# EXCAVATION METHOD OF LARONA RIVER IN SOUTH SULAWESI INDONESIA

Presented by:

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**AGTI, BE (1983) (Mining)**



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# 1. GENERAL

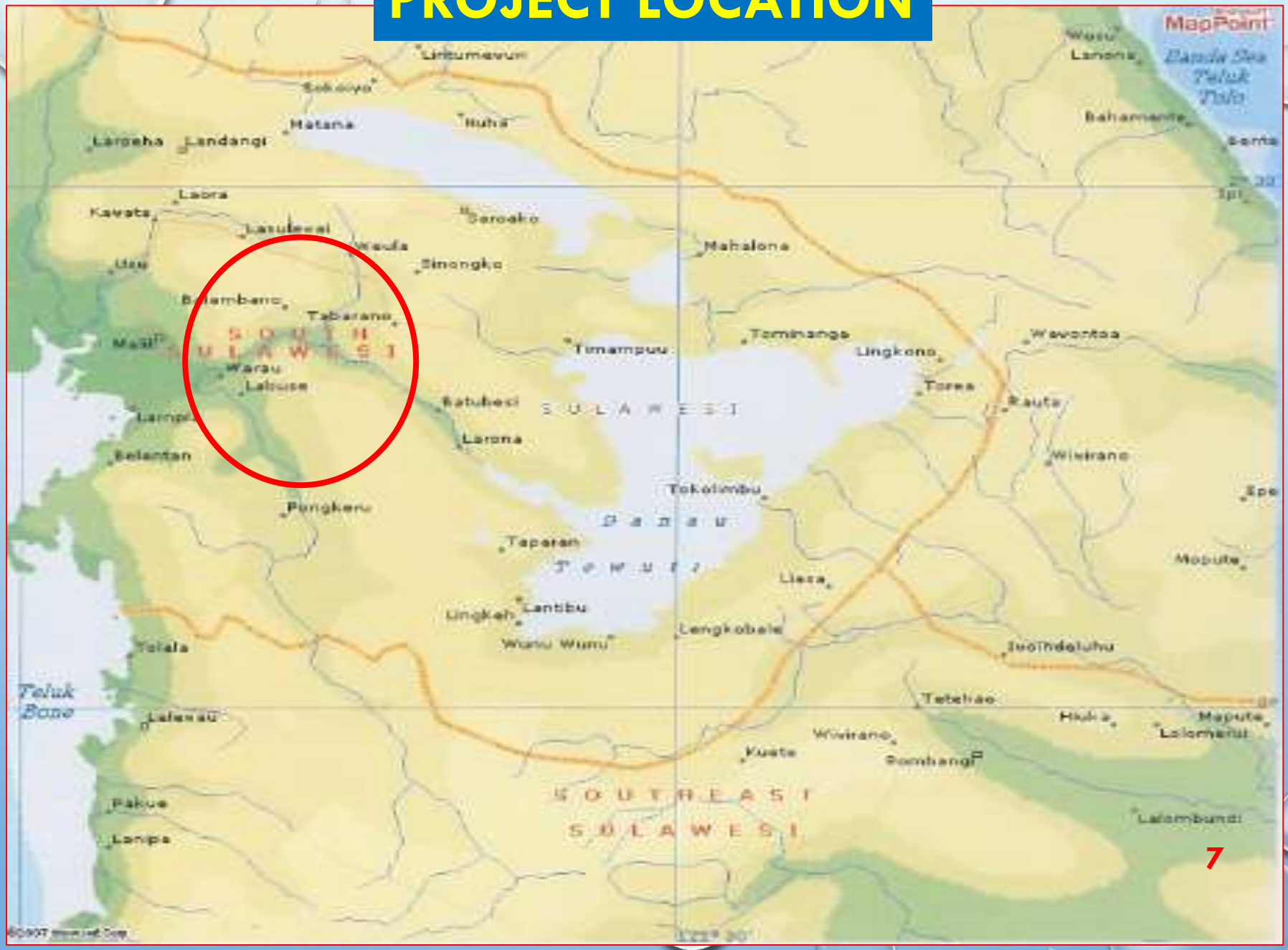
# PROJECT LOCATION



# PROJECT LOCATION



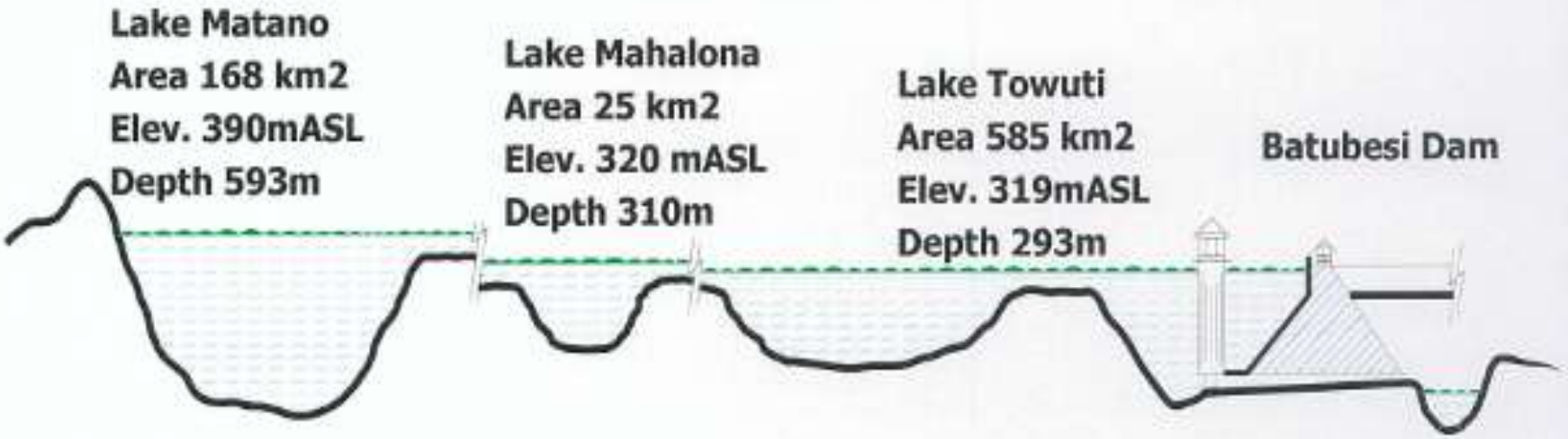
# PROJECT LOCATION



# PROJECT LOCATION



# UPSTREAM RIVER




- The upper basin consist of three lakes in cascade Batubesi Dam and the intake to the power canal of the Larona hydropower development are some 5 km downstream of Lake Towuti outlet

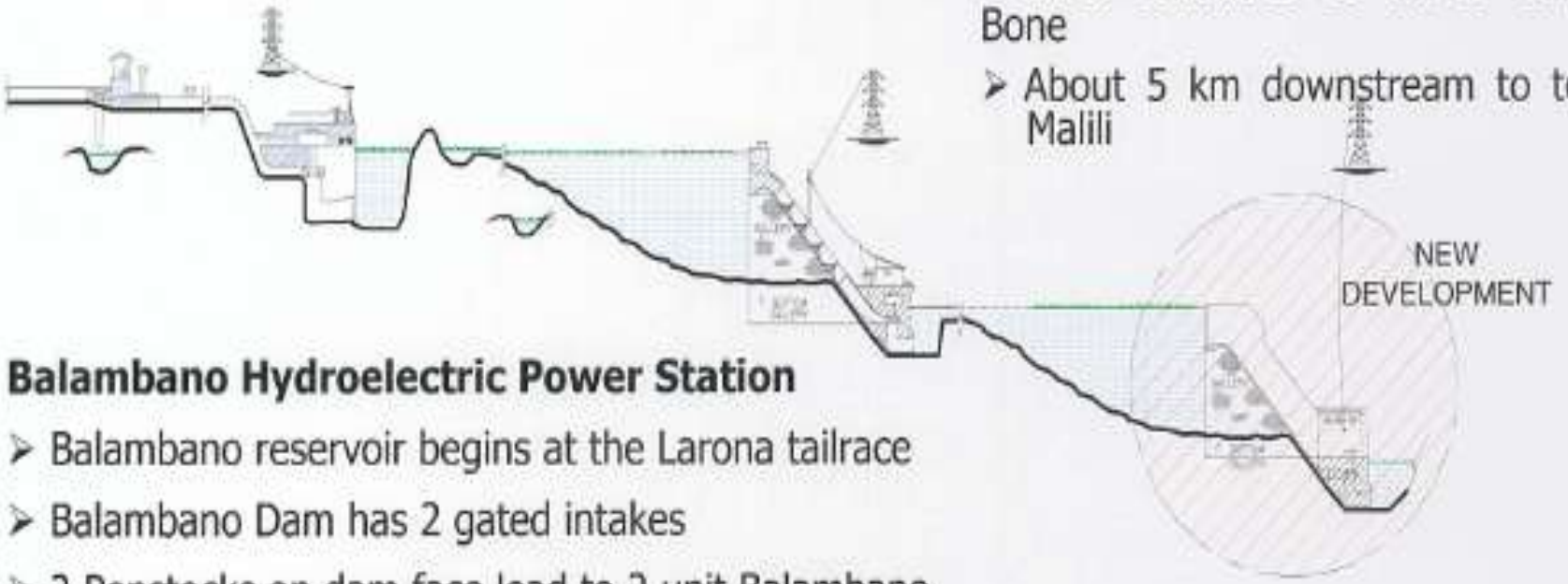
# UPSTREAM RIVER

## Karebbe Site

- A steep gorge approximately 6 km downstream of Balambano
- Dam and powerhouse planned as combined structures
- River downstream near sea level after construction
- River continues 20 km to Gulf of Bone
- About 5 km downstream to town Malili

## Larona Hydroelectric Power Station

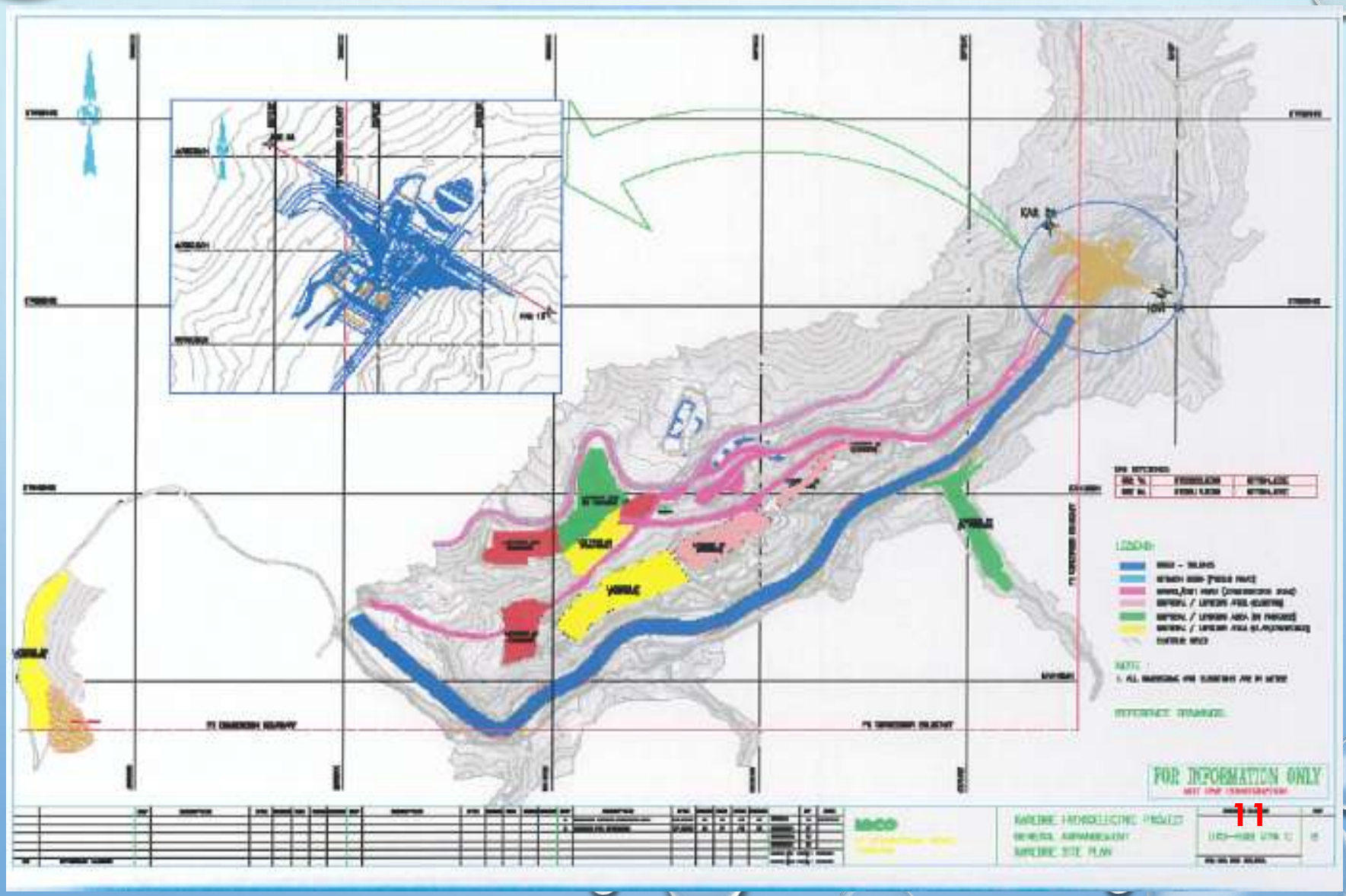
- canal is 6.9 km long from Batubesi Dam
- gated intake to 3 penstocks 1300 m long penstocks lead to the 3 units Larona powerhouse,




## Balambano Hydroelectric Power Station

- Balambano reservoir begins at the Larona tailrace
- Balambano Dam has 2 gated intakes
- 2 Penstocks on dam face lead to 2 unit Balambano Powerhouse

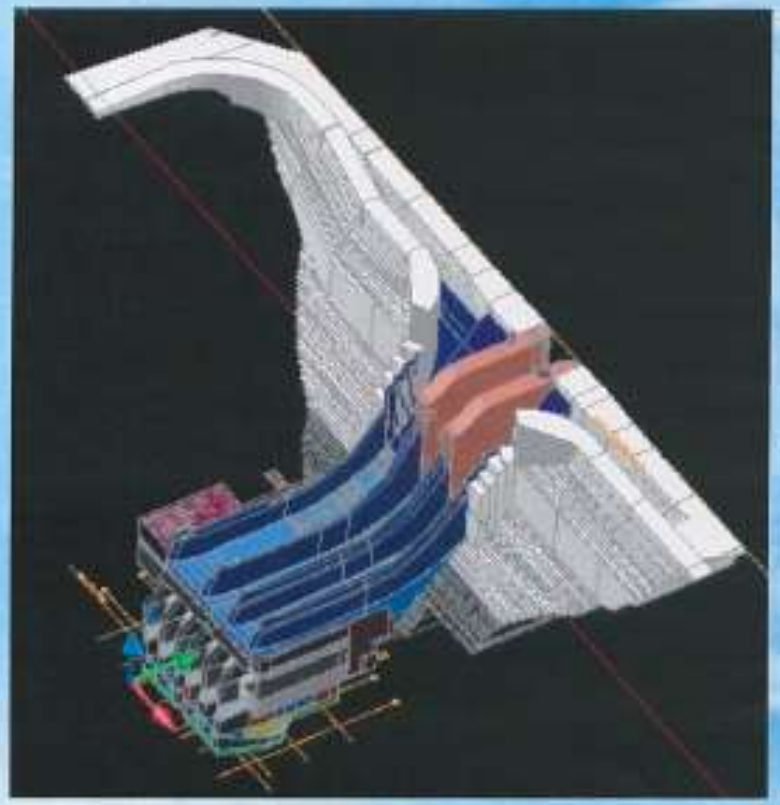
# PROJECT SITE LAYOUT

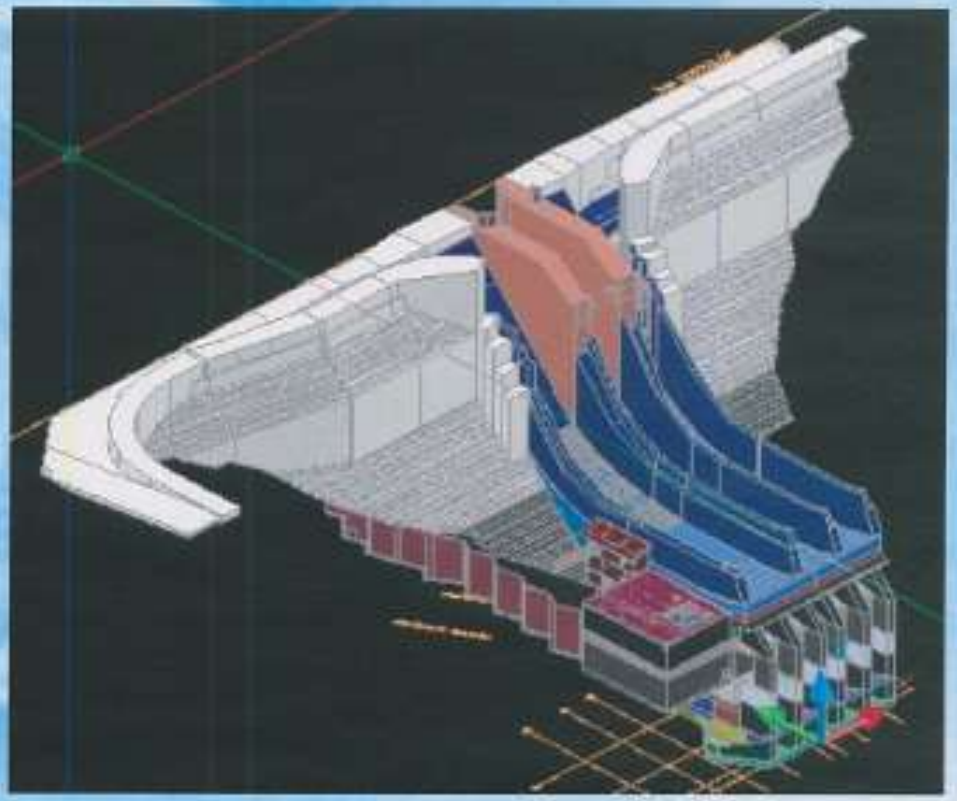


# PROJECT SITE LAYOUT



# POWERHOUSE CONSTRUCTION





POWERHOUS & DAM COMPLETE



# 2. RIVER CANNEL IMPROVEMENT PLAN

# RIVER CHANNEL IMPROVEMENT

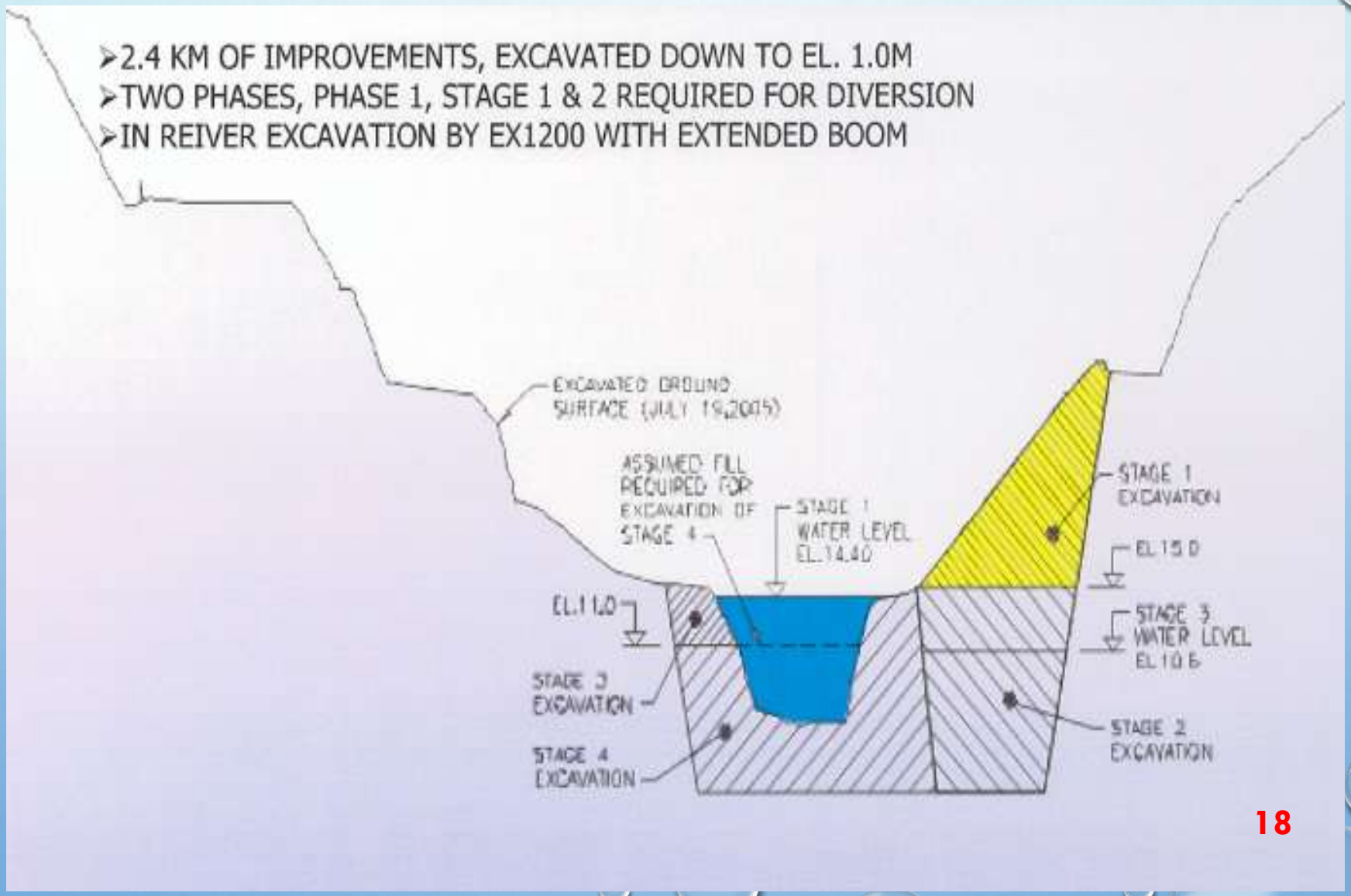


# EXISTING RIVER BEFORE IMPROVEMENT

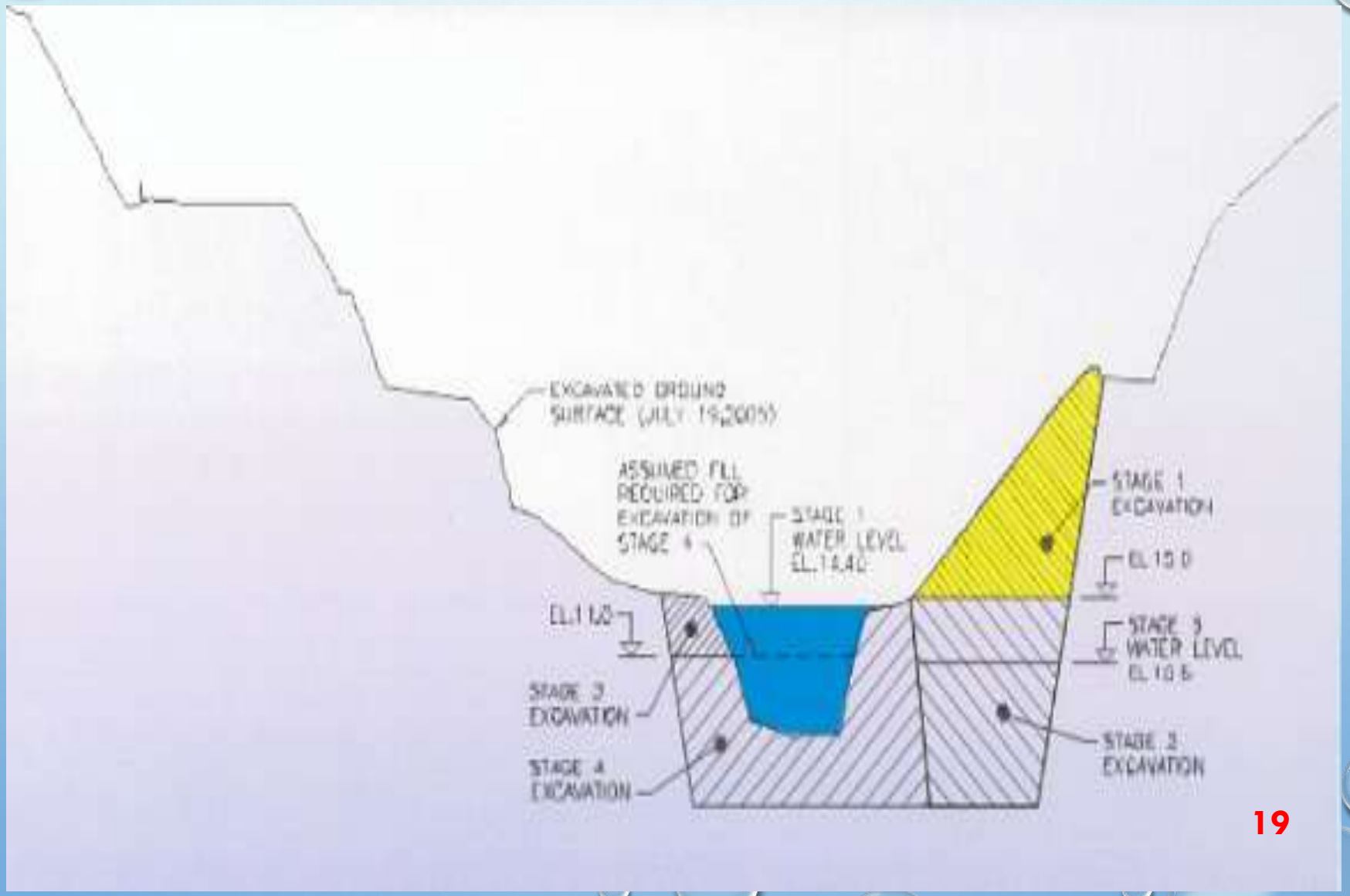


# SEQUENCE OF EXCAVATION (1)

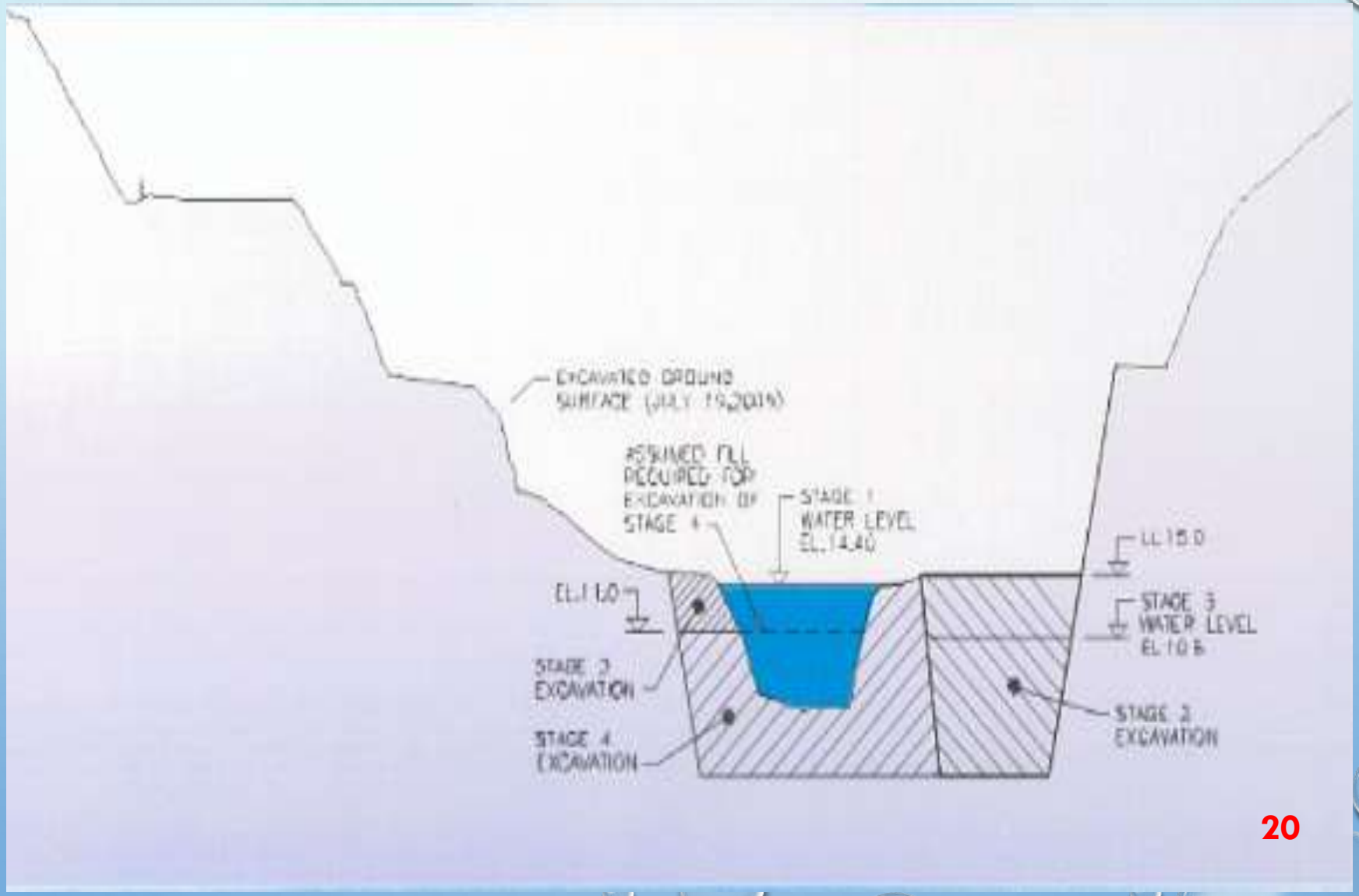
- 2.4 KM OF IMPROVEMENTS, EXCAVATED DOWN TO EL. 1.0M
- TWO PHASES, PHASE 1, STAGE 1 & 2 REQUIRED FOR DIVERSION
- IN REIVER EXCAVATION BY EX1200 WITH EXTENDED BOOM



