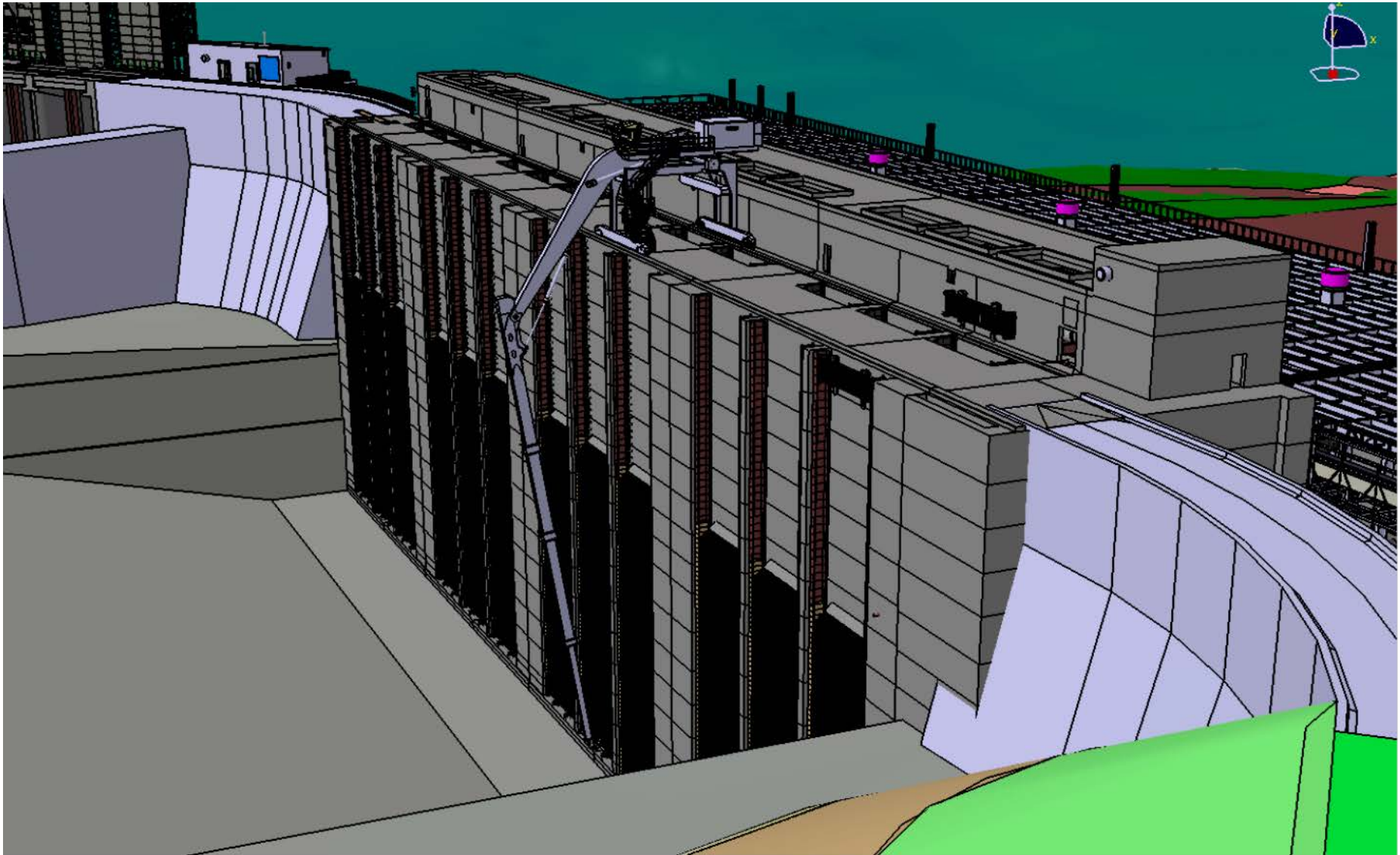
- Spillway Building located on concrete deck supported by center transition dam and steel columns, that houses:
  - 25 kV/600 Vac step down transformer
  - AC distribution for the Spillway equipment
  - Spillway gate controls
  - 600 kW backup diesel generator
- Diesel storage tank and fuel transfer skid located at the downstream base of the transition dam near or under the spillway building

