

CD: CM INFRASTRUCTURE PROJECTS REPORT

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Designation: Construction North Technical Advisor
Directorate: Infrastructure Management, Construction North
Date: 19 February 2024

WATER IS LIFE - SANITATION IS DIGNITY



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA



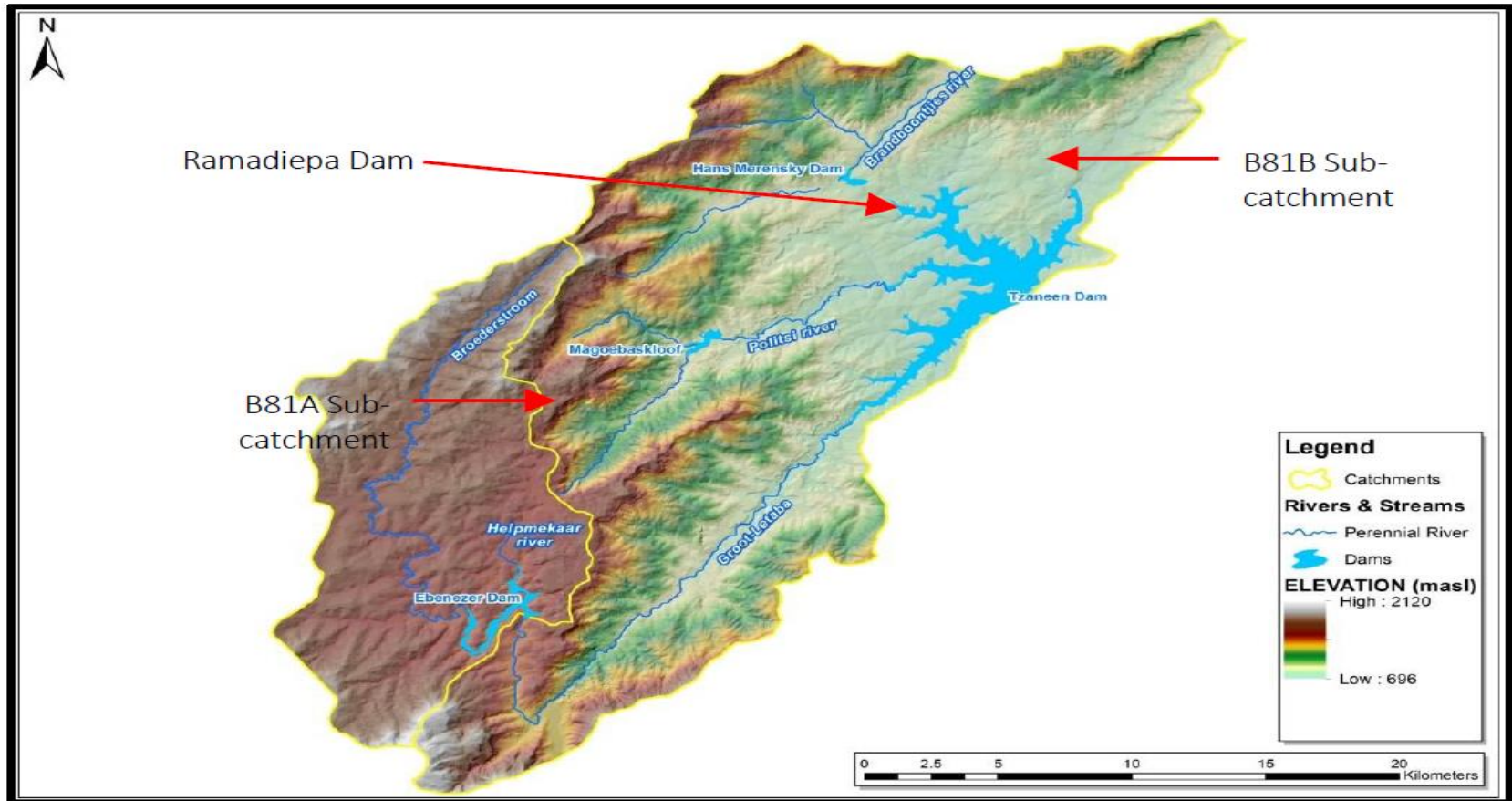
TZANEEN TOWN IN LIMPOPO



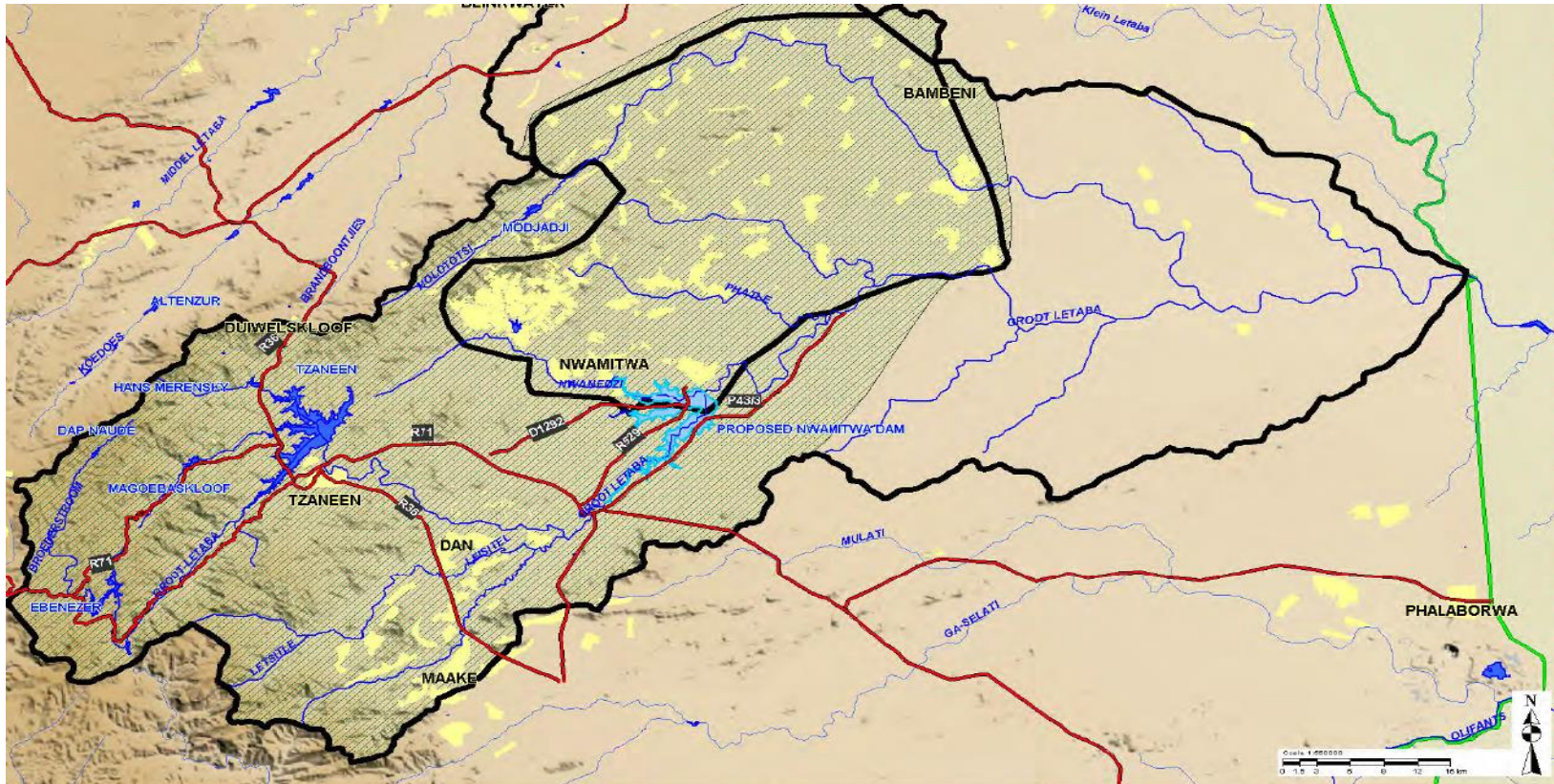
THE TZANEEN DAM



TZANEEN DAM CATCHMENT



THE GROOT LETABA RIVER CATCHMENT



BACKGROUND

- The Construction of the original Tzaneen Dam was **completed in 1977** and comprises of a **mass concrete gravity spillway** section flanked by earth fill embankments covered with paving bricks.
- The current gross capacity of Tzaneen dam is 157,3 million m³. The Bridging Study recommends increasing the storage capacity by 35,7 million m³ to total **new capacity of 193 million m³**.
- The project entails raising of Tzaneen dam wall **OG crest with 3m** from the original full supply level. The rest of the NOC Tongue wall and **NOC Embankment raising by 2m**.
- The original **OG concrete crest spillway of 91.44m**, will be replaced with a combination of Labyrinth and OG spillway crests.

PROJECT PURPOSE:

- To meet the projected growing water requirements to a 20-year planning horizon at an acceptable assurance of supply.
- To prevent further degradation of the riverine ecosystem by implementing the signed-off preliminary Reserve determined in compliance with the NWA.
- To minimize further lowering of the assurance of availability of water supplies to the irrigation sector for the existing development.
- To make water available for the establishment of resource-poor farmers in the irrigated agriculture sector.

PROJECT SCOPE

1. Scope of Work
 - Raise the LEFT Embankment - 175meters
 - Raise the Right Embankment - 780 meters
 - Labyrinth /OG Concrete spillway - 91 meters
 - River diversion = 265 meters

2. Project Duration (Construction)
 - 18 months
 - Until End March 2025

3. Project Start Date
 - 01st of June 2023

4. Project End Date
 - 13th March 2025

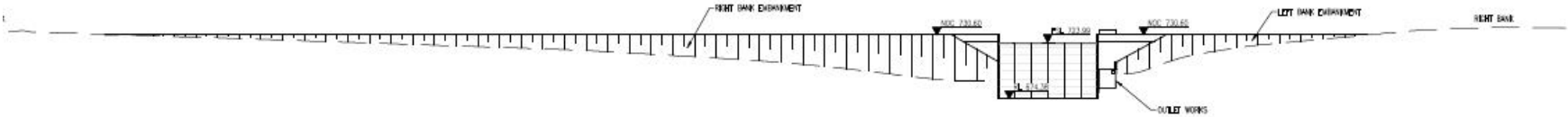
6. Category III dam (max height 55m)

7. Additional Work
 - Soil placement = 100 000m³ and 40 000m³
 - Terra Mesh wall and Soil Nailing
 - Geotechnical Investigations