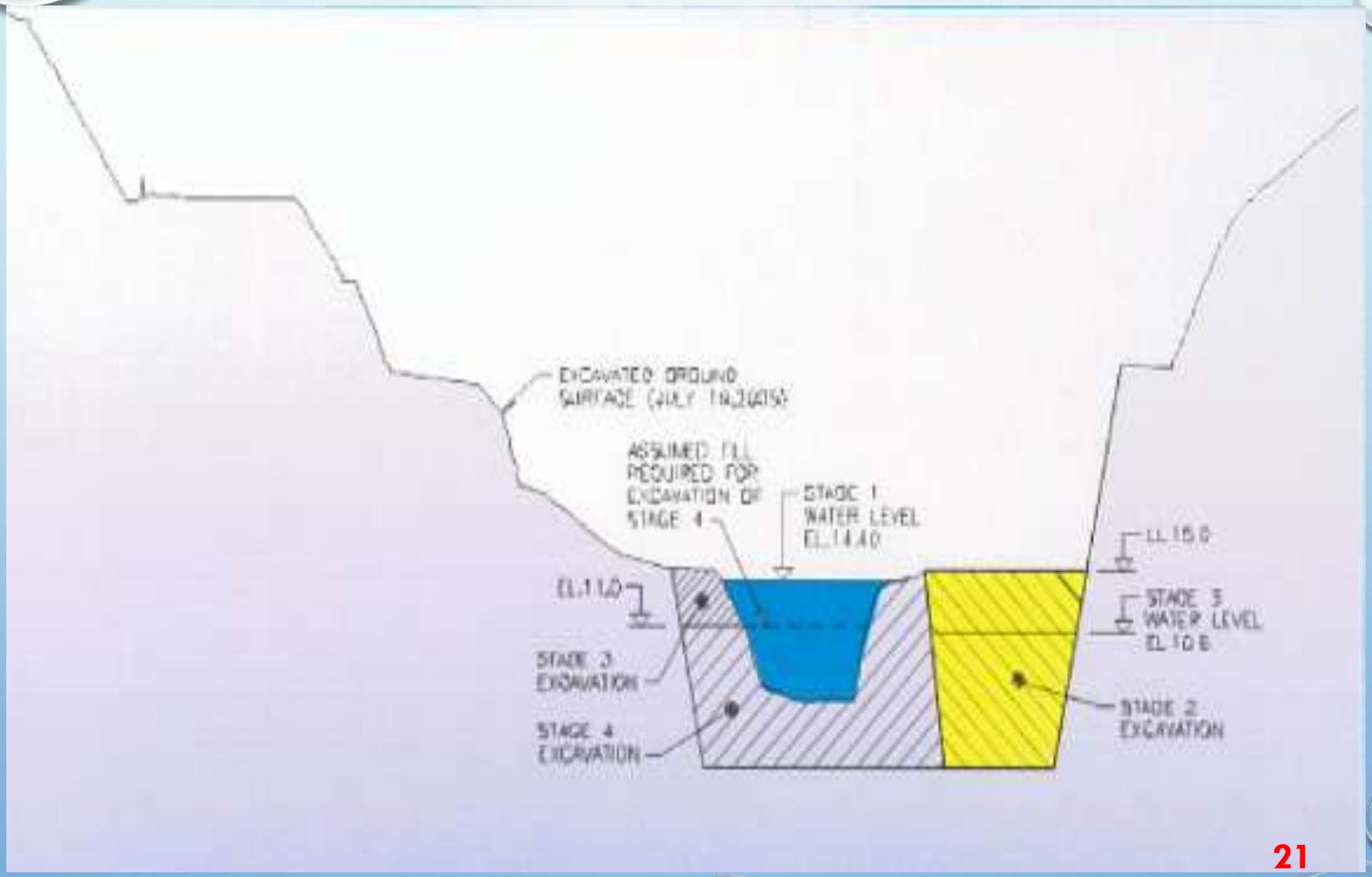
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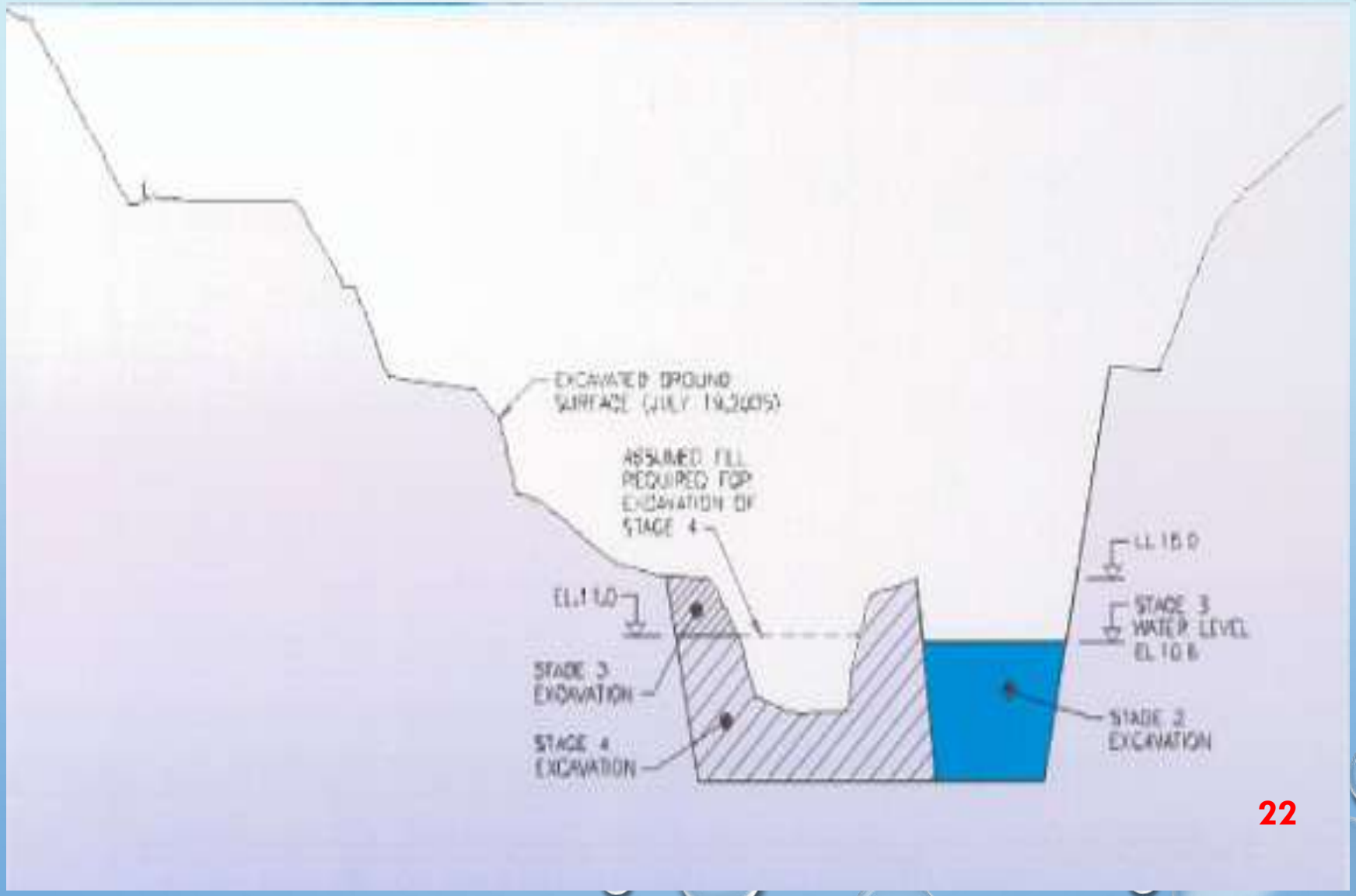
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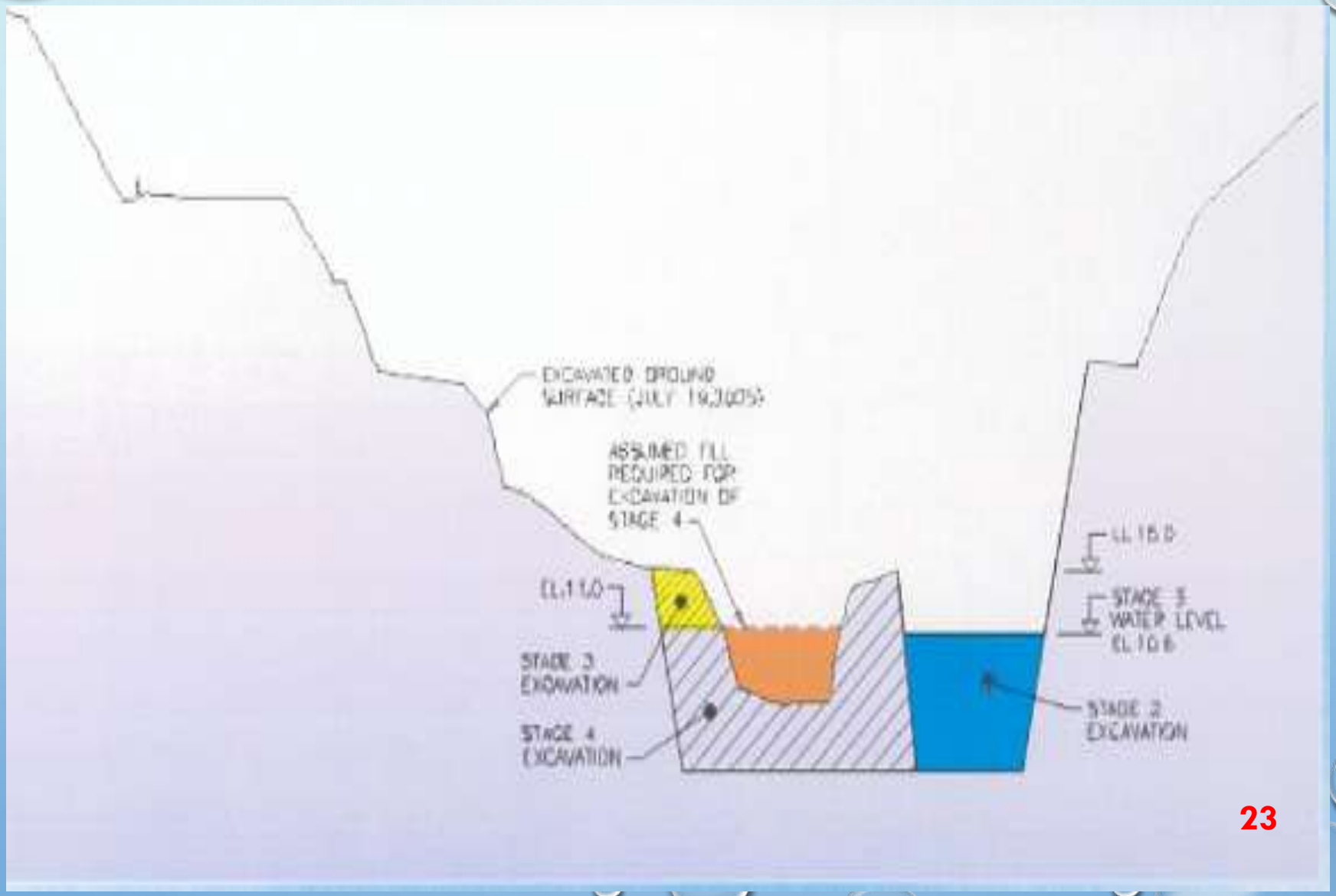
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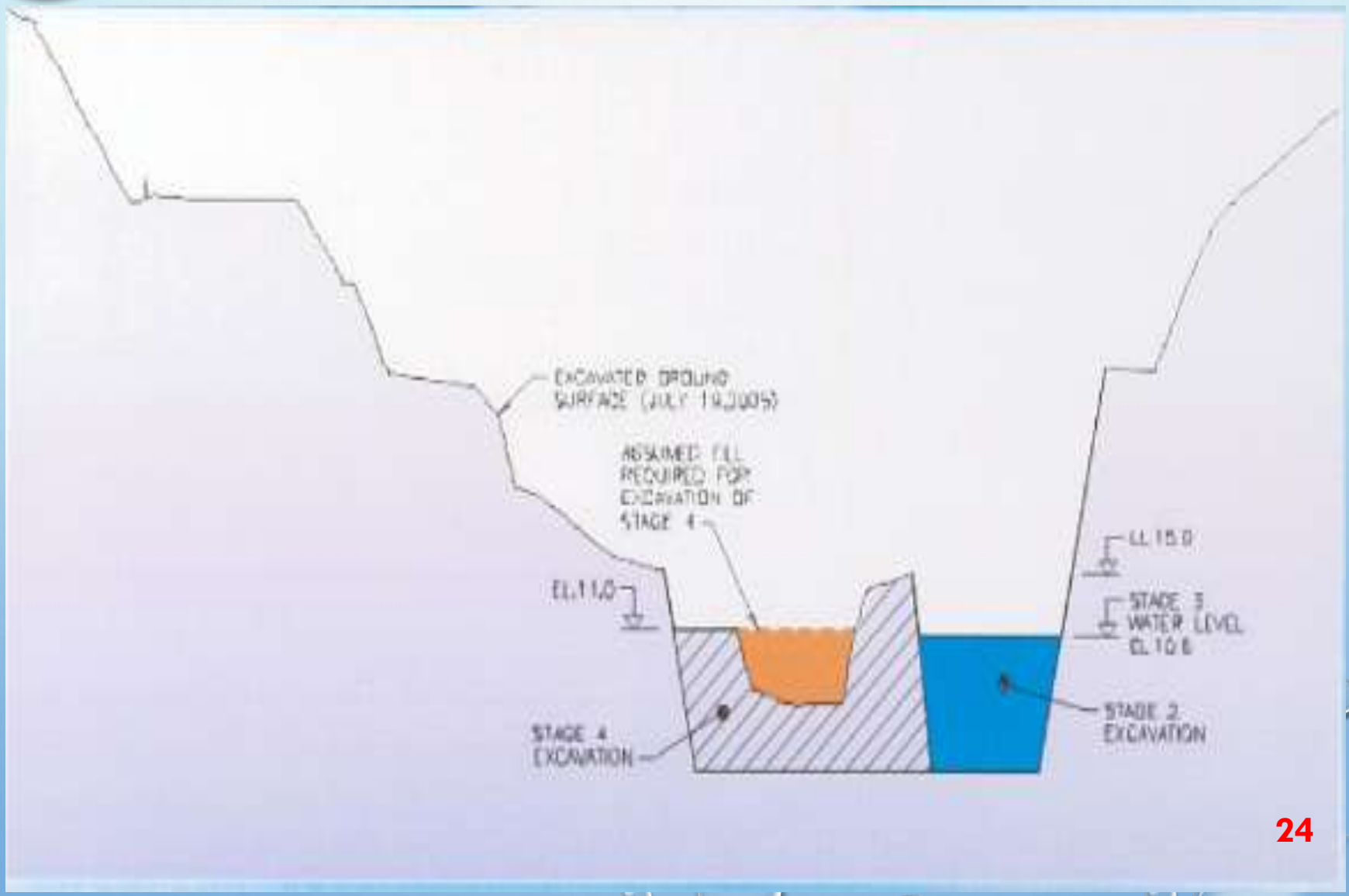
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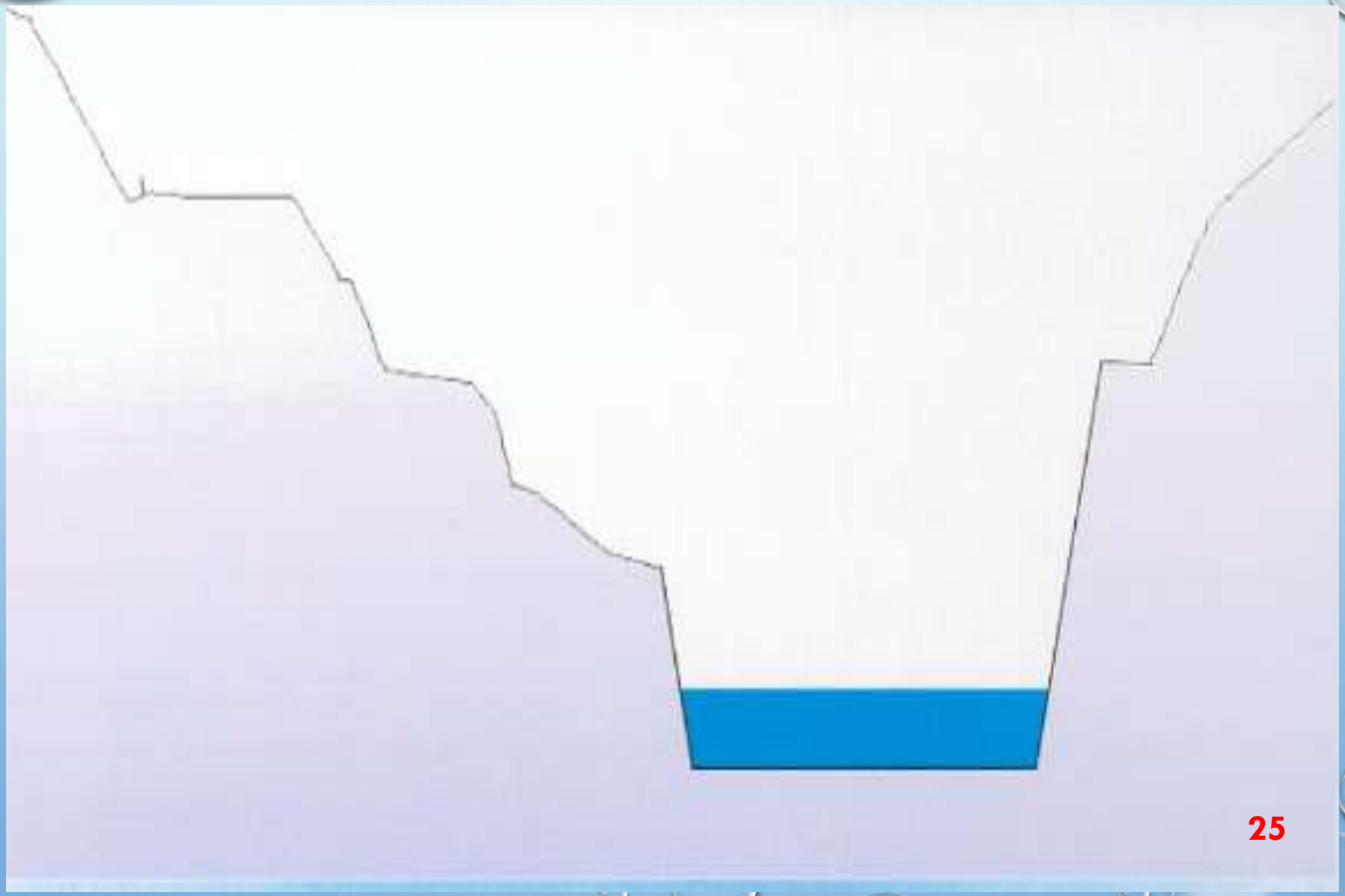
# SEQUENCE OF EXCAVATION (6)



# SEQUENCE OF EXCAVATION (7)

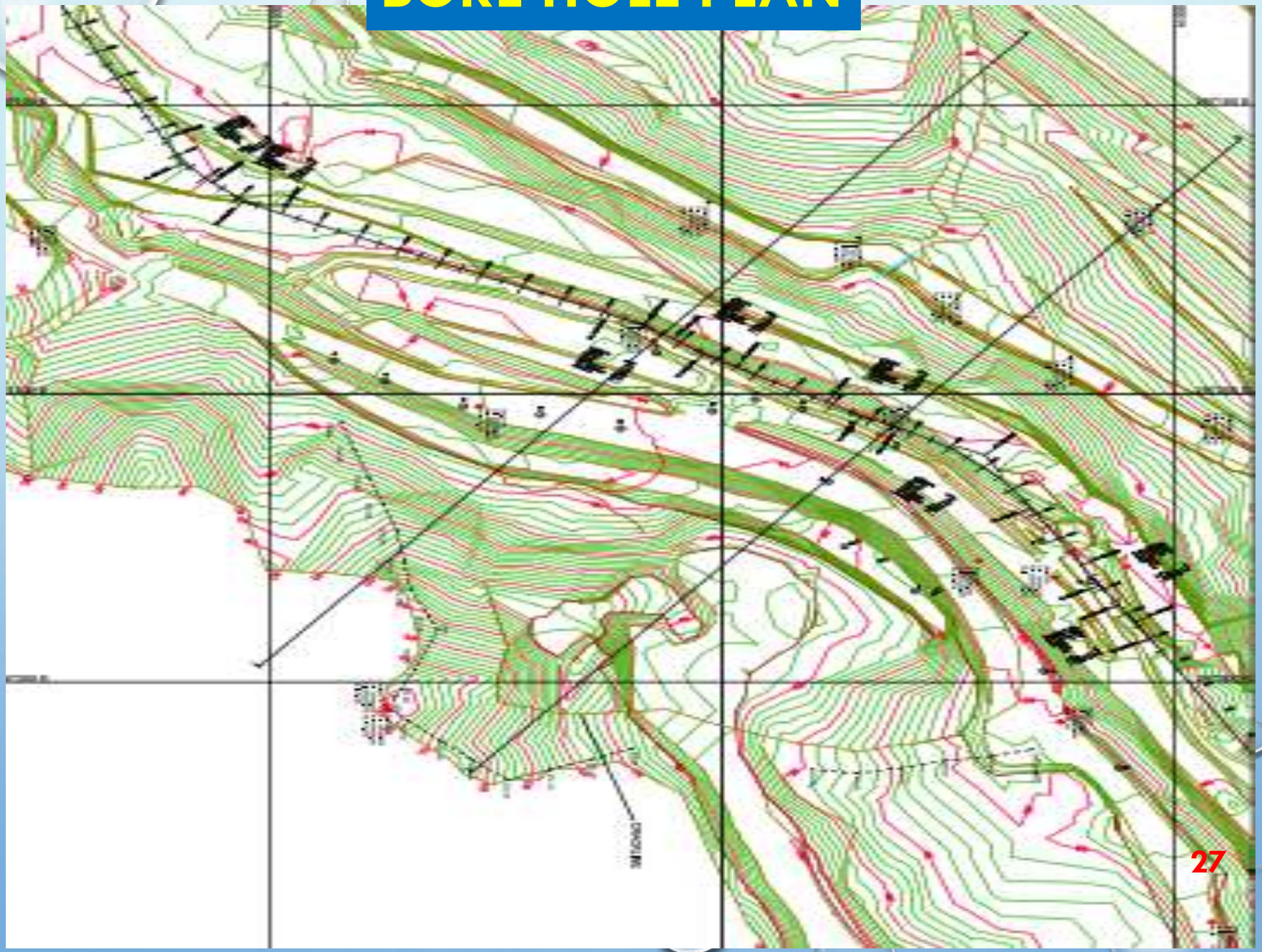


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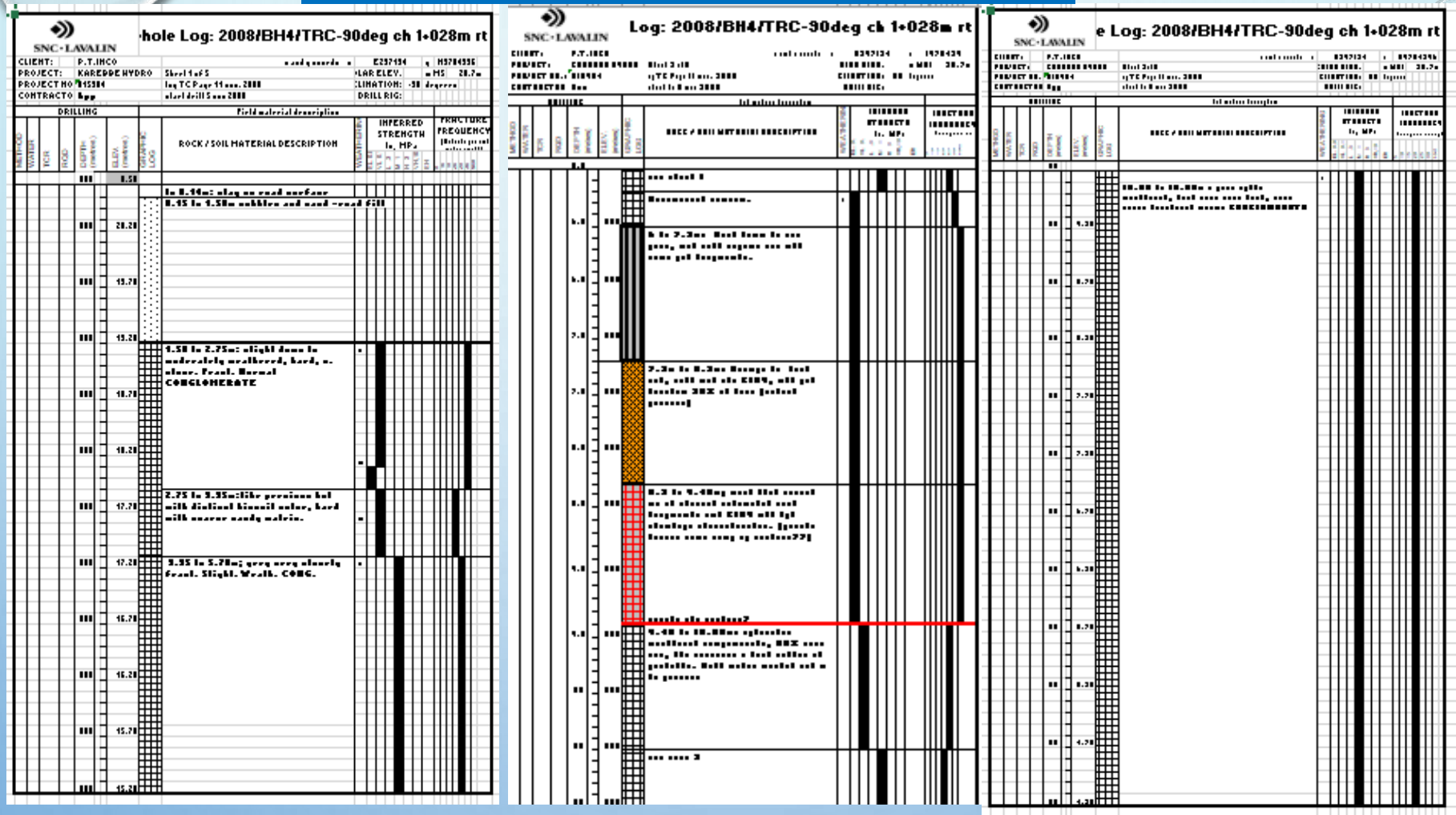


# 3. Preparation

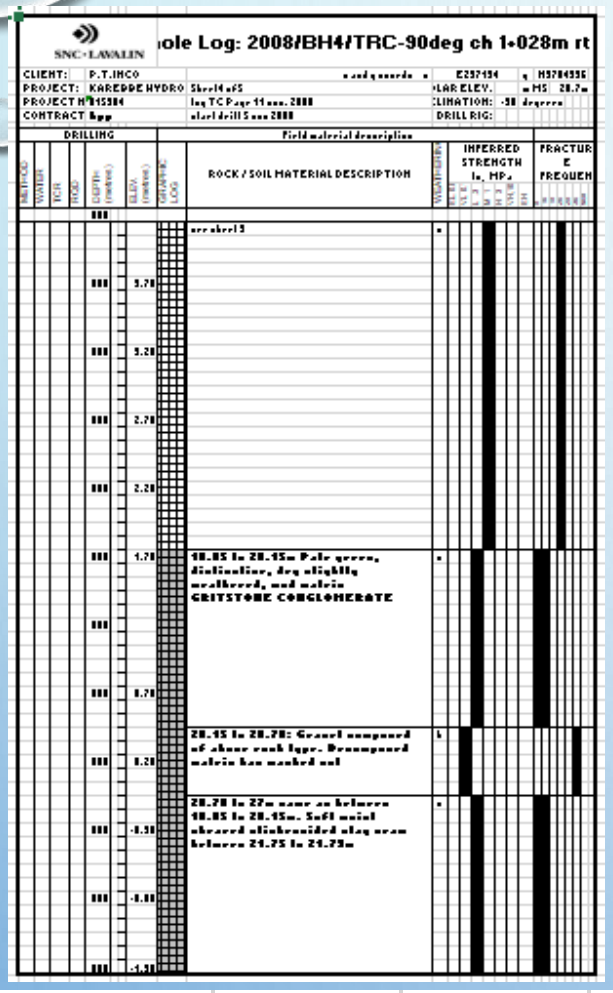
# BORE HOLE PLAN

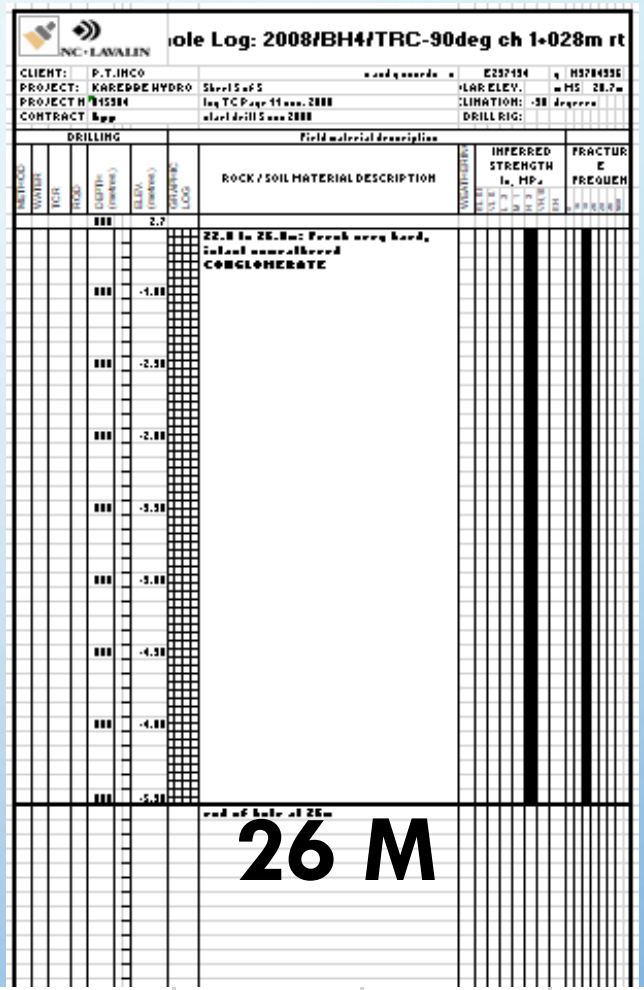


# SAMPLE OF BORING LOG



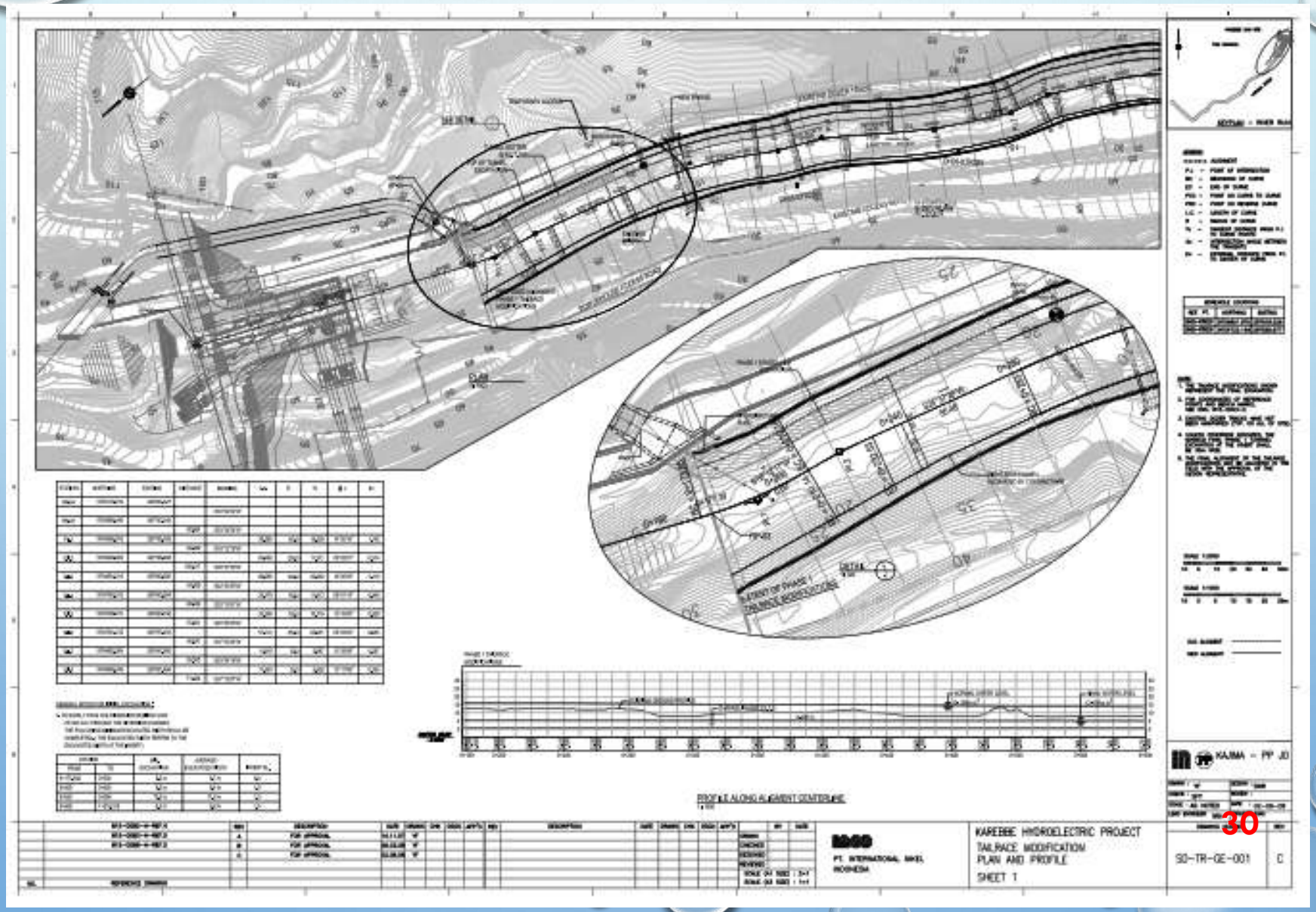
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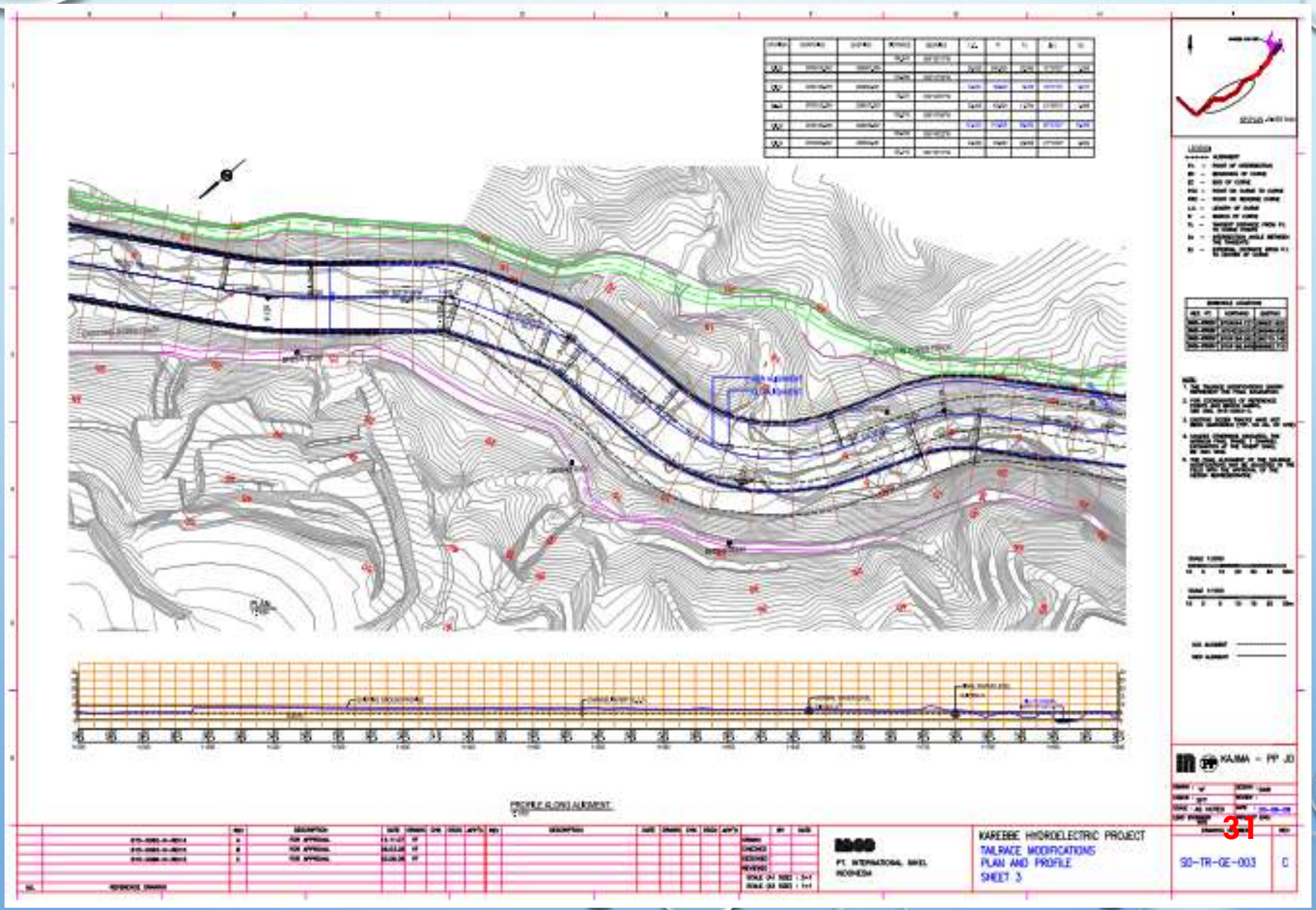


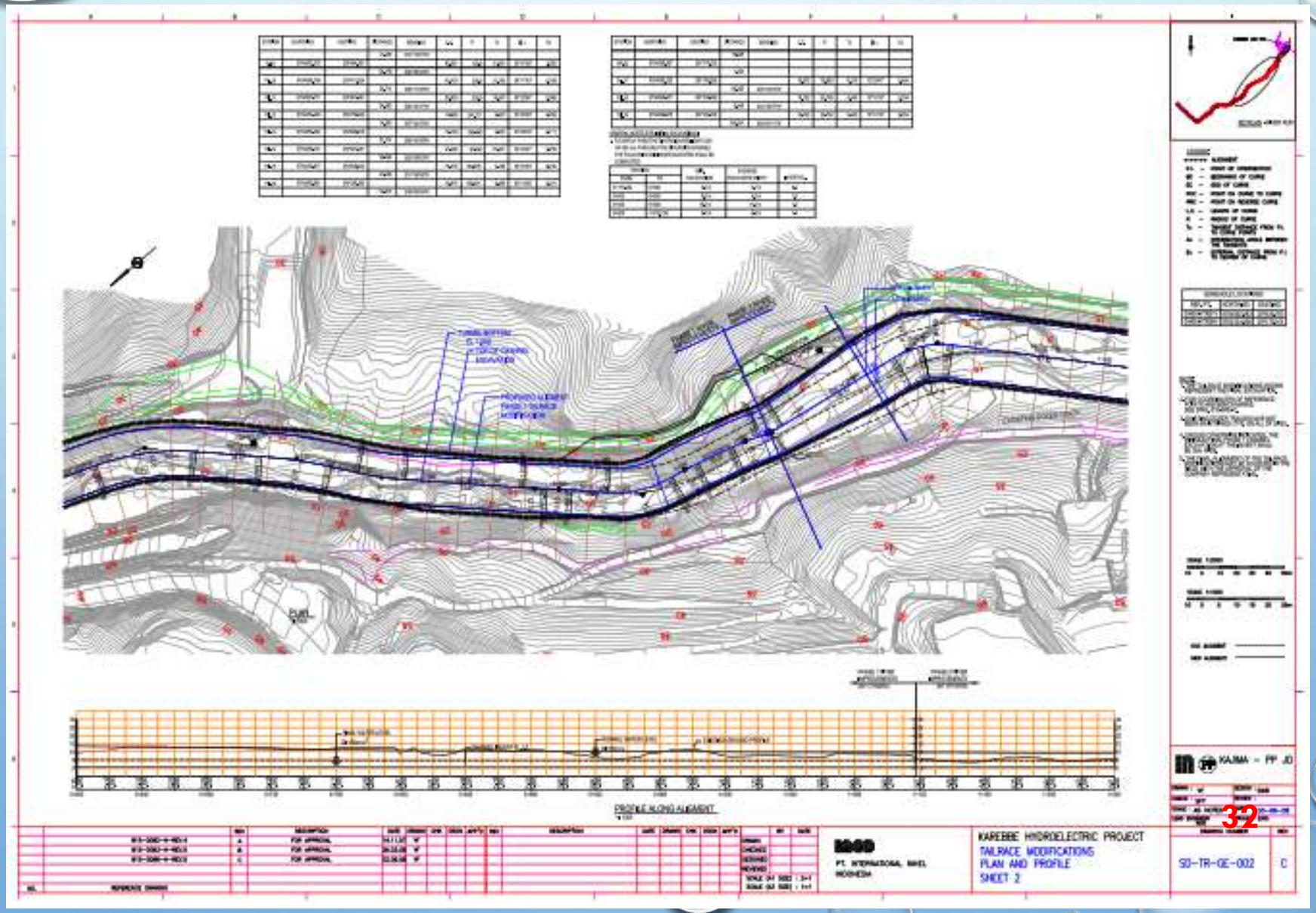



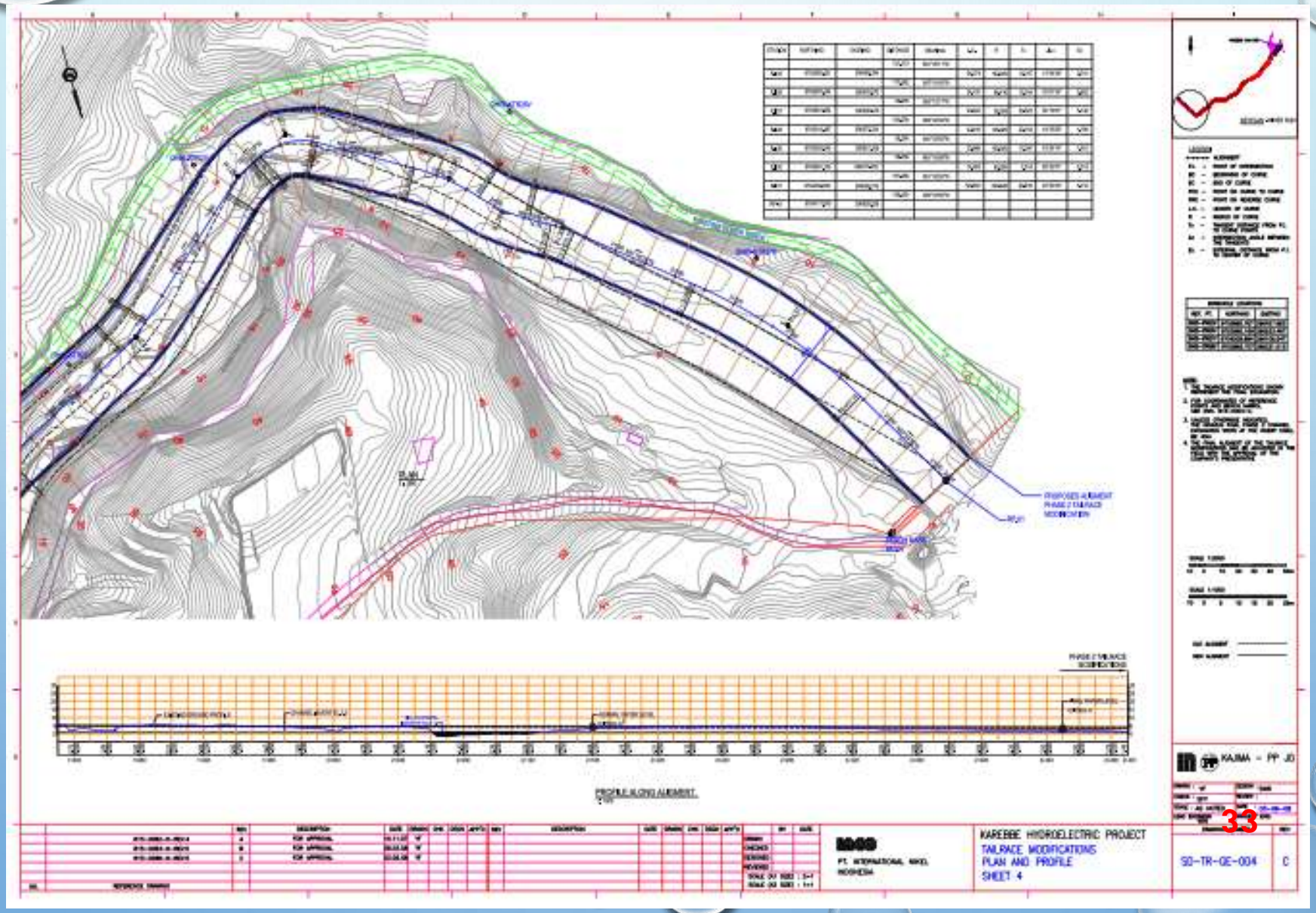

LEGEND

| org slick mudst | sandstone | fine sand | sand silt | silt | silt/clay | mudst | conglom | peridotite |
|---|---|---|---|---|---|---|---|---|


KAREBBE HYDROELECTRIC PROJECT
TAILRACE MODIFICATION
PLAN AND PROFILE
SHEET 1
SD-TR-GE-001
PT. INTERNATIONAL NIKEL INDONESIA
PROFILE ALONG ALIGNMENT CENTERLINE
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KAREBBE HYDROELECTRIC PROJECT
TAILRACE MODIFICATIONS
PLAN AND PROFILE
SHEET 3
SD-TR-GE-003
PT. INTERNATIONAL MINEL
INDONESIA
KAIMA - PP JO
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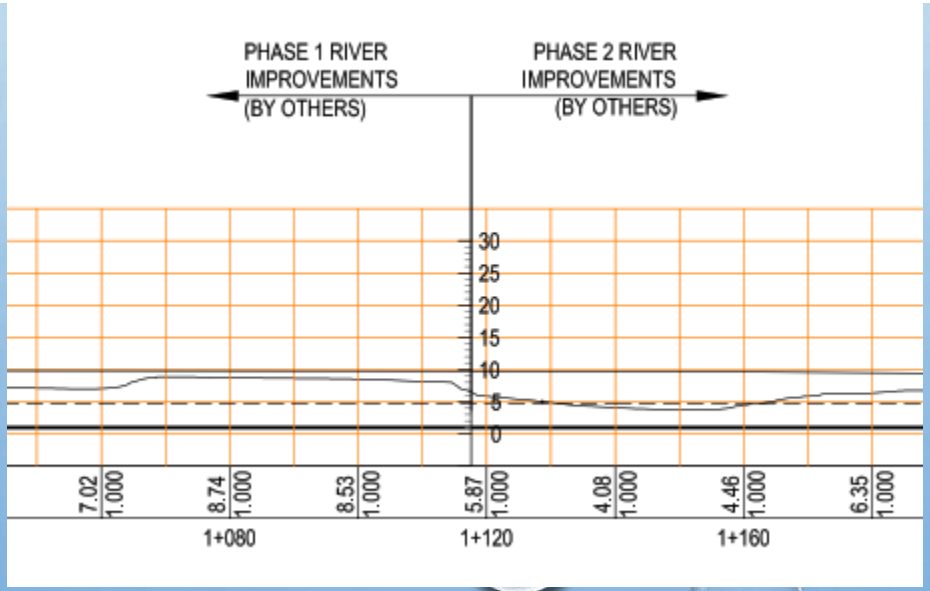