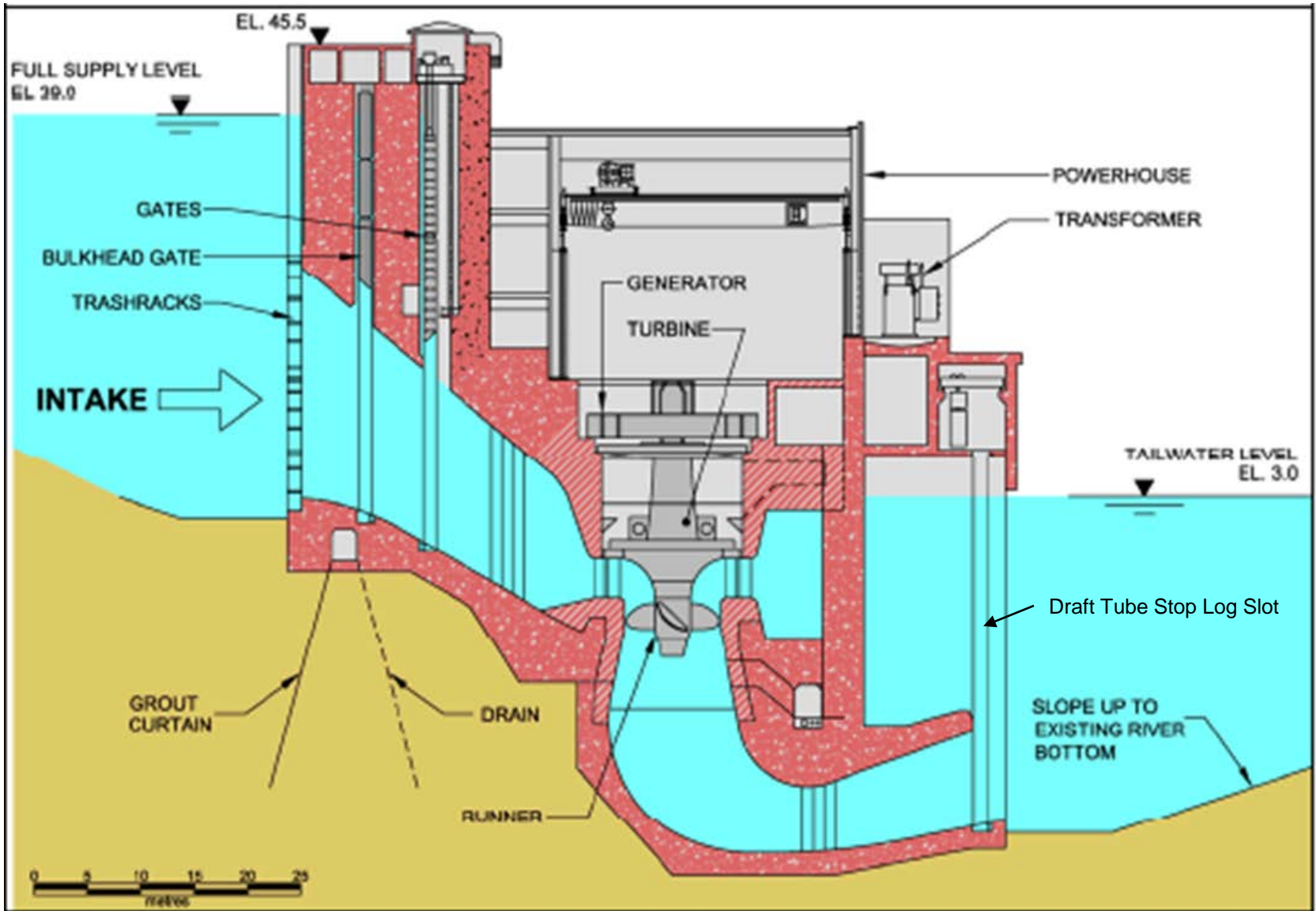
# Powerhouse

# Intake Hydro-Mechanical Description

- The powerhouse has four turbine/generator units with three intake bays per unit.
- From upstream to downstream each intake bay has:
  - Trashracks and guides,
  - Bulkhead gate guides,
  - Intake Gate and guides.
- One set of bulkhead gates are provided to isolate one unit bay to permit maintenance on one Intake Gate.