EXISTING TZANEEN DAM LAYOUT



EXISTING DAM PLAN VIEW
SCALE: 1:2,000



EXISTING DAM DOWNSTREAM ELEVATION
SCALE: 1:2,000

RAISED TZANEEN DAM LAYOUT



THE TZANEEN DAM 1 FEB. 2024



The Right Earth fill Embankment



Top view of demolished OG-crest



Spillway and left earthfill embankment



RAISING OF TZANEEN DAM

RAISING OF TZANEEN DAM

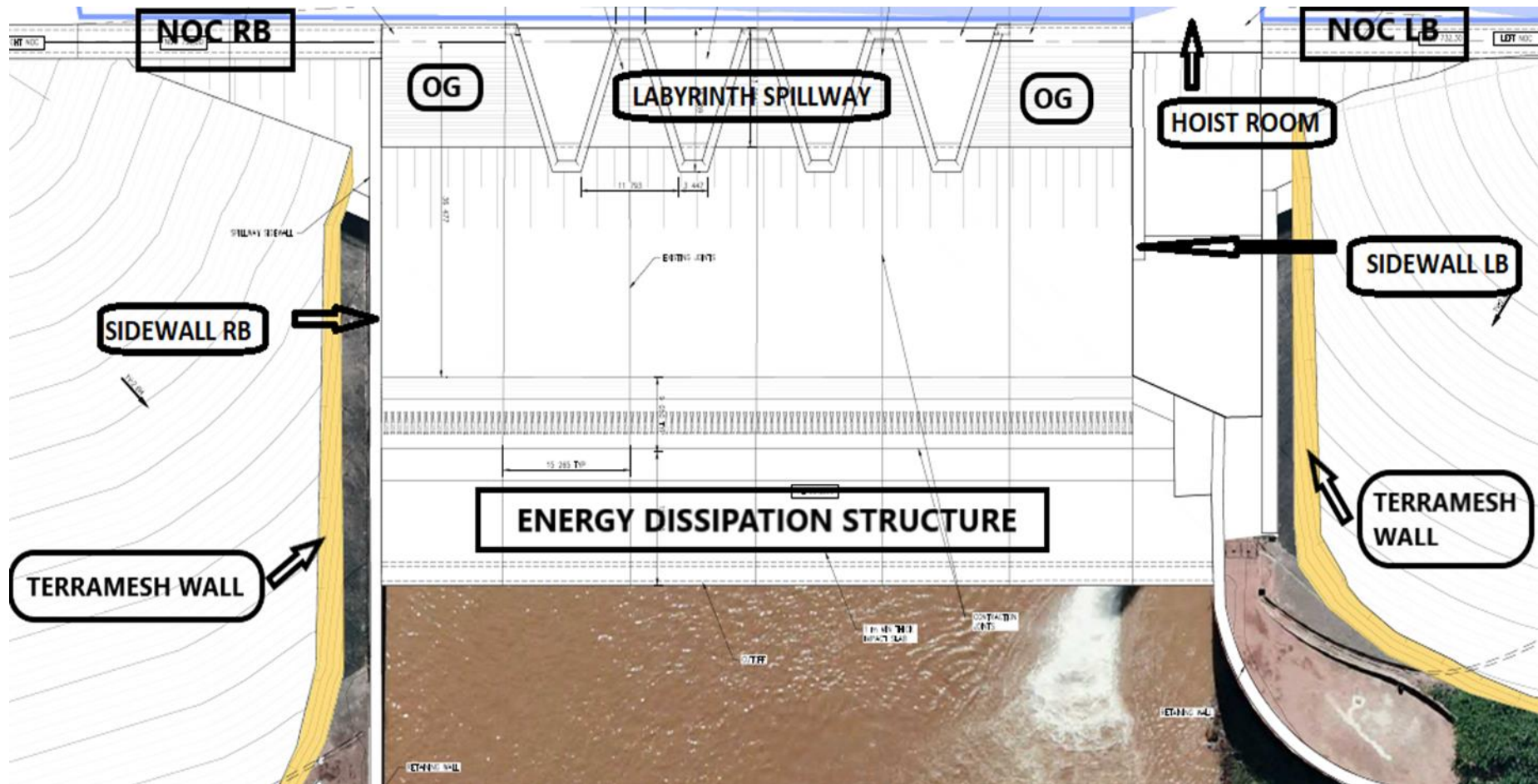
DAM WALL VIEW



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RAISING OF TZANEEN DAM

MAJOR CONSTRUCTION ACTIVITIES



CONSTRUCTION SITE LAYOUT

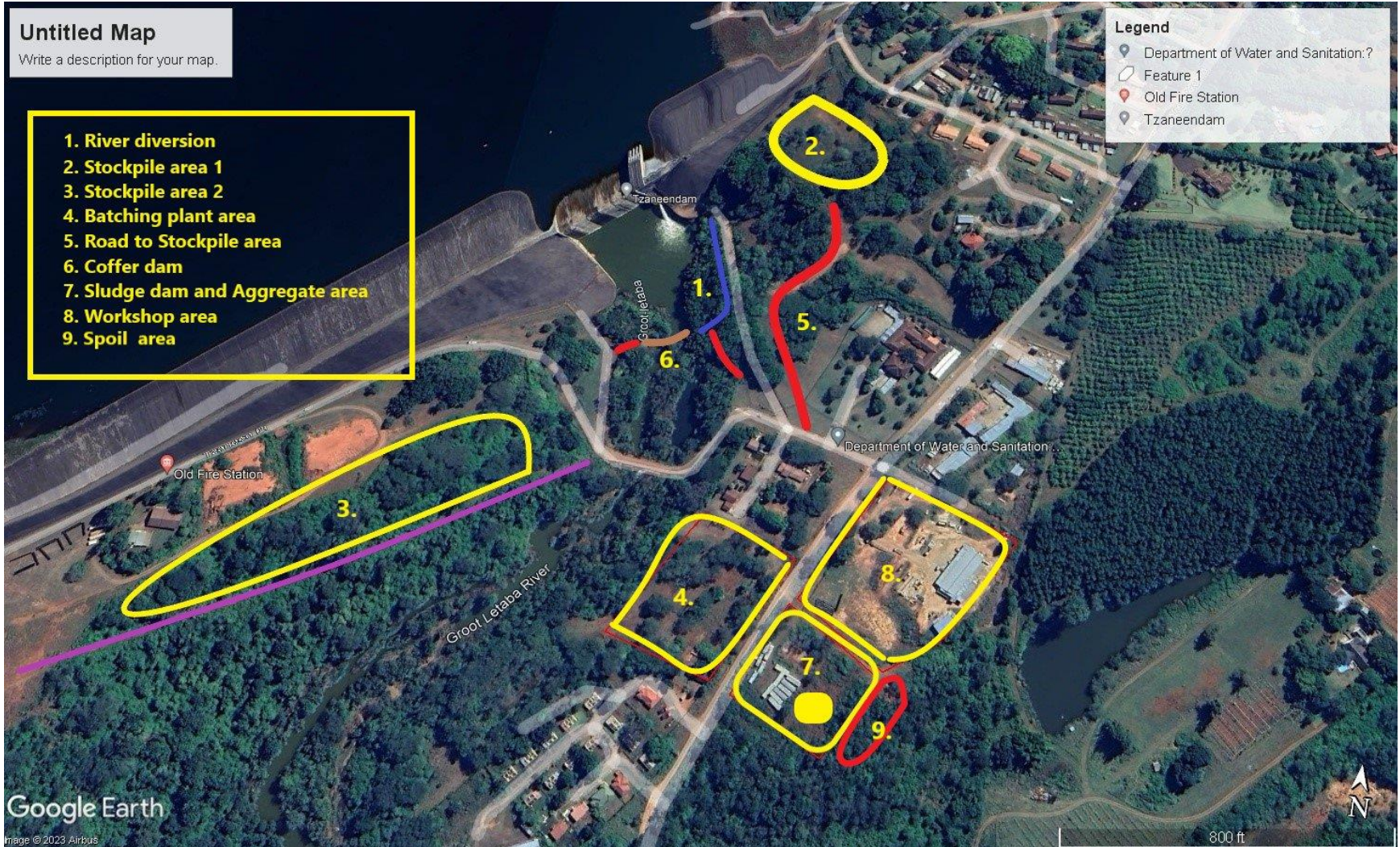
Untitled Map

Write a description for your map.

1. River diversion
2. Stockpile area 1
3. Stockpile area 2
4. Batching plant area
5. Road to Stockpile area
6. Cofferd dam
7. Sludge dam and Aggregate area
8. Workshop area
9. Spoil area

Legend

- Department of Water and Sanitation?
- Feature 1
- Old Fire Station
- Tzaneendam



CONTRACT INFORMATION

CONTRACT REF:	
CONTRACT TITLE:	Raising of Tzaneen Dam
CLIENT:	DWS Chief Directorate: Infrastructure Development
EMPLOYER'S AGENT:	DWS Chief Directorate: Engineering Services
MAIN CONTRACTOR:	DWS: CONSTRUCTION NORTH
CONTRACT VALUE:	R 635 353 405

CONTRACT INFORMATION

CONTRACT REF NO.:	
IMPLEMENTING AGENT:	Development Bank of South Africa (DBSA)
EMPLOYER'S AGENT:	ARQ Dams (Pty) Ltd.
MAIN CONTRACTOR:	DWS: CONSTRUCTION NORTH

RAISING OF TZANEEN DAM

DAM PARAMETERS

DAM INFO	NEW DAM
DAM STORAGE CAPACITY	195 million m ³ from 154 million m ³
NEW CONCRETE TO BE PLACED	16 400 cubic meters (3 280 mixer truck loads)
EXCAVATION TAILPOND	18 500 cubic meters (3 150 truck loads)
EMBANKMENT SOIL FILL	140 000 cubic meters (24 000 truck loads)

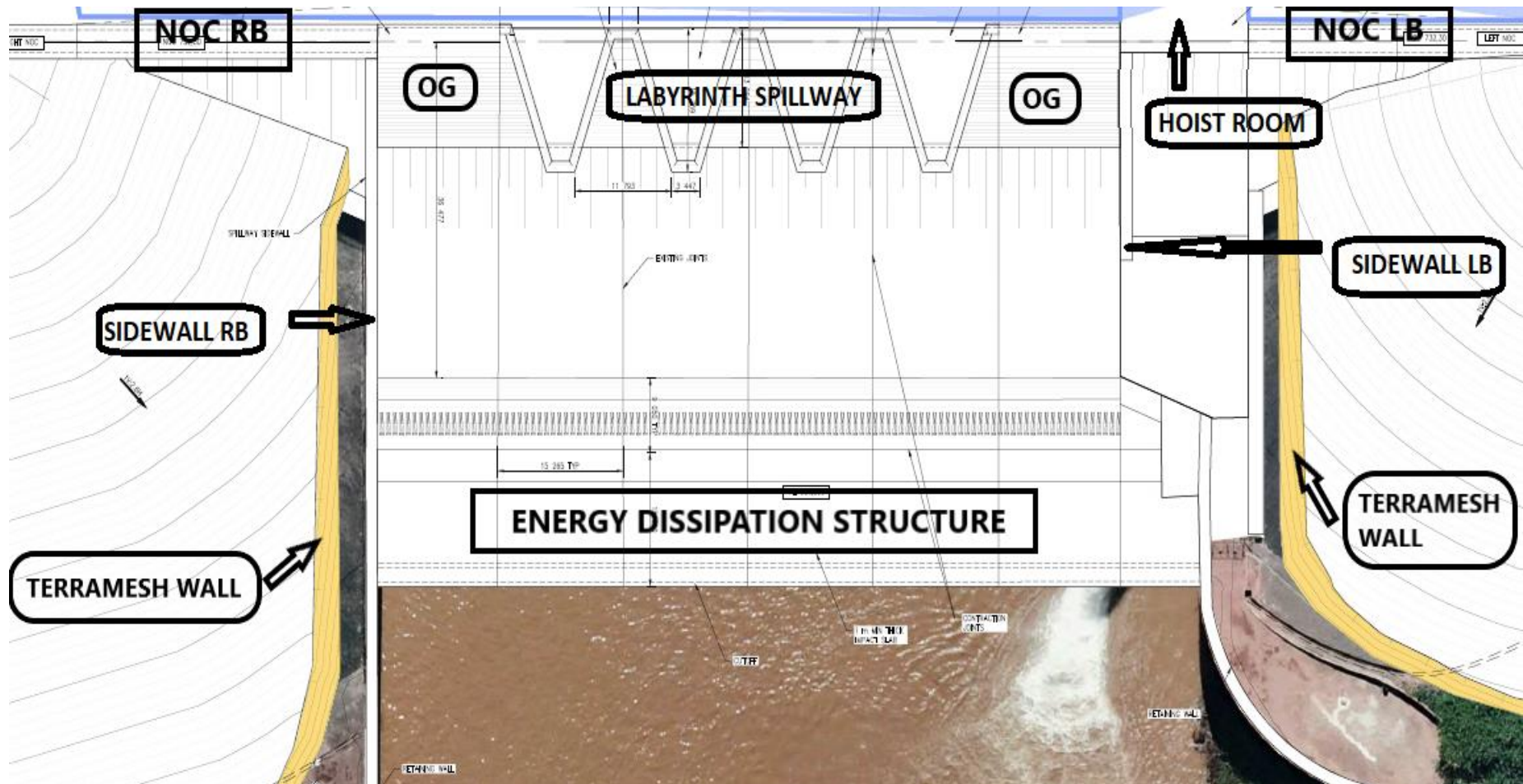
Project Progress Summary

Project Name	Start Date	% Progress to Date	Expected Completion	Status
Site Establishment	May 2023	95 %	March 2024	
River Diversion	August 2023	100 %	Nov. 2023	Completed
Temporary Access Road	September 2023	100 %	Nov. 2023	Completed
Batching Plant	June 2023	90 %	May 2024	In progress
Raising of Tzaneen Dam	May 2023	23%	May 2025	In Progress

Current Project Activities Summary

Project Name	Current Activities	% Progress to Date	Challenges	Mitigation
Raising of Tzaneen Dam	<ul style="list-style-type: none"> Erection of Tower Cranes. Erecting of the Batching Plant. Clearing of Stockpile areas. Load and Transport Material from the stilling Basin. 	23%	<ul style="list-style-type: none"> Flooding of the Stilling Basin area, during the December recess. Delays in the erection of the Tower crane 	<ul style="list-style-type: none"> Pumping and redirecting the water from the Toe Drain. Regular monitoring of the sub-contractor