KAREBBE HYDROELECTRIC PROJECT
TAILRACE MODIFICATIONS
PLAN AND PROFILE
SHEET 2
SD-TR-GE-002
C
PT. INTERNATIONAL NIKEL INDONESIA
KAJIMA - PP JO

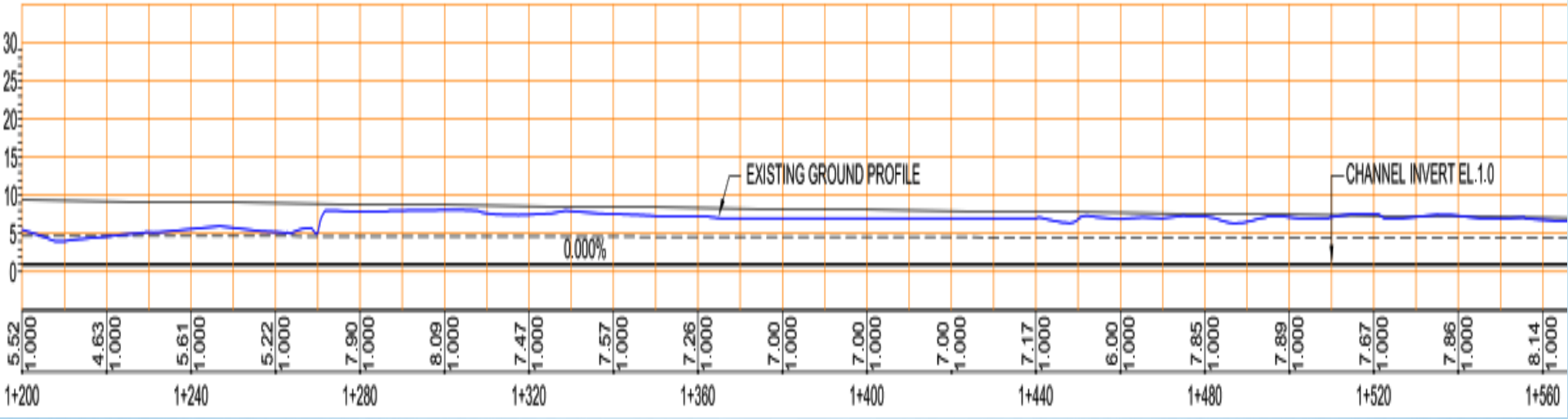

KAREBBE HYDROELECTRIC PROJECT
TAILRACE MODIFICATIONS
PLAN AND PROFILE
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PT. INTERNATIONAL NIKEL INDONESIA
KAJIMA - PP JO
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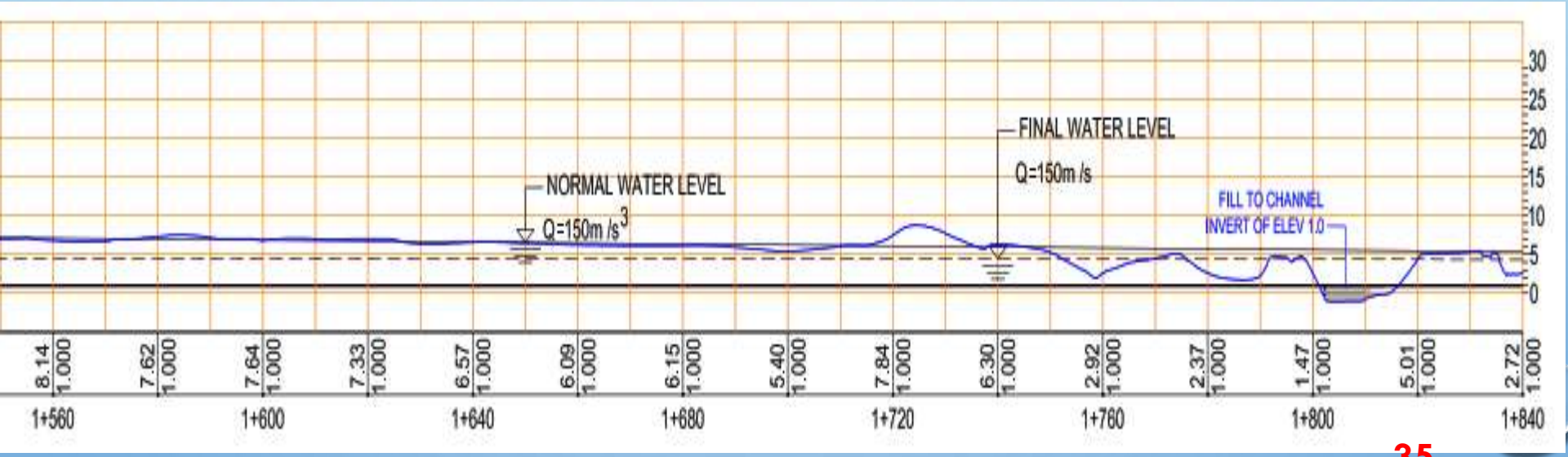
GENERAL NOTES FOR INITIAL EXCAVATION :

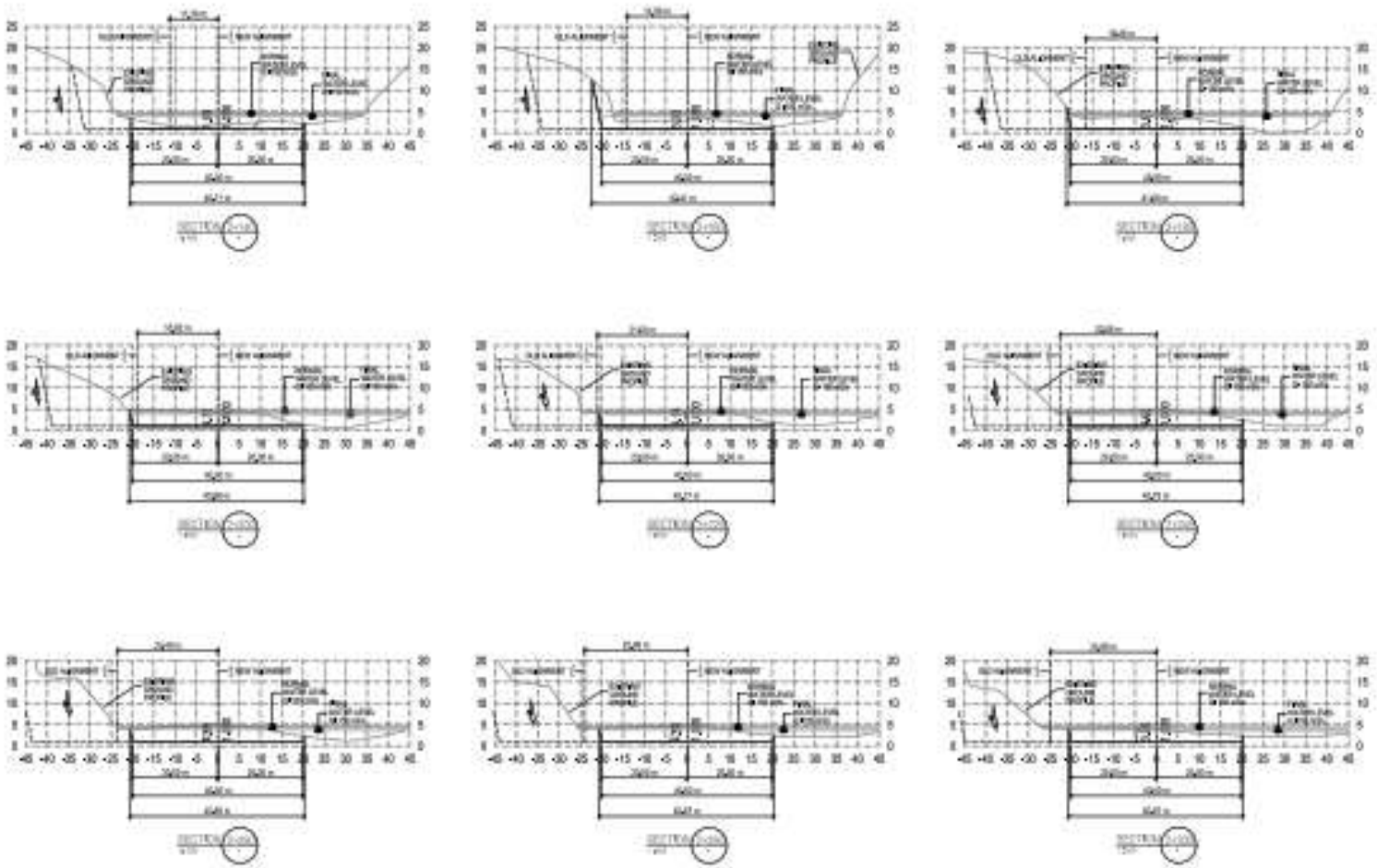
1. TO SAFELY PASS THE DIVERSION DESIIGN FLOW OF 600 m/s THROUGH THE DIVERSION CHANNEL THE FOLLOWING MINIMUM EXCAVATED WIDTH SHALL BE COMPLETED. ( THE EXCAVATED WIDTH REFERS TO THE EXCAVATED WIDTH AT THE INVERT)

| STATION | | MIN. EXCAVATION | AVERAGE EXCAVATED WIDTH | INVERT EL. |
|---|---|---|---|---|
| FROM | TO | | | |
| 0+177.392 | 0+500 | 5.0 m | 6.7 m | 6.0 |
| 0+500 | 0+630 | 6.0 m | 6.4 m | 1.0 |
| 0+630 | 0+908 | 10.0 m | 11.8 m | 1.0 |
| 0+908 | 1+019.316 | 6.0 m | 6.8 m | 1.0 |




EXISTING GROUND PROFILE
CHANNEL INVERT EL.1.0
0.000%
30
25
20
15
10
5
0
5.52 1.000
4.63 1.000
5.61 1.000
5.22 1.000
7.90 1.000
8.09 1.000
7.47 1.000
7.57 1.000
7.26 1.000
7.00 1.000
7.00 1.000
7.00 1.000
7.17 1.000
6.00 1.000
7.85 1.000
7.89 1.000
7.67 1.000
7.86 1.000
8.14 1.000
1+200
1+240
1+280
1+320
1+360
1+400
1+440
1+480
1+520
1+560


NORMAL WATER LEVEL
Q=150m /s3
FINAL WATER LEVEL
Q=150m /s
FILL TO CHANNEL
INVERT OF ELEV 1.0
30
25
20
15
10
5
0
8.14 1.000
7.62 1.000
7.64 1.000
7.33 1.000
6.57 1.000
6.09 1.000
6.15 1.000
5.40 1.000
7.84 1.000
6.30 1.000
2.92 1.000
2.37 1.000
1.47 1.000
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1+640
1+680
1+720
1+760
1+800
1+840

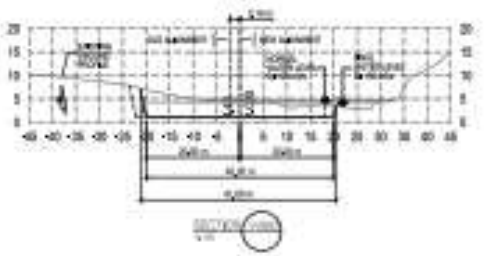


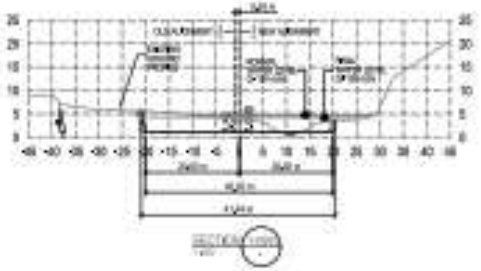
KARBBE HYDROELECTRIC PROJECT

TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 12

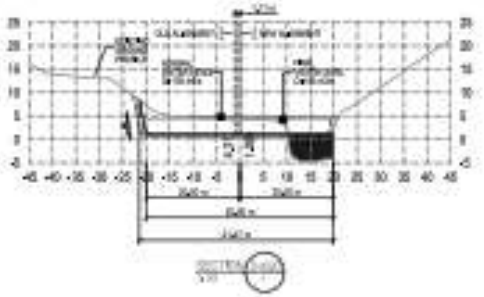
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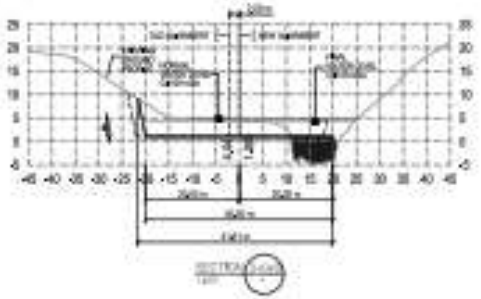
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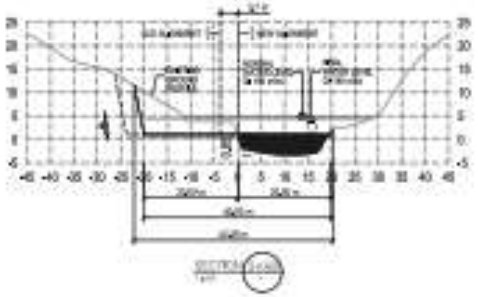


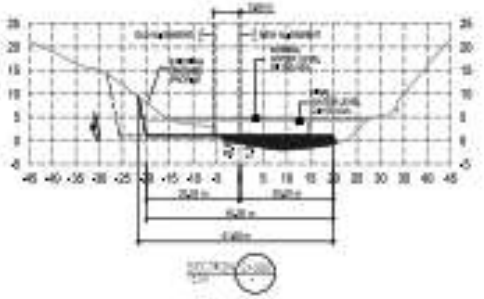




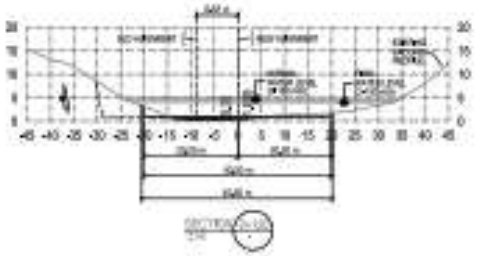














KAJIMA – PT JO

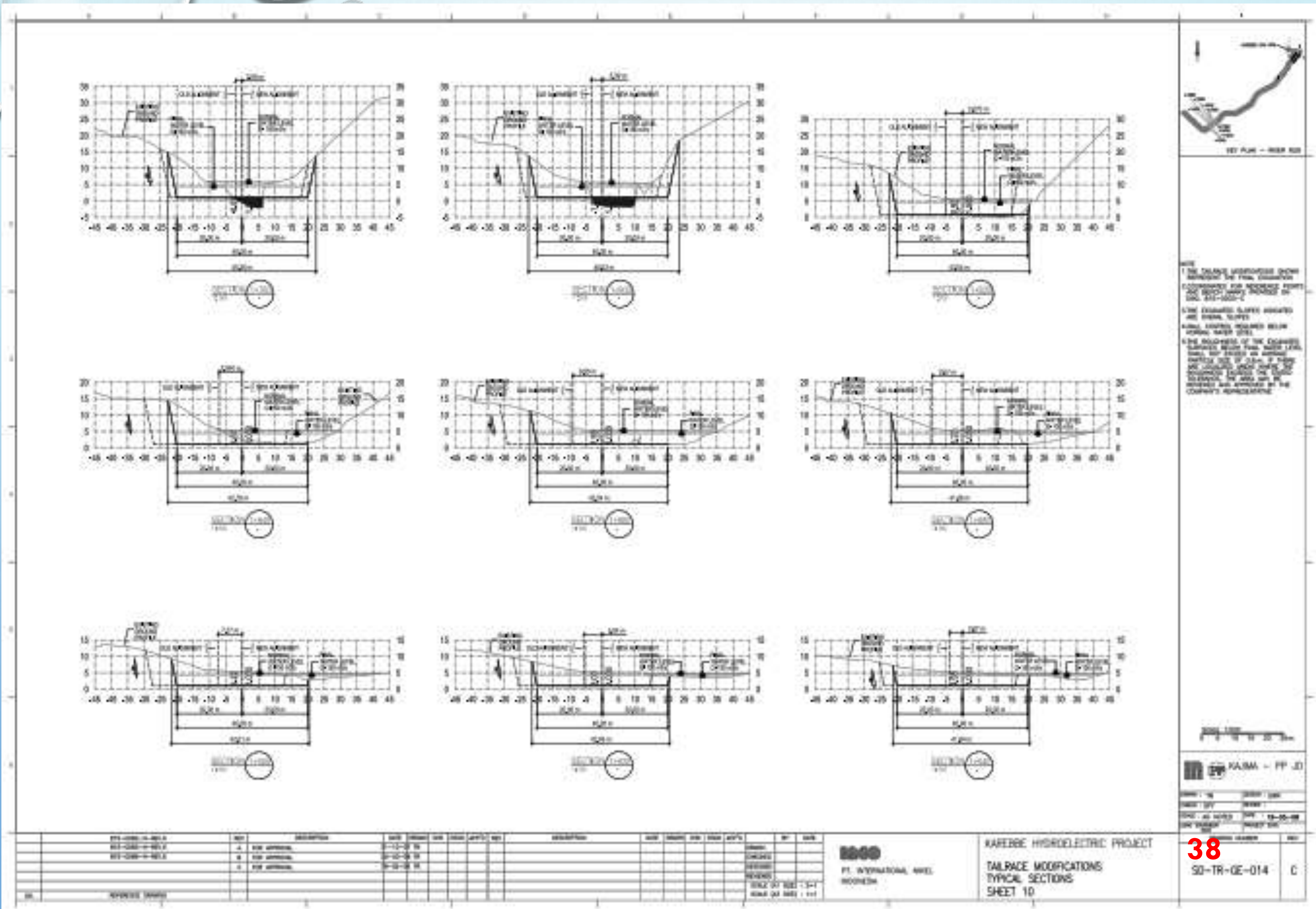
KAREBBE HYDROELECTRIC PROJECT

TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 11

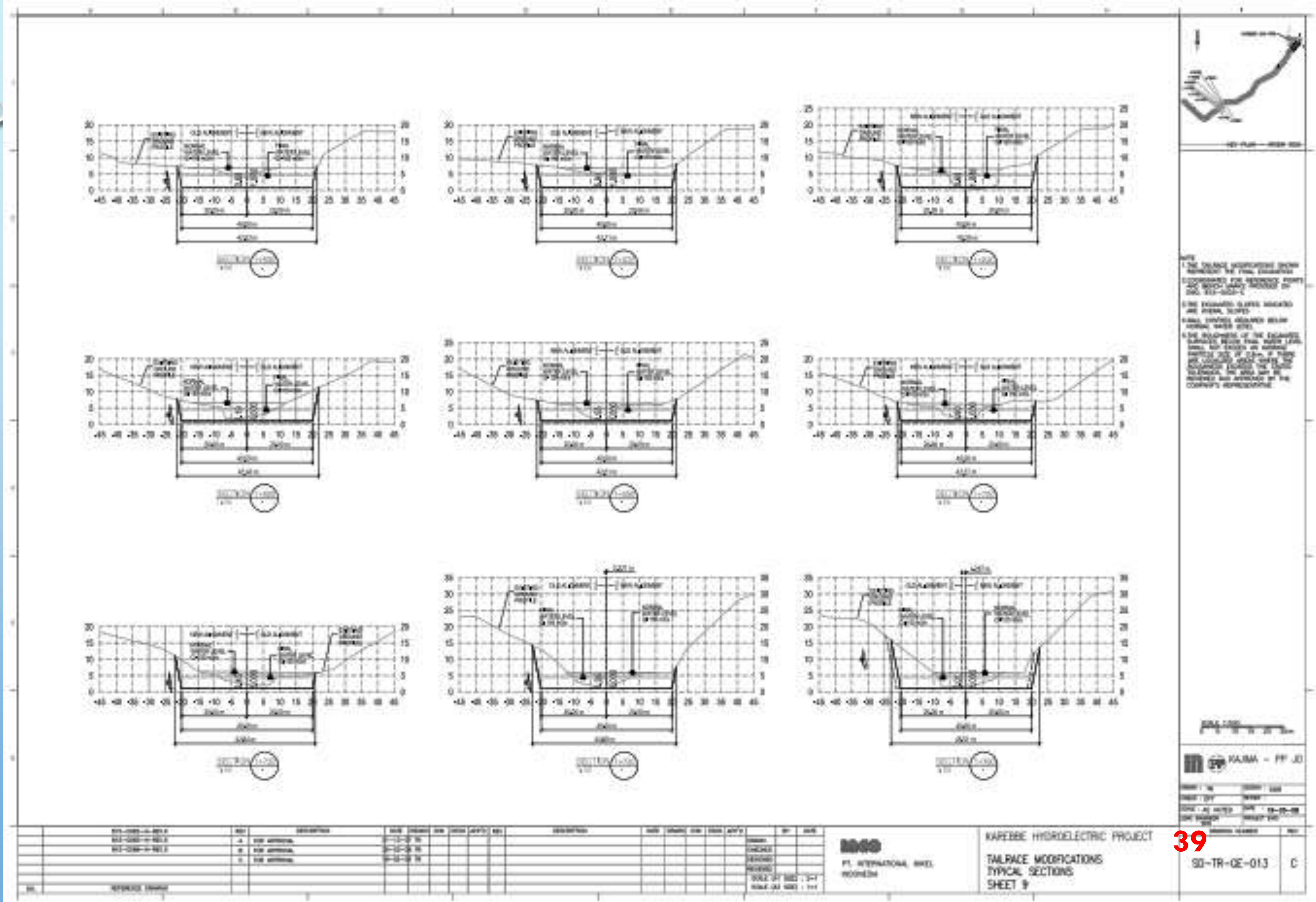
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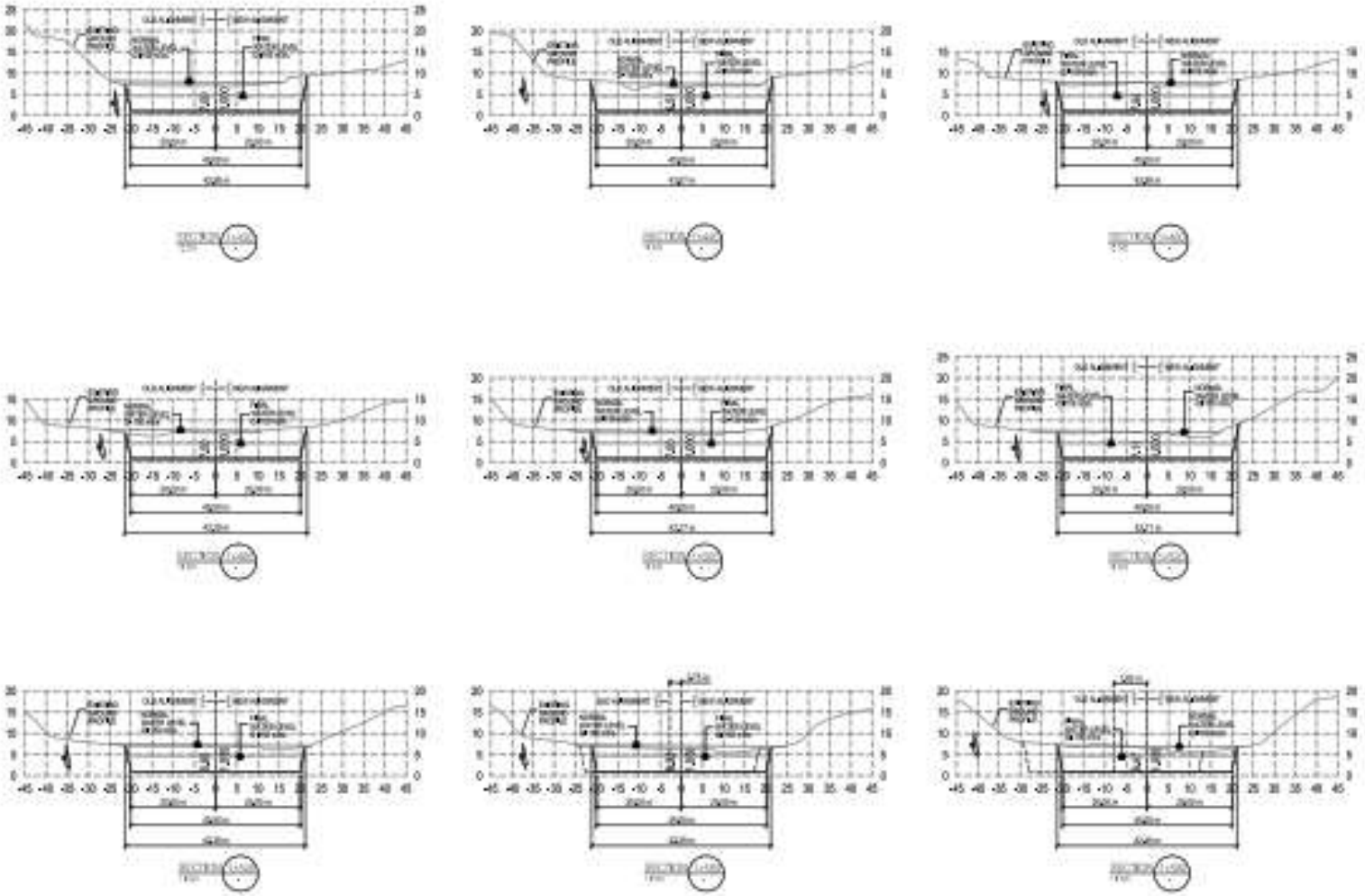
SD-TR-GE-015

C



KAREBBE HYDROELECTRIC PROJECT
TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 10
KAJIMA – PP JO
SD-TR-GE-014
C


KAJIMA - PP JO
KAREBBE HYDROELECTRIC PROJECT
TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 9
SD-TR-QE-013
C



KARIBBE HYDROELECTRIC PROJECT

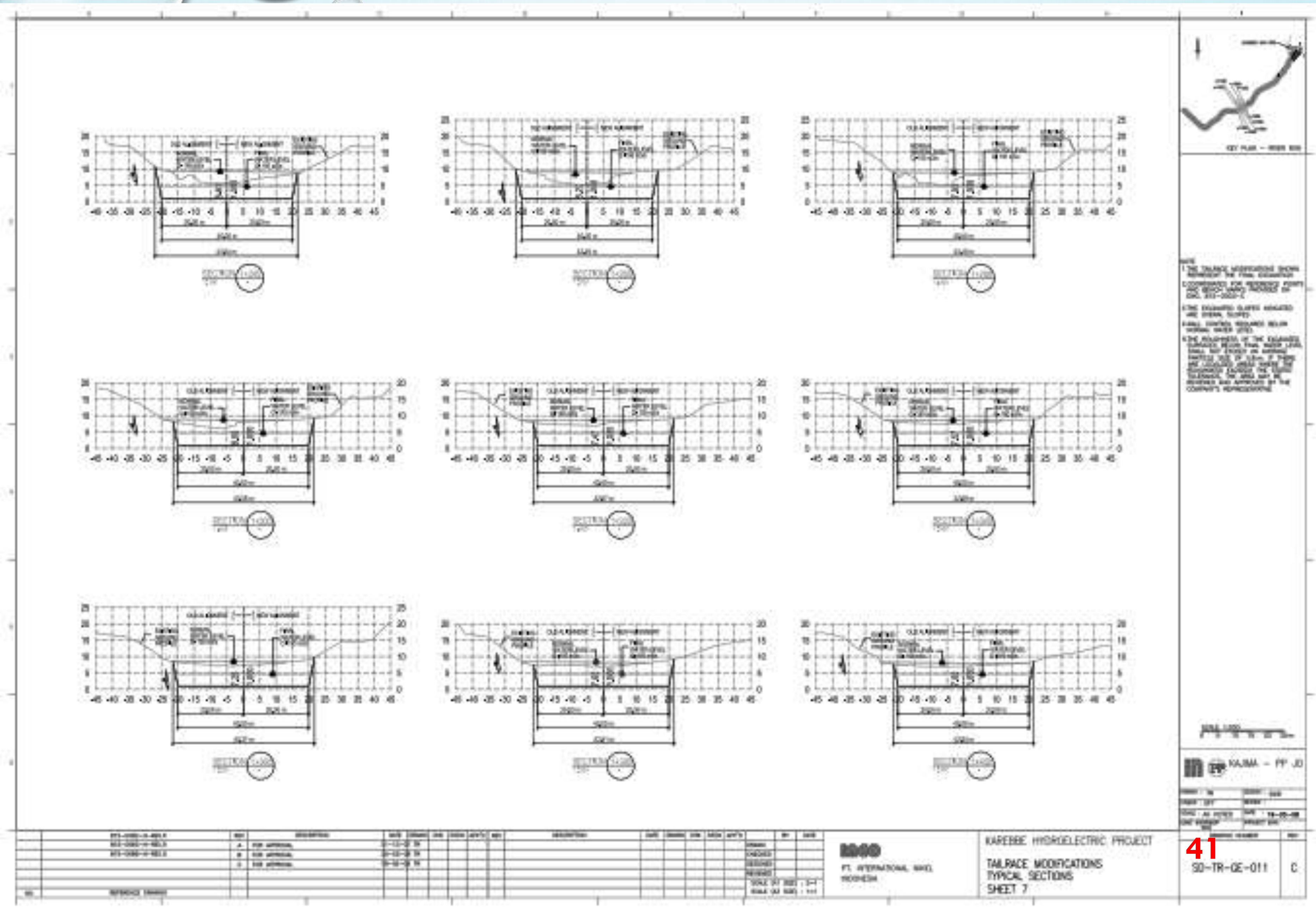
TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 8

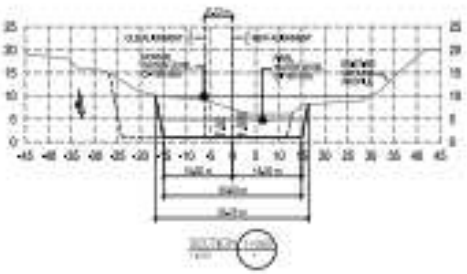
PT. INTERNATIONAL NIKEL INDONESIA

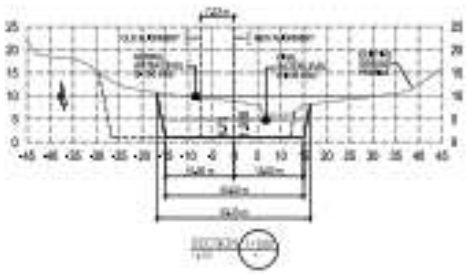
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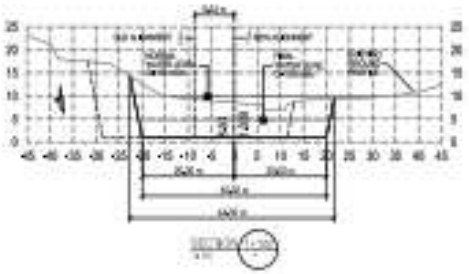
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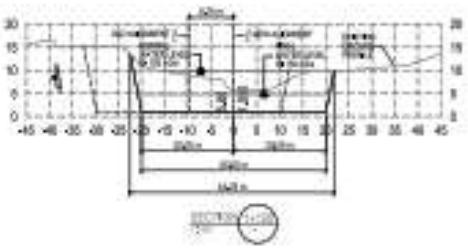
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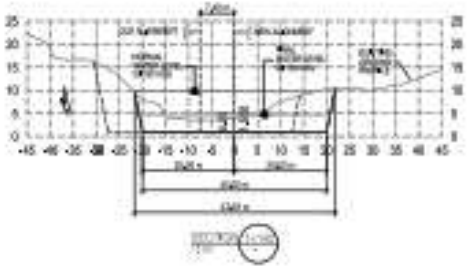

KAJIMA – PP JO
KAREBBE HYDROELECTRIC PROJECT
TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 7
SD-TR-OE-011
C



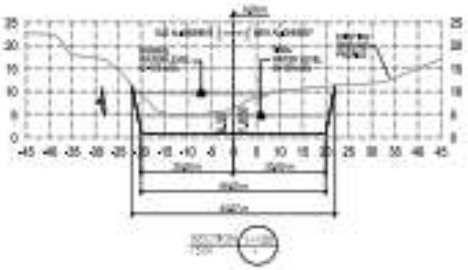


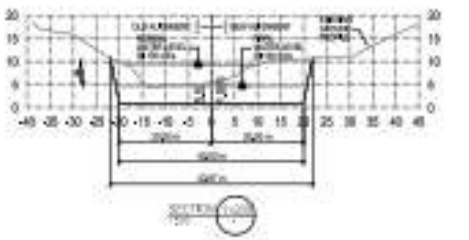
















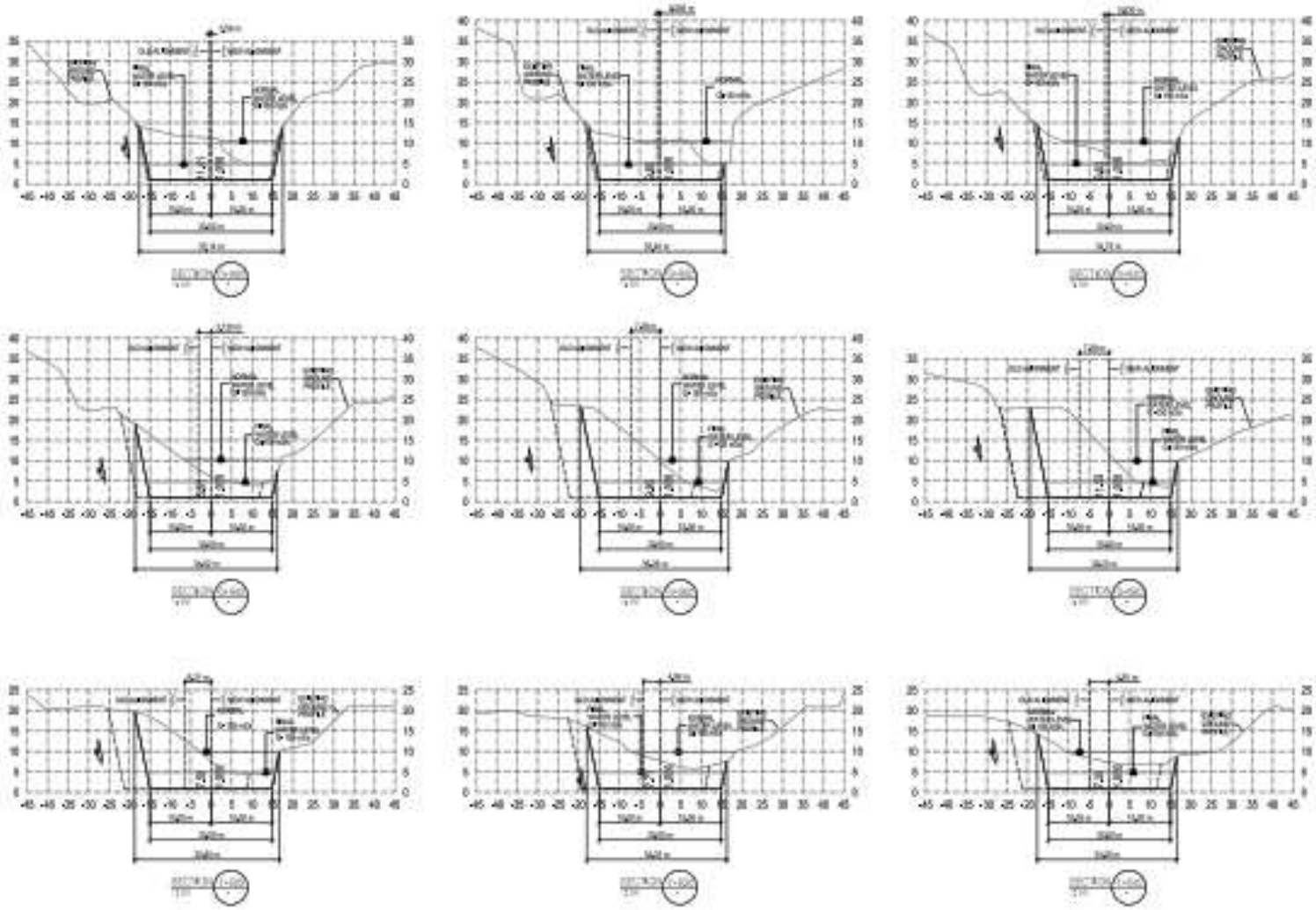
KAJIMA – PP JO

KAREBBE HYDROELECTRIC PROJECT

TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 6

42

-GE-010 D

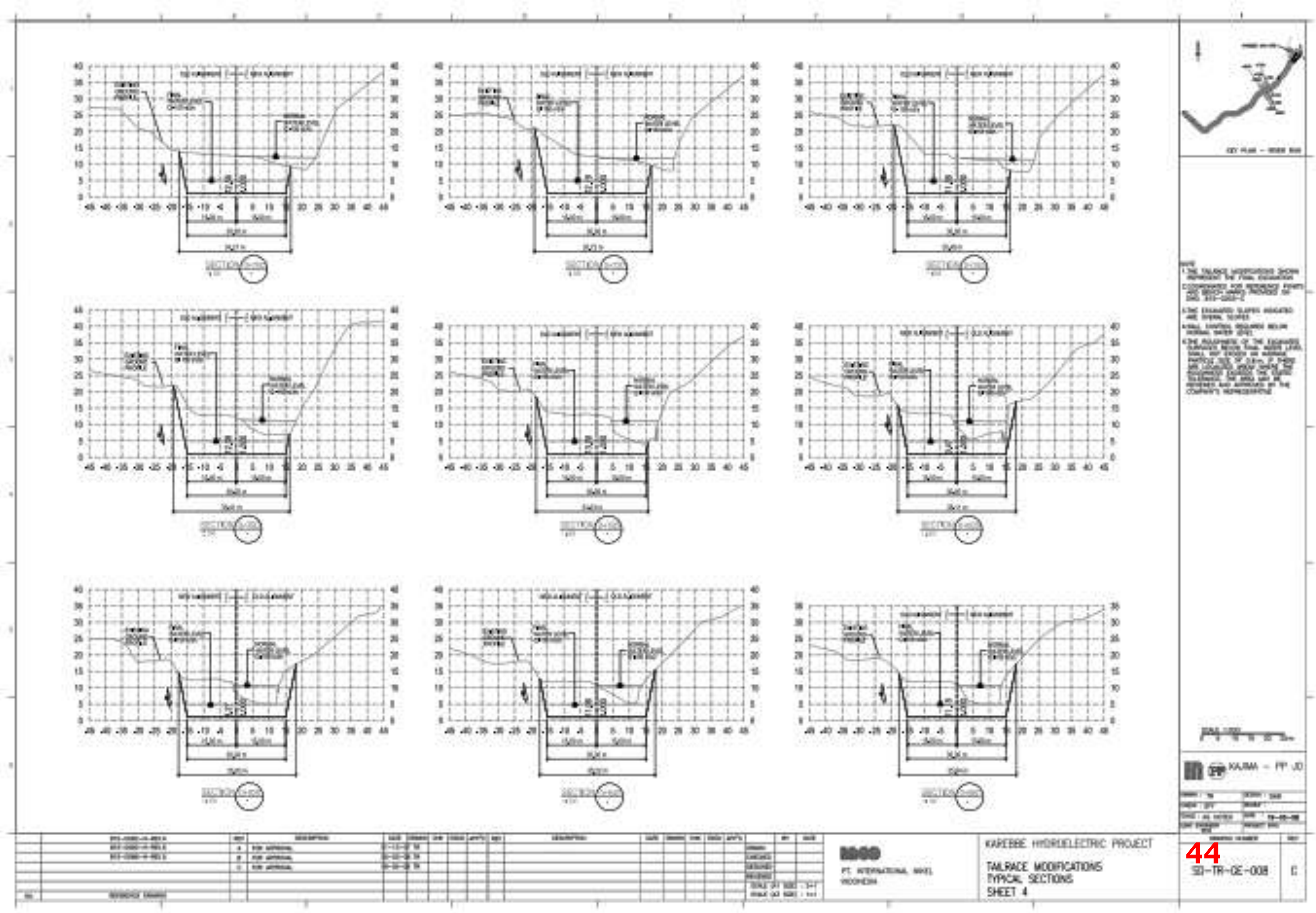


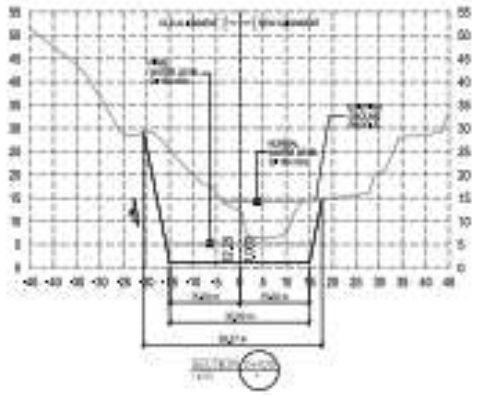
KAREBBE HYDROELECTRIC PROJECT

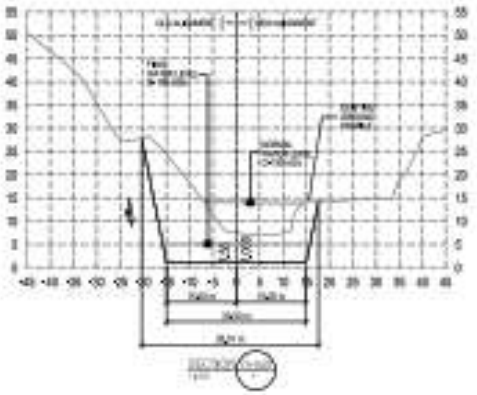
TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 5