<b>Powerhouse Hydro-Mechanical Equipment - Budget Quantities</b>					
<b>Description</b>	<b>Qty</b>	<b>Units</b>	<b>Weight each (kg)</b>	<b>Weight Subtotal (kg)</b>	
<b>Intake</b>					<b>4,212,000</b>
Fixed wheel intake gates	12	Sets	125,500	1,506,000	
Intake gates embedded parts per gate (with primary anchors)	12	Sets	85,000	1,020,000	
Fixed wire rope hoists for the intake gates per gate	12	Sets	25,000	300,000	
Intake bulkhead gates for one passage (5 sections)	1	Sets	103,000	103,000	
Bulkhead gates embedded parts per bay (with primary anchors)	12	Sets	104,000	1,248,000	
Bulkhead gate lifting beam	1	Sets	10,000	10,000	
Dogging mechanism for bulkhead gate sections	5	Sets	5,000	25,000	
<b>Trash Racks</b>					<b>3,088,000</b>
Trashracks for one bay (8 panels)	12	Sets	166,500	1,998,000	
Trashrack lifting beam	1	Sets	10,000	10,000	
Trashrack embedded parts for surface gates per bay (with primary anchors)	12	Sets	90,000	1,080,000	
<b>Draft Tube</b>					<b>1,080,000</b>
Draft tube stoplogs (8 sections per unit)	2	Sets	210,000	420,000	
Draft tube embedded parts per bay (with primary anchors)	8	Sets	69,500	556,000	
Draft Tube overhead crane with lifting beam	1	Lump Sum	24,000	24,000	
Draft tube stoplog supports for storage	16	Sets	5,000	80,000	
<b>Auxiliaries</b>					
Electrical equipment supply	1	Lump Sum			
Auxiliary Mechanical Systems	1	Lump Sum			
			<b>Total Weight</b>		<b>8,380,000</b>





# Intake Gates

- The Intake Gates are capable of:
  - Opening under normal differential head to fill the water passages
  - Closing under maximum head and maximum discharge as part of an emergency shutdown sequence to protect the turbine and generator
- Intake Gates are approximately 20m high x 7m wide fixed wheeled gates with upstream skin plate and seals.
- Gate weight: approx. 125,000 kg per gate