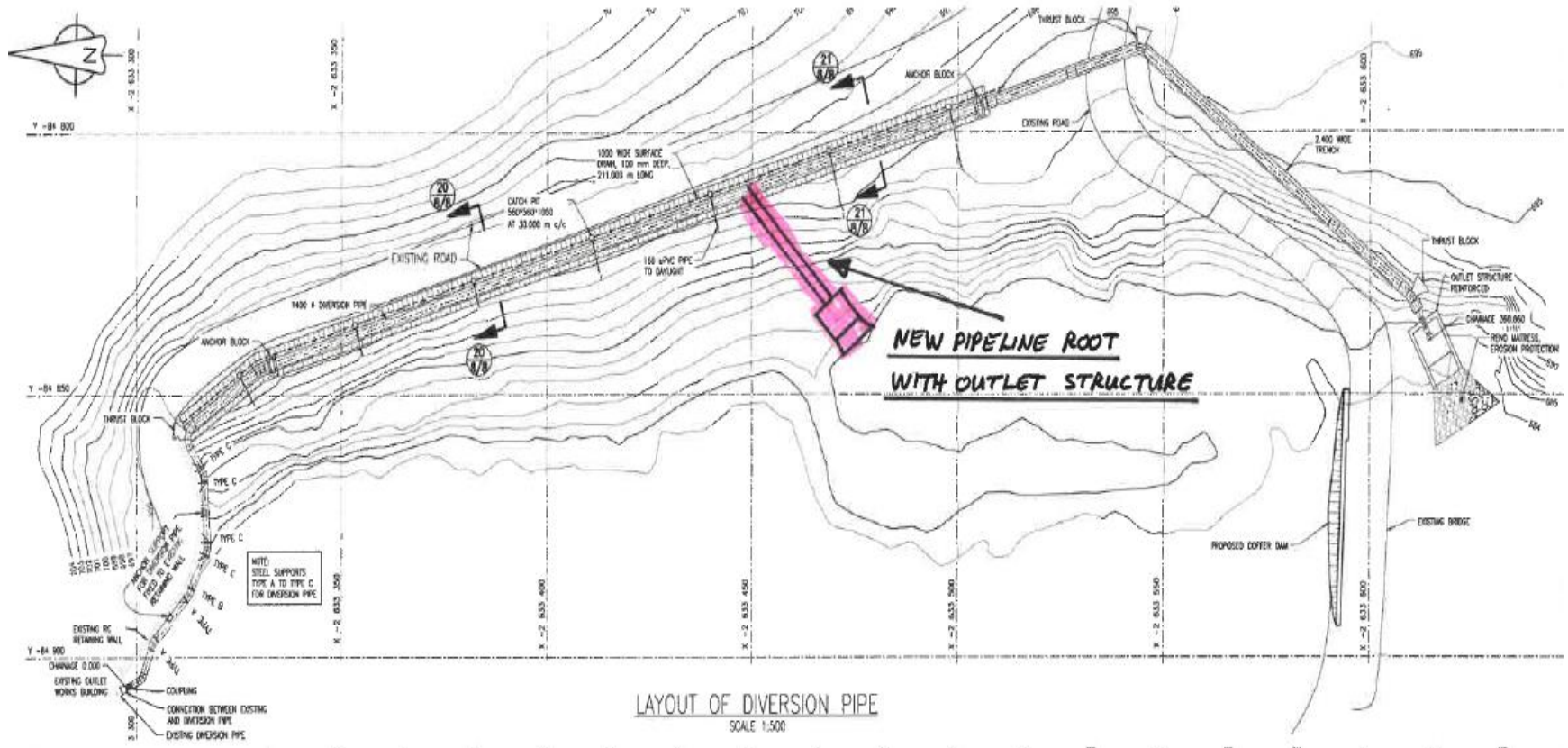
RAISING DAMWALL ACTIVITIES



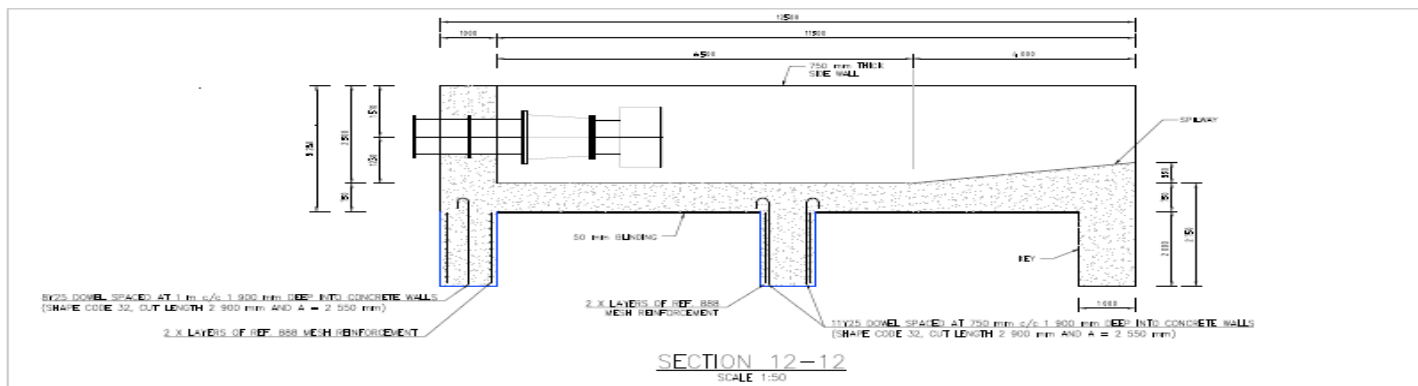
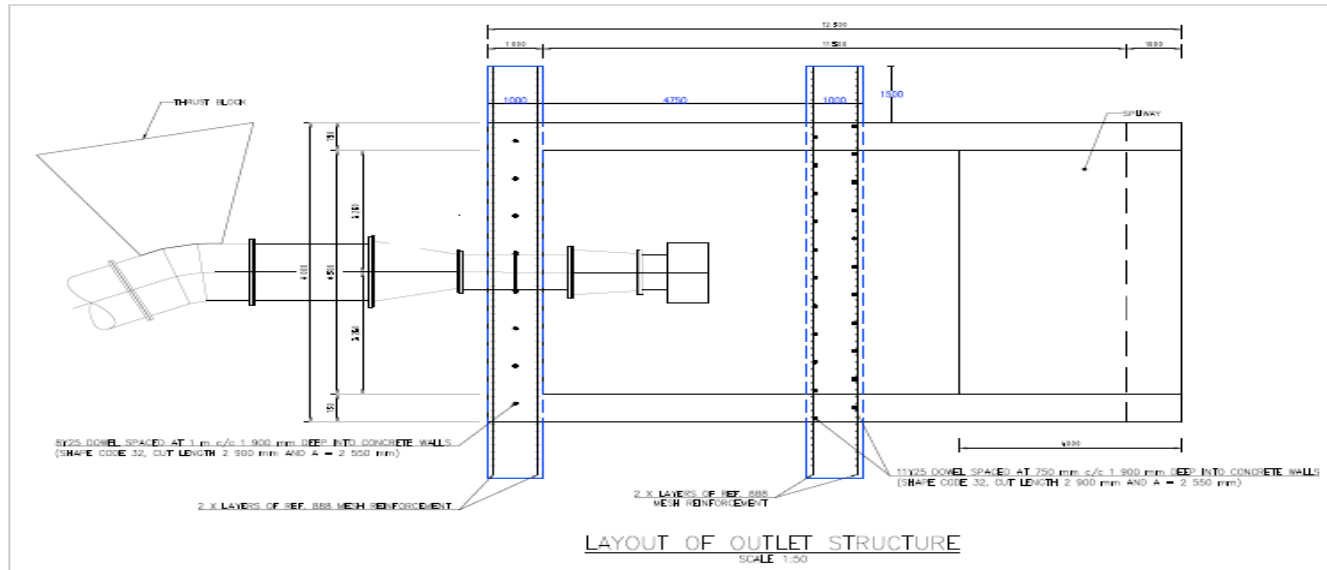
TZANEEN DAM RAISING CONCRETE

Section	Volume of concrete [m3]
Concrete Labyrinth	1,450
OG	2,950
NOC Retaining wall	1,630
Tongue wall	505
Side Wall (Training wall)	150
Still Base Toe	2,250
Basin Apron Sla	3,770
Intake Tower wall	80
Intake Tower roof slab	27
Intake Tower floor slab	123
Concrete Repairs	50
Diversion Pipe	310
Total Volume	14,745

RIVER DIVERSION



THE OUTLET STRUCTURE



Connection of River Diversion Pipe



River diversion pipeline video



THE FIRST CONCRETE MIX -7 Dec. 23



THE FIRST CONCRETE POUR – 7 Dec. 23



THE OUTLET STRUCTURE POUR



RIVER DIVERSION PIPELINE



CONCRETE TRUST BLOCK



River Diversion Outlet





River Diversion Outlet

Batching plant



Project Specification

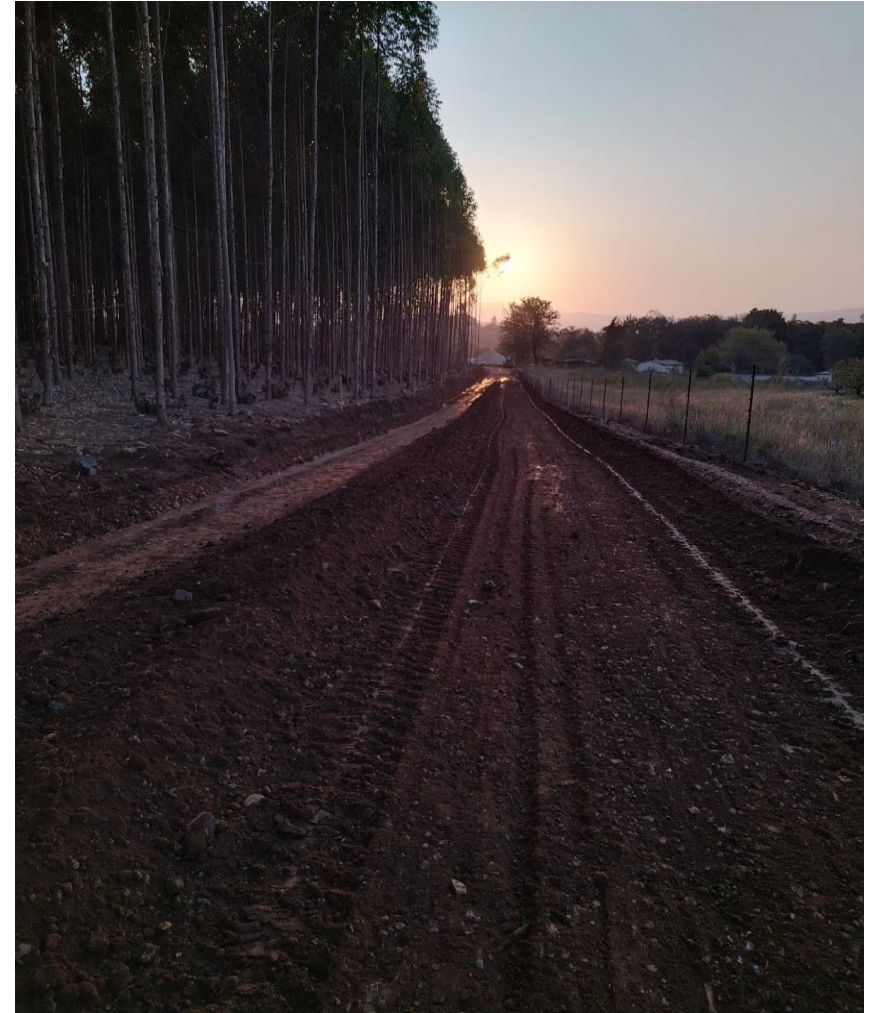
(Particular Specification for watertight concrete)

1. The concrete mix of water / cement ratio not exceeding 0,48
2. To ensure workability, water-reducing admixtures of approved manufactures to be used. (sub-clause 3.5 of SANS 1200G)
3. Minimum of 30% Fly-ash to be used.
4. Cementitious material content shall vary between min/max of 250kg/m³ and 450kg/m³ for mixes containing Fly-ash.
5. The 28-day cube strength of watertight concrete shall not be less than 30 Mpa.

TEMPORARY ACCESS ROAD



TEMPORARY ACCESS ROAD



Temporary Access Road



Mechanical Workshop



Stilling basin view





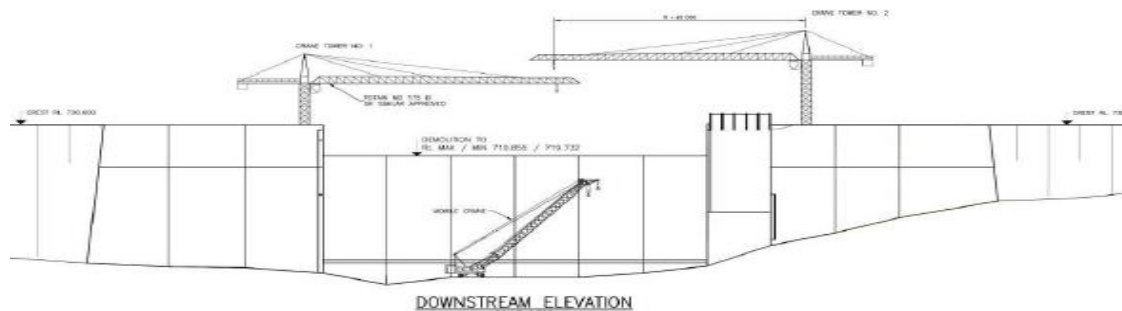
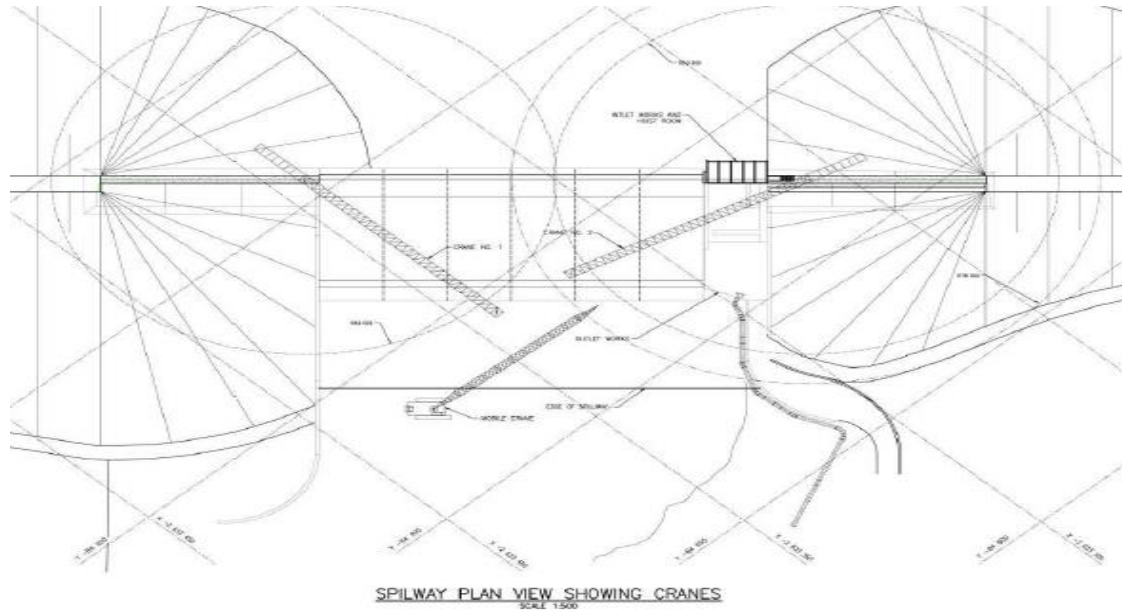
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TZANEEN DAM SPILLING