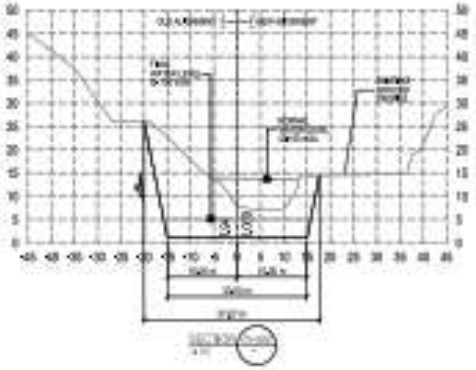
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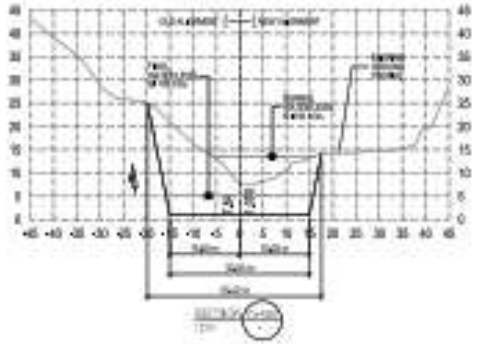
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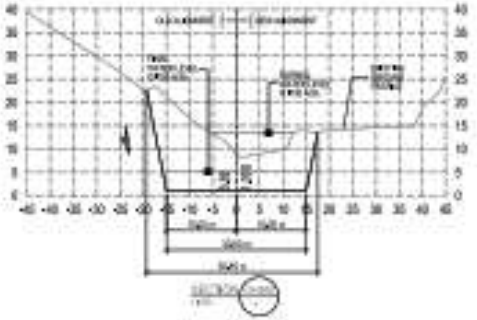

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SHEET 4
PT. INTERNATIONAL NIKEL INDONESIA
KAJIMA - PP JO
SD-TR-CE-008
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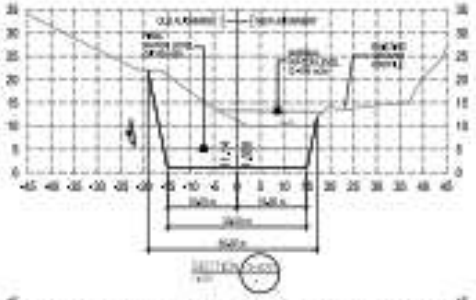




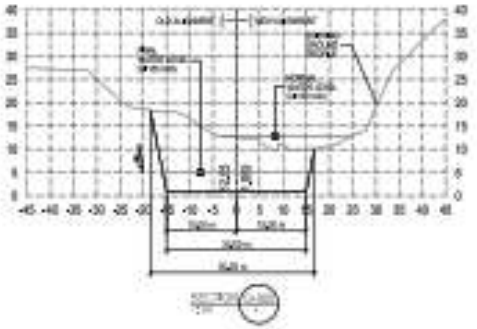
















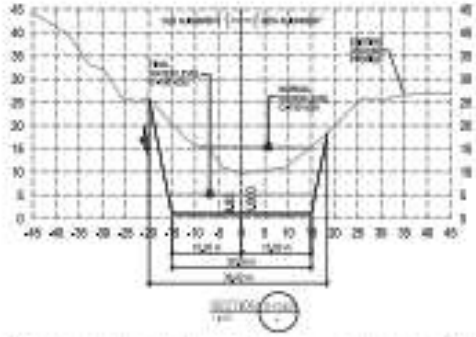
KAREBBE HYDROELECTRIC PROJECT

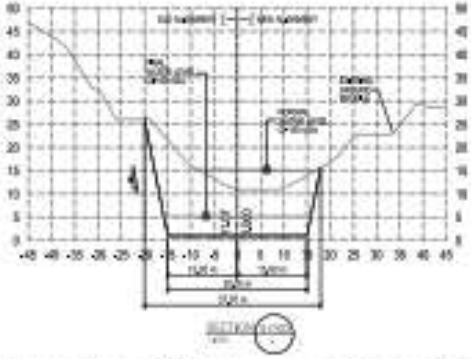
TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 3

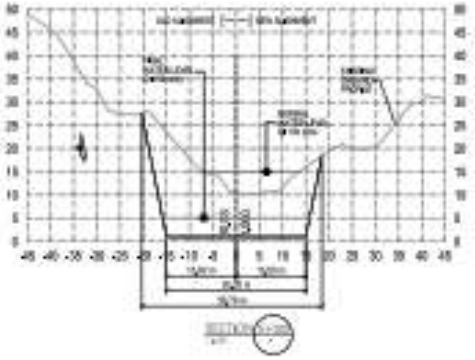
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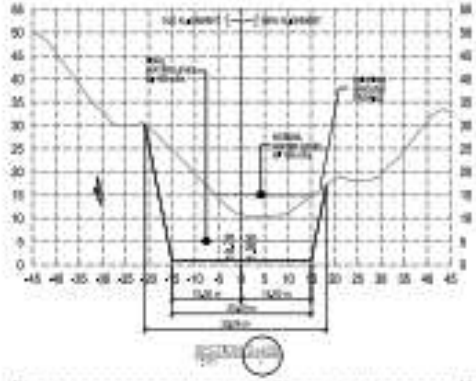
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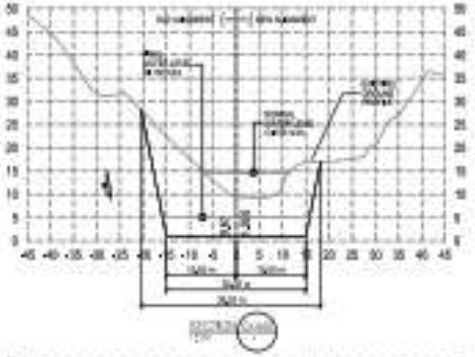


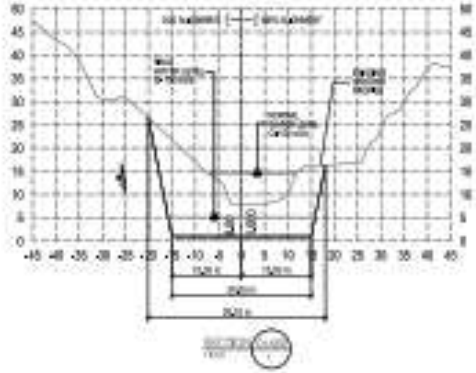


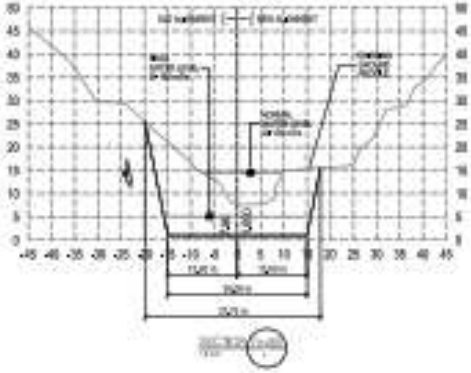


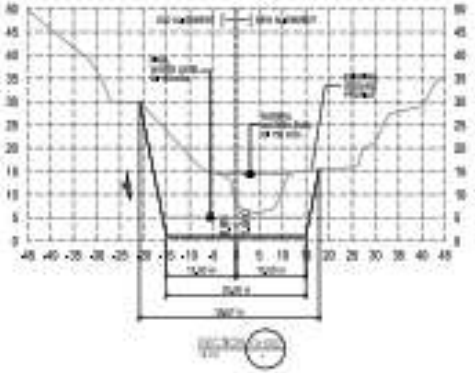














KARIMA – PP JO

PT. INTERNATIONAL WHO, INDONESIA

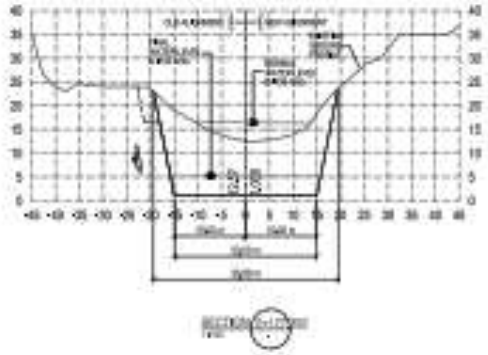
KAREBBE HYDROELECTRIC PROJECT

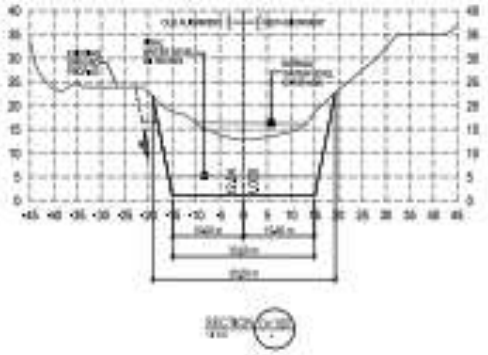
TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 2

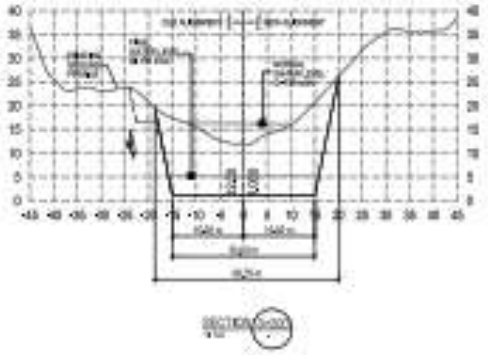
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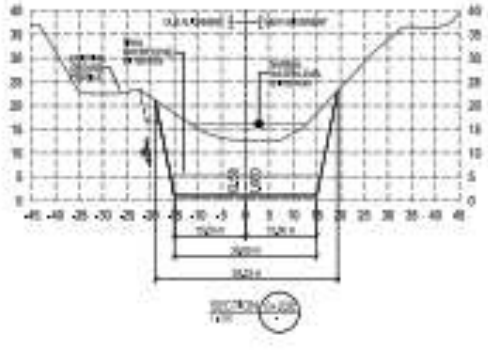
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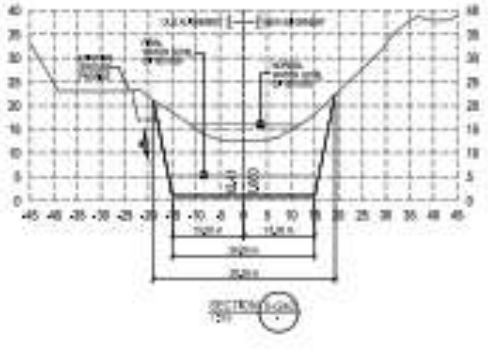
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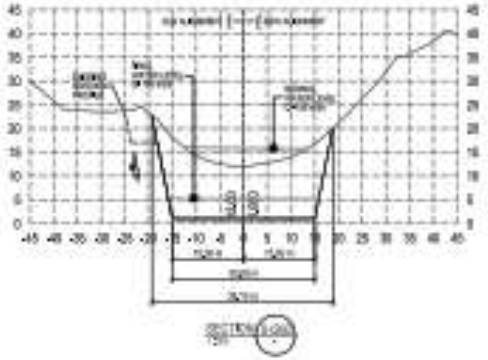


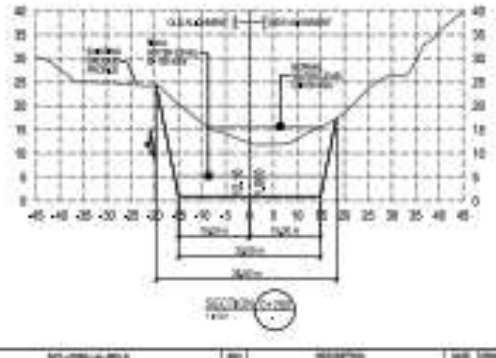


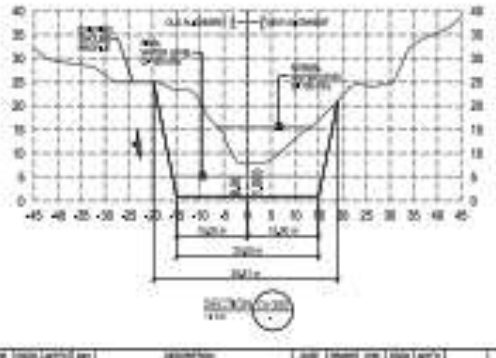


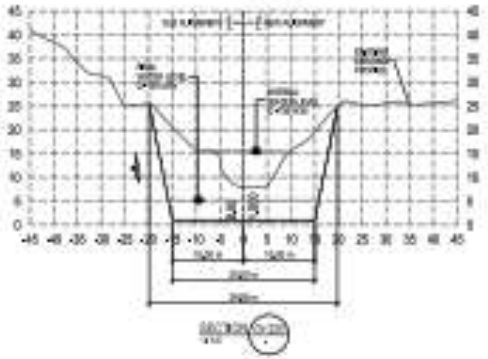












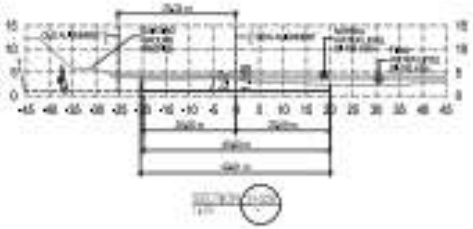
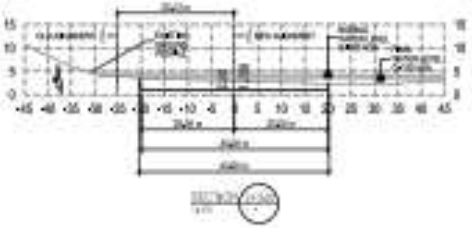
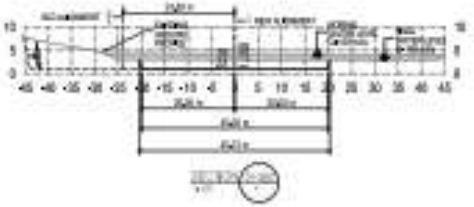
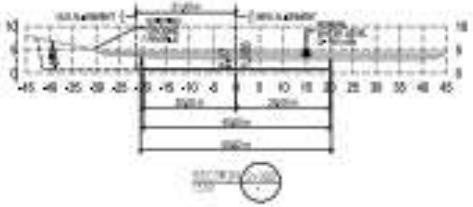
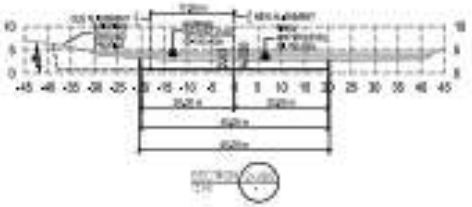
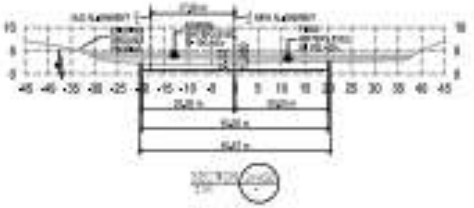
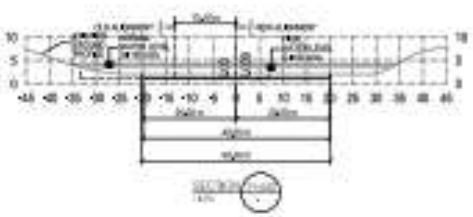
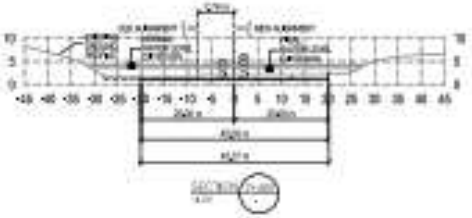
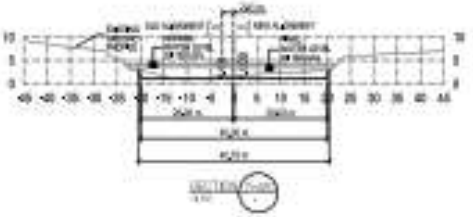
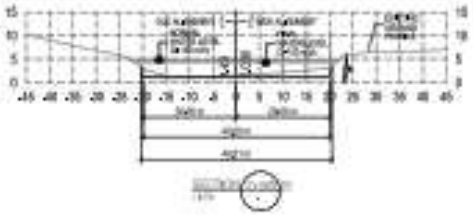
KAREBBE HYDROELECTRIC PROJECT

TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 1

47

SD-TR-GE-005

D

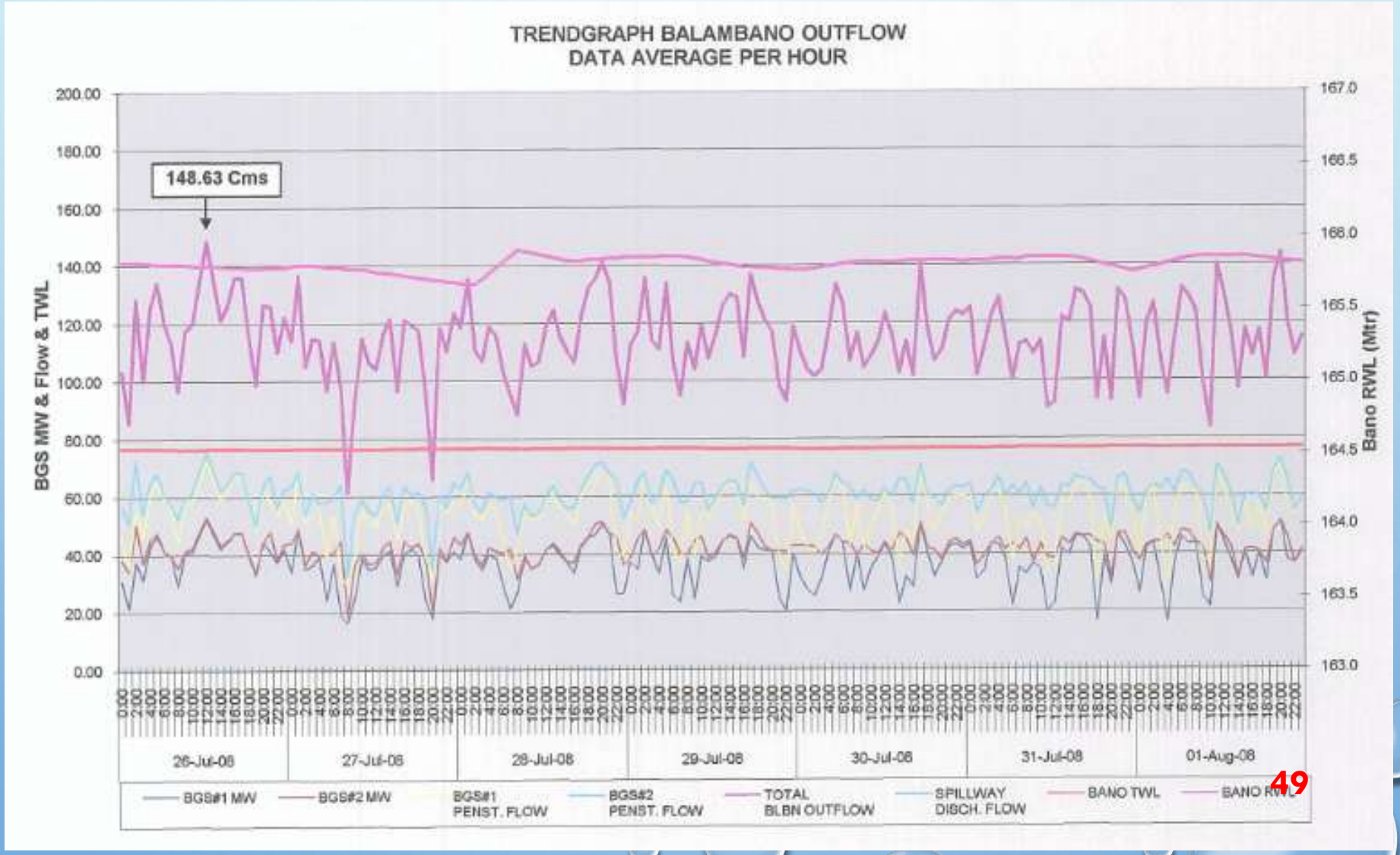

KARIBBE HYDROELECTRIC PROJECT

TAILRACE MODIFICATIONS
TYPICAL SECTIONS
SHEET 13

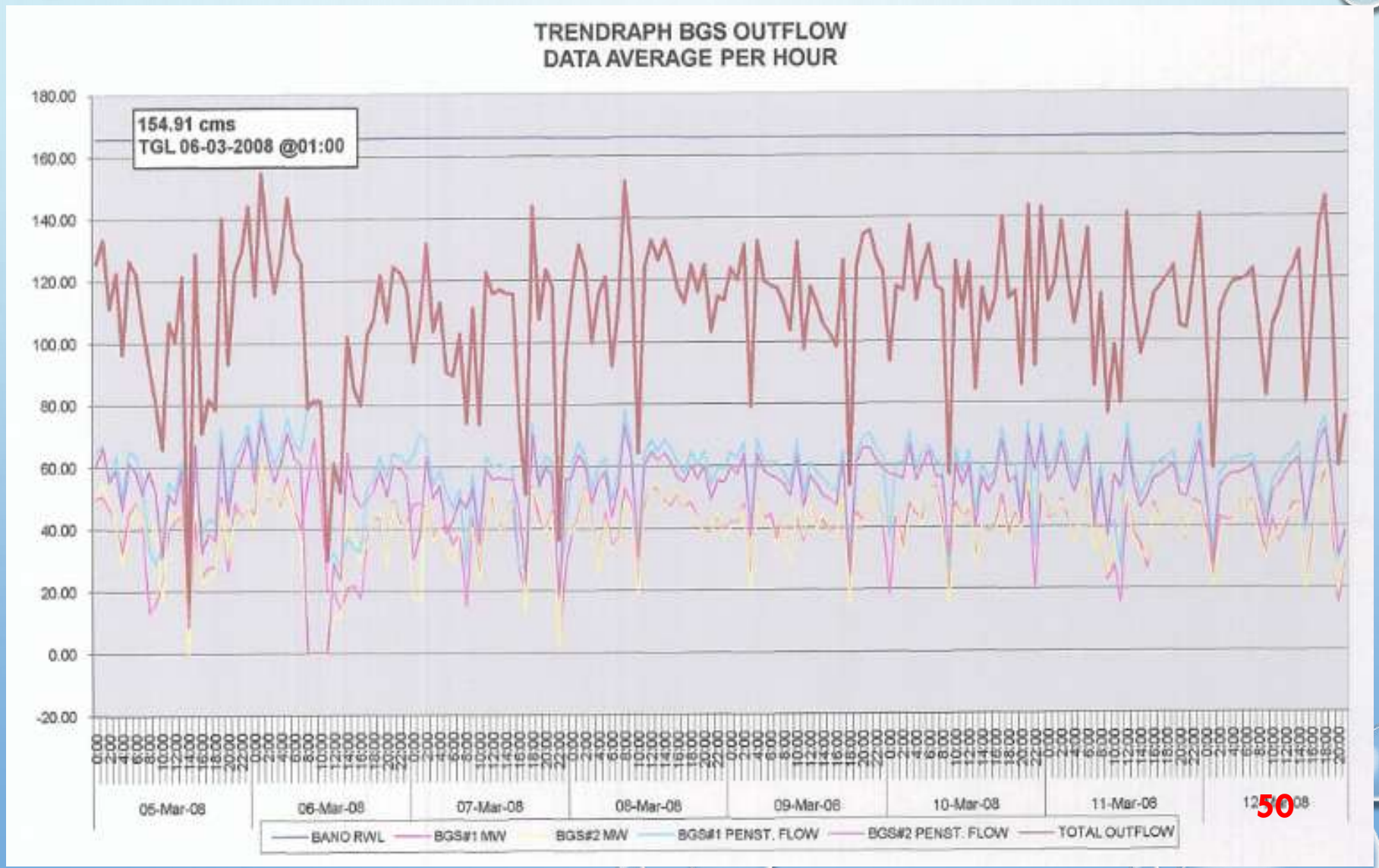
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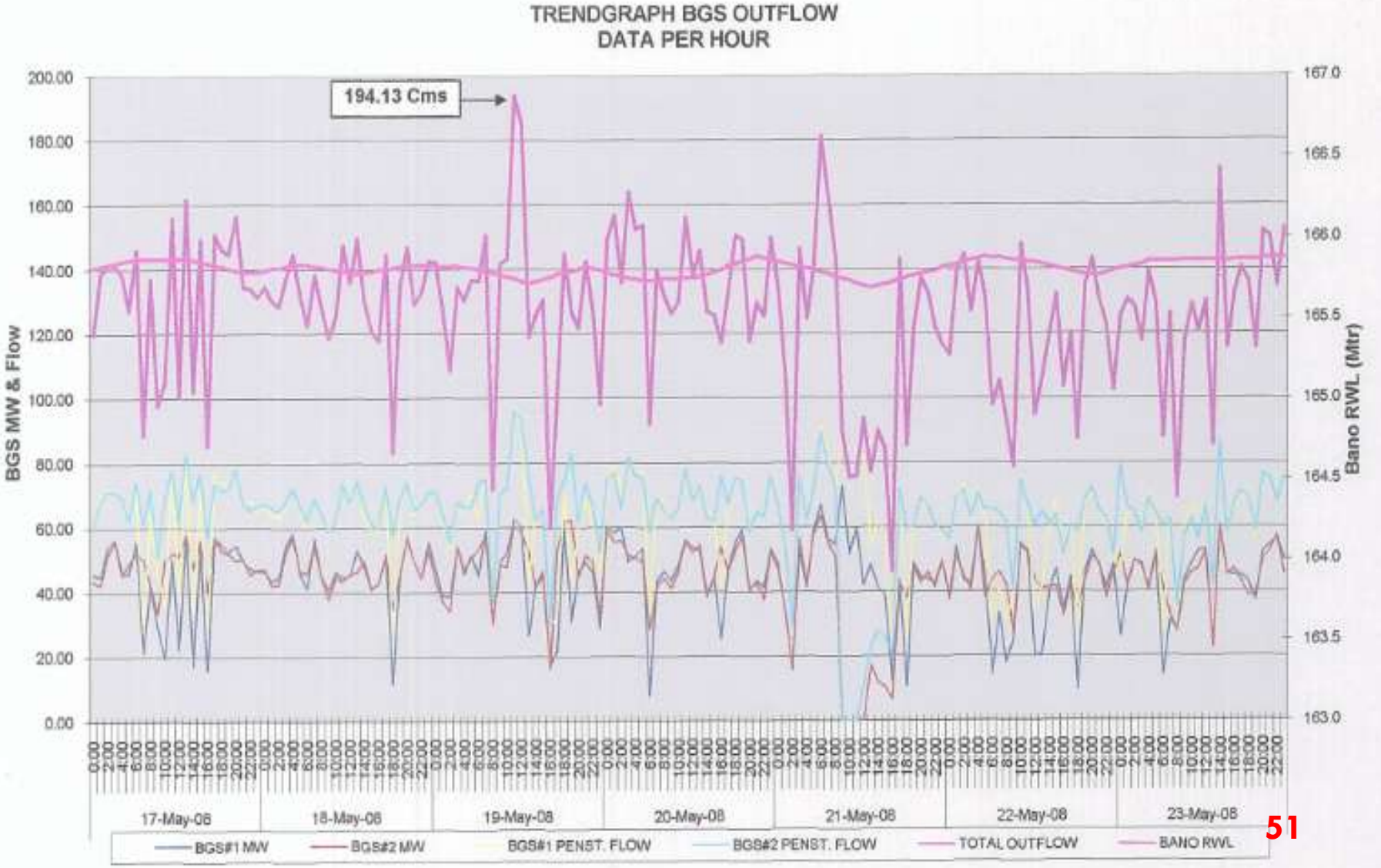
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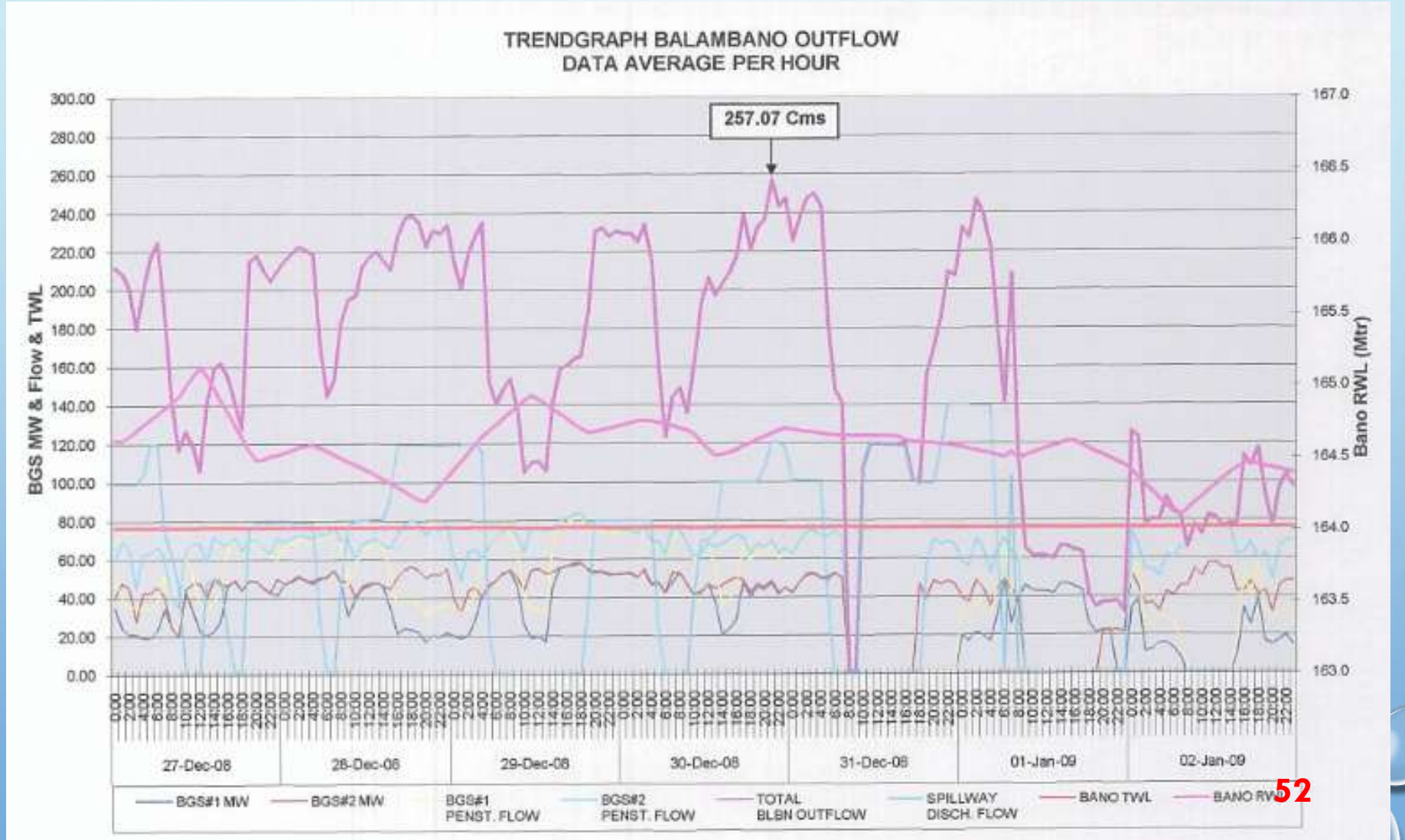

TRENDGRAPH BALAMBANO OUTFLOW
DATA AVERAGE PER HOUR
148.63 Cms
BGS MW & Flow & TWL
Bano RWL (Mtr)
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
167.0
166.5
166.0
165.5
165.0
164.5
164.0
163.5
163.0
26-Jul-08
27-Jul-08
28-Jul-08
29-Jul-08
30-Jul-08
31-Jul-08
01-Aug-08
BGS#1 MW
BGS#2 MW
BGS#1 PENST. FLOW
BGS#2 PENST. FLOW
TOTAL BLBN OUTFLOW
SPILLWAY DISCH. FLOW
BANO TWL
BANO RWL

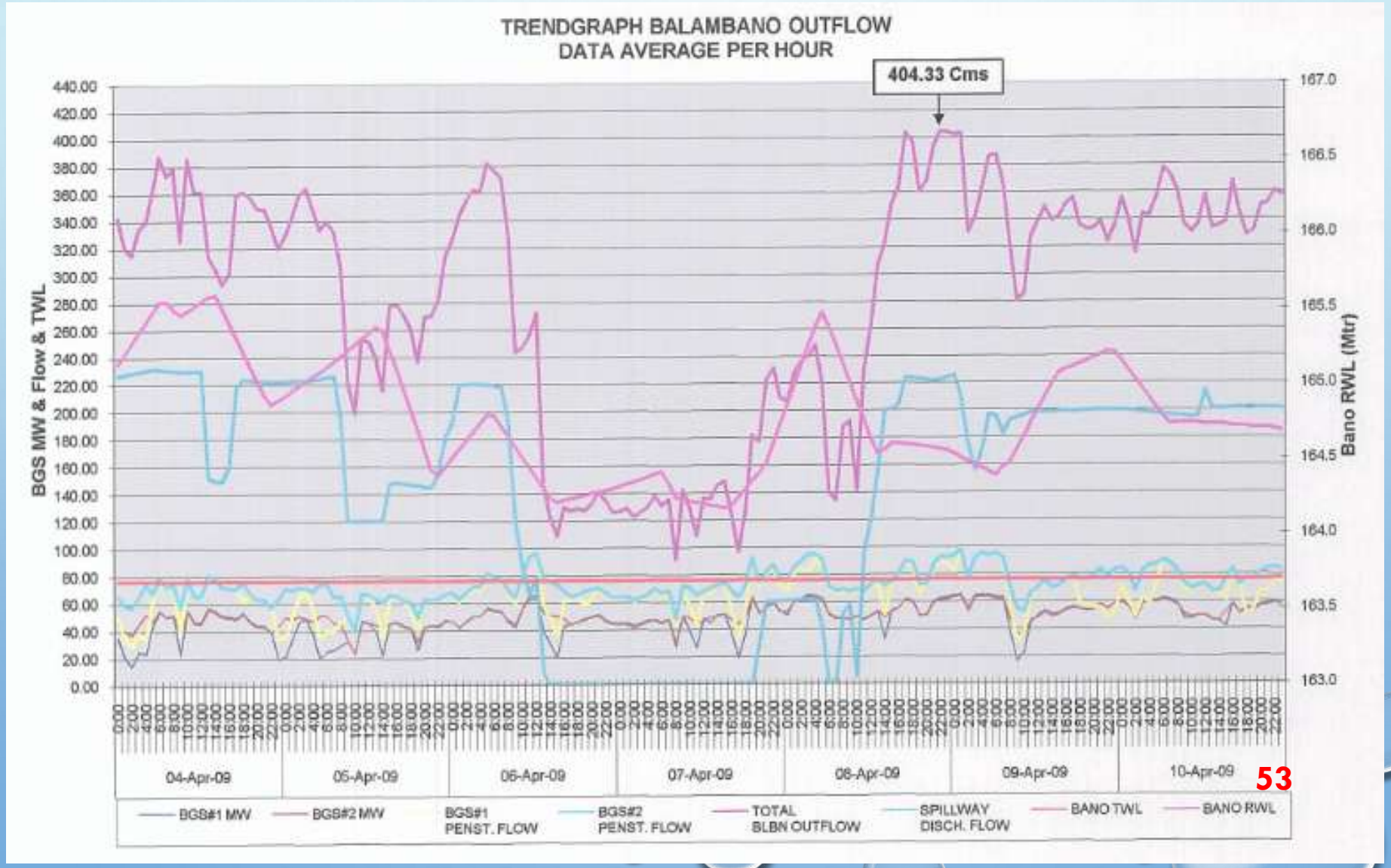
# DAILY WATER FLOW RECORD



# DAILY WATER FLOW RECORD




TRENDGRAPH BALAMBANO OUTFLOW
DATA AVERAGE PER HOUR
257.07 Cms
BGS MW & Flow & TWL
Bano RWL (Mtr)
300.00
280.00
260.00
240.00
220.00
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
167.0
166.5
166.0
165.5
165.0
164.5
164.0
163.5
163.0
27-Dec-08
28-Dec-08
29-Dec-08
30-Dec-08
31-Dec-08
01-Jan-09
02-Jan-09
BGS#1 MW
BGS#2 MW
BGS#1 PENST. FLOW
BGS#2 PENST. FLOW
TOTAL BLSN OUTFLOW
SPILLWAY DISCH. FLOW
BANO TWL
BANO RWL