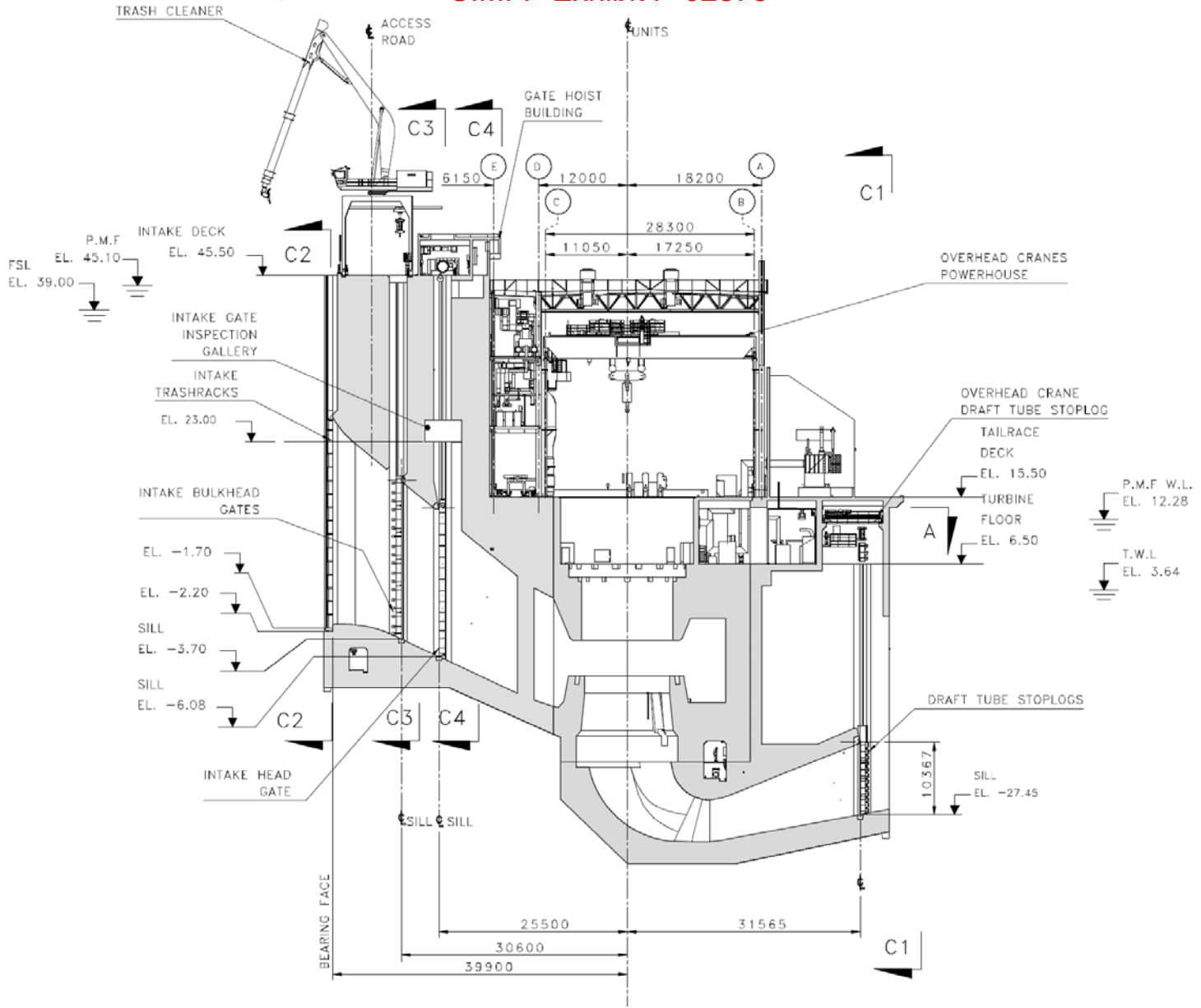
# Intake Gate Guides and Accessories

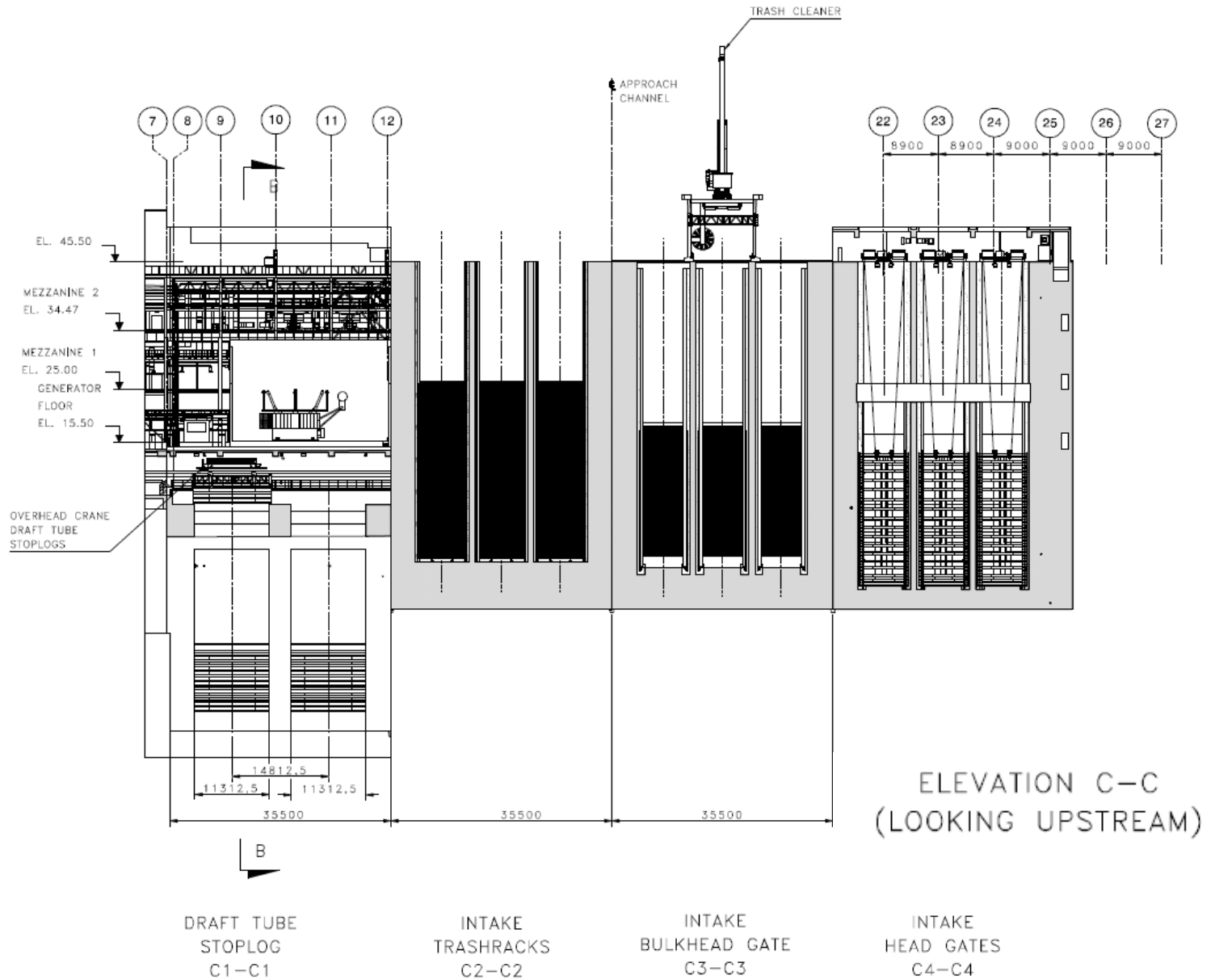
- Lower guides extend from sill beam to maintenance gallery, with upper guides to top of gate slot
- Primary anchors: CH0032 supply and CH0007 install
- Embedded parts and second stage concrete are CH0032 supply and installed
- Dogging devices provided at maintenance gallery to service gates and hoists
- Gate slot heaters required to keep the slot ice free



# Intake Gates Hoists

- Hoist building is located on intake deck (hoist building provided by CH0007)
- One wire rope hoist per gate; two drums per hoist; one wire rope per drum.
- Hoists complete with holding brakes and emergency fan brakes





# Intake Trash Rack and Bulkhead Gates

- Each intake bay is protected by trashracks made up of removable sections installed in slots.
- Trashracks are installed and removed by a mobile crane.
- Bulkhead gates are sliding type with downstream skin plate and seals.
- Bulkhead gates are installed and removed by the gantry hoist integral to the Trash Cleaner
- Primary anchors: CH0032 supply and CH0007 install
- Embedded parts and second stage concrete are CH0032 supply and installed

# Draft Tube Hydro-mechanical Equipment

- Each of the four turbine/generator units has two Draft Tube outlets
- Each outlet has stoplogs guides that permit isolation of the water passages for turbine maintenance
- Sufficient Draft Tube stoplogs are provided to isolate two turbine/generator units or four (4) Draft Tube water passages
- An Overhead Bridge Crane in the Draft Tube Gallery handles the stoplogs
- The maintenance gallery is used to service the stoplogs

# Trash Cleaner

# Trash Cleaner

- Electric / Hydraulic with articulating & telescoping arm



- Travels on rails (by CH0007) to service spillway & intake
- Integrated gantry hoist for intake bulkhead gates and spillway upstream stoplogs
- Used to clean trashracks, floating surface debris; and clean the upstream Debris and Sediment trap 47 m below the water surface
- Trash Cleaner weight: approx. 100,000 kg