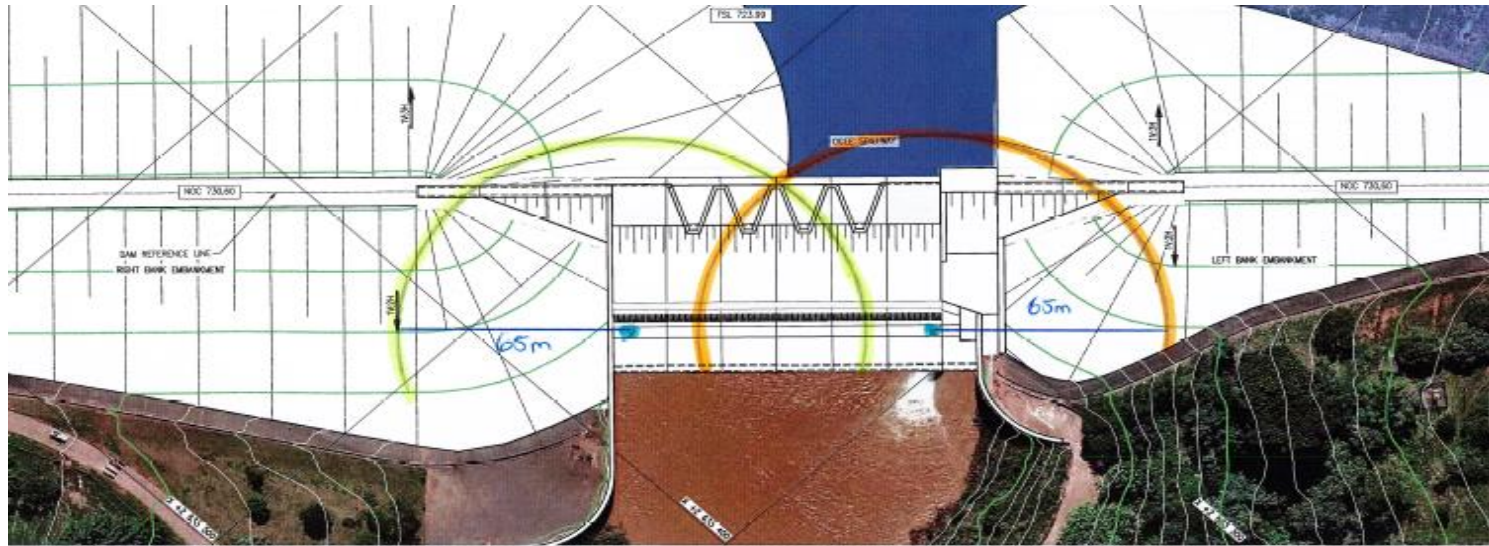
- 14 FEBRUARY 2023



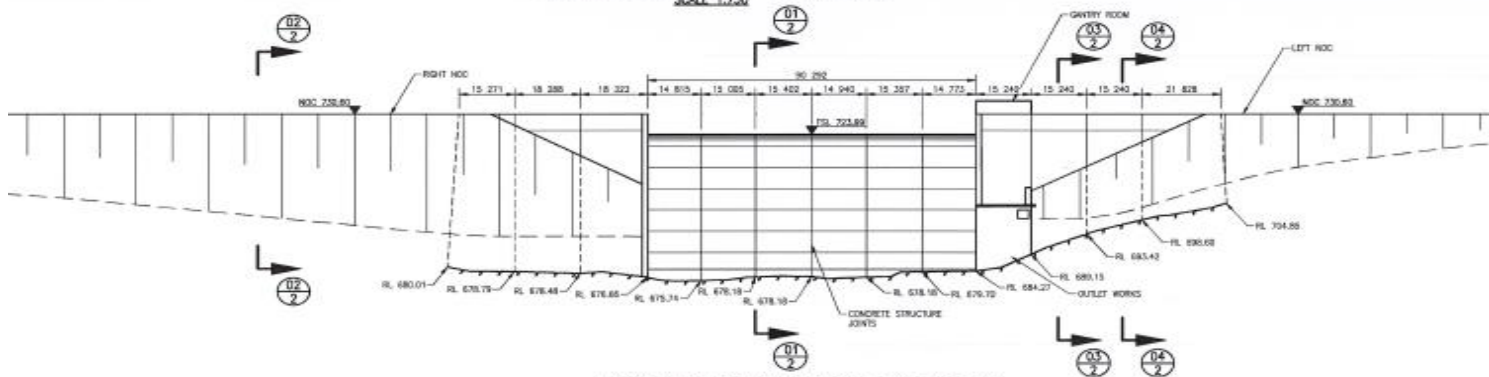
Original tower crane positions



Tower Crane Positions

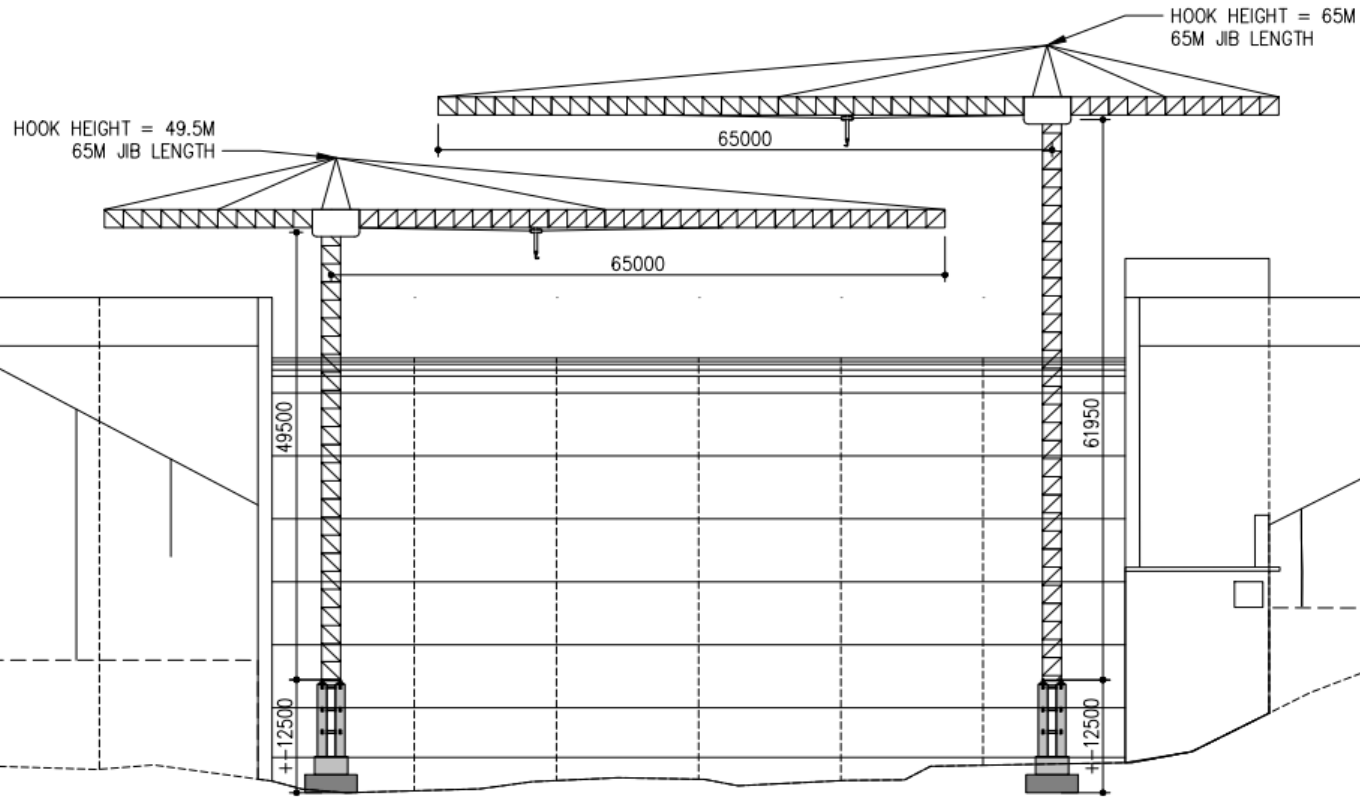


EXISTING SPILLWAY PLAN VIEW
SCALE 1:750



EXISTING DOWNSTREAM ELEVATION

Tower Crane positions



CURRENT DAM AND CRANE ELEVATION

Cleaning of the Stilling basin



Cleaning of the Stilling basin



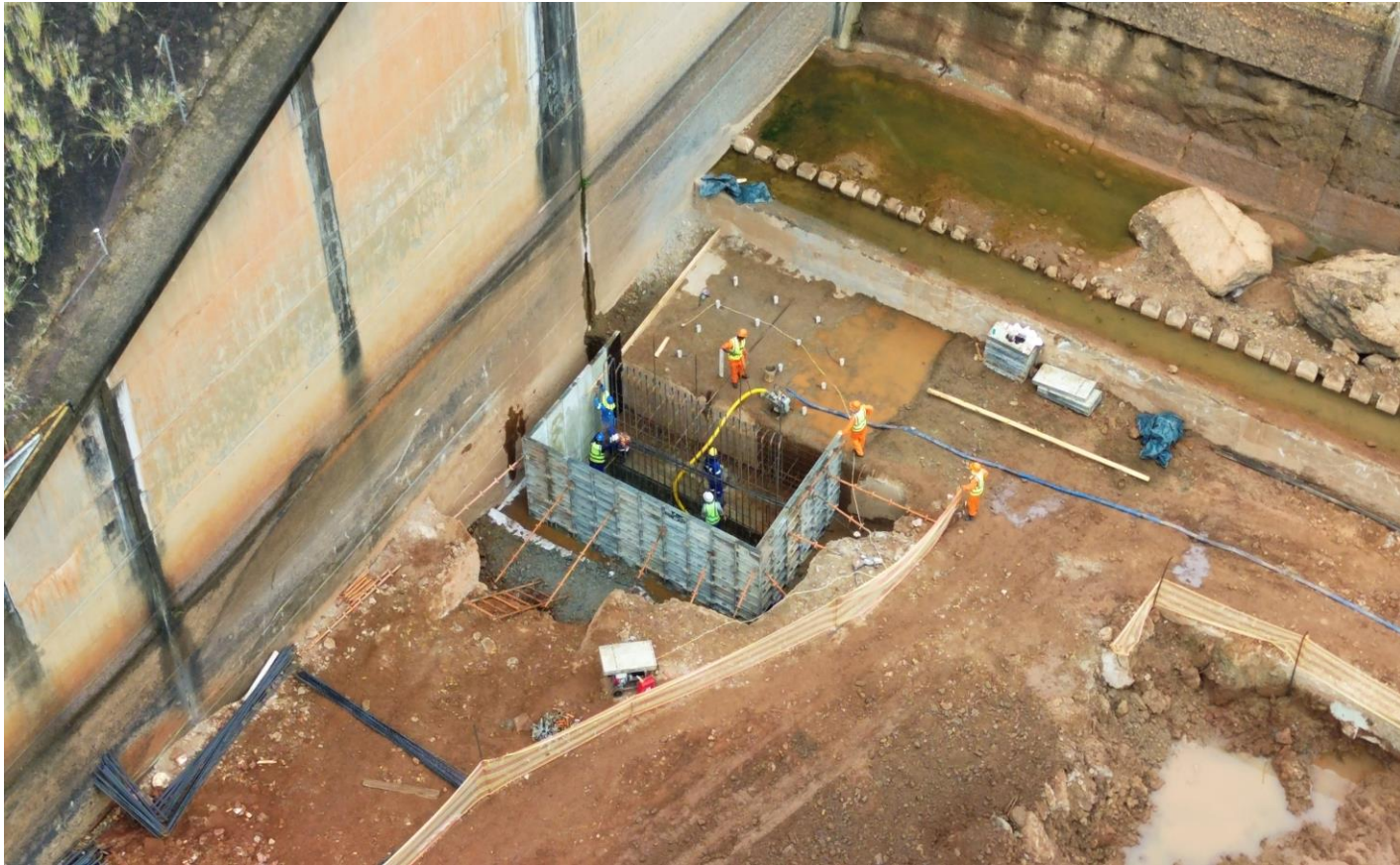
Foundation for the Tower crane plinths



Cleaning of stilling basin



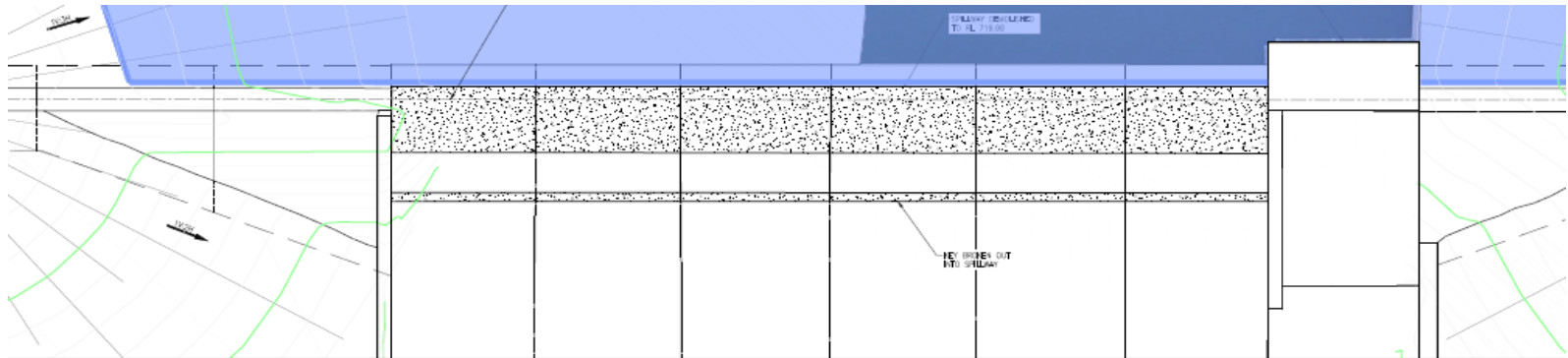
Tower Crane Base Right Flank



First concrete cast for Tower Crane RB

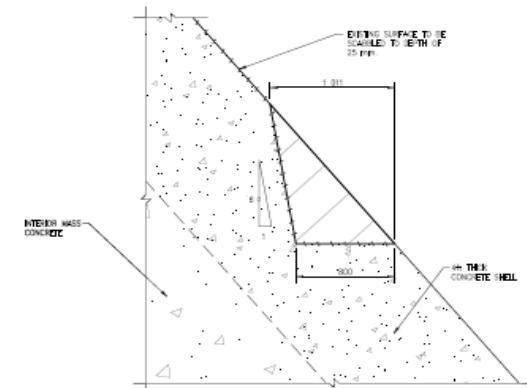
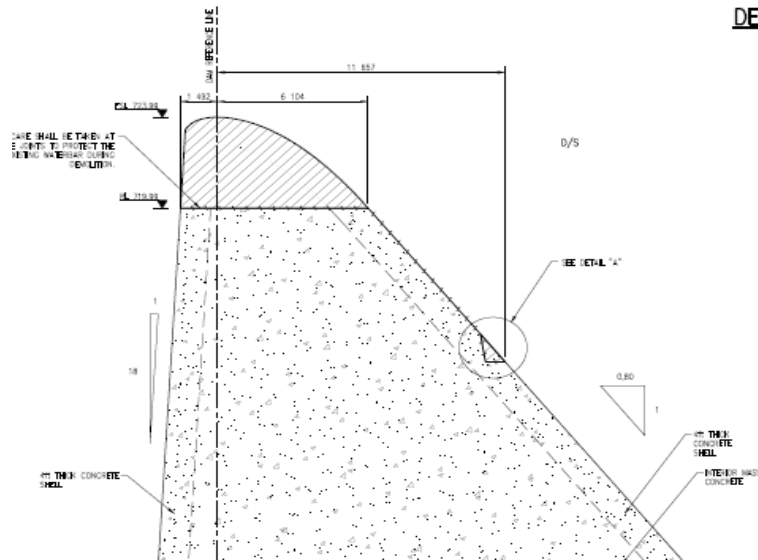