TRENDGRAPH BALAMBANO OUTFLOW
DATA AVERAGE PER HOUR
404.33 Cms
BGS MW & Flow & TWL
Bano RWL (Mtr)
440.00
420.00
400.00
380.00
360.00
340.00
320.00
300.00
280.00
260.00
240.00
220.00
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
167.0
166.5
166.0
165.5
165.0
164.5
164.0
163.5
163.0
04-Apr-09
05-Apr-09
06-Apr-09
07-Apr-09
08-Apr-09
09-Apr-09
10-Apr-09
BGS#1 MW
BGS#2 MW
BGS#1 PENST. FLOW
BGS#2 PENST. FLOW
TOTAL BLBN OUTFLOW
SPILLWAY DISCH. FLOW
BANO TWL
BANO RWL

# 4. Bill of Quantities

# BILL OF QUANTITIES AND PROGRESS

| No. | Description | Unit | Contract | As of Jul | Final Complete |
|---|---|---|---|---|---|
| | | | | | |
| | **PHASE- 1** | | | | |
| | **Stage 1 - Left Bank** | | | | |
| TR.1 | Clearing and Grubbing | m2 | 8,200 | 4,286 | 8,200 |
| TR.2 | Ripable Rock | m3 | 52,000 | 29,415 | 29,415 |
| TR.2 A | Excavation Ripable Rock (New Road) | m3 | | 33,423 | 33,423 |
| TR.3.A | Blasted Rock (New Road) | m3 | | 9,420 | 9,420 |
| TR.4 A | Excavation Blasted Rock (New Road) | m3 | | 9,420 | 9,420 |
| TR.2B | Excavation Blasted Rock Stage-1 | m3 | | 16,070 | 16,070 |
| | **Stage 2 - Left Bank** | | | | |
| TR.3 | Rock Blasted | m3 | 112,650 | 122,538 | 118,608 |
| TR.4 | Rock Excavated | m3 | 102,900 | 58,471 | 102,538 |
| TR.5 | Smooth Blasting | m2 | 10,700 | 17,253 | 17,253 |
| TR.6 | Temporary fill for Access | m3 | 2,120 | 7,458 | 19,000 |
| | | | | | |

# BILL OF QUANTITIES AND PROGRESS

| No. | Description | Unit | Contract | As of Jul | Final Complete |
|---|---|---|---|---|---|
| | | | | | |
| | **Stage 3 - Right Bank** | | | | |
| TR.7 | Clearing and Grubbing | m2 | 1,630 | | 1,630 |
| TR.8 | Excavation - Overburden | m3 | 590 | | |
| TR.9 | Excavation - Rippable Rock | m3 | 10,570 | 3,081 | 3,082 |
| TR.10 | Blasting - Rock | m3 | 3,740 | | 2,394 |
| TR.11 | Excavation - Blasted Rock | m3 | 3,740 | 2,394 | 2,394 |
| TR.12 | Temporary Fill for Access | m3 | 2,220 | | 2,220 |
| | | | | | |
| | **Stage 4 - Right Bank** | | | | |
| TR.13 | Blasting - Rock | m3 | 93,490 | 73,031 | 135,192 |
| TR.14 | Excavation - Blasted Rock | m3 | 93,490 | 2,886 | 135,192 |
| TR.15 | Smooth Blasting | m2 | 8,640 | 6,180 | 8,640 |
| TR.16 | Temporary Fill for Access | m3 | 18,360 | 44,682 | 64,682 |
| | | | | | |
| | **Stage 5 - Riverbed** | | | | |
| TR.17 | Blasting - Rock | m3 | 55,850 | | 52,070 |
| TR.18 | Excavation - Blasted Rock | m3 | 65,640 | | 52,070 |
| | | | | | |

# BILL OF QUANTITIES AND PROGRESS

| No. | Description | Unit | Contract | As of Jul | Final Complete |
|---|---|---|---|---|---|
| | | | | | |
| | **PHASE 2** | | | | |
| | **Stage 1 - Left Bank** | | | | |
| TR.19 | Clearing and Grubbing | m2 | 5,510 | 13,155 | 13,155 |
| TR.20 | Excavation - Overburden | m3 | 2,820 | | |
| TR.21 | Excavation - Rippable Rock | m3 | 2,370 | 12,524 | 12,524 |
| TR.21A | Blasting - Rock | m3 | | 2,055 | 2,055 |
| TR.21B | Excavation Blasted Rock | m3 | | 529 | 2,055 |
| TR.22 | Temporary Fill for Access | m3 | 8,100 | 800 | 8,100 |
| | | | | | |
| | | | | | |
| | **Stage 2 - Left Bank** | | | | |
| TR.23 | Excavation - Rippable Rock | m3 | 27,510 | 15,238 | 15,238 |
| TR.24 | Blasting - Rock | m3 | 45,300 | 190,827 | 131,581 |
| TR.24A | Smooth Blasting | m3 | 0 | 3,913 | 3,913 |
| TR.25 | Excavation - Blasted Rock | m3 | 45,300 | 117,536 | 131,581 |
| TR.26 | Temporary Fill for Access | m3 | 30,690 | 24,720 | 30,690 |
| | | | | | |

# BILL OF QUANTITIES AND PROGRESS

| No. | Description | Unit | Contract | As of Jul | Final Complete |
|---|---|---|---|---|---|
| | | | | | |
| | **Stage 3 - Right Bank** | | | | |
| TR.27 | Clearing and Grubbing | m2 | 4,230 | 819 | 4,230 |
| TR.28 | Excavation - Overburden | m3 | 2,300 | | |
| TR.29 | Excavation - Rippable Rock | m3 | 7,450 | 287 | 287 |
| | | | | | |
| | **Stage 4 - Right Bank** | | | | |
| TR.30 | Excavation - Rippable Rock | m3 | 55,650 | 13,862 | 13,862 |
| TR.31 | Blasting - Rock | m3 | 99,970 | 105,738 | 89,508 |
| TR.32 | Excavation - Blasted Rock | m3 | 99,970 | 85,495 | 89,508 |
| TR.33 | Temporary Fill for Access | m3 | 96,860 | 34,576 | 76,860 |
| TR.34 | Place Fill in Channel Bed | m3 | 7,640 | | 7,640 |
| | | | | | |

# Chronology of Tailrace Water Flow Information

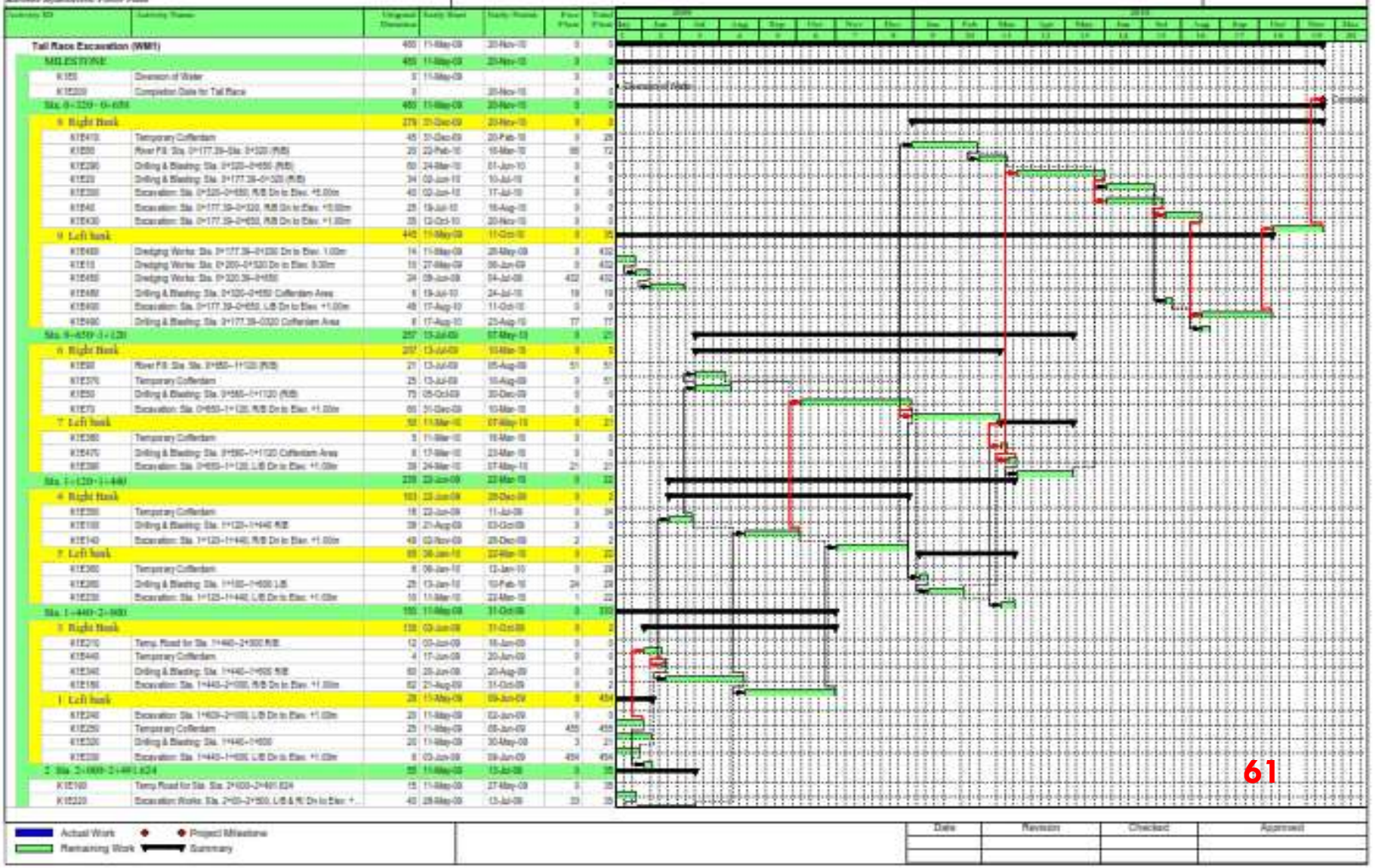
| ITEMS | DESCRIPTION | | | INFORMATION |
|---|---|---|---|---|
| | Supplemental Schedule of Quantities and Prices for Negotiation | | | |
| BOQ | Tailrace Modification for Phase 1, Stage 1 and Stage 2 | | | |
| | | | | |
| Drawing | 815-0025-C | Rev.1 | Tailrace Modifications Plan and Section | ***Section C (Ch:0+300)*** |
| | | | | Water Level = EL + 15.6m |
| | | | | Stage 1 Exc = EL+ 16m |
| | | | | Stage 2 Exc = EL + 6m |
| | | | | ***Section B (Ch:0+500)*** |
| | | | | Water Level = EL + 14.4m |
| | | | | Stage 1 Exc = EL+ 15m |
| | | | | Stage 2 Exc = EL + 1m |
| | | | | ***Section A (Ch:0+750)*** |
| | | | | Water Level = EL + 10.58m |
| | | | | Stage 1 Exc = EL+ 10.3m |
| | | | | Stage 2 Exc = EL + 1m |
| | 815-0082-H | Rev.2 | Tailrace Modifications Plan and Profile (Sheet-1) | ***(After Excavation of Phase 1)*** |
| | | | | Normal Water Level Q = 145m3/sec |
| | | | | Water Level = Aprox EL +5 m |
| | | | | Channel Envert = EL +1 m |
| | 815-0083-H | Rev.2 | Tailrace Modifications Plan and Profile (Sheet -2) | Normal Water Level Q = 145m3/sec |
| | | | | |

# 5. Construction Schedule

KAJIMA CORPORATION

Karnfuli Hydroelectric Power Plant

# TAILRACE MODIFIED SCHEDULE




Actual Work
Remaining Work
Project Milestone
Summary

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

# SCHEDULE ANALYSIS

SCHEDULE ANALYSIS ON TAILRACE MODIFICATION WORKS UPTO MAY 2009

| Major Works Description | PLAN | | | ACTUAL | | | Complete | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | Start | Finish | Duration | Strat | Finish | Duration | Percent | |
| **PHASE I** | | | | | | | | |
| Stage 1. Excavation Works | 22-Dec-07 | 26-Feb-08 | 67 | 15-Jan-08 | 16-Apr-08 | 93 | 100% | |
| Stage 1. Excavation Works Near Bridge | 15-Jun-08 | 20-Jun-08 | 6 | 1-Dec-08 | 27-Apr-09 | 148 | 100% | |
| Stage 2. Excavation Works | 27-Dec-07 | 18-Jun-08 | 175 | 3-Feb-08 | (on going) | | 59% | |
| Stage 3. Excavation Works | 19-Feb-08 | 21-Jun-08 | 124 | 16-Jun-08 | 30-Apr-09 | 319 | 14% | |
| Stage 4. Excavation Works | 17-Oct-08 | 11-Jan-09 | 87 | 16-Jun-08 | (on going) | | 7% | |
| Stage 5. Excavation Works | 12-Jan-09 | 12-Apr-09 | 91 | | | | 0% | |
| | | | | | | | | |
| | | | | | | | | |
| **PHASE II** | | | | | | | | |
| Stage 1. Excavation Works | 3-Mar-08 | 30-Mar-08 | 28 | 24-Mar-08 | (on going) | | 90% | |
| Stage 2. Excavation Works | 31-Mar-08 | 31-Jul-08 | 123 | 21-Mar-08 | (on going) | | 45% | |
| Stage 3. Excavation Works | 1-Jun-08 | 22-Jun-08 | 22 | 19-Jun-09 | (on going) | | 1% | |
| Stage 4. Excavation Works | 29-Jul-08 | 11-Feb-09 | 198 | 27-Jul-09 | (on going) | | 0% | |
| | | | | | | | | |
| | | | | | | | | |

# 6. Work Method Statement

# WORK METHOD OF STATEMENT

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1. **INTRODUCTION**
2. **RIVER WORKING CONDITION**
3. **PROPOSED WORKING SCHEDULE**
4. **SCOPE OF WORK**
   - 4.1. Work Performed
   - 4.2. Work Location
5. **REFERENCE DOCUMENTS**
6. **RESOURCES**
   - 6.1. Organizational Chart of the Work
   - 6.2. Roles and responsibilities
   - 6.3. Materials
   - 6.4. Equipment & Tools
   - 6.5. Manpower Work force

# WORK METHOD OF STATEMENT (11)

7. **WORK METHOD**
   - 7.1. Activity Flow Chart
   - 7.2. Work Description
   - 7.3. Sequence of Work
8. **EHS (ENVIRONMENTAL, HEALTH & SAFETY PLAN)**
9. **QA/QC (Quality Control/Quality Assurance**
   - 9.1. Quality Control
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10. **SCHEDULE**
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    - 10.2. Equipment Schedule
11. **ATTACHMENTS**
    - 11.1. Work Location Plan
    - 11.2. Work Method

## 1. INTRODUCTION

This method of statement serves as guidelines for the client and the contractor in determining the feasibility of work based on the information gathered from client and to the actual site condition. It also relies on the proposed methodology given by the client on the excavation procedure for left bank and right bank of tailrace.

## 2. RIVER WORKING CONDITION

The contractor assumed that the river flow has an average water flow of 150 cubic meters per second. And based on this assumption, average water surface area required is computed in every station.

## 3. PROPOSED WORK SCHEDULE

The contractor will work on a basis of six (6) working days in a week and a proposed shifting schedule as follows:

| | | |
|---|---|---|
| a. Working Time: | 12 hours | day shift |
| b. Working Time: | 24 hours | day & night shift. |

## 4. SCOPE OF WORK

This Work Method Statement (WMS) covers the work of developing the main dam tailrace by excavating the ground level down to elevation +1.00m. The approximate remaining volume of excavation is around 521,000 cubic meters of rock. The excavated rock will be stockpiled and used for reinstating and developing the access road of the project as well as the cofferdam structure. The boundary line of excavation should be in accordance to the Project Specification and Drawings issued by the client.

### 4.1. Work Performed

a.) Temporary Roads
b.) River Fill
c.) Drilling & Blasting
d.) Excavation

### 4.2. Work Location

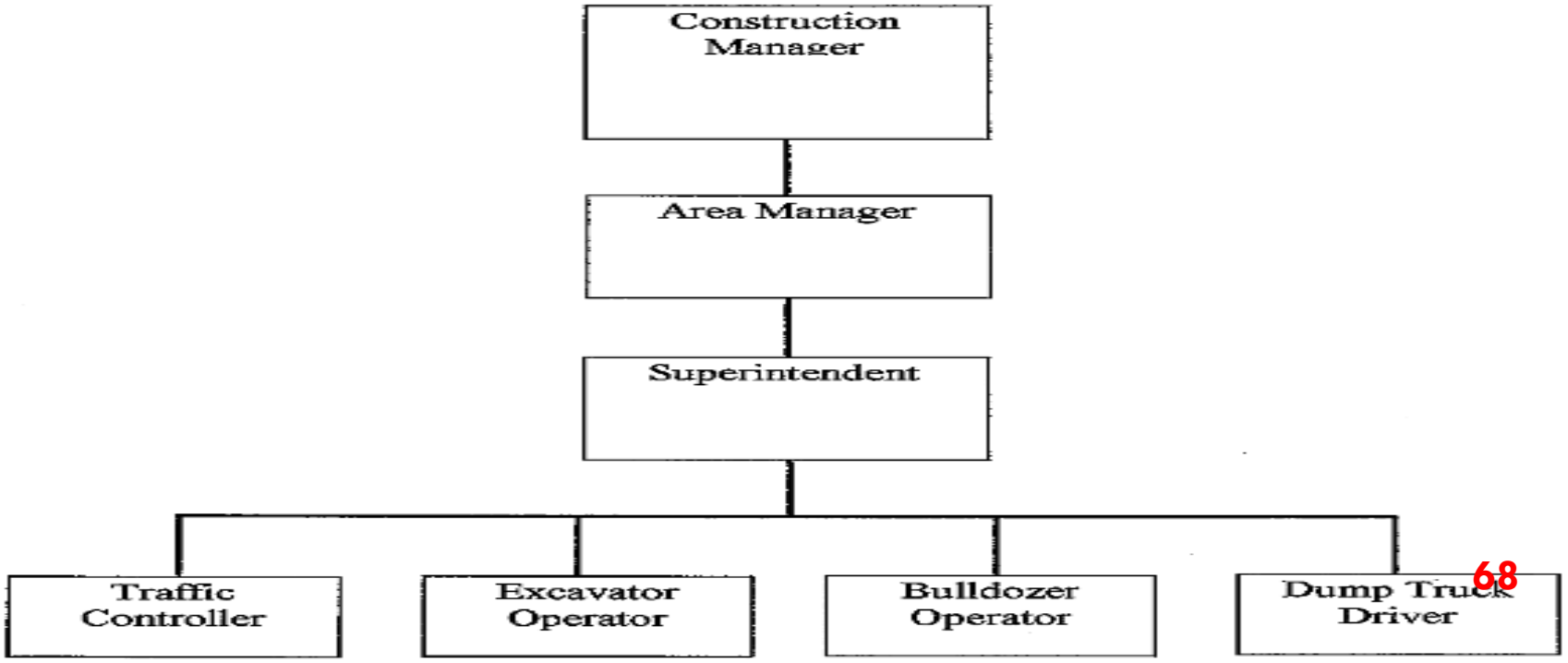
Downstream of Main Dam: Sta. 0+177.39~Sta. 2+491.624.

## 5. REFERENCE DOCUMENTS

5.1. Project Contracts & Specifications.
5.2. Specification for Clearing and Excavation.
5.3. EHS Standards.
5.4. Drawings.

## 6. RESOURCES

6.1. Organizational Chart for this Work



## 6.2 Roles and Responsibilities

### 6.2.1 Construction Manager

- ✓ Planning the work.
- ✓ Checking the work progress.
- ✓ Ensuring work safety.

### 6.2.2 KPP Subcontractor's Field Supervisor / Foreman

- ✓ Conduct daily tool box talk on the work condition / activities before start of work.
- ✓ Control of field operations by instructing and checking the daily activities of operators/workers.
- ✓ Obtaining necessary materials, equipment and tools for the work.
- ✓ Ensuring all workers are equipped and using the appropriate PPE.
- ✓ Checking the condition of equipment and tools being used by the operators/workers and arranging for necessary repair or replacement of unsafe equipment and tools.
- ✓ Identifying and removing safety hazards in the field work and environment.
- ✓ Immediately reporting any incident or accident to the Construction Manager and HSE personnel.
- ✓ Take advice from HSE personnel on unsafe act and unsafe conditions.

### 6.2.3 KPP Subcontractor's Operators / Workers

- ✓ Performing jobs in accordance with the Field Supervisor / Foreman's instructions.
- ✓ Responding immediately to safety instructions from the Field Supervisor / Foreman / HSE Inspector(s).
- ✓ Using the necessary PPE.
- ✓ Working safely and efficiently.
- ✓ Reminding and warning each other (or any other person) of safety hazards.
- ✓ Immediately reporting any incident or accident to the Foreman, Field Supervisor or HSE personnel.

### 6.2.4 HSE Inspector

- ✓ Inspecting the field work.
- ✓ Identifying safety hazards.
- ✓ Instructing the Field Supervisor, Foreman or Workers to remove unsafe equipment/tools and to remedy unsafe working condition.

### 6.2.5 QC Inspector

- ✓ Inspecting the field work in accordance with the requirements of project specifications.

## 6.3 Materials

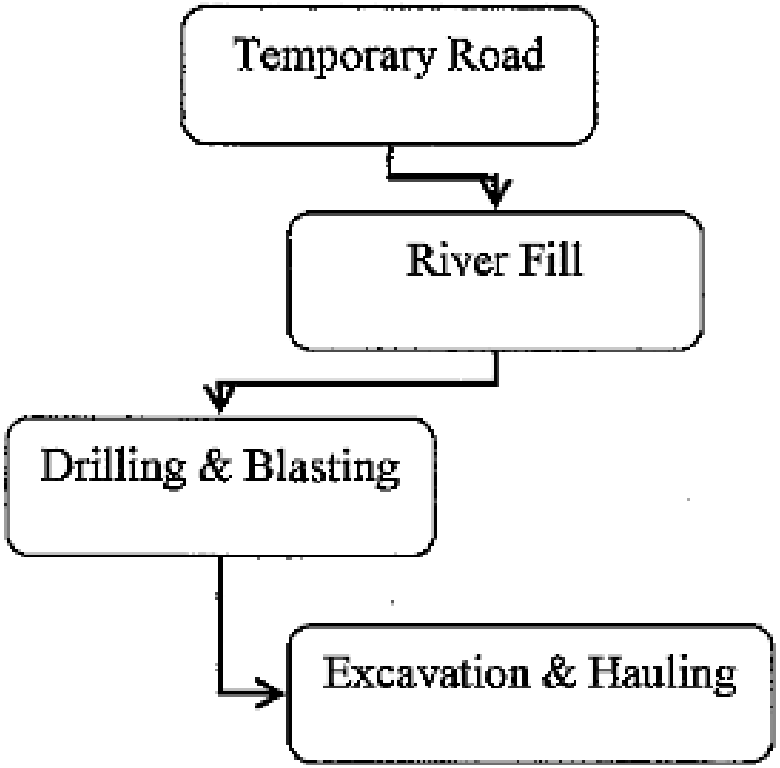
- N/A.

## 6.4 Equipment and Tools

| Equipment | Num. of Units | Use |
|---|---|---|
| Bulldozer (D650) | 1 | Spreading of excavated materials. |
| Excavator (EX1200) | 2 | Excavating blasted rock. |
| Crane 250T | 1 | Dredging Excavation |
| Dredging Bucket | 1 | Dredging Excavation |
| Excavator (PC650) | 1 | Loading of Materials |
| Dump Truck (Terex/Euclid) | 5 | Materials hauling. |
| Drilling Machine | 3 | Drilling of Holes |
| Boom Truck | 1 | Maintenance |
| Generator | 2 | Dewatering |
| Water Pump (8") | 2 | Dewatering |

## 7. WORK METHOD

### 7.1. Activity Flow Chart



## 7.2. Work Description

### 7.2.1. Temporary Road

Access road used to haul and deliver the excavated materials on designated disposal area.

### 7.2.2. River Fill

Embankment of river bed for drilling and blasting works. It also serves as the platform of equipment for excavation.

### 7.2.3. Drilling and Blasting

It is the procedure used to break or disintegrate the rock formation. Blasting materials is provided by the client.

### 7.2.4. Excavation and Hauling

Excavation works of river bed down to design elevation +1.00m.

## 7.3. Sequence of Work

- ✓ The sequence of work is divided into steps and stationing. Most of the steps in each stationing have common activities as stated in the flow chart.

- ✓ Sta. 1+440~2+000 L/B

In the first step of work, a temporary cofferdam is established to make a partition between left bank and right bank. Sta. 1+600~2+000 left bank is excavated down to design elevation +1.00m. Simultaneously, temporary road for Sta. 2+000~2+491.624 will do using excavated materials in Sta. 1+600~2+000. Sta.1+440~1+600 will likewise start drilling and blasting. After completion of excavation works in Sta. 1+600~2+000, Sta. 1+440~1+600 will be next. Estimated of cut is about 14,700$m^3$. Approximate volume of fill is approximately 6,000$m^3$. Estimated duration of work is 25days.

- ✓ Sta. 2+000~ 2+491.624 Left & Right Bank

Excavated materials in station 1+440~2+000 L/B are enough to make a temporary access going to end of tail race. Estimated volume of fill is approximately 12,000m3.The design width of platform is 20 meter square in the end with a 10 meter width temporary access. To pass the water in the left bank during excavation, an overflowing access road will be made.

Long arm backhoe is being used to reach both left bank and right bank. Blasting is assumed not necessary. Estimated volume of cut is 29,700$m^3$. Estimated duration of work is 55 days.

✓ Sta.1+440~2+000 R/B

While excavation is on going at the left bank area, a temporary access is established at the right bank. Right bank area will be close by cofferdam after completing the left bank excavation and divert the water flow at the left bank. Drilling and blasting works start after completing the diversion of water flow. Estimated volume of cut is 92,960$m^3$. Estimated duration of excavation work is 62 days.

✓ Sta.1+120~1+440 R/B & L/B

At this stage, both right bank and left bank will do drilling and blasting works. Right bank drilling and blasting can start after station 1+440~2+000 has been completed. Excavation works will start after completing station 1+440~2+000 right bank area. Estimated volume of excavation is 72,490. Estimated duration of excavation work is 49 days.

Left bank area will not be started, unless, at least a 40 meter long excavation work at the right bank of station 0+650~1+120 is being done. This will be done to allow the water flow to transfer in right bank of this station. After diversion of water flow, drilling and blasting works begin. Excavation works proceeds after station 0+650~1+120 R/B has been done. Estimated volume of cut is 14,8000$m^3$. Estimated duration of excavation work is about 10 days.

✓ Sta.0+650~1+120 R/B

Drilling and blasting works proceed after station 1+120~1+440 is completed. Excavation works should follow after excavation works in station 1+120~1+440 is also completed. Estimated volume of cut is 90,000$m^3$. Estimated duration of excavation work is 60 days.

On the left bank area, the cofferdam in between L/B & R/B must be drilled and blasted. This portion of river bed is intentionally not blasted to make the middle cofferdam stable. Excavation works commence after station 1+120~1+1440 L/B excavation is complete. Estimated volume of cut is 44,000$m^3$. Estimated duration of excavation work is 39 days.

✓ Sta.0+177.39~0+650 R/B & L/B

At this station, left bank portion was cut down to elevation +8.00m using dredging method. Building cofferdam in the right bank portion will start during excavation in station 0+650~1+120. If after cofferdam was completed, and strong water seepage occurs, backfilling of right bank at least the same water level will establish. Drilling and blasting will start.

Excavation procedure starts at the leftmost part of the right bank. Excavation limit is down to maximum reach of backhoe. After excavation of almost half of river section, water level can be reduced. This time platform for excavation can be reduced also to a water surface limit. There is a possibility that excavation works cannot be done in two stages. Therefore, the plan is to lower down the right bank of the river to at least +5.00m or less. Then, divert the water to the right bank.

After diversion of water flow to the right bank of the river, excavation work at the left bank starts. After completing the left bank excavation works down to elevation +1.00m, divert again the water to the left bank of river.

This time remaining portion of the right bank will then excavate to design elevation +1.00m.

## 8. EHS (Environmental, Health and Safety Plan)

All EHS requirements such as Risk Assessment and Job Safety Analysis will be in accordance with PTI Major Hazard Standards and KPP EHS & Security Management Plan (KPP Doc. No. KPP-K3A-EHS-0810-2501).

## 9. QA/QC (Quality Control / Quality Assurance

### 9.1. Quality Control Program

Quality Control Program shall include the following:

- ✓ Segregation of suitable materials to unsuitable materials.
- ✓ Stockpiling of materials.
- ✓ Excavation boundary limits.
- ✓ Drilling and Blasting works.

### 9.2. Quality Assurance Program

Contractors' QA/QC engineers will conduct routine inspection on stockpile area and conduct sample test if necessary.

## 10. SCHEDULE:

10.1. **Master Schedule.** (See attachment)

10.2. **Equipment Schedule.** (See Attachment)

## 11. Attachments:

# 7. Job Safety Analysis

PT INCO
PT International Nickel Indonesia Tbk

# JOB SAFETY ANALYSIS

| Issued on | Date: 01 Nov 2008 | Time: 08.00 | JSA#KPP-0025 |
|---|---|---|---|

## 1. Is a JSA Required? Answer the following questions and sign to confirm your decision.

| Question | Answer (Yes/No) | Action Required! |
|---|---|---|
| Is the task being considered a routine job? | No | No! – A JSA must be completed! |
| Is the task controlled by a Standard Operating Procedure (SOP)? | Yes | No! – A JSA must be completed! |
| Are there unusual conditions or has the scope of work changed? | Yes | Yes! – A JSA must be completed! |

| | |
|---|---|
| **2. Department:** | KAJIMA PP JO |
| **3. Location:** | KAREBBE |

**4. Task Description:** Brief describe the job to be done or Standard Operating Procedure to be reviewed

Working Near or In Water

## 5. Identify Hazards: Answer the questions below to identify the hazards associated with the Job!

| Hazard | Questions | Yes / No | How will you control the identified hazards? |
|---|---|---|---|
| 1. Human Movement | Is manual handling (lifting, pushing, pulling) required? | Yes | |
| 2. Human Position | Will the task require awkward posture or repetitive movement? | Yes | |
| 3. Gravitational (People) | Is there a risk of slipping, twisting, tripping or falling?<br>Is it possible to fall from height? | Yes | |
| 4. Gravitational (Objects) | Could objects fall from above?<br>Can objects (ladders, tools) fall over or drop? | Yes | |

## 5. Identify Hazards: Answer the questions below to identify the hazards associated with the Job!

| Hazard | Questions | Yes / No | How will you control the identified hazards? |
|---|---|---|---|
| 1. Human Movement | Is manual handling (lifting, pushing, pulling) required? | Yes | |
| 2. Human Position | Will the task require awkward posture or repetitive movement? | Yes | |
| 3. Gravitational (People) | Is there a risk of slipping, twisting, tripping or falling?<br>Is it possible to fall from height? | Yes | |
| 4. Gravitational (Objects) | Could objects fall from above?<br>Can objects (ladders, tools) fall over or drop? | Yes | |
| 5. Equipment (Fixed) | Will fixed equipment be used?<br>Are guards in place? | Yes | |
| 6. Equipment (Mobile) | Will mobile equipment be used?<br>Will the equipment create a risk to people? | Yes | |
| 7. Equipment (Portable) | Will power tools be used?<br>Could power tools create a hazard?<br>Are guards in place? | Yes | |
| 8. Stored (Pressure) | Could pressure be released suddenly?<br>Will oxy-acetylene equipment be used? | No | |
| 9. Chemical | Will task involve hazardous chemicals?<br>Could people be exposed to chemicals? | No | |
| 10. Electrical | Could electrocution occur?<br>What tools could cause an electric shock? | No | |
| 11. Thermal | Are there any sources of extreme heat or cold? | No | |
| 12. Radiation | Are there any sources of radiation? | Yes | |
| 13. Object (Kinetic) | Could there be any flying objects?<br>Are there any free moving objects? | Yes | |
| 14. Noise | Will any task be noisy? | No | |
| 15. Biological | Is there a risk of infection? | No | |
| 16. Lighting | Is there adequate lighting? | Yes | |
| 17. Environment | Could the work be affected by storm or other environmental factors? | Yes | |

## 6. JSA Authorisation: Authorised by the worker if working alone and by the Supervisor if there is a team of workers

| | | | | | |
|---|---|---|---|---|---|
| Authorised by: | Tawakkal Saing | | Safety Officer | 01/03/08 | 08.00 |
| | Name & BN: | Signature: | Position: | Date: | Time: |

I have completed the JSA and have identified all of the hazards and will ensured controls are in place to protect myself and other workers from injury.

I have explained all controls to the other workers who have demonstrated understanding and committed to following the steps outlined in the JSA.

## 7. Is a Work Activity Briefing (WAB) required?

| | |
|---|---|
| I will provide the Work Activity Briefing on this JSA to all workers on this job before any work is commenced. | YES / NO |

| | | | | | |
|---|---|---|---|---|---|
| Work Team Supervisor: | Eko Septiyanto | | Site Supervisor | 28/09/07 | 08.00 |
| | Name & BN: | Signature: | Position: | Date: | Time: |

I have checked / authorised this JSA and agree that all hazards have been identified and controlled. All workers have been briefed on the controls identified in this JSA.

## 8a. Controls: Engineering Controls (examples)

| Control | Example of application. |
|---|---|
| ☐ Elimination / Minimisation | Lower speed, lower voltage, limit quantity, or substitute chemicals, equipment or tools.<br>Substituting processes, equipment, materials or other factors to reduce the hazard. |
| ☐ Enclosure | Using enclosed cabs or other structure for noisy equipment, or<br>Containing the hazard behind barriers, provide insulation. |
| ☐ Isolation | Using interlocks, machine guards, blast shields, welding curtains to control the exposure of the hazard. |
| ☐ Removal or redirection | Local exhaust to remove welding fumes, provide path for flow of process materials.<br>Clean up spilt materials, housekeeping. |

## 8b. Controls: Administrative (Procedural) Controls (examples)

| Control | Example of application. |
|---|---|
| ☒ Written Procedures | Standard Operating Procedures, Work Permits, and other documented Safe Work Practices. |
| ☐ Exposure Time Limitation | Commonly used to control work environment temperature extremes and ergonomic hazards. |
| ☐ Monitoring | Process to monitor the use of highly hazardous materials such as some chemicals. (eg gas testing) |
| ☐ Buddy System | Use of a work partner to monitor exposure to hazards. (eg flag men on roads) |

## 8c. Controls: Personal Protective Equipment (PPE). (examples)

| | | | |
|---|---|---|---|
| ☒ Standard PPE plus | ☐ Specialist Gloves | ☐ Fall Arrest Equipment | ☒ Safety Goggles |
| ☒ Hearing Protection | ☐ Fire Resistant Clothing | ☐ Fall Restraint Equipment | ☐ Face Shield |
| ☐ Respirator | ☐ SCBA | ☐ Flotation Aid | ☐ Other? |

## 9. Members of the Working Party:

I have read (or been told) about the controls outlined in this JSA and I fully understand and will comply.
I will report any additional hazards to my Supervisor if they occur during the work.

| Name & B/N | Signature | Name & B/N | Signature |
|---|---|---|---|
| 1. | | 16. | |
| 2. | | 17. | |
| 3. | | 18. | |
| 4. | | 19. | |
| 5. | | 20. | |
| 6. | | 21. | |
| 7. | | 22. | |
| 8. | | 23. | |
| 9. | | 24. | |
| 10. | | 25. | |
| 11. | | 26. | |
| 12. | | 27. | |
| 13. | | 28. | |
| 14. | | 29. | |
| 15. | | 30. | |

| # | JOB STEPS (Basic Task Sequence) | HAZARDS (What could go wrong? How could I be hurt?) | CONTROLS (How will I protect myself?) | SAFE? Yes / No |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| 9. | | | | |

# 8. Blasting Record

# BLASTING RECORD

**BLASTING RECORD**

| No. | Shot No. | Location | Stage | Upper Elevation | Lower Elevation | Station From | Station To | Average Width | Average Length | Hole No. | Diameter (mm) | Depth (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33 | Tailrace | Stage-2 | 15 | | 0+780 | 0+820 | | | 70 | 65 | 12-13 |
| 2 | 38 | Tailrace | Stage-2 | 15 | | 0+780 | 0+815 | 10 | | 40 | 76 | 6 |
| 3 | 47 | Tailrace | Stage-2 | 15 | | 0+760 | 0+740 | | | 32 | 65 | 12 |
| 4 | 47 | Tailrace | Stage-2 | 15 | | 0+760 | 0+740 | 10 | | 40 | 76 | 12 |
| 5 | 51B | Tailrace | Stage-2 | 12 | | 0+740 | 0+730 | 12 | | 36 | 76 | 12 |
| 6 | 51A | Tailrace | Stage-2 | 12 | | 0+740 | 0+730 | | | 41 | 65 | 12 |
| 7 | 58 | Tailrace | Stage-2 | 12 | wall | 0+730 | 0+710 | | | 81 | 65 | 12 |
| 8 | 60 | Tailrace | Stage-2 | 15 | | 0+730 | 0+710 | 14 | | 60 | 76 | 12 |
| 9 | 78 | Tailrace | Stage-2 | 12 | | 0+820 | 0+840 | | | 52 | 65 | 12 |
| 10 | 78 | Tailrace | Stage-2 | 15 | | 0+820 | 0+840 | 8 | | 33 | 76 | 12 |
| 11 | 87 | Tailrace | Stage-2 | 10 | | 0+840 | 0+880 | 10 | | 40 | 76 | 10 |
| 12 | 88 | Tailrace | Stage-2 | | | 0+840 | 0+880 | | | 50 | 65 | 10 |
| 13 | 89 | LD-9 Access Tailrace | | 26 | | 0+580 | 0+620 | | | 210 | 76 | 2-3 |
| 14 | 105 | Tailrace | Stage-2 | 19 | | 0+660 | 0+680 | 12 | | 65 | 76 | 13 |
| 15 | 105 | Tailrace | Stage-2 | 19 | | 0+660 | 0+680 | | | 79 | 65 | 13 |
| 16 | 119 | Tailrace | Stage-2 | | | 0+610 | 0+640 | | | 16 | 65 | 13 |
| 17 | 119 | Tailrace | Stage-2 | | | 0+610 | 0+640 | 12 | | 63 | 76 | 13 |
| 18 | 147 | Tailrace | Stage-2 | | | 0+950 | 0+980 | 8 | | 56 | 76 | 3 |
| 19 | 154 | Tailrace | Stage-2 | | | 0+960 | 0+990 | 14 | | 120 | 65 | 3 |
| 20 | 163 | Tailrace | Stage-2 | | | 0+580 | 0+620 | | | 130 | 65 | 13 |

# BLASTING RECORD

**BLASTING RECORD**

| No. | Shot No. | Location | Stage | Upper Elevation | Lower Elevation | Diameter (mm) | Depth (m) | Over Drill | Production Spacing | Production Burden | Perimeter Spacing | Area | Volume | Type | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33 | Tailrace | Stage-2 | 15 | | 65 | 12-13 | | | | 0.8 | 700 | | Pre-split | 21.2.08 |
| 2 | 38 | Tailrace | Stage-2 | 15 | | 76 | 6 | | 2 | 2 | | | 960 | Production | 26.2.08 |
| 3 | 47 | Tailrace | Stage-2 | 15 | | 65 | 12 | | | | 0.8 | 307 | | Pre-split | 5.3.08 |
| 4 | 47 | Tailrace | Stage-2 | 15 | | 76 | 12 | | 2 | 2 | | | 1920 | Production | 5.3.08 |
| 5 | 51B | Tailrace | Stage-2 | 12 | | 76 | 12 | | 2 | 2 | | | 1728 | Production | 8.3.08 |
| 6 | 51A | Tailrace | Stage-2 | 12 | | 65 | 12 | | | | 0.8 | 394 | | Pre-split | 8.3.08 |
| 7 | 58 | Tailrace | Stage-2 | 12 | wall | 65 | 12 | | | | 0.8 | 777.6 | | Pre-split | 12.3.08 |
| 8 | 60 | Tailrace | Stage-2 | 15 | | 76 | 12 | | 2 | 2 | | | 2880 | Production | 17.3.08 |
| 9 | 78 | Tailrace | Stage-2 | 12 | | 65 | 12 | | | | 0.8 | 499 | | Pre-split | 26.3.08 |
| 10 | 78 | Tailrace | Stage-2 | 15 | | 76 | 12 | | 2 | 2 | | | 1584 | Production | 26.3.08 |
| 11 | 87 | Tailrace | Stage-2 | 10 | | 76 | 10 | | 2 | 2 | | | 1600 | Production | 2.4.08 |
| 12 | 88 | Tailrace | Stage-2 | | | 65 | 10 | | | | 0.8 | 400 | | Pre-split | 2.4.08 |
| 13 | 89 | LD-9 Access Tailrace | | 26 | | 76 | 2-3 | | 2 | 2 | | | 2100 | Production | 5.4.08 |
| 14 | 105 | Tailrace | Stage-2 | 19 | | 76 | 13 | | 2 | 2 | | | 3380 | Production | 19.4.08 |
| 15 | 105 | Tailrace | Stage-2 | 19 | | 65 | 13 | | | | 0.8 | 821.6 | | Pre-split | 19.4.08 |
| 16 | 119 | Tailrace | Stage-2 | | | 65 | 13 | | | | 0.8 | 166.4 | | Pre-split | 26.4.08 |
| 17 | 119 | Tailrace | Stage-2 | | | 76 | 13 | | 2 | 2 | | | 3276 | Production | 26.4.08 |
| 18 | 147 | Tailrace | Stage-2 | | | 76 | 3 | | 2 | 2 | | | 672 | Production | 8.5.08 |
| 19 | 154 | Tailrace | Stage-2 | | | 76 | 3 | | 2 | 2 | | | 1440 | Production | 10.5.08 |
| 20 | 163 | Tailrace | Stage-2 | | | 65 | 13 | | | | 0.8 | 1352 | | Pre-split | 14.5.08 |

# 9. Fuel Usage Record

# FUEL USAGE RECORD

| | | Effective Ratio | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Invoice Month Year | Total Temporary Filling(m3) | Total Excavation Rock (m3) | Total Excavation Rippable (m3) | Total Blasting Rock(m3) | Total Smooth Blasting(m2) | Total Temporary Filling(m3) | Total M3 | Fuel Used | Lit/m3 |
| | | 47.50% | 17.25% | 16.45% | | 18.80% | | 100.00% | |
| Dec-07 | 0.00 | - | - | - | - | - | - | | |
| Jan-08 | 0.00 | - | - | - | - | - | - | | |
| Feb-08 | 2,213.03 | - | - | - | - | 416.05 | 416.05 | | |
| Mar-08 | 11,787.28 | - | - | 1,755.84 | - | 2,216.01 | 3,971.85 | | |
| Apr-08 | 1,597.11 | - | - | 1,440.06 | - | 300.26 | 1,740.32 | 95,215 | 54.71 |
| May-08 | 1,472.00 | - | - | 1,977.95 | - | 276.74 | 2,254.68 | 68,039 | 30.18 |
| Jun-08 | 0.00 | 1,554.68 | 564.59 | 1,106.92 | - | - | 3,226.19 | 69,108 | 21.42 |
| Jul-08 | 160.96 | 5,674.64 | 2,060.79 | 1,678.82 | - | 30.26 | 9,444.52 | 126,858 | 13.43 |
| Aug-08 | 0.00 | 1,907.19 | 692.61 | 2,214.83 | - | - | 4,814.63 | 89,501 | 18.59 |
| Sep-08 | 0.00 | - | - | 4,573.36 | - | - | 4,573.36 | 82,326 | 18.00 |
| Oct-08 | 0.00 | 2,177.50 | 790.78 | 1,073.86 | - | - | 4,042.13 | 35,129 | 8.69 |
| Nov-08 | 0.00 | 192.70 | 69.98 | 2,704.38 | - | - | 2,967.06 | 37,011 | 12.47 |
| Dec-08 | 0.00 | - | - | 1,211.38 | - | - | 1,211.38 | 82,652 | 68.23 |
| Jan-09 | 0.00 | 376.24 | 136.63 | 2,463.55 | - | - | 2,976.42 | 89,586 | 30.10 |
| Feb-09 | 0.00 | - | - | 1,841.08 | - | - | 1,841.08 | 94,619 | 51.39 |
| Mar-09 | 0.00 | 17,474.17 | 6,345.88 | 3,712.11 | - | - | 27,532.16 | 133,510 | 4.85 |
| Apr-09 | 0.00 | 2,233.60 | 811.15 | 1,652.24 | - | - | 4,696.99 | 76,348 | 16.25 |
| May-09 | 0.00 | 2,390.53 | 868.14 | 955.42 | - | - | 4,214.09 | 41,225 | 9.78 |
| Jun-09 | 39,544.43 | 973.60 | 353.57 | 1,545.48 | - | 7,434.35 | 10,307.00 | 146,912 | 14.25 |
| Jul-09 | 0.00 | 2,046.22 | 743.10 | 4,266.18 | - | - | 7,055.50 | 126,316 | 17.90 |
| Aug-09 | 0.00 | 3,367.62 | 1,222.98 | 1,051.16 | - | - | 5,641.76 | 121,718 | 21.57 |
| Sep-09 | 0.00 | 11,525.21 | 4,185.47 | 3,808.50 | - | - | 19,519.19 | 133,339 | 6.83 |
| Oct-09 | 10,543.57 | 8,492.53 | 3,084.13 | 2,331.62 | - | 1,982.19 | 15,890.47 | 174,594 | 10.99 |
| Nov-09 | 11,784.69 | 6,136.81 | 2,228.63 | 4,548.75 | - | 2,215.52 | 15,129.71 | 147,571 | 9.75 |
| Dec-09 | 28,017.66 | 4,452.75 | 1,617.05 | 5,013.80 | - | 5,267.32 | 16,350.92 | 214,932 | 13.14 |
| Jan-10 | 0.00 | 17,263.25 | 6,269.28 | 7,646.78 | - | - | 31,179.32 | 251,161 | 8.06 |
| Feb-10 | 0.00 | 6,819.12 | 2,476.42 | 5,747.63 | - | - | 15,043.17 | 23,745 | 1.58 |
| Mar-10 | 0.00 | 11,449.02 | 4,157.80 | 1,163.34 | - | - | 16,770.17 | 132,400 | 7.89 |
| Apr-10 | 5,114.86 | 6,989.30 | 2,538.22 | 3,115.96 | - | 961.59 | 13,605.07 | 156,382 | 11.49 |
| | | | | | | | | | |
| | | | | | | Average | 242,027.30 | 2,750,197.00 | 11.36 |

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# 10. Explosive Used Record

# EXPLOSIVE USED RECORD

| Description | UOM | QUANTITY ORDER | TOTAL STOCK (1st,2nd & 3rd Shipment + Stock Nov. 07) | EXPLOSIVE USED Dec.13, 07 - June 25, 08 | STOCK ON HAND (at Larona Magazine) June 27, 2008 | Vendor Magazine in Balikpapan (OutStandingOrder) | In Country Stock (Larona & Balikpapan Magazine) | Summary Explosive for Talirace (KPP New Request) | New Purchase Order | MAGAZINE MAX. CAPACITY |
|---|---|---|---|---|---|---|---|---|---|---|
| **Class 5.1D** | | | | | | | | | | |
| Ammonium Nitrate (AN/FO) | Kg | 50,000 | 51,600 | 0 | 51600 | 0 | 51600 | | | [illegible] Kg |
| Bulk Emulsion | Kg | | | | | | | | | 150,000 Kg |
| **Class 1.1D** | | | | | | | | | | |
| **Packaged Explosives** | | | | | | | | | | |
| Powergel 50*400mm | Kg | 10,000 | 26,120 | 26,120 | 0 | 0 | 0 | 165,555 | 141,513 | |
| Powergel 32*200mm | Kg | 10,000 | 10,000 | 9,600 | 400 | 0 | 400 | 7,333 | | |
| Powergel 25*200mm | Kg | 50,000 | 26,600 | 19,025 | 7,575 | 23,400 | 30,975 | | | |
| **Presplit product** | | | | | | | | | | |
| Powersplit 32*400mm | Kg | | 9,620 | 6,680 | 2,940 | 0 | 2,940 | | | 25,000 Kg |
| **Boosters** | | | | | | | | | | |
| Boosters 150g | ea | 6,000 | 2,880 | 1,342 | 1,538 | 3,120 | 4,658 | | 5,040 | |
| **Detonating Cord** | | | | | | | | | | |
| Cordtex 10 (10g/m) | m | 30,100 | 42,480 | 27,763 | 14,717 | 2,100 | 16,817 | 149 | 30,100 | |
| **Class 1.1B** | | | | | | | | | | |
| **Down Hole Detonators** | | | | | | | | | | |
| Exel MS Det D12 (400ms) 6m | ea | 5,075 | 1,400 | 633 | 767 | 3,675 | 4,442 | | | |
| Exel MS Det D12 (400ms) 12m | ea | 10,000 | 5,218 | 3,396 | 1,822 | 5,100 | 6,922 | 2,345 | | |
| Exel MS Det D12 (400ms) 9m | ea | | | | | | | 670 | 5,000 | |
| Exel MS Det D12 (400ms) 15m | ea | | | | | | | 3,686 | 5,000 | |
| Electric Detonators | ea | | 4,634 | 4,362 | 272 | 0 | 272 | 159 | | |
| **Surface Connectors** | | | | | | | | | | |
| Exel Connectadet 4.5m 25ms | ea | 5,075 | 1,675 | 1,114 | 561 | 3,400 | 3,961 | 2,345 | 1,000 | |
| Exel Connectadet 4.5m 42ms | ea | 5,075 | 1,825 | 808 | 1,017 | 3,250 | 4,267 | | | |
| Exel Connectadet 4.5m 60ms | ea | | 1,698 | 393 | 1,305 | 0 | 1305 | | 3,000 | |
| Exel Connectadet 4.5m 75ms | ea | 5,075 | 1,775 | 654 | 1,121 | 3,300 | 4,421 | | | |
| Exel Connectadet 4.5m 100ms | ea | | | | | | | 670 | 1,000 | |
| **Underground Assemblies** | | | | | | | | | | |
| Tunnelmaster 4.5m Delay #1 | ea | 3,000 | 1,600 | 1,084 | 516 | 1,400 | 1,916 | | | [illegible] |
| Tunnelmaster 4.5m Delay #2 | ea | 3,000 | 1,600 | 998 | 602 | 1,400 | 2,002 | | | |
| Tunnelmaster 4.5m Delay #3 | ea | 3,000 | 1,600 | 698 | 902 | 1,400 | 2,302 | | | |
| Tunnelmaster 4.5m Delay #4 | ea | 3,000 | 1,800 | 1,167 | 633 | 1,200 | 1,833 | | | |
| Tunnelmaster 4.5m Delay #5 | ea | 3,000 | 1,800 | 1,306 | 494 | 1,200 | 1,694 | | | |
| Tunnelmaster 4.5m Delay #6 | ea | 3,900 | 2,400 | 1,344 | 1056 | 1,500 | 2,556 | | | |
| Tunnelmaster 4.5m Delay #7 | ea | 5,600 | 2,800 | 1,736 | 1064 | 2,800 | 3,864 | | | |
| Tunnelmaster 4.5m Delay #8 | ea | 3,400 | 2,600 | 1,913 | 687 | 800 | 1,487 | | | |
| Tunnelmaster 4.5m Delay #10 | ea | 2,800 | 2,800 | 1,991 | 809 | 0 | 809 | | | |
| Tunnelmaster 4.5m Delay #12 | ea | 3,200 | 2,800 | 2,070 | 730 | 400 | 1,130 | | | |
| Tunnelmaster 4.5m Delay #13 | ea | 3,800 | 3,600 | 3,600 | 0 | 200 | 200 | | | |
| Tunnelmaster 4.5m Delay #14 | ea | 6,300 | 3,200 | 2,752 | 448 | 3,100 | 3,548 | | | |
| **Nonel Lead in Line** | | | | | | | | | | |
| Nonel Lead in Line | Roll | 100 | 15 | 4 | 11 | 100 | 111 | | | |

# EXPLOSIVE DETAILS

| Description | UOM | QUANTITY ORDER |
|---|---|---|
| **Class 5.1D** | | |
| Ammonium Nitrate (AN/FO) | Kg | 50,000 |
| Bulk Emulsion | Kg | |
| **Class 1.1D** | | |
| **Packaged Explosives** | | |
| Powergel 50*400mm | Kg | 10,000 |
| Powergel 32*200mm | Kg | 10,000 |
| Powergel 25*200mm | Kg | 50,000 |
| **Presplit product** | | |
| Powersplit 32*400mm | Kg | |
| **Boosters** | | |
| Boosters 150g | ea | 6,000 |
| **Detonating Cord** | | |
| Cordtex 10 (10g/m) | m | 30,100 |

# EXPLOSIVE DETAILS

| | | |
|---|---|---|
| **Class 1.1B** | | |
| **Down Hole Detonators** | | |
| Exel MS Det D12 (400ms) 6m | ea | 5,075 |
| Exel MS Det D12 (400ms) 12m | ea | 10,000 |
| Exel MS Det D12 (400ms) 9m | ea | |
| Exel MS Det D12 (400ms) 15m | ea | |
| Electric Detonators | ea | |
| **Surface Connectors** | | |
| Exel Connectadet 4.5m 25ms | ea | 5,075 |
| Exel Connectadet 4.5m 42ms | ea | 5,075 |
| Exel Connectadet 4.5m 60ms | ea | |
| Exel Connectadet 4.5m 75ms | ea | 5,075 |
| Exel Connectadet 4.5m 100ms | ea | |

# EXPLOSIVE DETAILS

| Underground Assemblies | | |
|---|---|---|
| Tunnelmaster 4.5m Delay #1 | ea | 3,000 |
| Tunnelmaster 4.5m Delay #2 | ea | 3,000 |
| Tunnelmaster 4.5m Delay #3 | ea | 3,000 |
| Tunnelmaster 4.5m Delay #4 | ea | 3,000 |
| Tunnelmaster 4.5m Delay #5 | ea | 3,000 |
| Tunnelmaster 4.5m Delay #6 | ea | 3,900 |
| Tunnelmaster 4.5m Delay #7 | ea | 5,600 |
| Tunnelmaster 4.5m Delay #8 | ea | 3,400 |
| Tunnelmaster 4.5m Delay #10 | ea | 2,800 |
| Tunnelmaster 4.5m Delay #12 | ea | 3,200 |
| Tunnelmaster 4.5m Delay #13 | ea | 3,800 |
| Tunnelmaster 4.5m Delay #14 | ea | 6,300 |
| **Nonel Lead in Line** | | 95 |
| Nonel Lead in Line | Roll | 100 |

# 11. Environmental, Health and Safety

# Management Plan (22)

# EHS MANAGEMENT PLAN

## GENERAL EHS REQUIREMENTS FOR CONTRACTORS

1. Contractors working at PT Inco shall comply with all applicable legal requirements. In particular, they shall comply with relevant Sections of the Decree of the Minister of Mines & Energy No.555.K/26/M.PE/1995.
2. Contractors working at PT Inco shall comply substantially with applicable PT Inco EHS Standards. A full set of these standards is available from the EHS Department. PT Inco will routinely audit compliance with these Standards with the following consequences:

    a. Companies that are substantially non-compliant may be prevented from entering the site at the discretion of PT Inco;
    b. A Company's compliance with these Standards will be an important input into the tender evaluation process;
    c. A Safety Improvement Plan (SIP) may be required that demonstrates how the Company will progressively improve into compliance with the Standards.

3. Contractor Companies working at PT Inco shall comply with key PT Inco Standard Procedures as applicable. These are available from the EHS Department.
   Specifically, Contractor companies shall comply with the Standard Procedure *JSA* (SP02) and the Standard Procedure *Permit to Work* (SP04) in accordance with the criteria defined by these documents.
   Additionally, Contractor Companies are obliged to conduct risk assessments to meet requirements of the Major Hazard Standards. All risk assessments shall comply with the Standard Procedure *General Purpose Risk Assessment* (SP01).

# EHS MANAGEMENT PLAN

4. Contractor Management must ensure their employees are in good mental and physical health condition based on the requirements of their working environment.

5. Contractor Companies are accountable to ensure that the employees who drive light vehicles on PT Inco premises have a PT Inco Drivers license as well as an Indonesian driver's license. All drivers must follow the rules contained in the PT Inco Drivers Manual.

6. EHS sanctions as defined in *Buku Pedoman Hubungan Industrial* (*BPHI*) must be applied by Contractor Companies to all employees. A full record of disciplinary sanctions must be maintained and available for review.

7. Contractor Companies must provide all employees with Personal Protective Equipment as defined in the relevant EHS Standard (EHS 09) or as indicated by area signage.

8. Contractor Companies are accountable for ensuring that all persons working at PT Inco have attended the General Induction Program (GIP) before commencing work. Attendance is required at least every two years.

9. Where applicable, Contractor Companies are accountable for ensuring that all employees working in areas of risk have attended the relevant Site Specific Induction Program (SSIP).

10. Contractor Companies are accountable for ensuring that all employees working in areas of risk understand the hazards and the controls necessary for safe work.

# EHS MANAGEMENT PLAN

11. Contractor Companies are accountable for ensuring that personnel working
    a) at heights
    b) in confined spaces
    c) with rigging

    have successfully completed the relevant PT Inco training classes for these activities (PT Inco *Basic Safety Training or equivalent*).

12. Contractor Companies are accountable for ensuring that all employees understand the PT Inco Golden Rules (when implemented) or other special controls and requirements applicable to Contractor companies.

13. Contractor Companies are accountable for ensuring that all employees working on-site have a valid PT Inco ID badge and are registered on the work permit.

14. In the event of an accident involving Contractor Company personnel, the Contractor shall immediately notify the PT Inco EHS Department through the PT Inco Area Safety Representative. A preliminary investigation must be completed and submitted to the Contract sponsor and the PT Inco EHS Department before completion of the shift (max. 8 hours).

15. Contractor Companies shall immediately implement corrective actions to minimize the chances of a reoccurrence of any accident.

# EHS MANAGEMENT PLAN

16. All Contractors shall submit a monthly safety report to their sponsor, copied to the EHS Department, which summarizes all EHS incidents during that month and provides a year-to-date tally of disabling injuries, medical aid cases, first aid cases and vehicle accidents.

17. Management of Contractor companies are routinely obliged to attend the PT Inco Contractor EHS Forum.

18. Contractors who employ more than 50 employees must have a safety plan approved by the PT Inco EHS Department. This will be determined on a case-by-case basis.

19. Contractors must ensure they prevent delivery or usage of asbestos material in PT. Inco operational area.

20. Contractors must prevent any environmental pollution including hydrocarbon spill (such as fuel oil, lubrication oil or oil contaminated material).

21. Contractors should keep their working area clean and tidy complying with EHS 02 standard.

22. Contractors must ensure that no pollutants are allowed to enter into any water systems or rivers.

# 12. Project Site Rules and Regulations (33)

# PROJECT SITE RULES & REGULATIONS

**Karebbe Project Site Rules**

1. ***Inductions:*** All personnel must attend Safety Inductions before starting work on site.
2. ***PPE:*** All personnel must wear appropriate Personal Protective Equipment when on site, including high visibility vest (or approved equivalent) in operational areas.
3. ***ID Badges:*** Identification badges must be carried at all times on site and produced when requested.
4. ***Visitors:*** All visitors must be approved by the Project Manager and sign the visitors book (in and out). Visitors will be issued with temporary ID badge and must be accompanied at all times while on site. Visitors who will be on site for more than 1 day must attend a visitor's safety induction. Visitors are not permitted to perform any work on site.
5. ***Work Permits:*** All work on site is subject to obtaining Permit to Work unless exempted by the Project Manager, (E.g. catering or office staff).
6. ***Additional Permits:*** Additional permits are required for; Excavation, Confined Spaces, Equipment Isolation, High Voltage Access, and Hot Work.
7. **River Diversion:** All work conducted **inside** the River Diversion Zone (i.e. between the upstream coffer dam and the downstream coffer dam) is subject to Karebbe Project Permit to Work.

# PROJECT SITE RULES & REGULATIONS

8. **Larona River:** All work conducted **outside** the River Diversion Zone which is in an area below water level during normal operating conditions is subject to obtaining an authorized Permit to Work from Karebbe Project **and** PT Inco Utilities Department. (This type of work should only occur under controlled conditions during Hydro Plant shutdown).
9. ***Blasting Zones:*** No person shall enter a blasting zone or handle explosives unless authorized by the Blasting Engineer.
10. ***Explosives:*** All work related to Blasting and Explosives Handling must be conducted in accordance with the Karebbe Project Standard Operating Procedure (SOP) **"Explosives Handling and Use".**
11. ***Restricted Areas (Blasting):*** Larona Explosives Magazine and Balambano Quarry are restricted areas. Entry is subject to Specific Induction Program.
12. ***Supervision:*** All work on site must be supervised by competent persons.
13. ***Working at Height:*** All work at heights must be conducted in accordance with relevant Regulations, Standards and Procedures. The "100% Tie Off" rule will be enforced.
14. ***Working Near Water:*** All work near water (within 4 meters) must be conducted in accordance with relevant Regulations, Standards and Procedures.
15. ***Traffic signs & Speed limits:*** All drivers must obey traffic signs and speed limits.
16. ***Heavy Equipment:*** Priority must be given to Heavy Equipment Operations.
17. ***Mobile Equipment Operations:*** All persons must ensure that they wait until equipment operators have given them a clear signal that it is safe to drive or walk past operating mobile equipment. Special caution must be taken near Truck Loading operations.
18. ***Protection of Workers Above or Below:*** Effective barricades, fencing,

# PROJECT SITE RULES & REGULATIONS

signs, overhead protection, etc, must be used where work is conducted on multiple work levels.

19. ***Seat belts:*** Seat belts must be worn at all times when vehicles are in motion.
20. ***Flashing Light & Buggy Whip:*** Yellow "strobo" light and standard buggy whip with flag are required for all light vehicles entering operational areas.
21. ***Non-Smoking Areas:*** Smoking is not permitted inside buildings or in designated non-smoking areas.
22. ***Cranes and Rigging:*** All crane operators and riggers must posses relevant qualifications and trade certificates.
23. ***Scaffolding:*** All scaffolding must be erected and inspected by competent persons and comply with relevant standards.
24. ***Bridges:*** Load limit restrictions must be clearly posted and obeyed.
25. ***Driving Under Influence:*** It is prohibited to drive any vehicle while under the influence of excessive levels of alcohol (0.05% weight / volume) or drugs.
26. ***Alcohol & Drugs:*** The consumption of Alcohol & Illegal Drugs is prohibited within project areas.

# PROJECT SITE RULES & REGULATIONS

27. ***Passenger Vehicles:*** All vehicles used to carry passengers must be designed by the manufacturer for that purpose. Modified trucks or pick-up vehicles are not permitted unless engineered and certified by a competent body and approved by PT Inco
28. ***Drivers Licence:*** All drivers and equipment operators must posses a valid PT Inco driver's license and relevant Indonesian or International license.
29. ***Car Parking:*** All vehicles should be parked in a safe position that will not cause a hazard to other traffic and reverse parked in designated areas. All vehicles parked in operational areas must be left unlocked with keys in the ignition when unattended.
30. ***Waste / Rubbish:*** All waste must be disposed of properly in a manner approved by PT Inco.
31. ***Hydrocarbons:*** All hydrocarbons must be stored and handled according to PT Inco Standards and relevant Government Regulations. All storage facilities must have appropriate spill cleanup equipment ready for use. Any spillage must be reported and cleaned up within 8 hours.
32. ***Dangerous & Hazardous Goods:*** All Dangerous & Hazardous Goods must be used, handled and stored in accordance with requirements and MSDS.
33. ***Fires:*** Lighting of any fires within or adjacent to the project area is prohibited.

# 13. Mine Site Rules and Regulation (23)

# MINE SITE RULES & REGULATIONS

**PT Inco Site Regulations**

A breach of any of the site regulations will be grounds for disciplinary action that may result in Contractors' employees being denied further access to the project site.

Contractors are responsible for the conduct of their employees while on the project site. All Contractors and employees must be aware of PT Inco site rules and regulations including:

SR.1 Theft, embezzlement or fraud.
SR.2 Ill-treatment or bribery of the company's representatives.
SR.3 Invitation to the company's representatives to act against the law.
SR.4 Destruction of the company's property either on purpose or by carelessness or neglect.

SR.5 Giving false information.
SR.6 Drunkenness or using prohibited drugs on PTI premises.
SR.7 Being offensive or threatening to the company's representatives or fellow employees.
SR.8 Revealing the company's trade secrets or exposing confidential matters relating to the company's or private matters concerning company officials or their families.
SR.9 Refusing to carry out reasonable instructions.

# MINE SITE RULES & REGULATION

SR.10 Carelessly neglecting their duty, viz.
- Repeatedly coming late to the place of work
- Repeatedly staying away from work without good reason
- Refusing to undergo a physical examination
- Repeatedly neglecting safety and sanitation rules
- Repeatedly neglecting reminders to improve work standards

SR.11 Complete incompetence

SR.12 Being deceitful by giving false or incomplete information on applying for their position.

SR.13 Abusing company confidence by receiving bribes either money or in goods or services to the detriment of the company's interest.

SR.14 Persuasion of owner officials, their families or fellow employees to act in violation of the contents of their employment agreement or against morals.

SR.15 Grave violations of Indonesian law.

SR.16 Working either part-time of full time with another company without prior written agreement by the company.

SR.17 Use of company's equipment/facilities for personal gain.

# MINE SITE RULES & REGULATION

SR.18 Taking part in or encouraging any work stoppage, sit-down and slow-down of work.

SR.19 Acting in a manner that is considered to be in conflict with the company's interests.

SR.20 Falsification of company documents of any description.

SR.21 All vehicles and equipment are to be operated within the law and project regulations. All operators are required to have in their possession valid operator's licenses as issued by the government and valid PT Inco license as issued through the safety department. Gate entrance passes issued to contractor or rented equipment and vehicles are to be displayed as instructed at all times and are not transferable. No vehicle or equipment is to be operated without the specific instruction/approval of the authority responsible for the vehicle/equipment.

SR.22 Utilizing for the employee's own gain, information properly belonging to the company.

SR.23 All employees are required to wear the photo identification badge provided by the company at all times on the project site. The badge shall be displayed correctly and surrendered for inspection on request of the company's representatives.

# 14. Security Procedure (15)

# SECURITY PROCEDURES

## SECURITY PROCEDURES

Contractors will comply with all PT Inco security procedures, applicable laws and regulations. Compliance with site security procedures does not relieve the Contractor of its responsibility to maintain proper site security.

PT Inco Department of Security Services will control all access to the Karebbe project site. The primary function of Karebbe site security will be to prevent unauthorized access to the project site and the accommodation camp. Site security services are also required to protect personnel and assets within the project area and to ensure that no materials or equipment are permitted to leave the site without an authorized Gate Pass.

The following security procedures will be enforced on the Karebbe Project:

a. All persons entering the site must complete a safety induction and display a valid identification badge.
b. Identification badges must be carried at all times while on site and produced for inspection if requested.
c. Identification badges remain the property of PT Inco and must be returned on completion of contract or on instruction from PT Inco.
d. All visitors to site must be authorized by Karebbe Project Manager or Construction Manager and are not permitted to work on site.

# SECURITY PROCEDURE

e. Visitors to site or accommodation camp must be issued with a visitors badge and accompanied at all times by a member of Karebbe Project management team.
f. All persons or vehicles entering and leaving the site will be subject to inspection for compliance with PT Inco Safety and Security requirements.
g. Passengers are not permitted to remain in vehicles when entering or leaving the site.
h. All camp residents must complete the necessary registration to comply with legal requirements.
i. An authorized/signed gate pass must be produced prior to any materials or equipment being permitted to leave site.
j. Contractor vehicles must apply for and be issued with approved vehicle identification stickers prior to being permitted entry to site.
k. Delivery vehicles without identification stickers must obtain a Temporary Entry Pass at the security gate prior to being permitted to enter the site.
l. Delivery vehicles must be escorted by an approved contractor or PT Inco vehicle at all times within the project area.
m. Contractors are responsible for the security of their own assets within the project area and should provide PT Inco with accurate reports of any incidents of loss, theft or vandalism.
n. Regular patrol of the project boundaries will be made by the site security to restrict unauthorized access.
o. In the event of any Civil Disturbances at the project site Contractors will inform site security and Karebbe Senior Project Manager immediately. Appropriate action will be determined and implemented to ensure the protection and safety of project personnel and the security of assets within the project area.

# 15. DOCUMENT CONTROL PROCEDURE

# DOCUMENT CONTROL PROCEDURE

## DOCUMENT CONTROL

| Date | Version | Page | Revised By | Signature | Reason for Change |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Note:**

All revisions to this document must be in accordance with the procedure outlined in the Karebbe Project Procedures Manual. All changes must be initialled.

# 16. Mine Hazard Control (15)

# MINE HAZARD CONTROL

## HAZARD IDENTIFICATION AND CONTROL

### 1.0 PURPOSE

To ensure Karebbe Project Management and Contractors are provided with information regarding the known and potential hazards associated with the construction and development of the Karebbe Project.

To ensure adequate controls are implemented to reduce the risk associated with known and potential hazards to an acceptable level.

### 2.0 SCOPE

Review site conditions and anticipated construction methodology to identify hazards.

Establish and maintain a formal **Karebbe Project Hazard Register.**

Provide a central register for all completed risk assessments.

Ensure Contractors on Karebbe Project maintain their own formal register of identified and potential hazards associated with the construction tasks they are required to perform.

Provide a standard methodology for assessment of risk and implementation of effective control measures on Karebbe Project.

# HAZARA CONTROL

## 3.0 DEFINITIONS

***Hazard:*** A source or situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these.

***Risk:*** A combination of the likelihood and consequences of a specified hazardous event occurring.

***Controls:*** Are precautions designed to minimize or eliminate the impact or likelihood of harm caused from hazards.

## 4.0 PROJECT SPECIFIC HAZARDS

Karebbe Project Management and Contractors should acknowledge the Project Specific Hazards which have been previously identified in a **Construction Hazard and Operability Study** (HAZOP) conducted during the project feasibility study and

# HAZARA CONTROL

any subsequent HAZOP studies conducted during detailed design engineering and project execution.

Contractors on the Karebbe project are required to complete a detailed assessment of site conditions and hazards related to proposed construction methods including all materials and substances that they will use or encounter on site. This assessment must also include consideration of other contractors work activities and locations, to assess potential impacts on adjoining work areas and personnel. This information must be recorded in a formal hazard register and provided to Karebbe Project Management on request.

Karebbe Project Management and Contractors are required to conduct regular reviews of site conditions and construction methodology to ensure the effectiveness of identified controls and that both the Project Hazard Register and the Contractor's Hazard Register remain current and are updated to reflect the outcome of these reviews.

All known Hazards on Karebbe Project should be clearly explained to workers during Project Specific Inductions and reinforced daily on specific activities to be undertaken on that day.

# HAZARA CONTROL

## 5.0 IDENTIFIED HAZARDS

The following Hazards have been identified by Karebbe Project Management based on inspection of physical site conditions at the commencement of the project.

- Larona River (swift water flow);
- Excavated slopes;
- Falling rocks / raveling slopes;
- Oil pipeline passing underground through project areas;
- Main / public road intersections, interaction between project and public vehicles;
- Main / public road condition, tight curves, steep drop offs, insufficient edge protection, local traffic.
- Power transmission lines adjacent to main road and project site access;
- Underground services (eg: water pipelines, electric cables, communication cables, geotechnical instrumentation, sewage pipes, etc.);
- High Voltage switchyard & transmission lines (Balambano);
- Access & egress constraints;
- Climatic conditions (high temperatures);
- Isolated locations; and
- Surrounding protected forest.

# HAZARA CONTROL

## 6.0 POTENTIAL HAZARDS

In addition to the identified hazards, all Contractors must assess the risk associated with potential hazards such as:

- Working at (great) height;
- Working underground (tunneling);
- Heavy lifting / rigging operations;
- Deep excavations;
- Possible flooding / inundation of work areas;
- Blasting and all activities associated with the transportation, storage, handling and use of explosives;
- Congested work areas;
- Hazards associated with selected work methods;
- Scaffolding and elevated work platforms;
- Work activities on multiple levels;
- Bridge load restrictions;
- Interfacing between Contractors and PT Inco operations;
- On-site traffic interactions, (management of heavy equipment, light vehicles and pedestrian movements);
- Unauthorized persons gaining access to site;
- Heavy equipment and operations;

# HAZARA CONTROL

- Potential civil unrest;
- Industrial Health Hazards such as: noise, dust, smoke, fumes, gases, heat, radiation, etc;
- Waste and sewage handling and disposal;
- Hydrocarbon Management;
- Site drainage into river;
- Dangerous or Hazardous Goods;
- Ignition sources and potential fires.

## 7.0 MAJOR HAZARDS

### 7.1 PT Inco Major Hazard Standards

Contractors on Karebbe project are required to comply with the relevant PT Inco Major Hazard Standards (MHS) as applicable to their scope of work.

The PT Inco MHS are designed to address the major safety hazards at PT Inco. "For each major hazard they define the full range of available controls that could be implemented to address all aspects of the hazard in the context of industry best practice". All Contractors on Karebbe project will be provided with a copy of the ***PT Inco Major Hazard Standards:***

***MHS 01 Vehicle and mobile equipment condition***
***MHS 02 Vehicle and mobile equipment operation***
***MHS 03 Road condition***
***MHS 04 Isolation and lockout***
***MHS 05 Electrical***

# HAZARA CONTROL

*MHS 06 Working at heights*
*MHS 07 Confined spaces*
*MHS 08 Lifting and supporting loads*
*MHS 09 Explosives*
*MHS 10 Slope stability*
*MHS 11 Working near or in water*
*MHS 12 Boilers and pressure vessels*
*MHS 13 Aviation (Considered not applicable at KHP)*
*MHS 14 Molten materials (Considered not applicable at KHP)*
*MHS 15 Conveyors and machine guarding*
*MHS 16 Exploration, drilling and clearing operations*
*MHS 17 Dangerous goods*
*MHS 18 Tires and rims*

## 7.2 Major Hazard Standards Applicability

All work to be performed by Contractors on the Karebbe Project must be referenced against the ***Contractor Work-MHS Applicability Checklist***.
The ***PT Inco EHS Management System Manual*** provides additional information on the PT Inco Major Hazard Standards.

# HAZARA CONTROL

## 7.2 Major Hazard Standards Applicability

All work to be performed by Contractors on the Karebbe Project must be referenced against the ***Contractor Work-MHS Applicability Checklist***.
The ***PT Inco EHS Management System Manual*** provides additional information on the PT Inco Major Hazard Standards.

## 7.3 PT Inco General EHS Standards

Contractors on Karebbe project are also required to comply with the relevant PT Inco General EHS Standards as applicable to their scope of work including:

- ***EHS 01 Hydrocarbon Management***
- ***EHS 02 Waste Management***

**Note: All Contractors on Karebbe Project are required to dispose of Hazardous and Non-Hazardous Waste in a manner approved by PT Inco.**

## 8.0 RISK ASSESSMENT

The ***PT Inco General Purpose Risk Assessment Procedure*** (SP 01) describes the process of identifying hazards, calculating associated risks and identifying the need for controls to provide a common approach to conducting general purpose risk assessments at PT Inco.

This procedure shall be applied by all personnel conducting general purpose risk assessments at Karebbe Project.

Copies of all completed risk assessments shall be transmitted to the Karebbe Project EHS administration office to be held in a Project Risk Assessment Register.

## 9.0 JOB SAFETY ANALYSIS

The ***PT Inco Job Safety Analysis Procedure*** (SP 02) outlines the process of job safety analysis that shall be used at PT Inco to ensure all work is planned to be conducted safely.

This procedure shall be applied by all personnel on Karebbe Project to plan safe work and to ensure the controls used for all work reduces the significant hazards to an acceptable level.

Copies of all completed job safety analysis shall be transmitted to the Karebbe Project EHS administration office to be held in a Project Job Safety Analysis Register.

## 10.0 CHANGE MANAGEMENT

The ***PT Inco Change Management Procedure*** (SP 10) describes the process of change management at PT Inco. The purpose is to ensure that all changes to equipment, plant, processes or systems at PT Inco are reviewed or implemented by authorized, competent personnel in a safe manner, and then properly communicated to all those affected by the change.

The change management process will ensure all hazards associated with the change are identified, assessed, recorded and controlled or minimized to an acceptable level.

This procedure applies to all temporary or permanent changes performed within Karebbe Project areas where the change has the potential to impact on safety of personnel.

Copies of all completed change management assessments shall be transmitted to the Karebbe Project EHS administration office to be held in a Project Change Management Register.

## 11.0 SAFE WORK METHOD STATEMENTS

Project or Job Specific ***Safe Work Method Statements*** provide detailed procedures to be followed for specific tasks e.g. Critical Lifting Operations.

All work activities assessed as having significant Health and Safety risks require the preparation and implementation of detailed construction methodology in the form of Safe Work Method Statements.

When preparing such Statements, it is important to consult with and involve the personnel who will be doing the work.