Demolished Spillway



DEMOLISHED SPILLWAY PLAN VIEW

SCALE: 1/2500



DETAIL A

SCALE: 1/200

Concrete boulders of demolished Tzaneen dam wall crest



Energy dissipation structure



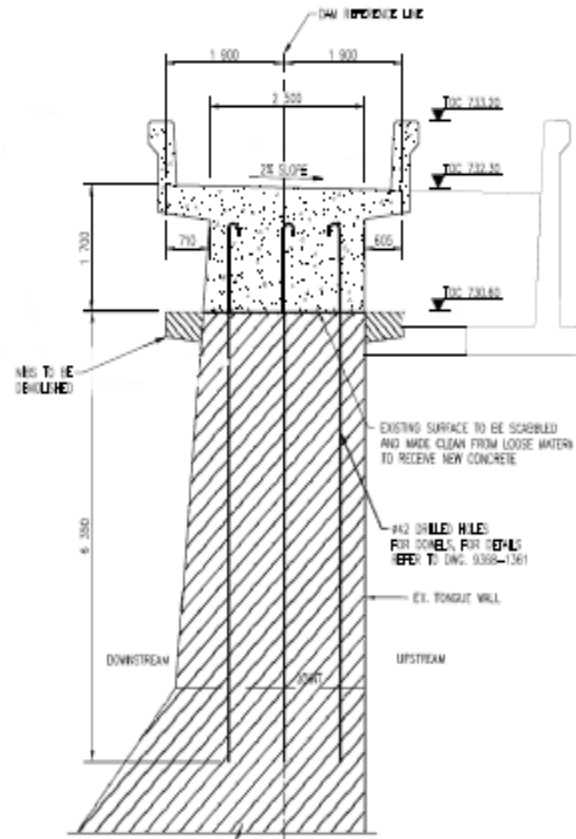
Concrete from stilling basin



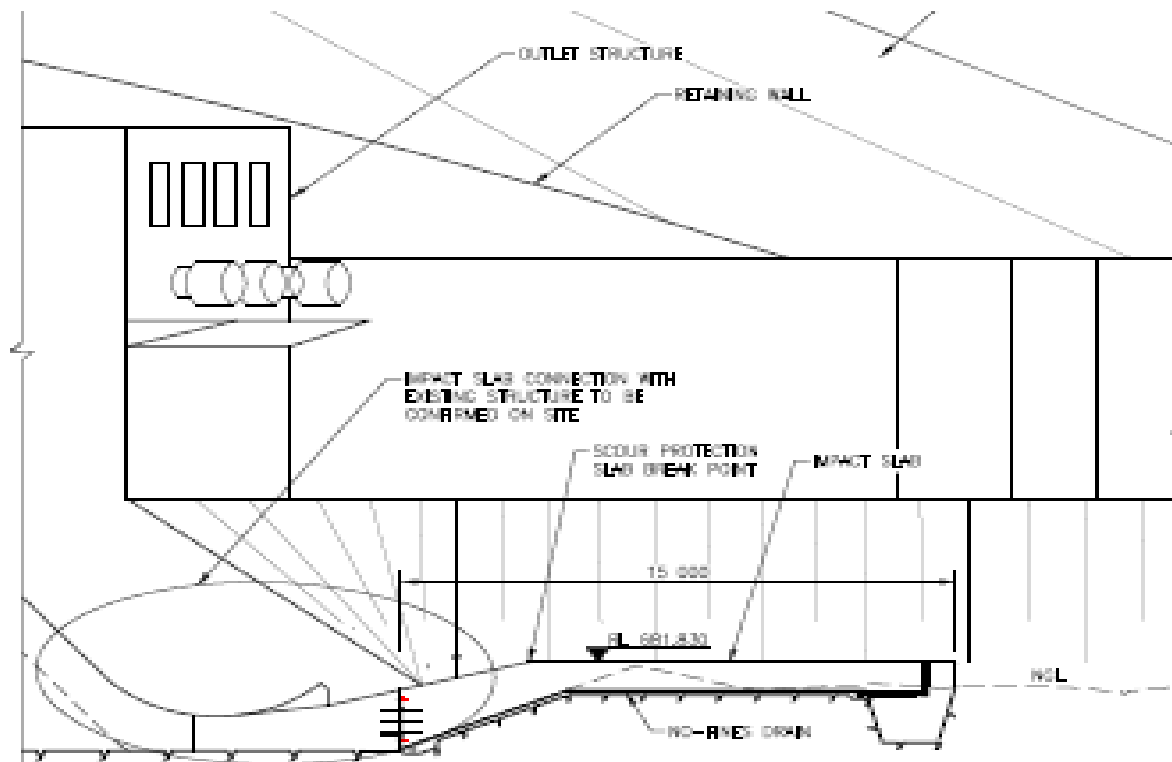
TZANEEN DAM MODEL



Tongue wall RB

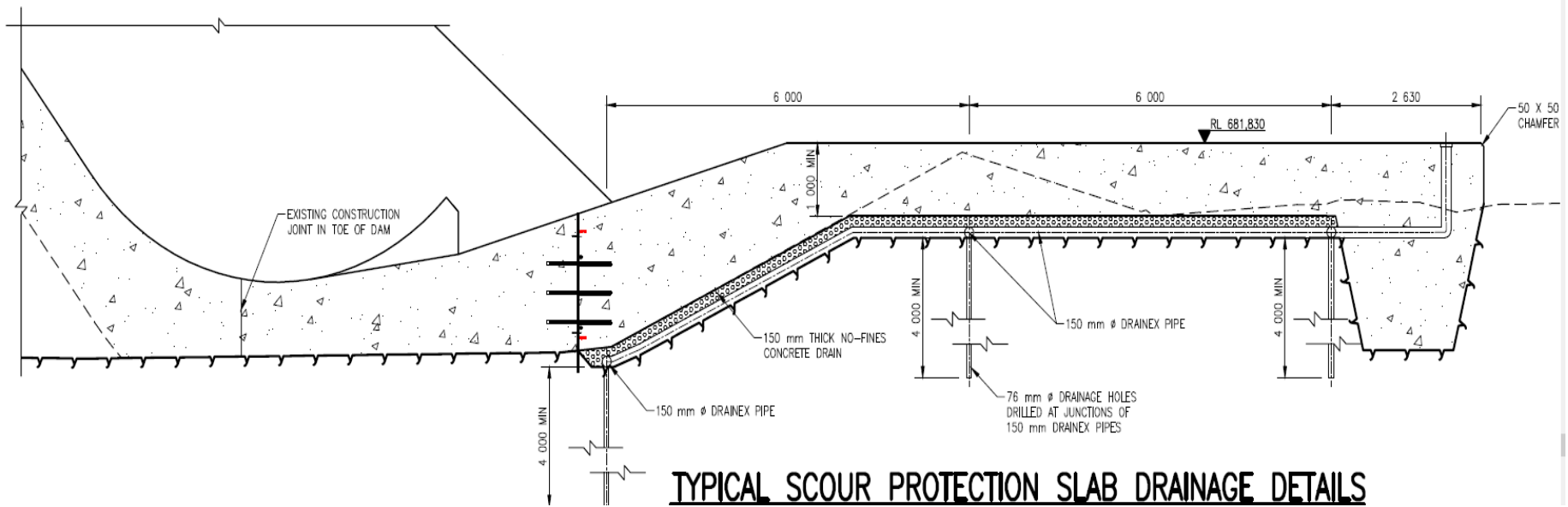


Energy dissipating structure

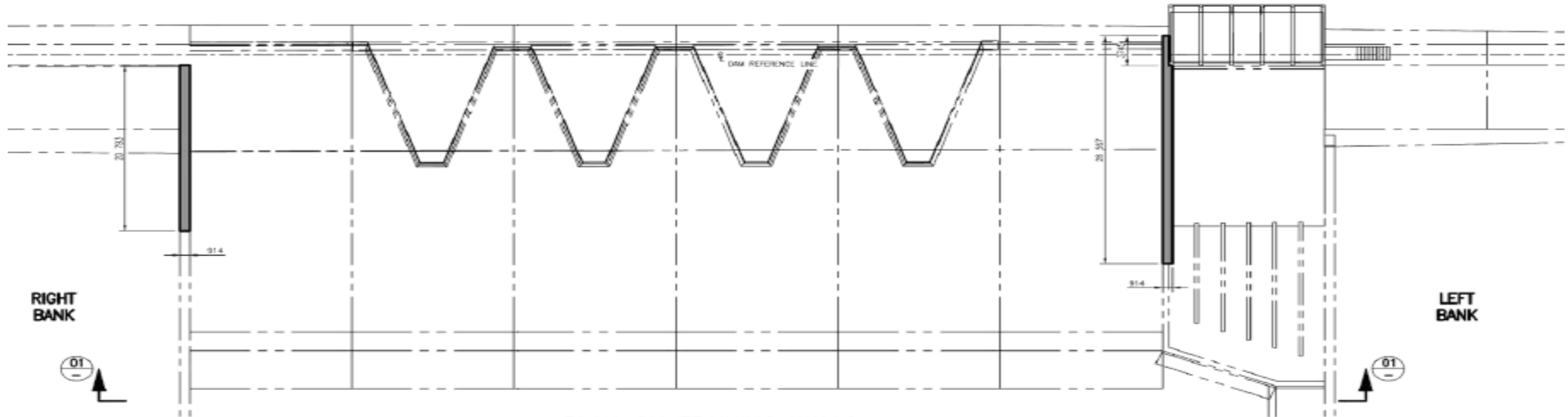


TYPICAL SECTION THROUGH SCOUR PROTECTION SLAB

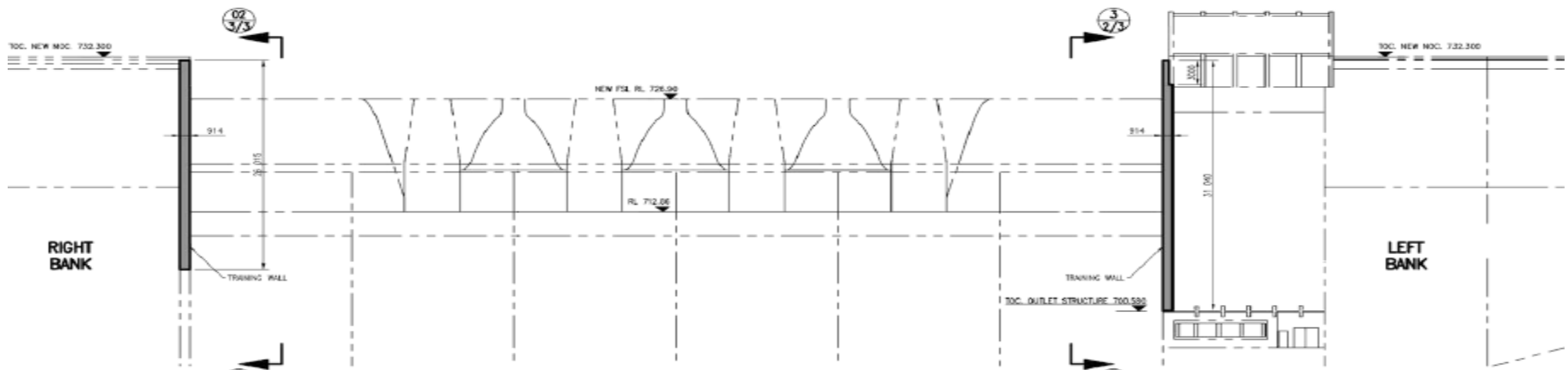
Scour Protection Slab



Training walls

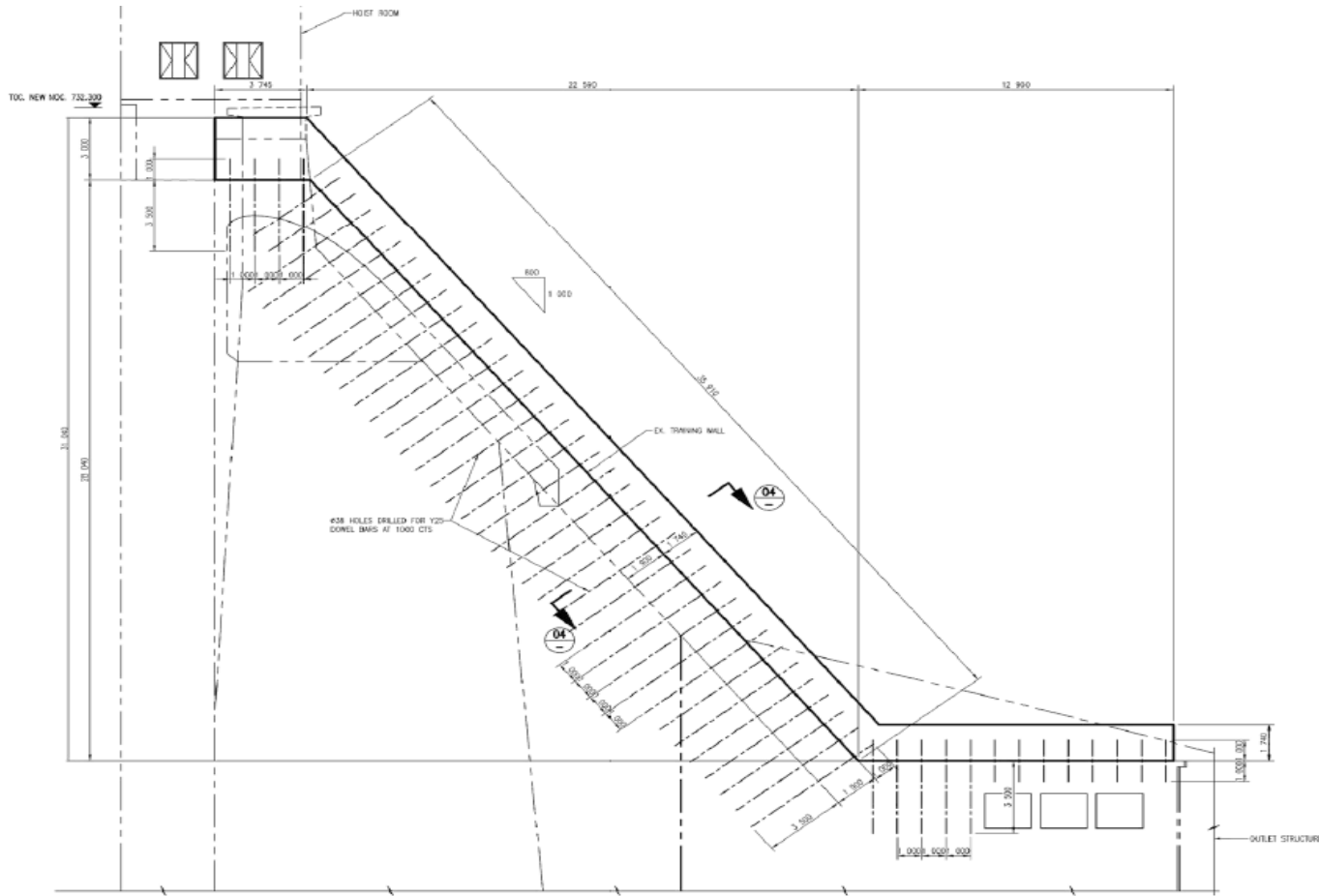


PLAN ON TRAINING WALLS
SCALE 1:250

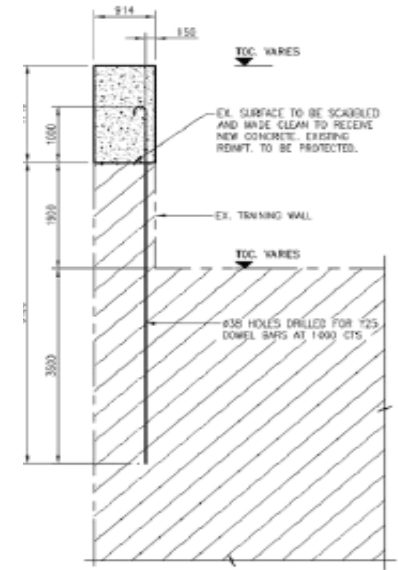


ELEVATION 01-01

Training wall LB

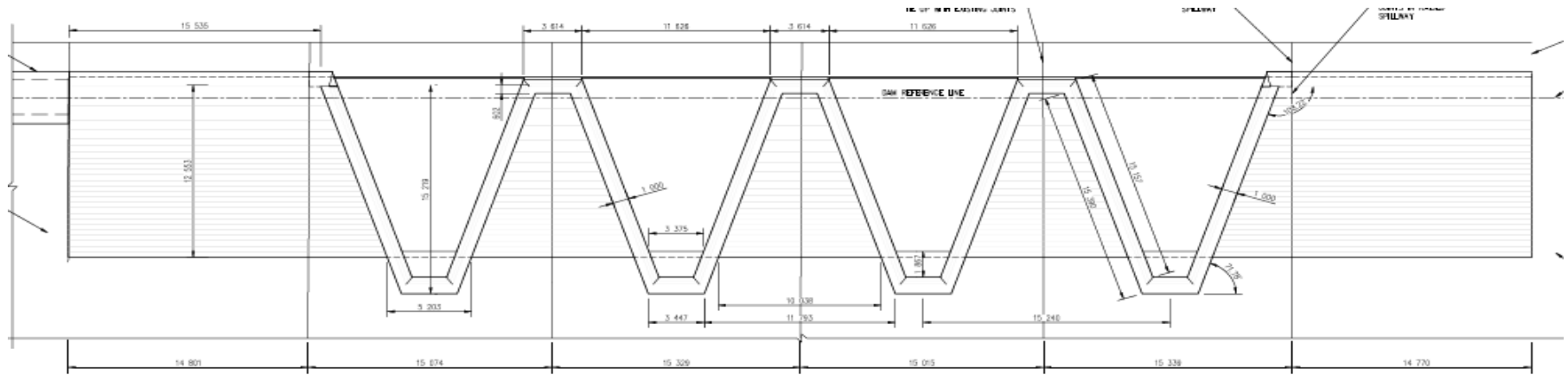


ELEVATION 03-03 ON TRAINING WALL (LEFT BANK)