## 12.0 HAZARD ASSESSMENT & EVALUATION

The following documents are provided to assist with the process of Hazard Assessment and Evaluation:

***PT Inco Hazard Assessment Form***

***PT Inco Health, Safety & Environment Evaluation Procedure for Capital Projects***

## 13.0 PERMIT TO WORK

The ***PT Inco Permit to Work Procedure*** (Sp 04) defines the process for protecting employees and company property from accident or damage when installation, construction, maintenance or repair activities are conducted.

The Permit to Work system will control and authorize all installation, construction, maintenance and repair work that requires a special authority or the control of energy or hazardous conditions within PT Inco lease areas.

All work on the Karebbe Project is subject to obtaining an approved and authorized *Permit To Work* prior to commencement unless exempted by the Project Manager, (E.g. catering or office staff).

**Note:** All work conducted **outside** the River Diversion Zone which is in an area below water level during normal operating conditions is subject to obtaining an authorized Permit to Work from Karebbe Project **and** PT Inco Utilities Department. (This type of work should only occur under controlled conditions during Hydro Plant shutdown).

## 14.0 ISOLATION AND LOCKOUT

The ***PT Inco Isolation and Lockout Procedure*** (SP 09) is a requirement of MHS 04 – Isolation and Lockout. It describes the general requirements for isolation and lockout conducted at PT Inco. Specific requirements for isolation and lockout shall be documented at the department level in *Isolation Procedures* or *Standard Operating Procedures*, which conform to the requirements of this Standard Procedure.

This procedure is an integral part of the *Permit to Work* system and therefore should be read in conjunction with *SP 04 Permit to Work.*

This standard procedure applies to all PT Inco personnel and to all Contractors conducting isolation and lockout on PT Inco premises.

This procedure does not cover the process of reinstating energies following work completion under a complex isolation. This forms part of a re-commissioning process that each department must create and is outside the scope of this procedure.

## 15.0 SITE HAZARD ALERTS

Information regarding significant hazards will be provided to all project employees by way of **Site Hazard Alert Bulletins**. These bulletins and other important EHS information will be posted on site notice boards and distributed for discussion at Tool Box Meetings.

All employees will be encouraged to report hazardous or unsafe conditions (including potential hazards) using the **Hazard Alert Report** forms.

# 17. EHS Supervision & Monitoring Program (6)

# EHS SUPERVISION & MONITORING PROGRAM

## 1.0 PURPOSE

Establish a clear system for measuring and monitoring EHS performance and compliance on Karebbe Project.

Evaluate effectiveness of project EHS Plans.

## 2.0 SCOPE

To provide a clear definition of the following:

- Checking and corrective action system;
- EHS meeting schedules; and
- Construction equipment inspection program.
- ***Karebbe Project EHS and Security Organizational Structure***
- ***Karebbe Project EHS Committee Structure***
- ***Workplace Inspection Audit and Monitoring Program***

## 3.0 CHECKING AND CORRECTIVE ACTION

The Karebbe Construction Manager is responsible for monitoring Contractor's EHS performance. This relies on audits, inspections, and reporting systems. The following section outlines the requirements for these.

### 3.1 EHS Inspections and Audits

Inspections and audits are conducted to determine the level of compliance with the relevant government legislation, PT Inco EHS Policies and objectives of the Karebbe Project EHS Plan. The audit also identifies those areas of the contractor's EHS plan which require improvement and provides recommendations for those improvements.

Regular inspections and audits will be carried out by the Karebbe Project EHS Committee.

Audits by Regulatory Authorities or other external auditors may also take place. A senior Karebbe Project Management Team Representative such as the Project Manager, Construction Manager, EHS Representative or Superintendent should be present during these audits.



An Audit is different from a Site Inspection. The **inspection** is concerned with physical conditions and what is actually happening on the work sites while the

**audit** is more concerned with the planned activities, systems and programs, compared with actual field implementation and performance results.

Construction Contractors are required to carry out their own safety and housekeeping inspections. Additionally the Project EHS Committee must perform formal weekly safety and housekeeping inspections on all Contractors and record this on a formal Workplace Safety Inspection document. See Safety Inspection and Audit forms in the ***Construction EHS Tool Kit.***

### 3.2 Preventive and Corrective Action

Any infraction and/or potential unsafe conditions observed during inspections or audits must be recorded and preventive or corrective action taken immediately if possible. If immediate corrective action is not possible, the hazard(s) must be identified with appropriate markers or barriers until permanent corrective action or controls are implemented. The Karebbe Construction Manager must follow-up all inspection and audit reports to ascertain that any un-safe conditions are being corrected as soon as possible.

All Audit Reports should be reviewed by the Karebbe Project Manager. Depending on the audit results and where results show recurring Health & Safety concerns, the Project Manager or their designate may initiate changes to the Project Specific EHS Plan including implementation of training sessions to communicate the modified requirements.

## 3.3 Audit Process

The audit process for the Karebbe Project is outlined in the following flow chart:



## 4.0 EHS MEETINGS

**All EHS meetings should have minutes and attendance recorded.**

### 4.1 Contractors

Regular Contractor EHS meetings are to be held between all workers and their supervisors to provide timely and ongoing safety communication. The Construction Contractor will confirm to the Karebbe Construction Manager that the required meeting plans have been established, and that the Contractor's Management and Supervision are committed to implementing them. This will ensure that the requirements for worker and management communication and site meetings are met on the project.

### 4.2 Contractor's Daily Toolbox Meeting

Contractor daily toolbox meetings must be held by each Contractor with a list of important topics prepared in advance. Subject matter and attendance records must be signed by all present. The Karebbe Construction Manager or EHS Representative must be advised of all scheduled meetings, and must be provided copies of Contractor's list of topics discussed and attendance records on request.

## 4.3 Contractor's Work Activity Briefings

This is a short, pre-job meeting to discuss the specific work activities of the day, the hazards involved and the precautions to be taken. Where a critical task is planned, this type of meeting is mandatory. Attendance should be limited to the workers on the specific job and their immediate supervisors.

Meeting topics should concern the job at hand. Workers should feel free to discuss immediate problems and concerns. The supervisor must review and explain pertinent work procedures at this meeting. The ***Construction EHS Tool Kit*** contains a sample Work Activity Briefing form.

## 4.4 Weekly Project EHS Meeting

A weekly Project EHS Meeting will be held with representatives from PT Inco, Karebbe Project Management and representatives from all Contractors required to attend. The meeting must have minutes recorded and attendance records signed by all present.

This meeting should discuss the one week look-ahead site work plan, the hazards involved and the controls to be applied. The aim should be to identify and resolve

any potential areas of conflicting activity. The overall site safety performance for all contractors and any incidents, accidents and near misses for the past week must be reviewed. Responsibility for corrective action must be assigned and be consistent with ***BMS Site Safe*** data and resolutions of the Weekly Construction Management Meeting.

The PT Inco Senior Project Manager and Construction Manager must be advised of all scheduled meetings and be provided with copies of the minutes and attendance records for audit purposes.

## 4.5 Weekly Construction Management Meeting

Weekly Construction Management meetings must include discussions on significant EHS issues including resolution of any previously identified EHS issues or action items.

The following personnel, at a minimum, must attend any portion of the meeting dealing with EHS issues:

- Karebbe Project Manager;
- Karebbe Project Construction Manager;
- Karebbe Project Contracts Manager;
- Karebbe Project EHS Representative;
- PT Inco EHS Representative;
- PT Inco Operations Representative (where applicable);
- Management Representatives of site contractors (when requested);
- Contractors EHS Representative (when requested).

Typical discussions should include:

- Accidents, incidents, near misses, illnesses, injuries or environmental occurrences reported or investigated since previous meeting;
- Status Report of action taken & target completion dates for previously identified action items;
- Assignment of responsibility and definition of any additional preventive or corrective action requirements;
- Any unsafe conditions as per incident or accident reports;
- Accidents or injuries requiring further investigation;
- Overall project EHS performance;
- EHS issues requiring interface with PT Inco Operations.

Required actions for EHS performance improvements on the project may result from these meetings. Implementation of these requirements will be the responsibility of the Karebbe Construction Manager.

## 4.6 Monthly EHS Committee Meetings

The Karebbe Project EHS Committee will hold monthly meetings to coordinate interface issues between various contracts and to ensure a standard and consistent application of EHS procedures across all project areas.



The EHS Committee will also conduct a weekly overall site inspection.

## 5.0 CONSTRUCTION EQUIPMENT INSPECTIONS

Contractors are required to conduct detailed inspections of all Construction Equipment prior to mobilization. Inspection forms must be provided to Karebbe Construction Manager on request. Construction Equipment which is deemed to be in an un-safe condition will not be allowed on site.

In addition to routine workplace inspections random inspections will be conducted by Karebbe Project Management on Construction Equipment to ensure no major defects exist which could present a hazard. Various Construction Equipment Checklists are available in the **Construction EHS Tool Kit.** Requirements for safety standards of construction equipment condition and operation are included in the **PT Inco Major Hazard Standards.**

### 5.1 Fire Extinguishers

All fire extinguishers and fire fighting equipment must be inspected by a competent person at least once a month, or more frequently if recommended by the manufacturer.

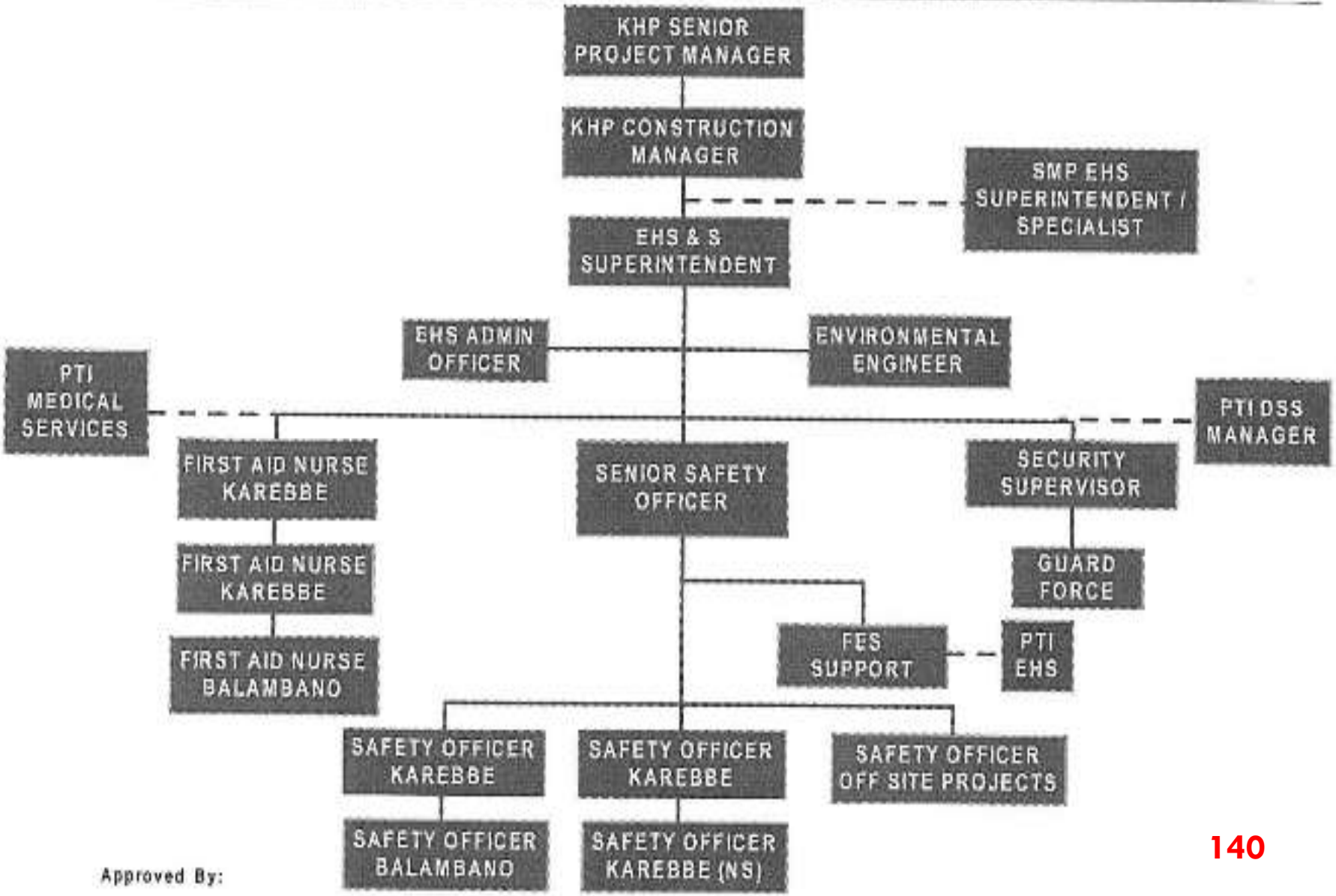
## 6.0 CONTRACTOR'S EHS SUPERVISION & MONITORING PROGRAM

All Contractors on Karebbe Project are required to prepare a detailed EHS Supervision and Monitoring Program as part of their overall Project EHS Plan.
This must include:

- Contractors EHS organizational structure;
- Workplace inspection and audit schedule;
- Reporting and corrective action system;
- EHS meeting schedules;
- Construction equipment inspection schedules.

The Contractor's EHS Supervision and Monitoring Program must be included as part of the Project Specific EHS Plan to be reviewed by Karebbe Project Management.

KHP - EHS & S ORGANIZATION CHART




Approved By:

# 18. Emergency Preparedness Procedure (9)

# EMERGENCY PREPAREDNESS PROCEDURES

## 1.0 PURPOSE

To ensure that adequate procedures are developed to mitigate the impact of any likely emergency events on Karebbe Project.

To provide an emergency response capability for the construction phase of the Karebbe Project.

## 2.0 SCOPE

To ensure awareness of information relating to emergency communication phone numbers, emergency evacuation siren, evacuation procedures and muster points is provided to all persons working on Karebbe Project.



Development of project specific communication procedures which will alert site personnel and Emergency Response personnel in the event of an emergency.

Development of appropriate response and recovery procedures for emergency events including the following:

- Major fire;
- Medical emergencies;
- Flooding /inundation;
- Technical rescue (from height or entrapment);
- Swift water rescue;
- Confined spaces rescue;
- Serious injuries resulting from an accident;
- Major hydrocarbon spills;
- Fatalities;
- Vehicle accidents;
- Civil defiance.

## 3.0 DEFINITION OF AN EMERGENCY

An emergency is a situation or a set of circumstances which, if not promptly eliminated, controlled, or contained results **or could result** in significant injury to people (including the community) and /or damage to plant, property or the environment.

PT INCO
PT International Nickel Indonesia Tbk

# EMERGENCY CALL

**Phone 9999** *or* **Radio Ch.1**

If You Require the Emergency Services

## SECURITY – FIRE – AMBULANCE

Dial **9999** (From PT. INCO Phone lines)

Dial **021 - 524 9999**

(From Hand Phones - *HP* and Non PT INCO phone lines-*TELKOM*)

*Emergency Call Procedures:*

1. *Be calm and dial the emergency phone number immediately.*
2. *Inform your name and your exact location.*
3. *State the type of emergency services required, exact location of incident , type of incident and number of injured persons.*

*Do not hang up your phone until the emergency call is closed by the Emergency Dispatch Operator.*

EHS Dept.

# 4.0 EMERGENCY PREPAREDNESS AND RESPONSE CAPABILITIES

The Emergency Preparedness and Response capability at PT Inco includes, but is not limited to the following:

- Emergency Management Team (EMT);
- Emergency Response Group (ERG); which includes
- EHS Personnel (Environmental, Safety & Hygiene); and
- Fire and Emergency Services Personnel.

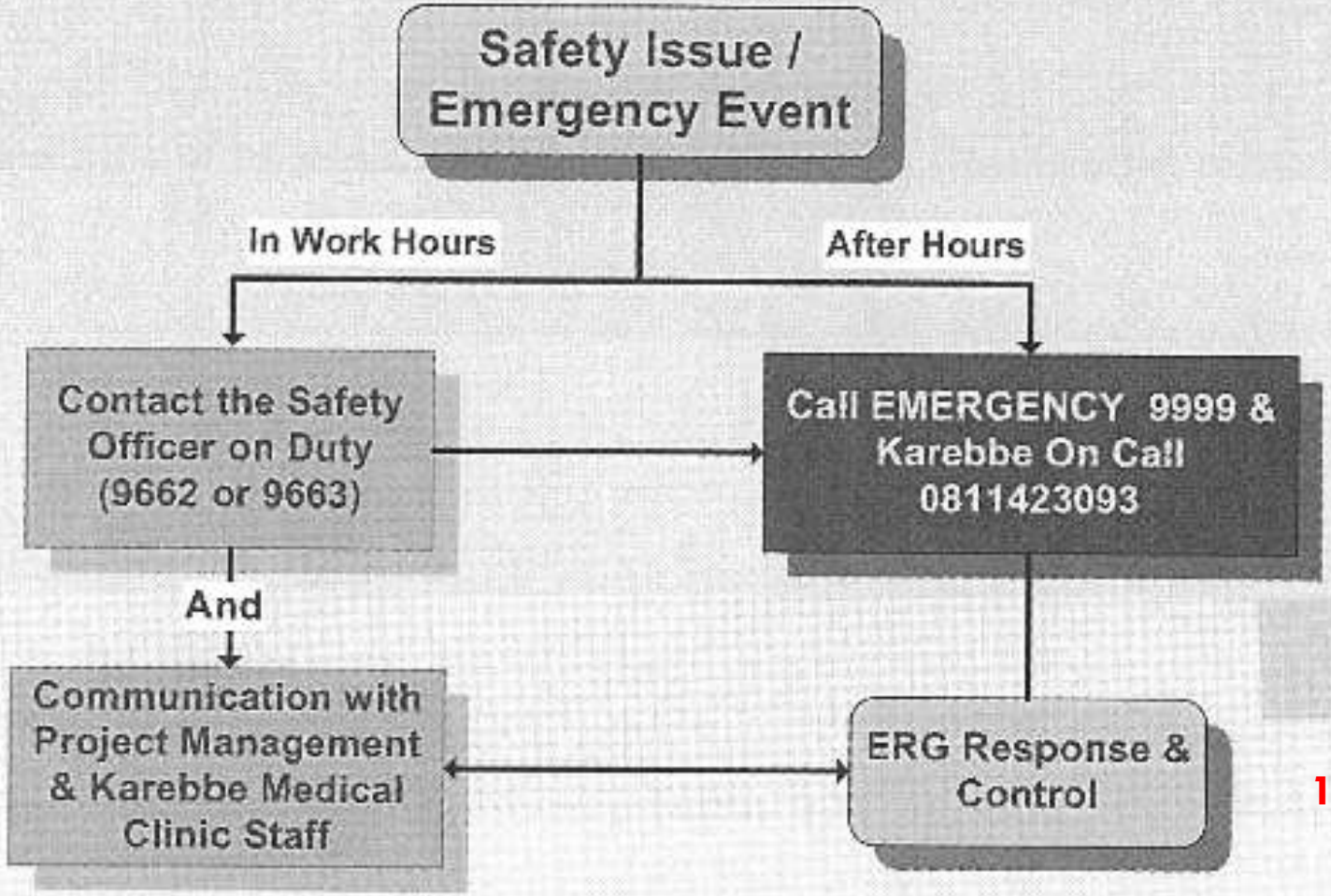
# 5.0 COMMUNICATION

## 5.1 Emergency Communication

Telephone numbers of all key emergency contacts are provided on the **Karebbe Project Emergency Communication Flowchart.** This information must be distributed to all site personnel and prominently displayed at all site telephones, in the site office complex, on site bulletin boards and in all project vehicles.

KAREBBE HYDROELECTRIC PROJECT

# EMERGENCY PROCEDURE FLOWCHART



## Emergency Procedure :

- Warn other workers in the danger area
- In case of fire, extinguish the fire, ONLY IF SAFE TO DO SO
- Evacuate the danger area (rescue yourself)
- Call the Emergency Number by radio or telephone
- Call the Emergency phone number (After work hours)
- Do not panic, speak clearly
- Tell your name and location
- explain the situation including any injury or equipment damage
- Proceed to Muster Point
- Stay there until all clear is announced

Once the type of emergency has been determined e.g. fire, gas leak, injury etc. and the requirement for any immediate action assessed, the designated Project Emergency Management Team must ensure that the appropriate action is taken and the relevant people are notified as defined by the Karebbe Project Emergency Communication Plan

## 6.0 EVACUATION PLAN

### 6.1 Emergency Evacuation Alarm

Karebbe Project has installed an ***Emergency Evacuation Alarm*** to be used only in the case of emergencies requiring a general site evacuation. This alarm will be tested weekly at 10.00 am each Wednesday. This information will be discussed during Site Specific Induction.
The general evacuation plan must go into effect upon the sounding of evacuation alarm.

### 6.2 General Site Evacuation Plan

The site evacuation plan must be discussed at the ***Karebbe Site Specific Induction*** session and site evacuation plans, including Muster Point locations, will be posted in conspicuous places around the site. Workers must be advised of the existence and location of the plans and of the evacuation alarms and muster points.

The purpose of the plan is to provide for the quick, safe evacuation of all employees in the event of an emergency and to establish the necessary teams and equipment required to respond to the emergency by rescue personnel administering first aid and accounting for all personnel at assembly (muster) points.

A list of equipment that could be utilized in the event of an emergency must be prepared, updated as necessary and included in the Emergency Preparedness Procedures.

After an evacuation, all personnel will remain at the muster point until directed to another location or the "All Clear" is given by KHP Management.

The all clear signal will not be given until the cause of the evacuation has been neutralized or determined to be safe by the KHP PM and EHS Superintendent or their designates..

### 6.3 Office Fire Alarm

The Karebbe Fire Alarm is located at the main Security Post. This alarm will be sounded in the case of fire in the general area of the main project office. When this alarm sounds, follow the **Emergency Procedure** then proceed to the nearest Muster Point and remain there until the "all clear" is announced.

### 6.4 Camp Fire Alarms

Fire alarms will be installed in each area at the Karebbe accommodation camp. These alarms will be sounded in the case of fire in the general area of the accommodation camp. When this alarm sounds follow the **Emergency Procedure** then proceed to the nearest Muster Point and remain there until the "all clear" is announced.

Water flow levels in the Larona River below the Balambano Dam can be expected to reach up to 214 CUMECS during normal operations. All Karebbe project work activities must be planned to be above this level. In the event that a release from Balambano will bring the water flow above 214 CUMECS, notification from Balambano and Larona control room will give advanced warning via telephone and radio. This communication will be relayed through the site areas. The reaction/travel time for flood waters from Balambano to the work area of Karebbe is approximately 20 minutes. Effective evacuation communication and drills will ensure that personnel will be safely at the muster point in such an event.

In the event that a sudden rise in the river flow or an unusually high river level is noted, the KHP EHS department must be notified immediately. KHP EHS personnel will confirm the conditions up stream and determine if evacuation is required. KHP EHS will arrange a sentry when water levels are extremely high to ensure that potential flood situations are closely monitored.

## 7.0 CONTRACTOR'S RESPONSIBILITIES

### 7.1 First Aid

All Contractors on Karebbe Project are required to provide their employees and sub-contractors with adequate First Aid facilities including trained First Aid personnel. It is the responsibility of Contractors to ensure these facilities are properly staffed and equipped. These facilities will be inspected and audited regularly by PT Inco.

### 7.2 Fire

Contractors are required to provide sufficient Fire Fighting resources and equipment to protect personnel and assets and to contain any fires within their own facilities or work areas (e.g. fire extinguishers).
All fire extinguishers and fire fighting equipment must be inspected by a qualified person at least once a month, or more frequently if recommended by the manufacturer.

### 7.3 Emergency Procedures

Contractors will ensure that their employees are familiar with the Karebbe Project Emergency Preparedness Procedures. All Contractors Project Specific EHS Plans must include Emergency Preparedness Procedures including Medical Emergency Procedures. These plans and procedures, covering all aspects of the respective Contractor's Construction Activities must be in place prior to the commencement of construction and will be developed in conjunction with and aligned to overall PT Inco emergency management arrangements.

## 7.4 Spills

Contractor's EHS Plans must include Emergency Response Procedures for Hydrocarbon or Hazardous Material spills.

## 7.5 Support

Contractors will support project emergency response procedures in the following ways:

- Advise all employees of the emergency procedures;
- Assist with evacuation practice drills and equipment tests;
- Maintain accurate lists of all employees on site;
- Ensure all employees are accounted for at Muster Points during an evacuation;
- Assist with notification of emergency, first aid response, securing the site, etc. as requested by the Construction Manager or Emergency Management Team;
- Provide manpower or equipment as requested to assist in emergency evacuation or response.

## 8.0 PT INCO CONTINGENCY EMERGENCY RESPONSE PLAN

PT Inco has prepared and maintains an overall emergency response and evacuation plan covering all aspects of PT Inco operations. This is a controlled document with restricted access. Accurate lists of all expatriate personnel on site must be updated and provided to PT Inco on a weekly basis.

## 9.0 EMERGENCY PREPAREDNESS INFORMATION

Emergency Call
Emergency Procedure Flowchart
Emergency Communication Flowchart
Emergency Evacuation Alarm
Utilities Emergency Coordination Procedure
KHP Emergency Management Team Structure
Medical Emergency Flowchart
KHP Personnel Telephone List
Larona Magazine Emergency Response
Hydrocarbon or Hazardous Material Spills
Civil Unrest Procedure
Vehicle Accident Procedure
Emergency Exercise Checklist
Karebbe Project Work Areas & Muster Points
PT Inco Risk & Crisis Management Standard (EHS 06)
PT Inco Fire and Emergency Services (SLA)
PT Inco Medical Services (SLA)
PT Inco Security Services (SLA)
Sorowako Frequently Used Phone Numbers

- *Contractor EHS Plans-Mandatory Requirements (Assessment Tool & Checklist)*
- *General Induction Program (Flow Chart & Request Forms)*
- *PT Inco Personal Protective Equipment Standard (EHS 09)*
- *Karebbe Site Specific Induction Program*
- *Larona Magazine Induction*
- *Balambano Quarry Induction*
- *Permit to Work Procedure*

- *Site Clearance Certificate*
- *Confined Space Permit*
- *Hot Work Permit*
- *Isolation Permit*
- *Work Activity Briefing*
- *Lifting (Rigging) Study*
- *Incident / Accident Report (Flowchart & Forms)*
- *PT Inco EHS Standards, Manuals and Procedures*
- *EHS Forms & Templates*
- *MHS Safety Layer Audit Forms*
- *MHS Contractor Audit Protocols*
- *Role Profiles and Responsibilities*
- *Safety Inspection and Audit Forms*
- *Construction Equipment Inspection Checklists*
- *Vehicle ID Stickers (Flowchart & Forms)*
- *EHS Meeting Agenda*
- *Meeting Attendance List*
- *Safe Work Method Statements*
- *Hazard Alerts*
- *BMS Site Safe*
- *General EHS Requirements for Contractors*
- *Site Rules & Regulations*
- *Security Procedures*
- *HAZOP Form*
- *Light Vehicle License Procedure (Flowchart & Forms)*

# 19. River Excavation Works Progress Photos

Survey

Tailrace (ch: 2+250 ~ 2+489)



Drilling for Blasting Rock, Phase I, Stage 1 and 2

Tailrace in front of LD#9 (Sta: 0+860 ~0+900)



Excavation Overburden

Tailrace Phase II, Sta 1+700



Grading Access Road

Tailrace Phase II, Sta 1+500



Clearing and Grubbing for Disposal Rock Stock Area

Laydown No.#10, Sta: 1+500



Drilling for Blasting Rock, Phase I, Stage 1 and 2

Tailrace infront of LD#9 (Sta: 0+720 ~0+780)



Filling Temporary Access

Tailrace Phase II, Sta 1+940 ~ 2+480



Tailrace General View

Phase 1 (ch: 0+300 ~ 1+020)



Access Slope Excavation

Tailrace (ch: 0+620 ~ 0+720)



Drilling for Blasting Rock, Phase I, Stage 2

Tailrace in front of LD#9 (Sta: 0+680 ~0+700)



Drilling for Blasting Rock, Phase I, Stage 2

Tailrace Sta: 0+600



Excavation Overburden

Tailrace Phase II, Sta 1+700



Disposal Area General View
Laydown No.9



General View Tailrace

Tailrace (Near Bridge)



Core Drilling

Tailrace Sta: 1+000 ~ 1+100



Blasted Rock Excavation Stage 2, Trial Pumping

Tailrace Phase 1, Sta 0+750



Presplit Drilling

Phase 1, Stage 2, Sta 0+900 ~ 1+020



Drilling, Stage 2, Phase 1

Tailrace (Phase 1 end, ch :1+020)



Blasting

Tailrace (Phase 1 End, Ch: 1+020)



Drilling Stage 1, Phase 1

Tailrace (Left Side)



Blasting, Stage 3, Phase 1

Tailrace Sta: 0+300 ~ 0+340



Excavation Blasted Rock, Stage 2, Phase 2

Tailrace (Ch: 1+600 ~ 1+700)



Excavation, Stage 2, Phase 2

Tailrace (Ch: 1+800 ~ 1+980)



Excavation Stage-2

Tailrace (Phase 2 End, Ch: 2+490)



Excavation Stage-2

Tailrace (Phase 2 End, Ch: 2+490)



Excavation Blasted Rock, Stage 2, Phase 1 (Upto EL+7)

Tailrace (Ch: 1+100 ~ 1+080)



Drilling Phase 1, Stage 4

Tailrace (Ch: 0+470 ~ 0+490) Right Bank



Land Slide and Soil Investigation

Tailrace Left Bank (Ch: 1+000)



Land Slide

Tailrace Left Bank (Ch: 1+000)



Excavation Landsliding Area(EL-50 & EL-30)

Tailrace (left bank,from Sta:0+800 to Sta:0+1100)



Excavation Landsliding Area (EL-20 & EL-15)

Tailrace (left bank,from Sta:0+800 to Sta:0+1100)



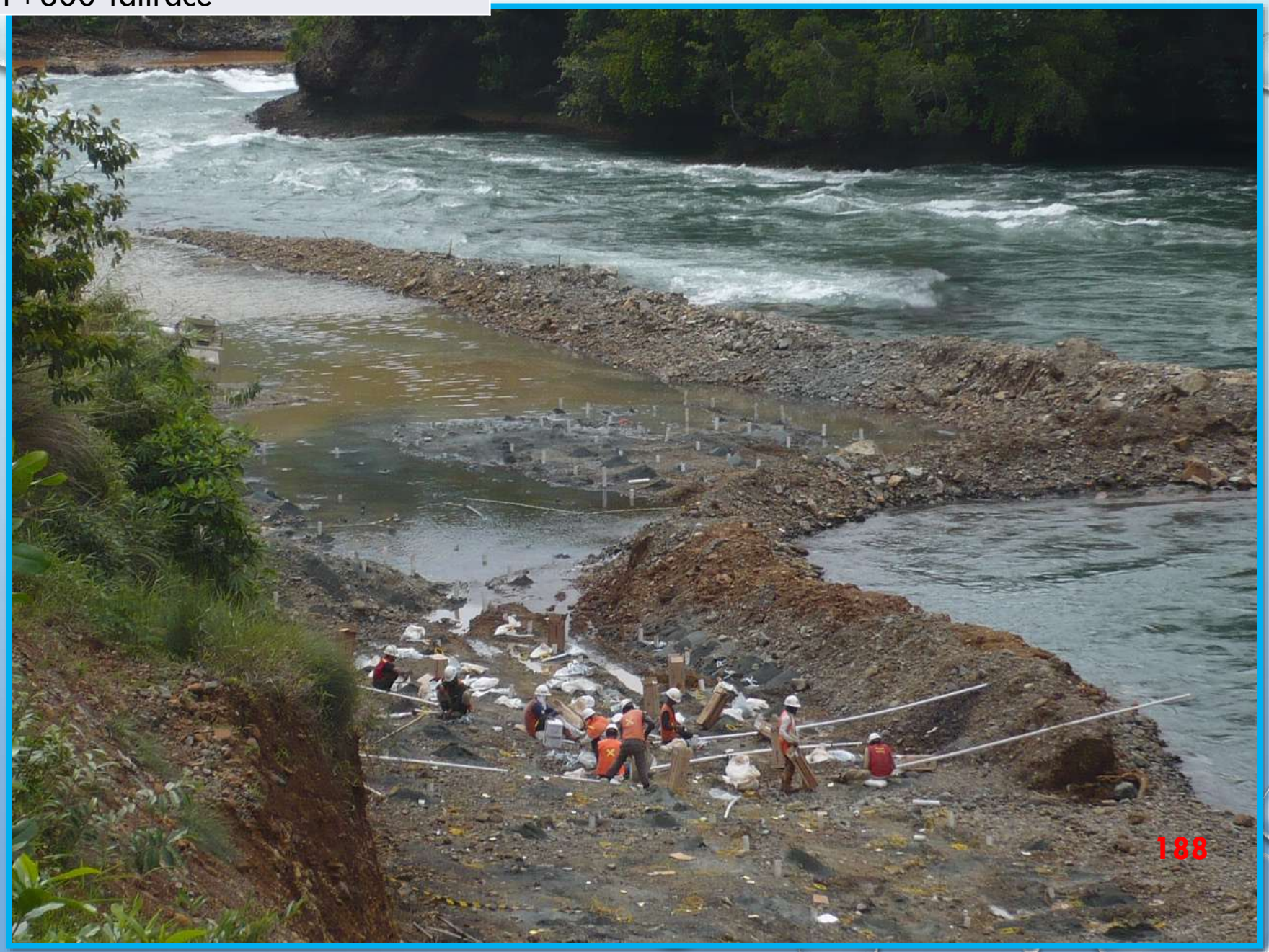
Surveying All Tailrace Excavation Progress for Yearly Record

Tailrace (Start to End)



Blasting for Tailrace Phase 2, Step-2

Ch: 1+800 Tailrace



Excavation Landsliding Area(EL+30 & EL+20)

Tailrace (left bank,from ch:0+800 to ch:0+960)



Excavation by Dragline

Tailrace (left bank,Stage 2, ch:1+020)



Blasted Rock Excavation by Ex 1200 Long Arm

Tailrace Left Bank, Phase 1, Stage 2, ch:0+380



Excavation Stage 3

Tailrace Right Bank, Ch: 0+300 ~ 0+177



Drilling Grouting

Tailrace Ch: 0+960, Berm



Drilling Grouting

Tailrace Ch: 0+360, Berm



Downstream Tailrace General View

Upstream to Downstream



Excavation Blasted Rock

Tailrace (left bank,Stage 2, ch:320 ~ 580)



Excavation Blasted Rock

Tailrace (left bank,Stage 2, ch:580 ~ 880)



Excavation Blasted Rock

Tailrace (left bank,Stage 2, ch:880 ~ 1+100)

16-Mar-09



Excavation Stage 2, Phase 2

Tailrace Ch: 2+200 ~ 1800

27-Mar-09



Drilling Stage 4, Phase 1

Tailrace ch: 177 ~ 250

31-Mar-09



Excavation by Dredger

CH : 580

27-Mar-09



# Excavation by Dredger

## CH : 580

27-Mar-09



Excavation by Dredger

CH : 580

27-Mar-09





Drilling Stage 4, Phase 2

Tailrace Right Bank ch: 1+900 ~ 2+400

31-Mar-09



Excavation Right Bank, Stage 4 and Temporary fill into the river

Ch: 0+177 ~ 0+300

25 June 2009



Excavation Right Bank, Stage 4 and Temporary fill into the river

Ch: 0+300 ~ 0+450

25 June 2009



Excavation Right Bank, Stage 4 and Temporary fill into the river

Ch: 0+450 ~ 0+ 550

25 June 2009



Excavation Blasted Rock, Stage 2 by Dredger (250 ton Crane)

Ch: 0+ 550 to 0+600

24 June 2009



Blasting Mid Part of River for Stage 4

Ch: 1+600 ~ 1+750

22 June 2009



Drilling for Blasting and Excavation Blasted Rock

Left Bank Ch: 0+180 ~ 0+400

29 Oct 2010



Removal of Sediment

Left Bank, Ch: 1+500

6 DEC 2010



High Water Flow at Working Area

Ch: 0+177 ~ 0+300

6 DEC 2010



High Water Flow at Working Area

Ch: 0+300 ~ 0+700

6 DEC 2010



Removal of Sediment

Ch: 1+200 ~ 1+300

10 DEC 2010



Removal of Sediment

Ch: 1+ 100

12 DEC 2010



Removal of Sediment

Ch: 0+200 ~ 0+300

12 DEC 2010



# Refilling of Temporary Working Platform

## Ch: 0+600 ~ 0+400

12 DEC 2010



Removal of Sediment and Reconstruction Access Working Platform

Ch: 0+300

14 DEC 2010



Temporary Re-Filling for Access

Ch:0+600 Left Bank

14 DEC 2010



Drilling for Blasting

Ch: 0+177 (Middle Berm)