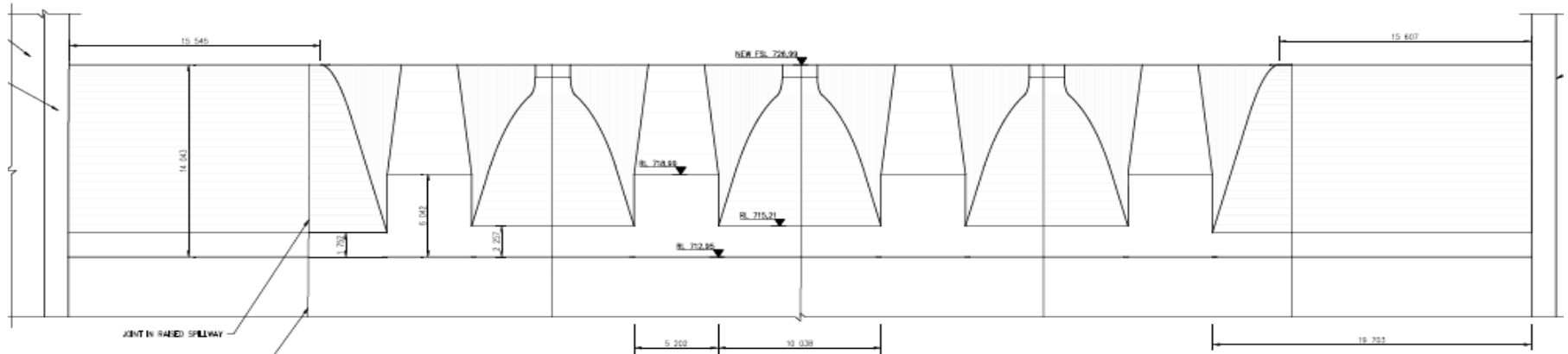


SECTION 04-04

SPILLWAY LAYOUT

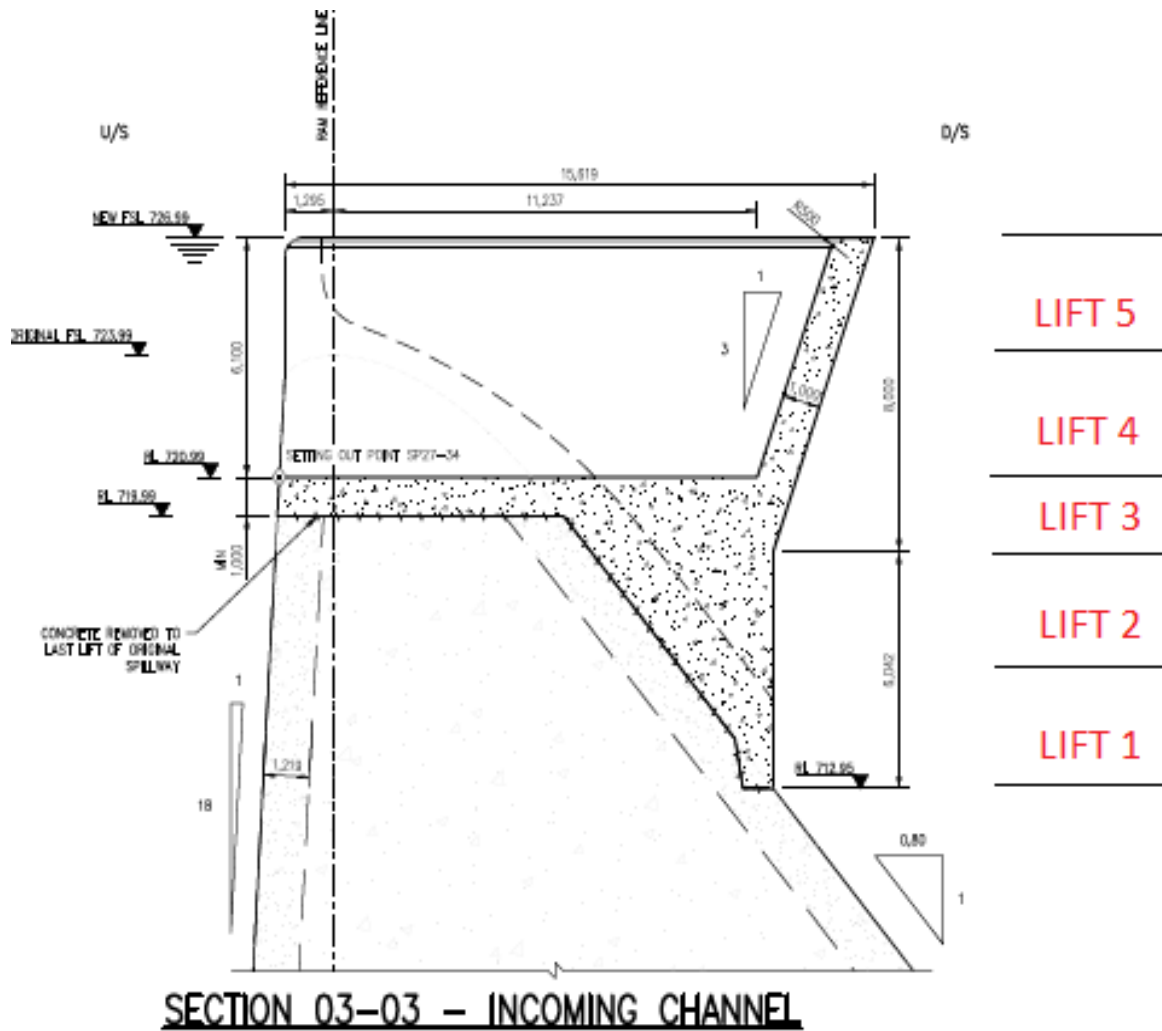


SPILLWAY PLAN VIEW
SCALE 1:1500

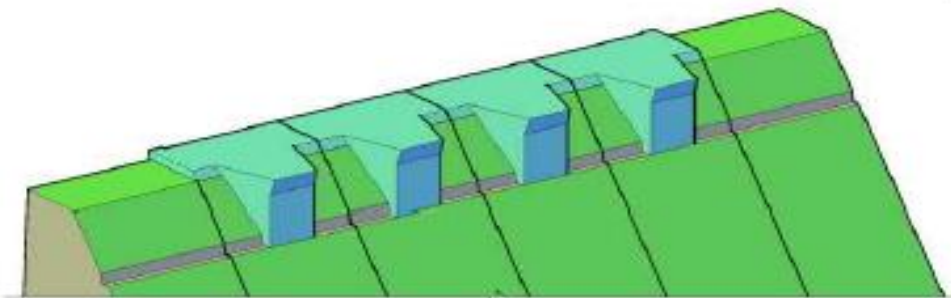
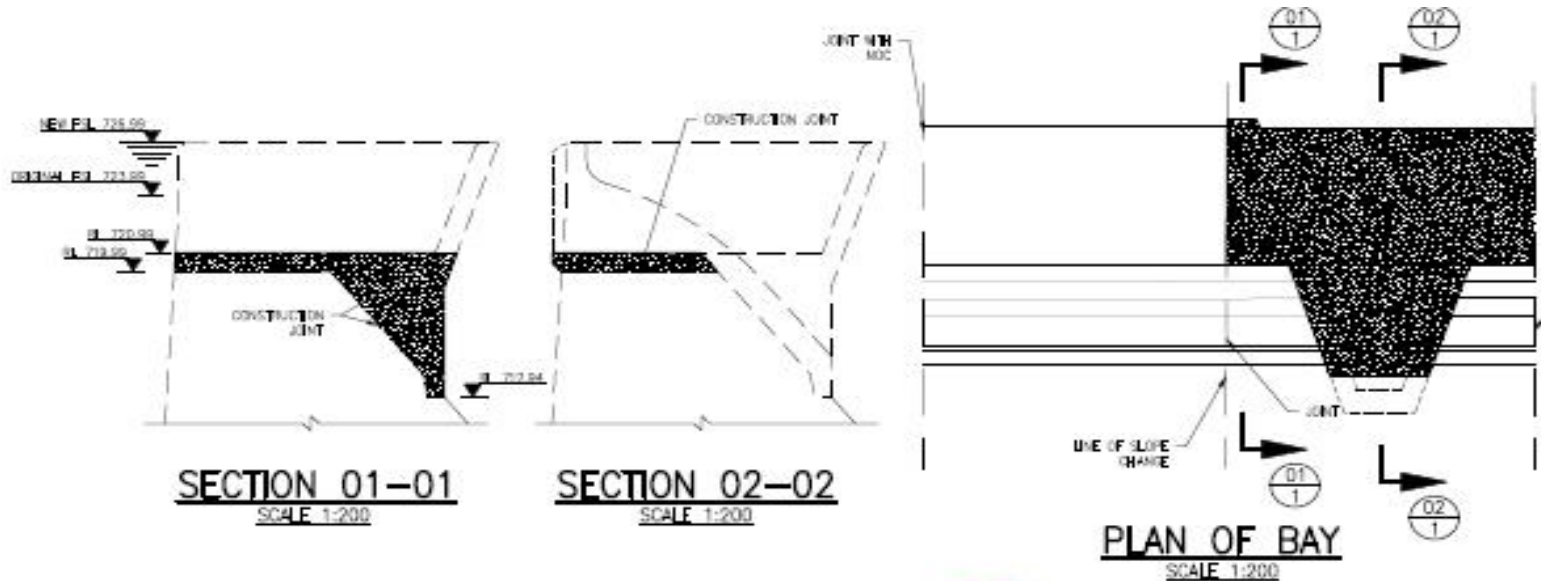


SPILLWAY DOWNSTREAM ELEVATION

LABYRINTH CONCRETE LIFTS

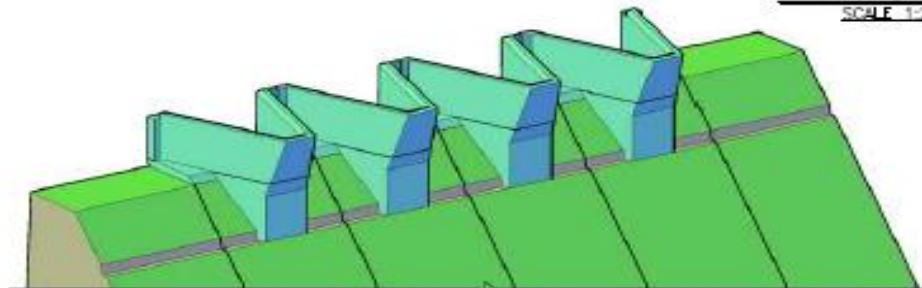
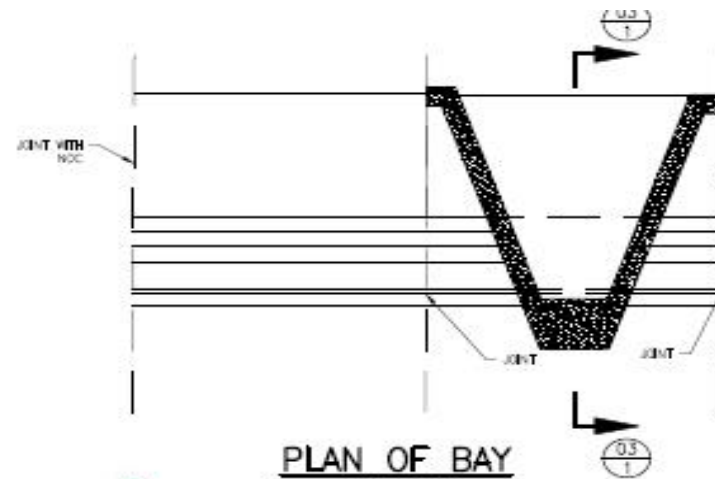
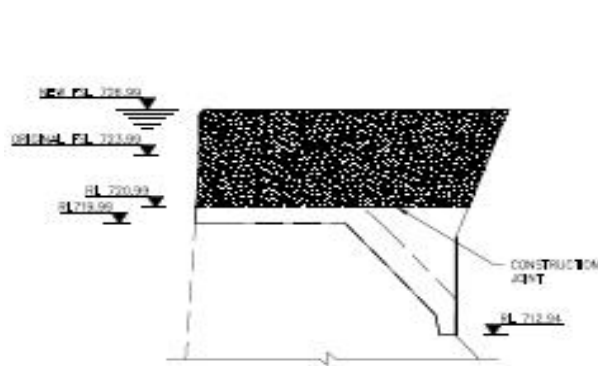


LAYBRINTH CONCRETE POUR PHASE 1



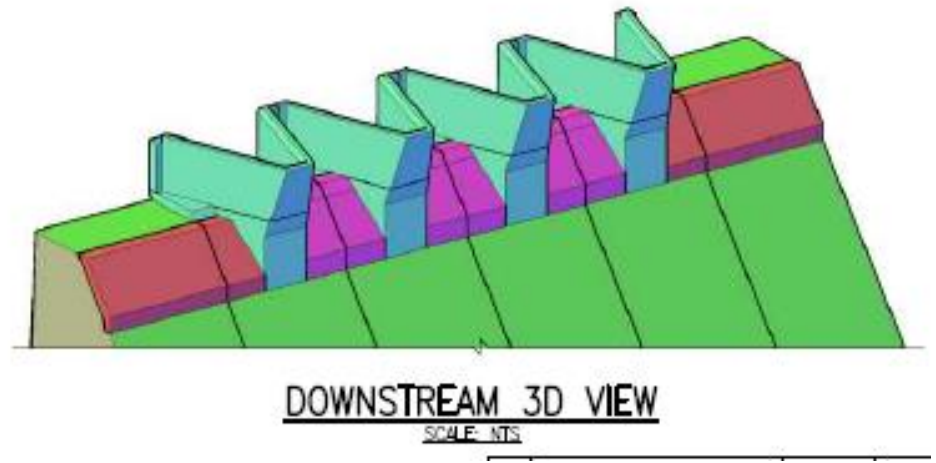
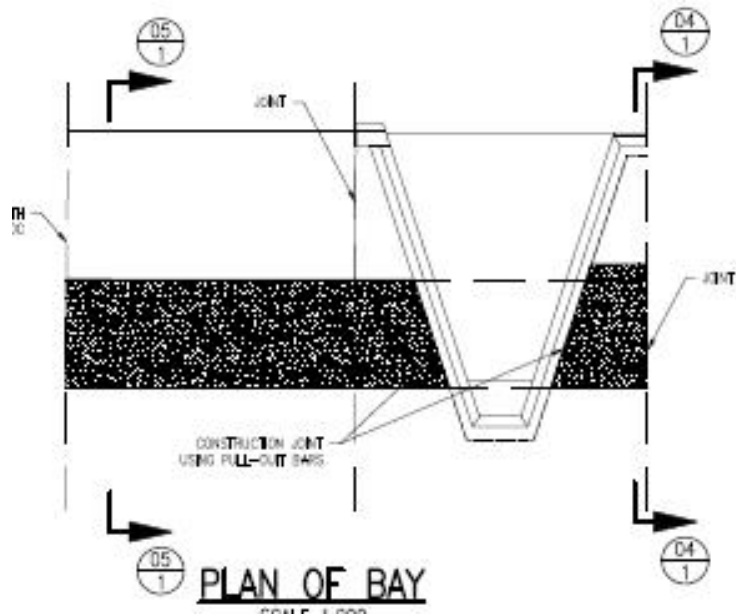
DOWNSTREAM 3D VIEW
SCALE: NTS
PHASE 1

LAYBRINTH CONCRETE POUR PHASE 2

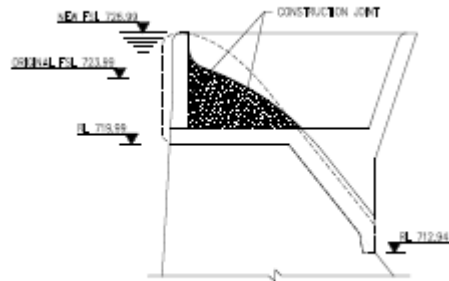


DOWNSTREAM 3D VIEW
SCALE: NTS
PHASE 2

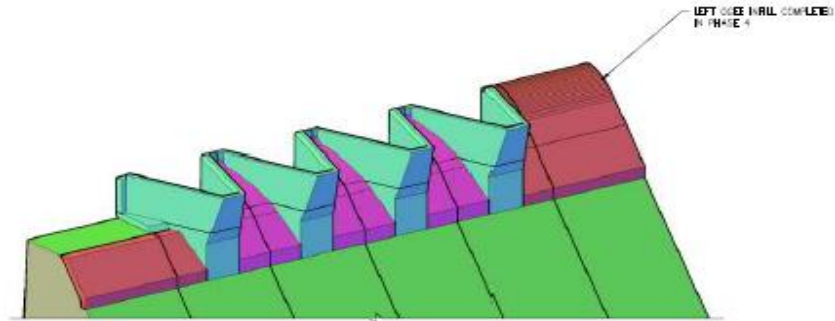
LABYRINTH CONCRETE POUR PHASE 3



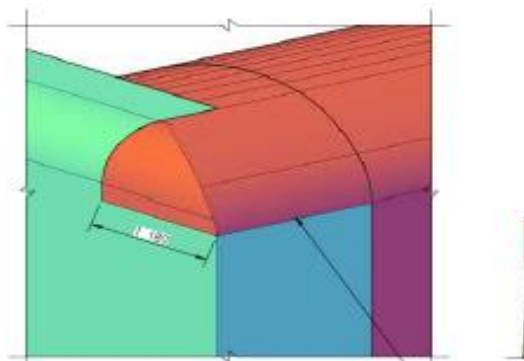
LABYRINTH CONCRETE POUR PHASE 4 & 5



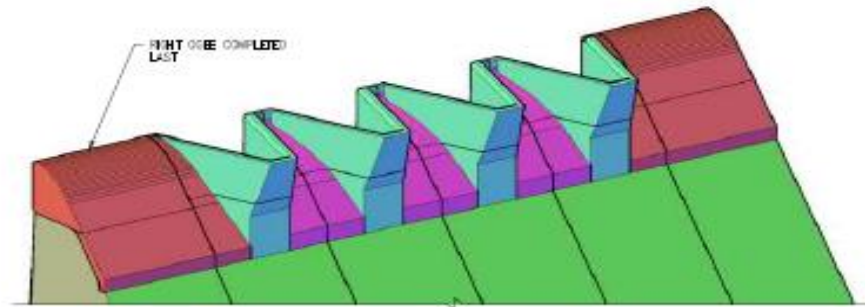
SECTION 06-06



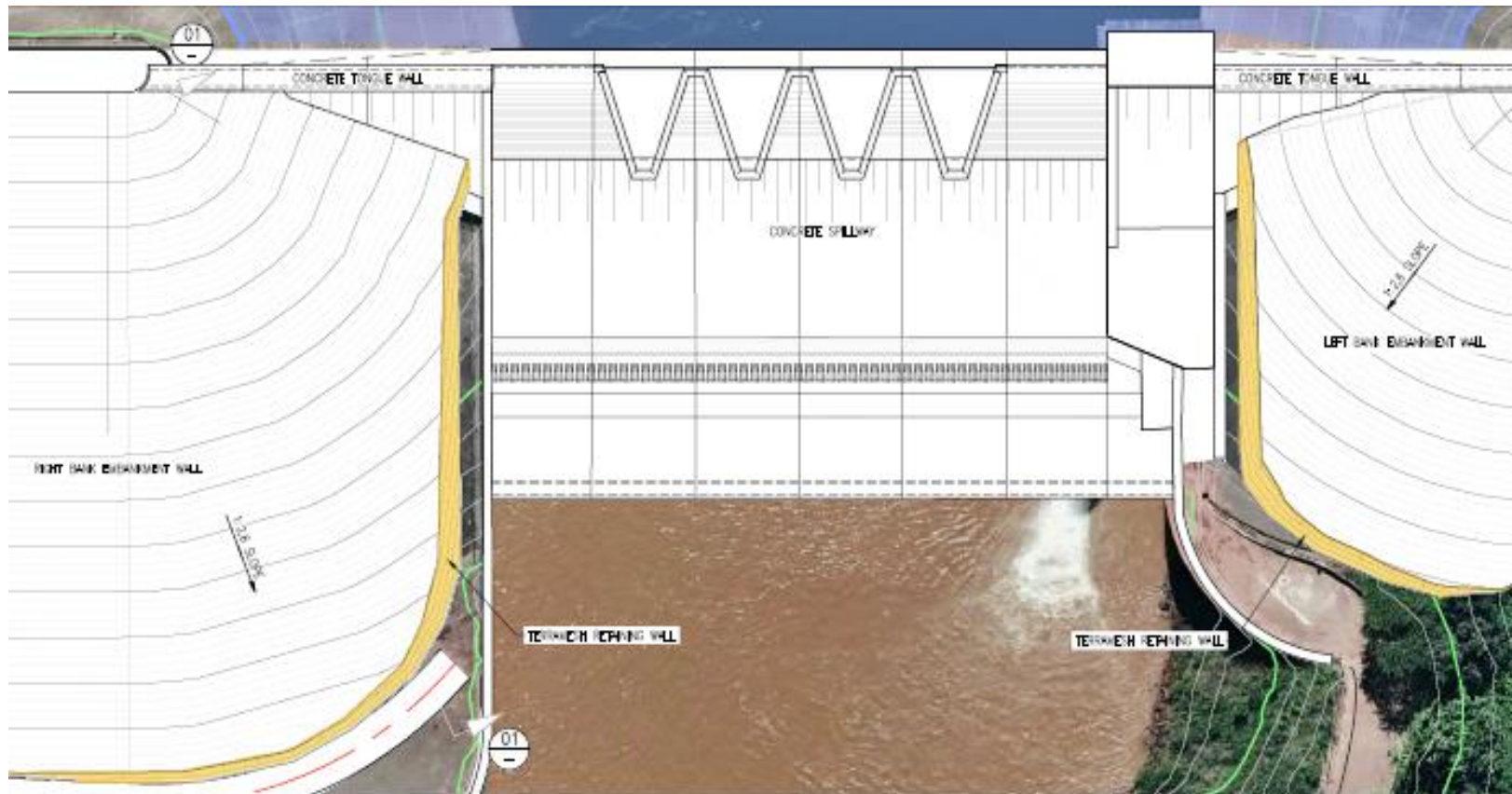
DOWNSTREAM 3D VIEW



DETAIL A
UPSTREAM 3D VIEW

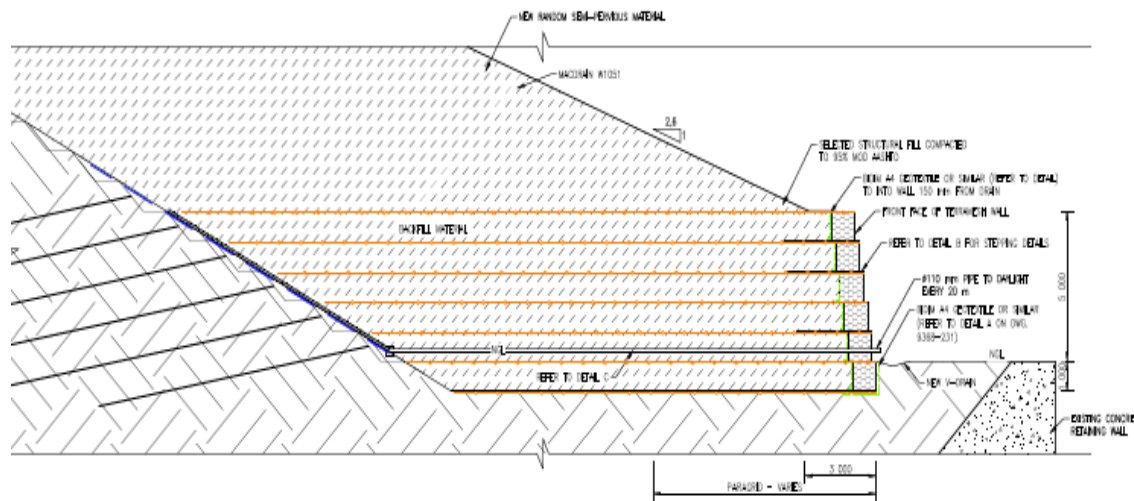
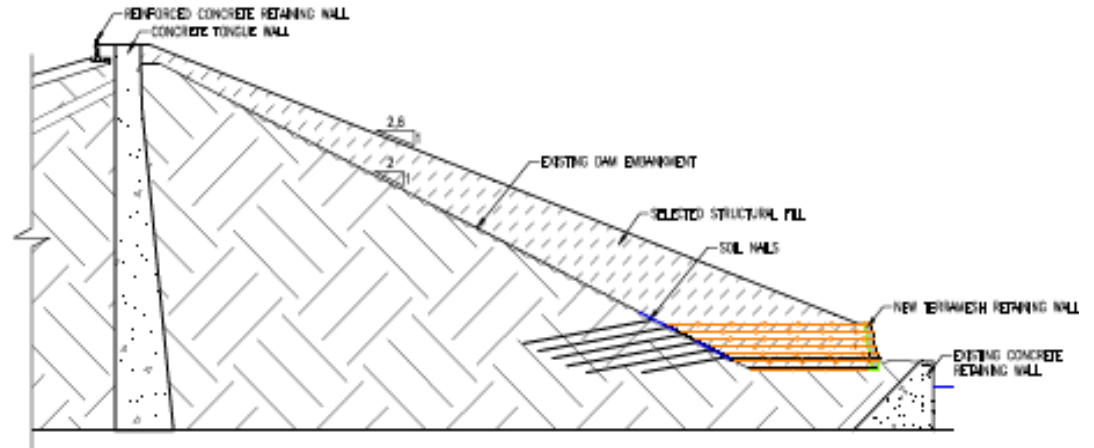


Plan layout of Terramesh walls



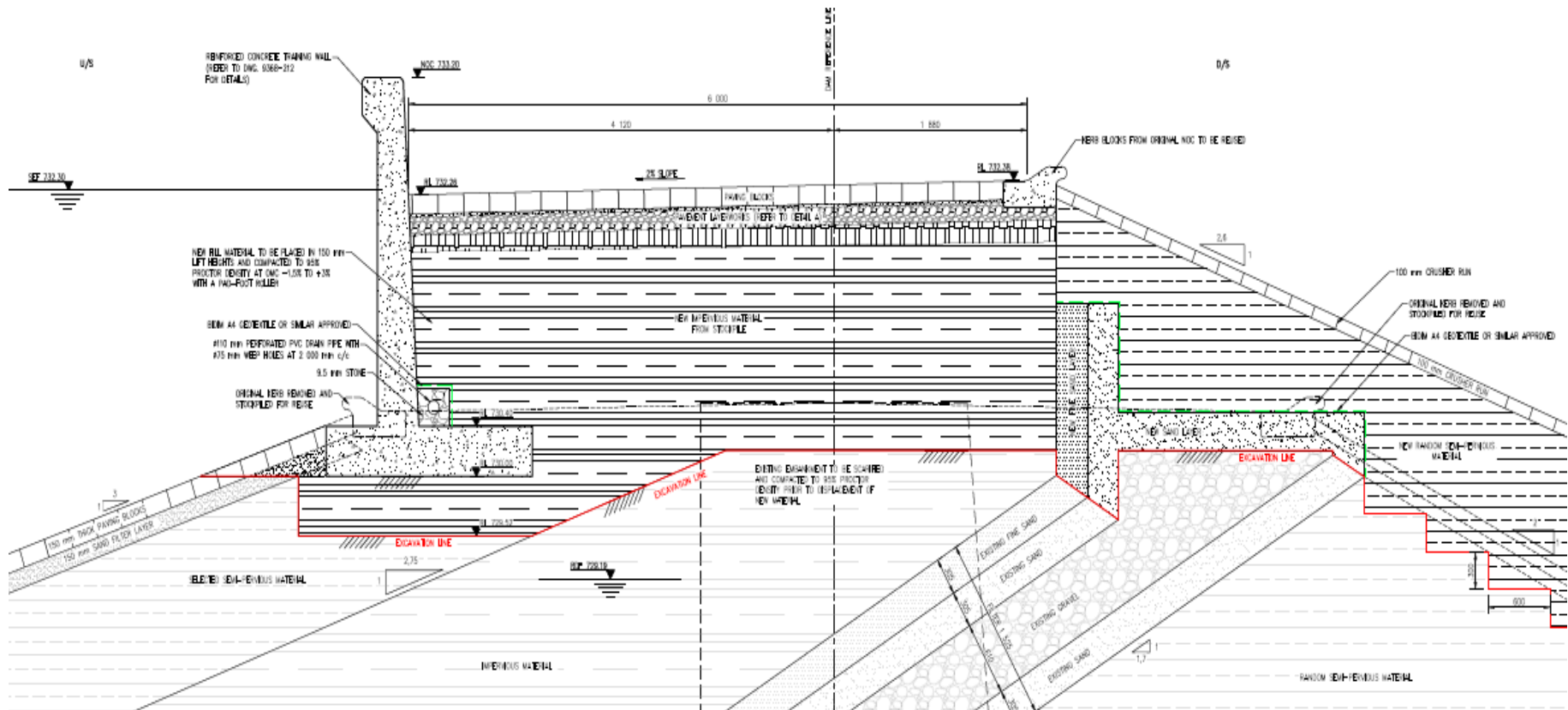
PLAN LAYOUT OF TERRAMESH WALL

Terramesh wall detail

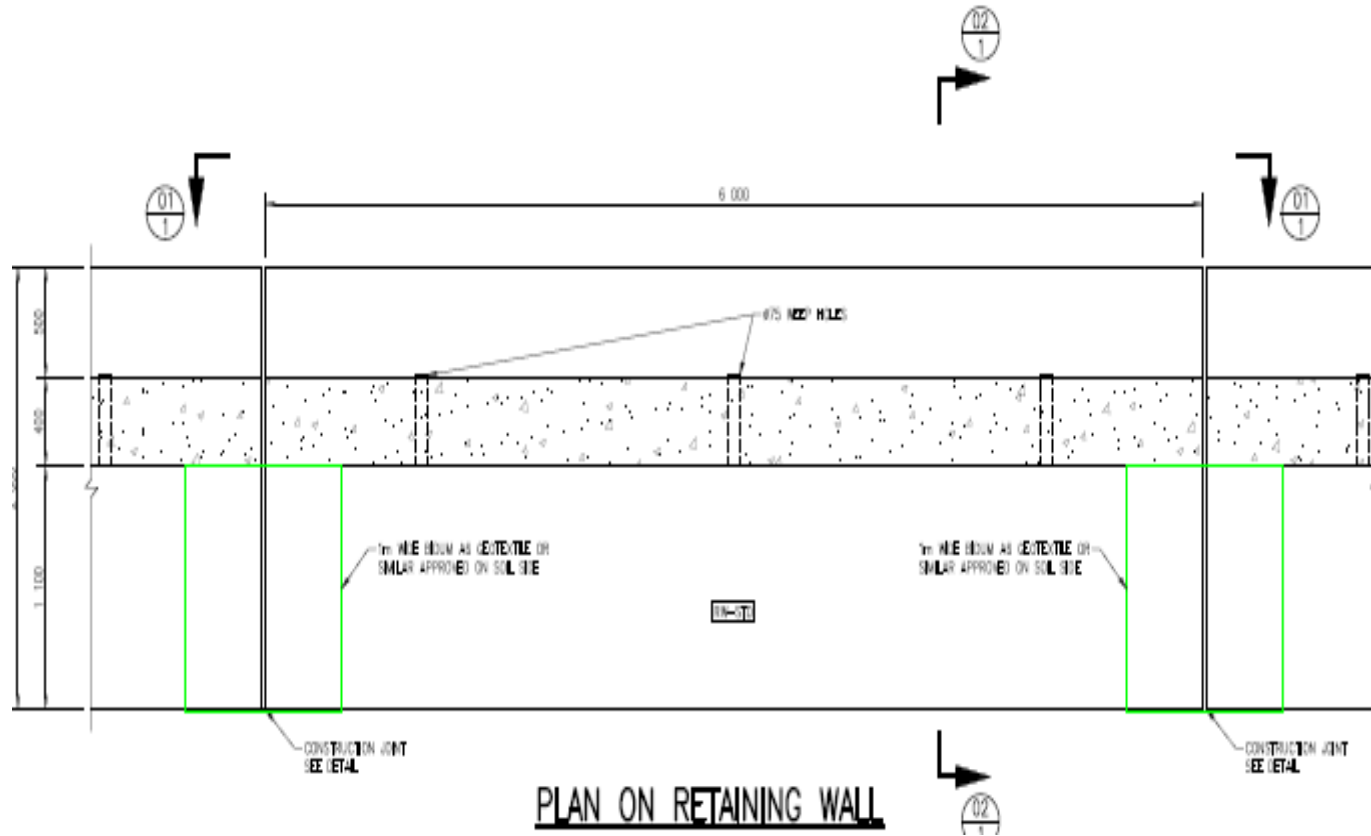


TYPICAL SECTION OF TERRAMESH WALL

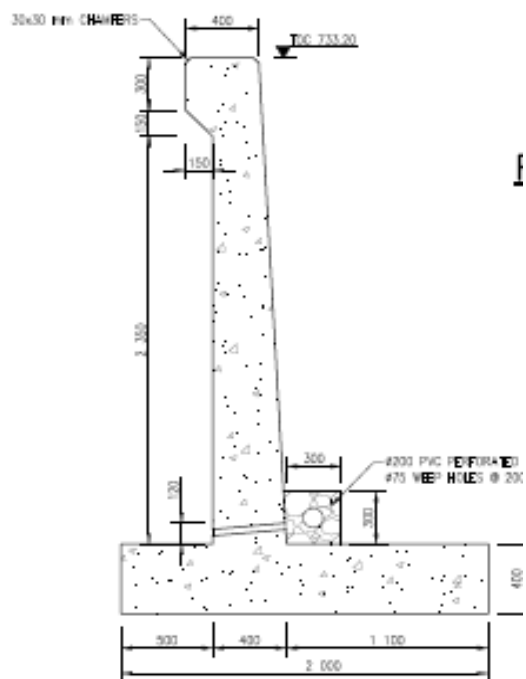
Raised NOC Embankment Section



NOC Retaining wall Plan layout

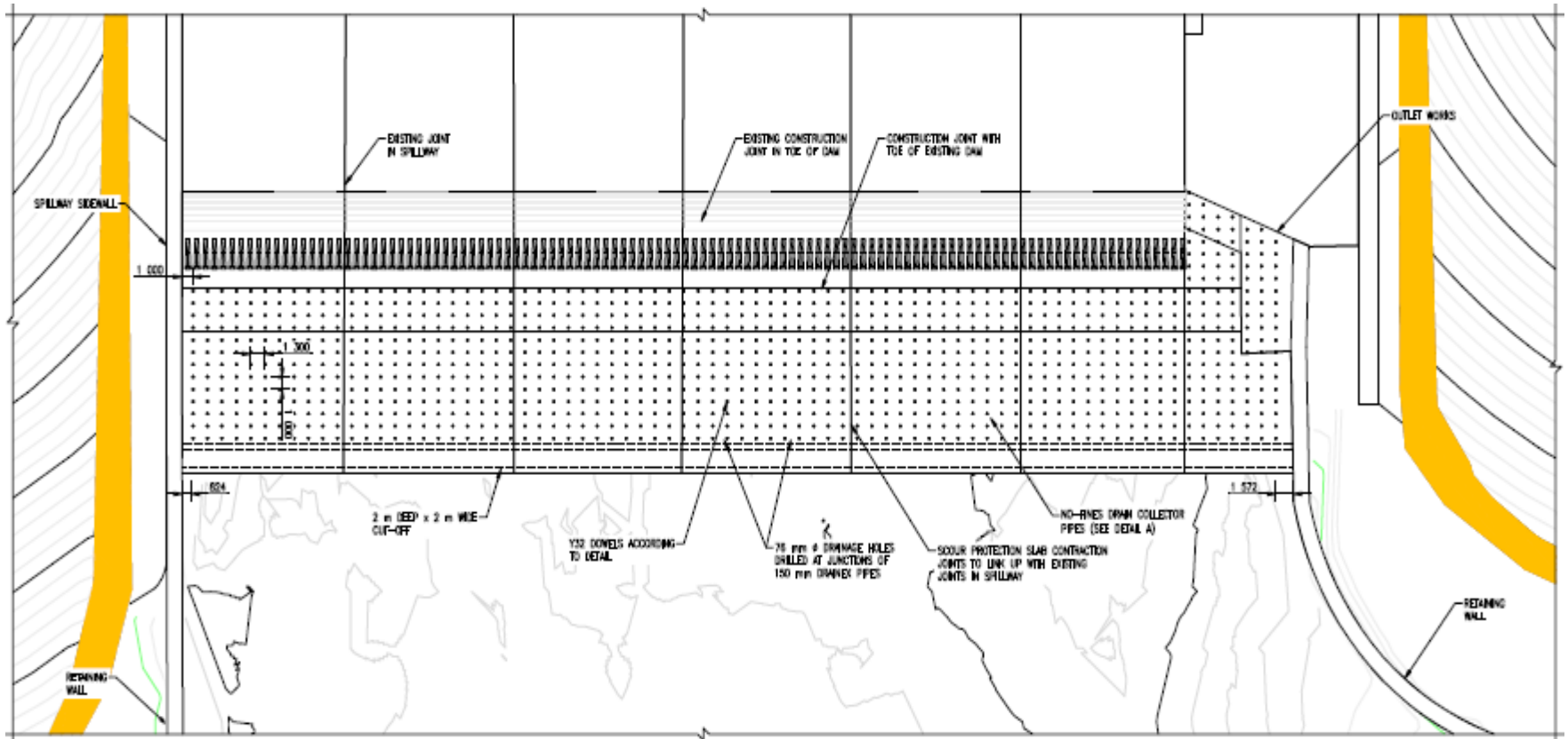


Retaining wall on NOC Embankment

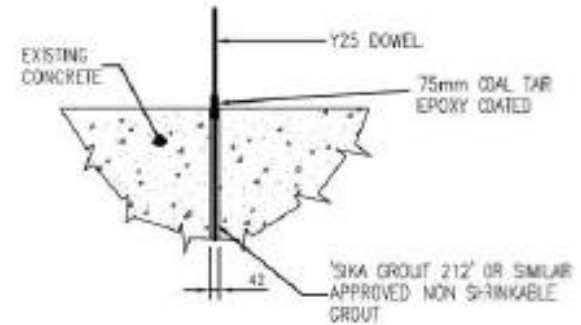
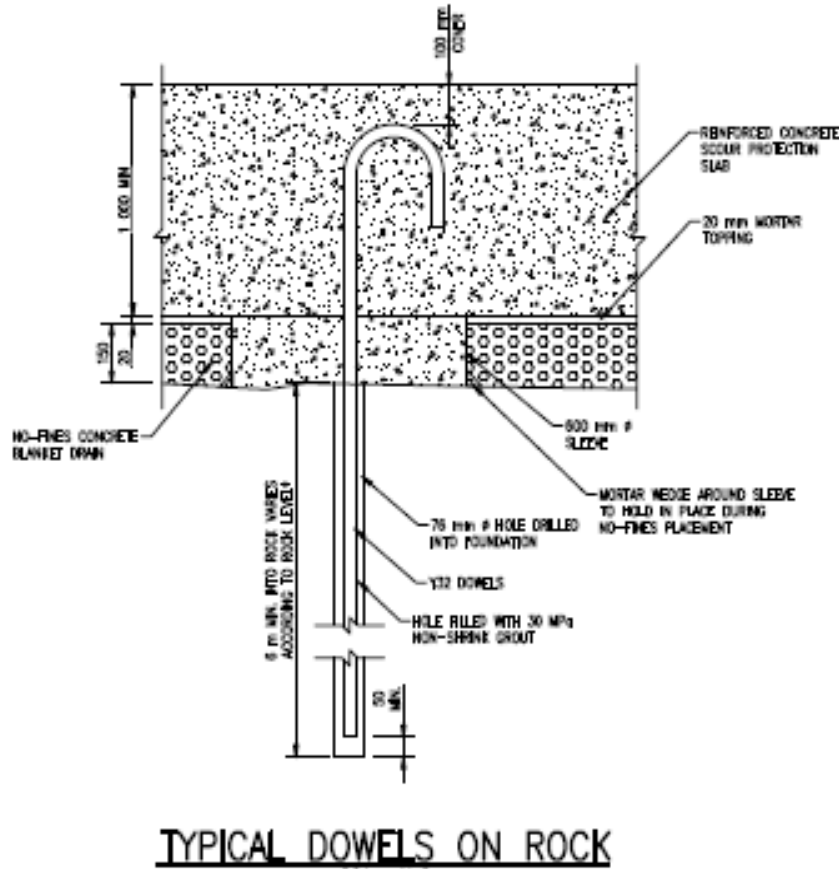


SECTION 02-02
SCALE 1:20

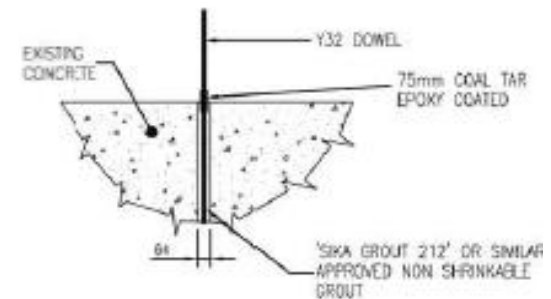
Dowel layout of energy dissipating structure



Typical Dowels Detail



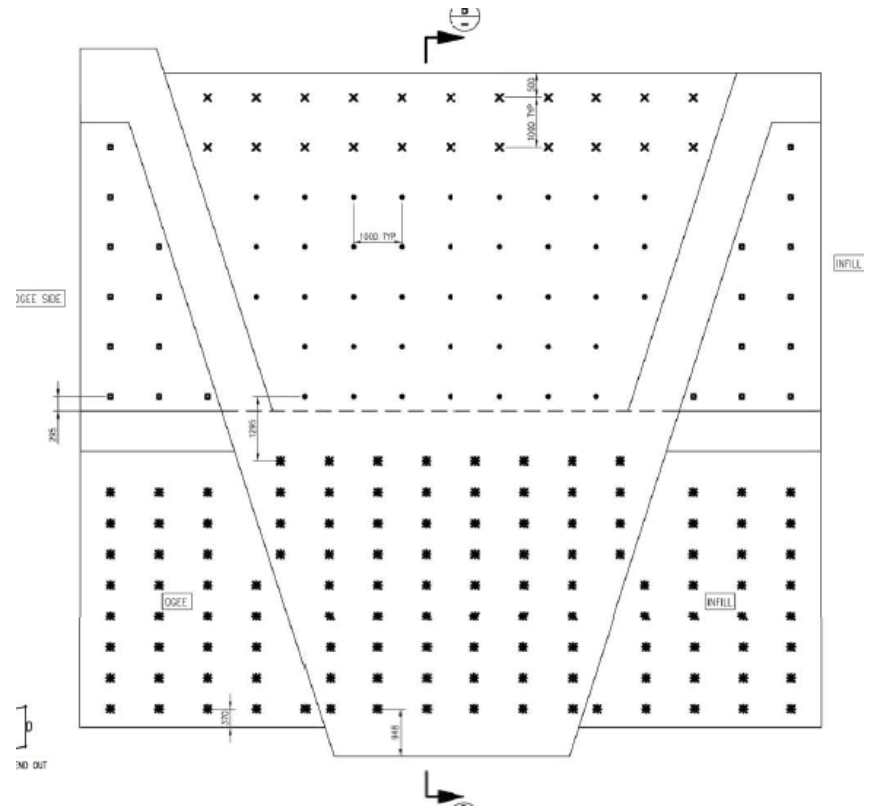
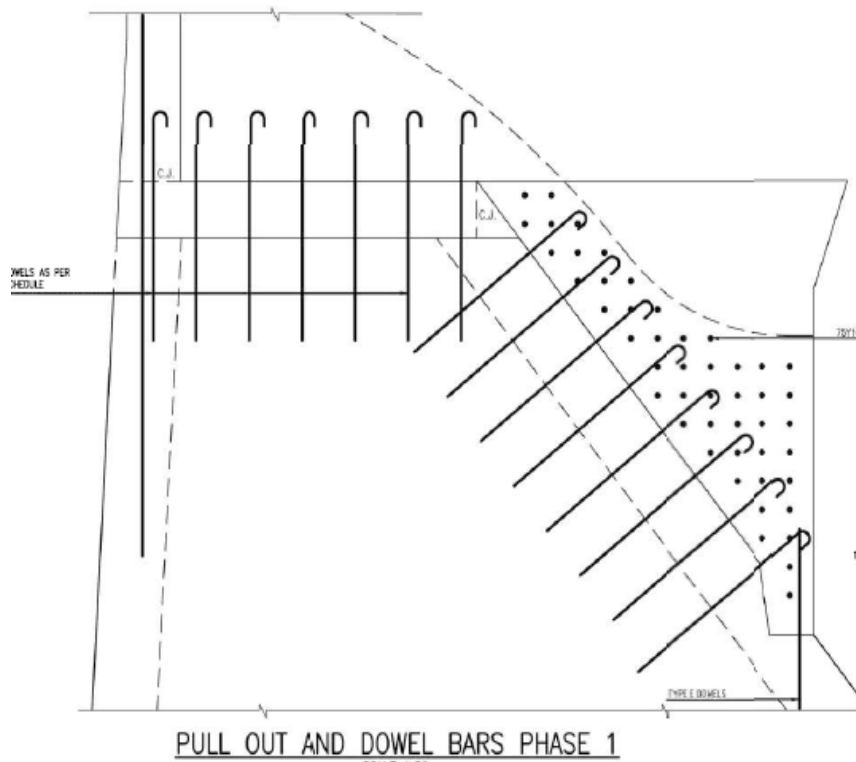
TYPICAL Y25 DOWEL DETAIL



TYPICAL Y32 DOWEL DETAIL

5
4

Labyrinth dowels layout



Now it's time to check the fishing lines.....



THANK YOU