12 DEC 2010



Preparation for Blasting

Ch:0+177 ~ 0+200

14 DEC 2010



Blasting

Ch:0+177 ~ 0+200

14 DEC 2010



Excavation

Ch:0+177 ~ 0+200

14 DEC 2010



# Excavation, Grneral View

## Ch+0+177 ~ 0+300

14 DEC 2010



Excavation General View

Ch: 0+177 ~ 0+600

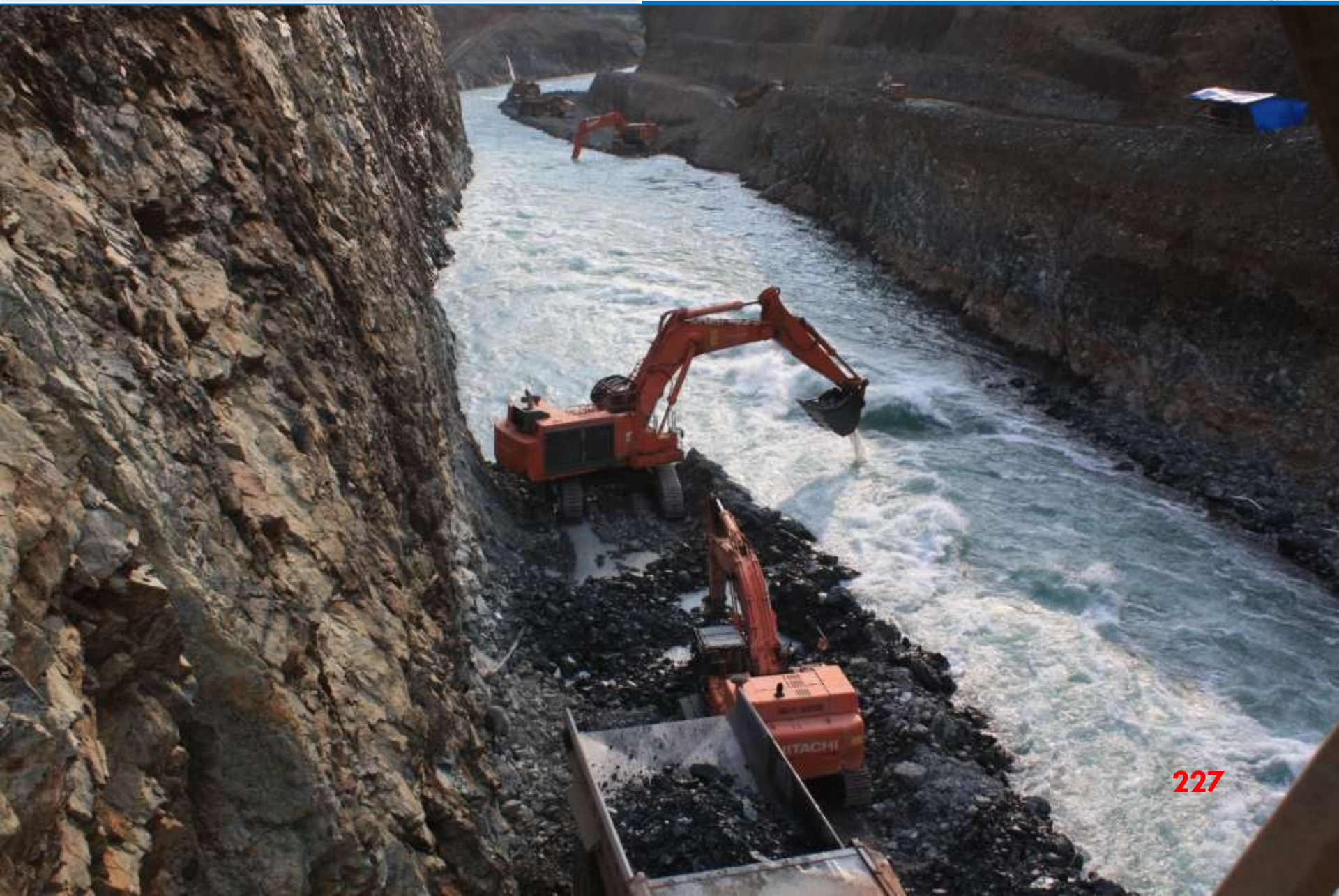
14 DEC 2010



Excavation of middle Berm

Ch: 0+300 ~ 0+600

14 DEC 2010



Excavation of middle Berm

Ch: 0+300 ~ 0+600

14 DEC 2010



# Preparation of working Platform for Right Bank

## Ch: 0+600 ~ 0+300

15 DEC 2010



Shotcrete (Left Bank)

Ch: 0+300

20 DEC 2010



# Driling for Blasting (Middle Berm)

## Ch: 0+200 ~ 0+300

20 DEC 2010



# Driling for Blasting (Middle Berm)

Ch: 0+200 ~ 0+250

21 DEC 2010



# Right Bank Working General View

## Ch:0+600 ~ 0+300

22 DEC 2010



Drilling for Rock Bolt

Ch: 0+300

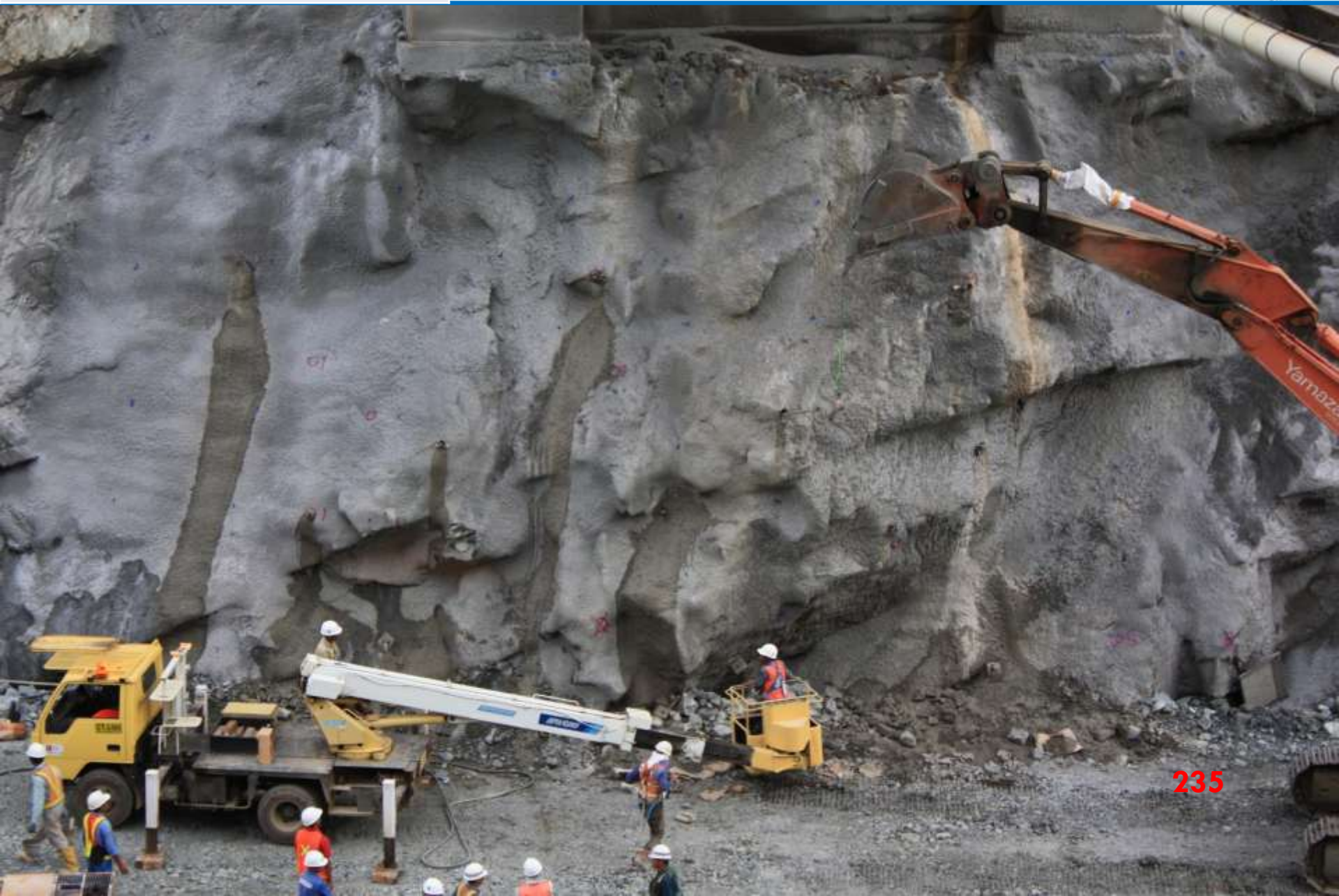
23 DEC 2010



Installation of Rock Bolt

Ch: 0+300

23 DEC 2010



Shotcrete

Ch: 0+300

24 DEC 2010



Preparation for Tunnel Outlet Area Excavation Works (Drilling and Blasting)
Ch:0+177



Tunnel Outlet Area Excavation Works

Ch:0+177



# COMPLETION OF RIVER EXCAVATION, GENERAL VIEW



# MAIN DAM BEFORE IMPOUNDING, GENERAL VIEW



# DAM AND SPILL WAY SLAB CONCRETE GENERAL VIEW



# LAND SLIDE



# LAND SLIDE EXCAVATION



# Completion of Landslide Excavation

Ch: 0+800 ~ 0+900 (Left Bank)

6 DEC 2010




245


246






249


250


251


252






255


256


257

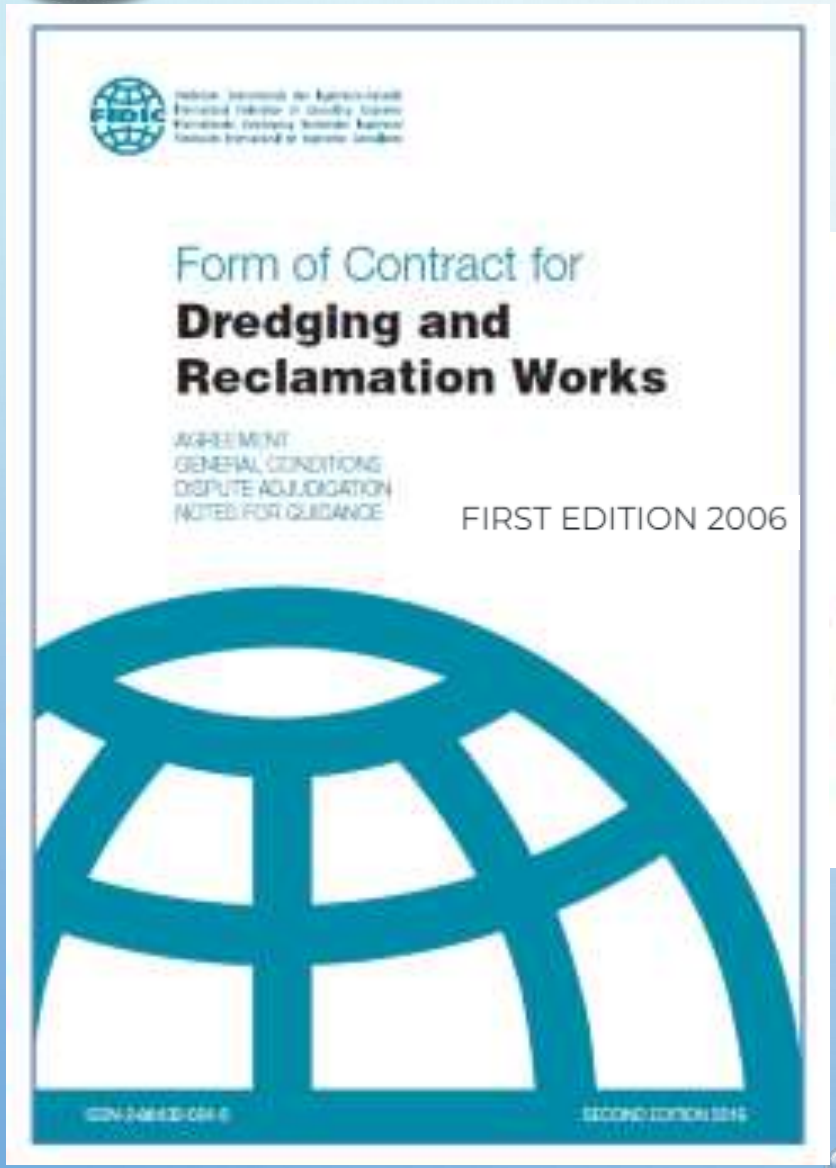

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# 20. FIDIC BLUE BOOK

# FIDIC BLUE GREEN BOOK






# Dredgers Contract 2nd Ed (2016 Blue-Green Book)




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-Dispute Adjudication Board Member's Agreement

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Form of Contract for Dredging and Reclamation Works (Dredgers Contract; Second Edition, 2016). Agreement, General Conditions, Dispute Adjudication and Notes for Guidance.

# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## RE-STATEMENT OF ORIGINAL GUIDELINES (1)

- *"in dredging and reclamation work, the Contractor is not normally held responsible for the maintenance of the dredging work after taking-over; and the areas of dredging are usually taken over in Sections as they are completed;*

## RE-STATEMENT OF ORIGINAL GUIDELINES (2)

- *the Contractor can only work economically if he is allowed to work continuously by day and by night; and*
- *equipment costs (mobilisation, use and demobilisation) form a much higher proportion of total cost in the case of a dredging contract than is generally the case with construction contracts. The cost of delays can therefore be significant."*

# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## ESSENTIAL PRE-CONTRACT INFORMATION, SOIL & SITE

- Soils information:
  - boreholes with testing;
  - vibro cores;
  - cone penetration testing;
  - bed sampling and relevant testing;
  - seismic, side scan & magnetometer surveys.
- Reclamation Information.
- Ordnance and obstructions.
- Environmental studies.

Notes for Guidance (the Notes)

In particular, the Employer should supply the following information:

- **Soils information:** good quality and adequately distributed information on soils to be dredged, disposed of (including disposal areas), used as reclamation materials and underlying the proposed reclamation area. A detailed investigation should be carried out before going out to tender. This investigations should include:
  - boreholes with testing;
  - vibro core testing;
  - cone penetration testing;
  - bed sampling and relevant testing; and
  - seismic, side scan and magnetometer surveys

  The quality of the information required cannot be stressed enough (see also Note 2.3 [*Site Data*]) as failure to provide this information is likely to lead to delays and additional costs.
- **Reclamation Information:** the required properties and testing regime for the reclamation materials should be specified.
- **Ordnance and obstructions:** ordnance is a possibility not just in Europe, but throughout the world. Thus, the potential presence of ordnance should be established and any likely impacts allowed for in the Contract and covered by insurance. In addition, the Employer should provide details of all man made obstructions present on the dredging, reclamation and disposal areas.
- **Environmental studies:** the necessary studies required for the relevant licences to be obtained and to ensure that the impact of the Works is eliminated or confined to acceptable levels. The potential environmental impacts can then be defined and monitored throughout the Works as specified in the Contract. In addition, the possible presence of polluted soils (normally fine grained) should be established and, if present, their disposal requirements specified.

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# Dredgers Contract 2nd Ed (2016 Blue-Green Book)



## PRICING, MEASUREMENT AND PAYMENT

- Flexibility for lump sum or remeasurement.
- Method of measurement.
- Bill of Quantities.
- Idle rates.

Notes for Guidance (the Notes)

11.1 **Valuation of the Works.** Normally only one of the options in the Contract Data should be used to indicate how the sum in the Contractor's offer is to be calculated and presented. It is important that the tender documents are written so that the costs of dredging are kept separate from the costs of the remaining works to allow for the operation of Sub-Clauses 9.1 [*Remedying Defects*], 11.5 [*Payment of Retention - Dredging Works*] and 11.6 [*Payment of Retention - Other Works*]. In addition, the tender documents should, where appropriate, separate the works included in different Sections (Sub-Clause 7.1 [*Execution of the Works*] refers).

The following explains what is intended by the different forms of payment:

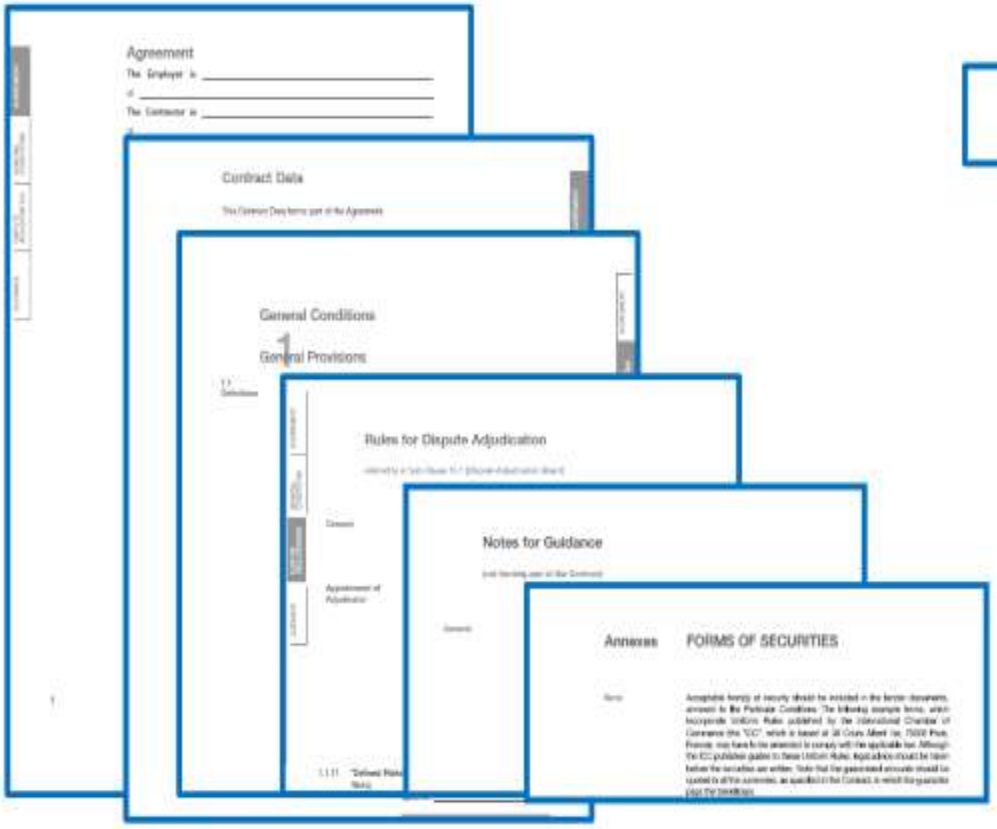
| | |
|---|---|
| Lump sum price | A lump sum offer without any supporting details. This would be used for very minor works where Variations are not anticipated and the Works will be completed in a short period requiring only one payment to the Contractor. |
| Lump sum price with schedules of rates | A lump sum offer supported by schedules of rates prepared by the tenderer. This would be a larger contract where stage payments would be required and there may be Variations. If the Employer does not have the resources to prepare his own bill of quantities then this alternative could be suitable. |
| Lump sum price with bill of quantities | A lump sum offer based on a bill of quantities prepared by the Employer. This would be the same as the previous form of payment but where the Employer has the resources to prepare his own bill of quantities. A better contract would result with an Employer's bill of quantities. |
| Remeasurement with bill of quantities | A sum subject to remeasurement at the rates offered by the tenderer in the bill of quantities prepared by the Employer. This would be the normal contract form. This would also suit a contract where changes are envisaged to the Works after the Contract has been awarded. |
| Cost plus | An estimate of the cost prepared by the tenderer which will be replaced by the actual cost of the Works calculated in accordance with the terms set by the Employer. This would suit a project where the extent of work cannot be ascertained before the Contract is placed. In the tender documents, provision should be made for tenderers to indicate allowances for overheads and profit. |

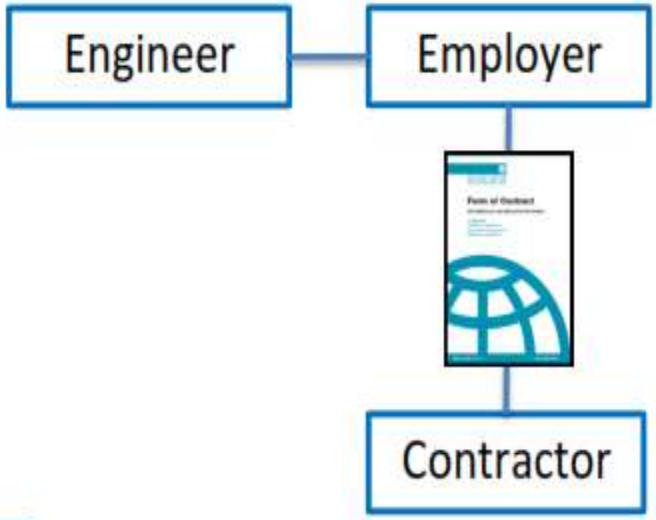
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# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## CONTRACT STRUCTURE




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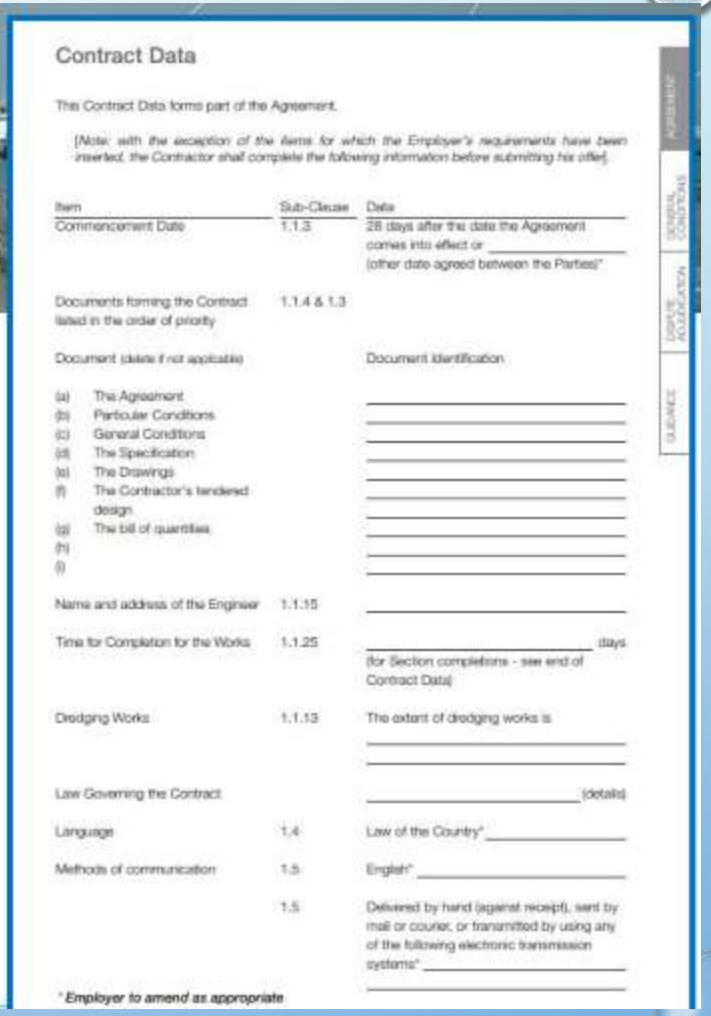
# Dredgers Contract 2nd Ed (2016 Blue-Green Book)



## CONTRACT DATA

- A title with meaning.
- An opportunity for the parties.

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Contract Data

This Contract Data forms part of the Agreement.

*[Note: with the exception of the items for which the Employer's requirements have been inserted, the Contractor shall complete the following information before submitting his offer].*

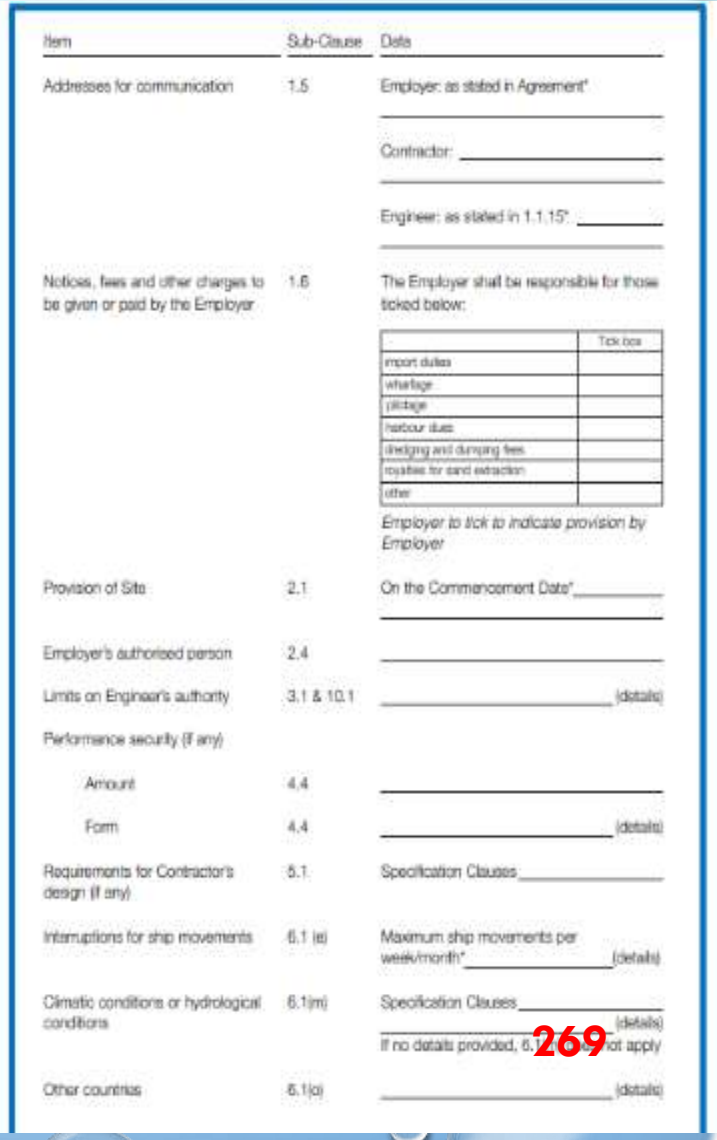
| Item | Sub-Clause | Data |
|---|---|---|
| Commencement Date | 1.1.3 | 28 days after the date the Agreement comes into effect or _____ (other date agreed between the Parties)* |
| Documents forming the Contract listed in the order of priority | 1.1.4 & 1.3 | |
| Document (delete if not applicable) | | Document Identification |
| (a) The Agreement | | _____ |
| (b) Particular Conditions | | _____ |
| (c) General Conditions | | _____ |
| (d) The Specification | | _____ |
| (e) The Drawings | | _____ |
| (f) The Contractor's tendered design | | _____ |
| (g) The bill of quantities | | _____ |
| (h) | | _____ |
| (i) | | _____ |
| Name and address of the Engineer | 1.1.15 | _____ |
| Time for Completion for the Works | 1.1.25 | _____ days (for Section completions - see end of Contract Data) |
| Dredging Works | 1.1.13 | The extent of dredging works is _____ _____ |
| Law Governing the Contract | | _____ (details) |
| Language | 1.4 | Law of the Country* _____ |
| Methods of communication | 1.5 | English* _____ |
| | 1.5 | Delivered by hand (against receipt), sent by mail or courier, or transmitted by using any of the following electronic transmission systems* _____ _____ |

* *Employer to amend as appropriate*

# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## PROJECT SPECIFIC DATA (1/2)

- Commencement Date.
- Documents forming the Contract.
- Name of the Engineer.
- Time for Completion.
- Dredging Works.
- Law & Language.
- Notices, fees and other charges by Employer.
- Contractor's design (if any).



| Item | Sub-Clause | Data |
|---|---|---|
| Addresses for communication | 1.5 | Employer: as stated in Agreement* _____ Contractor: _____ Engineer: as stated in 1.1.15*: _____ |
| Notices, fees and other charges to be given or paid by the Employer | 1.6 | The Employer shall be responsible for those ticked below: |
| Provision of Site | 2.1 | On the Commencement Date*_____ |
| Employer's authorised person | 2.4 | _____ |
| Limits on Engineer's authority | 3.1 & 10.1 | _____ (details) |
| Performance security (if any) | | |
| Amount | 4.4 | _____ |
| Form | 4.4 | _____ (details) |
| Requirements for Contractor's design (if any) | 5.1 | Specification Clauses_____ |
| Interruptions for ship movements | 6.1 (e) | Maximum ship movements per week/month*_____ (details) |
| Climatic conditions or hydrological conditions | 6.1(m) | Specification Clauses_____ (details) If no details provided, 6.1 shall not apply |
| Other countries | 6.1(o) | _____ (details) |

| | Tick box |
|---|---|
| import duties | |
| wharfage | |
| pilotage | |
| harbour dues | |
| dredging and dumping fees | |
| royalties for sand extraction | |
| other | |

*Employer to tick to indicate provision by Employer*

# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## INSURANCE

With reference to Sub-Clause 14.1 [*Arrangements*] the Parties shall arrange insurance as follows:

| Item N° | Type | Minimum amount | Insurance to be taken out by | Extent and Scope of Insurance | Name(s) of insured | Period of Insurance | Exclusions* |
|---|---|---|---|---|---|---|---|
| 1. | Hull and Machinery | Full replacement costs for each and every incident without limitation on the number of incidents throughout the insurance period. | Contractor | Including war risk and piracy coverage and, to the extent not provided in Protection & Indemnity, collision liability in respect of all vessels, craft or floating equipment owned, leased or hired by Contractor in the performance of the Contract | Contractor | Throughout the period during which the vessel is deployed in connection with the Works including mobilisation and demobilisation. | * |
| 2. | Protection and Indemnity | For each and every incident without limitation on the number of incidents throughout the insurance period and for an amount not less than [*.....] | Contractor | Including wreck and debris removal and oil pollution liability in respect of all vessels, craft or floating equipment owned, leased or hired by Contractor in the performance of the Contract, including Employer as protective co-insured | Contractor | Throughout the period during which the vessel is deployed in connection with the Works including mobilisation and demobilisation. | * |
| 3. | Land based equipment | Full replacement costs for each and every incident without limitation on the number of incidents throughout the insurance period. | Contractor | Including all land based equipment owned, leased or hired by Contractor in the performance of the Contract | Contractor | Throughout the period during which the equipment is deployed in connection with the Works including mobilisation and demobilisation. | * |
| 4. | The Works, Materials, Permanent Plant and fees | The Accepted Contract Amount, plus 15% for each and every incident | Contractor/ Employer* | Construction All Risk insurance insuring the Works for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. | Contractor and Employer with waiver of subrogation | From the Commencement Date until the date of issue of the Taking Over Certificate and completion of remedying defects* | * |
| 5. | Death or injury to the Employer, Engineer, Representative of the Engineer or their personnel | For each and every incident and for each person for an amount not less than [*.....] | Employer | In accordance with applicable legislation | Employer | From the Commencement Date until the date of issue of the Taking Over Certificate and completion of remedying defects* | Not applicable |

** The Employer is to amend as appropriate. Relevant amounts must be specified for each type of insurance.*

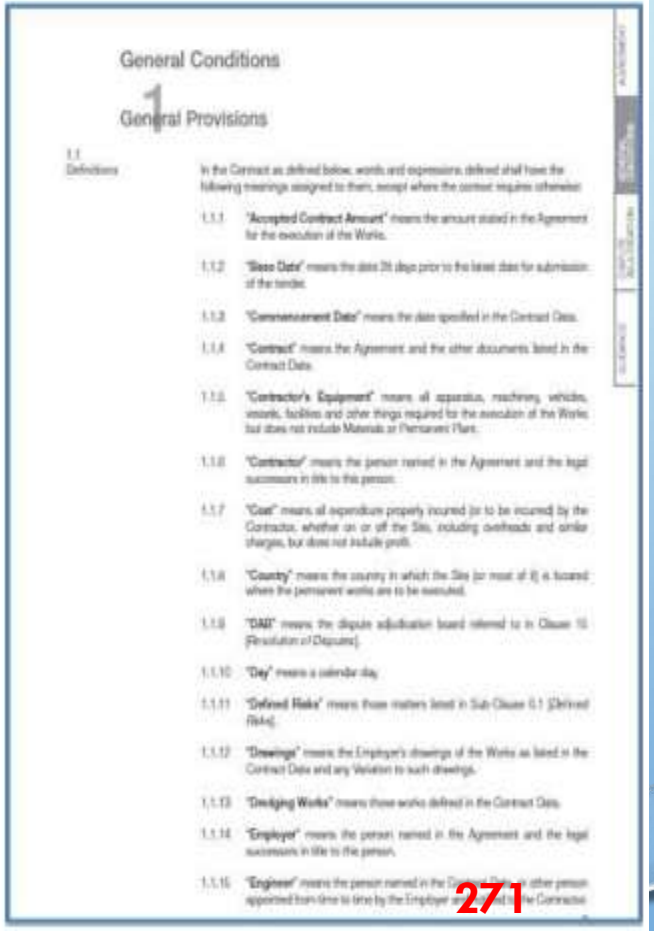


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# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## GENERAL CONDITIONS: 15 CLAUSES

1. General Provisions.
2. The Employer.
3. The Engineer.
4. The Contractor.
5. Design.
6. Defined Risks.
7. Time for Completion.
8. Taking-Over.
9. Remedying Defects.
10. Variations and Claims.
11. Contract Price and Payment.
12. Default.
13. Risk and Responsibility.
14. Insurance.
15. Resolution of Disputes.



General Conditions

1 General Provisions

1.1 Definitions

In the Contract as defined below, words and expressions defined shall have the following meanings assigned to them, except where the context requires otherwise:

1.1.1 "**Accepted Contract Amount**" means the amount stated in the Agreement for the execution of the Works.

1.1.2 "**Base Date**" means the date 28 days prior to the latest date for submission of the tender.

1.1.3 "**Commencement Date**" means the date specified in the Contract Data.

1.1.4 "**Contract**" means the Agreement and the other documents listed in the Contract Data.

1.1.5 "**Contractor's Equipment**" means all apparatus, machinery, vehicles, vessels, facilities and other things required for the execution of the Works but does not include Materials or Permanent Plant.

1.1.6 "**Contractor**" means the person named in the Agreement and the legal successors in title to this person.

1.1.7 "**Cost**" means all expenditure properly incurred (or to be incurred) by the Contractor, whether on or off the Site, including overheads and similar charges, but does not include profit.

1.1.8 "**Country**" means the country in which the Site (or most of it) is located where the permanent works are to be executed.

1.1.9 "**DAB**" means the dispute adjudication board referred to in Clause 15 (Resolution of Disputes).

1.1.10 "**Day**" means a calendar day.

1.1.11 "**Defined Risks**" means those matters listed in Sub-Clause 6.1 (Defined Risks).

1.1.12 "**Drawings**" means the Employer's drawings of the Works as listed in the Contract Data and any Variation to such drawings.

1.1.13 "**Dredging Works**" means those works defined in the Contract Data.

1.1.14 "**Employer**" means the person named in the Agreement and the legal successors in title to the person.

1.1.15 "**Engineer**" means the person named in the Contract Data or other person appointed from time to time by the Employer [illegible] the Contractor.



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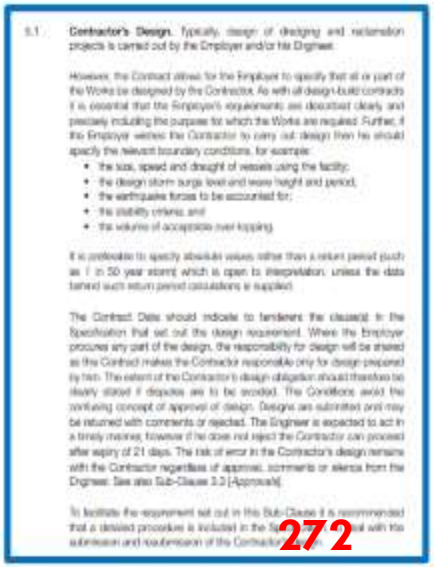
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## DESIGN: CLAUSE 5 RESPONSIBILITY FOR DESIGN (1/2)

- "The Contractor shall be responsible for his tendered design and design under Sub-Clause 5.1 [Contractor's Design], every element of which shall be fit for the intended purposes as specified in the Contract or, where no purposes are specified, fit for their ordinary purposes.



5.1 **Contractor's Design.** Typically, design of dredging and reclamation projects is carried out by the Employer and/or his Engineer.

However, the Contract allows for the Employer to specify that all or part of the Works be designed by the Contractor. As with all design-build contracts it is essential that the Employer's requirements are described clearly and precisely including the purpose for which the Works are required. Further, if the Employer wishes the Contractor to carry out design then he should specify the relevant boundary conditions, for example:

- the size, speed and draught of vessels using the facility;
- the design storm surge level and wave height and period;
- the earthquake forces to be accounted for;
- the stability criteria; and
- the volume of acceptable over topping.

It is preferable to specify absolute values rather than a return period such as 1 in 50 year storm which is open to interpretation, unless the data behind such return period calculations is supplied.

The Contract Data should indicate to tenderers the clause(s) in the Specification that set out the design requirement. Where the Employer procures any part of the design, the responsibility for design will be shared as this Contract makes the Contractor responsible only for design prepared by him. The extent of the Contractor's design obligation should therefore be clearly stated if disputes are to be avoided. The Conditions avoid the continuing concept of approval of design. Designs are submitted and may be returned with comments or rejected. The Engineer is expected to act in a timely manner, however if he does not reject the Contractor can proceed after expiry of 21 days. The risk of error in the Contractor's design remains with the Contractor regardless of approval, comments or silence from the Engineer. See also Sub-Clause 3.3 [Approvals].

To facilitate the requirement set out in this Sub-Clause it is recommended that a detailed procedure is included in the Specification dealing with the submission and resubmission of the Contractor's design.



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# Dredgers Contract 2nd Ed (2016 Blue-Green Book)



## DESIGN: CLAUSE 5 RESPONSIBILITY FOR DESIGN (2/2)

- The Employer shall be responsible for the Specification and Drawings."

5.2 **Responsibility for Design**. The Contractor's responsibility for his design remains, including fulfilment of the purpose for which the Works are required, as is made clear here and in Sub-Clause 3.3 [*Approvals*]. In the event of conflict between the Specification and Drawings and the Contractor's tendered design, the order of priority in the Contract Data makes it clear that the Employer's documents prevail. This means that if the Employer should prefer the Contractor's tendered solution, the Specification and Drawings should be amended before the Employer accepts the Contractor's tender. Otherwise a Variation would be needed.

The Contractor must ensure that the parts of the Works designed by him are fit for their intended purposes

If a Party wishes to protect the intellectual property rights in his design, provision must be made in the Particular Conditions.



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# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## DEFINED RISKS: CLAUSE 6.1

In this Contract, Defined Risks mean:

a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies, affecting the Works;
b) rebellion, terrorism, revolution, insurrection, military or usurped power, piracy, or civil war, affecting the Works;
c) riot, commotion or disorder by persons other than the Contractor's and his subcontractors' personnel, affecting the Works;
d) munitions of war, explosive materials, ionising radiation or contamination by radioactivity, except as may be attributable to the Contractor's use thereof as required for the Works;
e) interruptions due to ship movements in excess of those specified in the Contract Data;
f) use or occupation by the Employer of any part of the Works, except as may be specified in the Contract;
g) rectification of loss or damage to the Works caused by design of any part of the Works by the Employer, the Engineer or others for whom the Employer is responsible;
h) rectification of loss or damage to the Works caused by any operation of the forces of nature affecting the Site and/or the Works, which was unforeseeable or against which an experienced contractor could not reasonably have been expected to take precautions;
i) an Exceptional Event other than sub-paragraphs (a), (b), (c) or (d) of this Sub-Clause;
j) a suspension under Sub-Clause 3.2 [Instructions] unless it is attributable to any failure of the Contractor;
k) any failure of the Employer or the Engineer to fulfil his obligations;
l) physical obstructions or physical conditions encountered on the Site during the execution of the Works, which obstructions or conditions were not reasonably foreseeable by an experienced contractor by the Base Date and which the Contractor has immediately notified to the Engineer;
m) climatic or hydrological conditions more adverse than those specified in the Contract Data;
n) any delay or disruption caused by any Variation;
o) any change made after the Base Date to the Laws or in the judicial or official governmental interpretation of the Laws of the Country or other countries named in the Contract Data;
p) losses arising out of the Employer's right to have the permanent work executed on, over, under, in or through the Site and to occupy the Site for the permanent work; and
q) damage which is an unavoidable result of the Contractor's obligations to execute the Works.

One list of Defined Risks:

- Clear allocation of risk and responsibility;
- Promotes effective budget management;
- Straightforward to modify.

Sub-Clause 10.3 - Early Warning:

- Each Party shall notify;
- Entitlement based on had prompt notice been given.

Notice is not a condition precedent.

# Dredgers Contract 2nd Ed (2016 Blue-Green Book)



## CHANGES TO DEFINED RISKS

- Munitions.
- Piracy.
- Exceptional Events.
- Change in law.
- Ship interruptions.
- Hydrological conditions.

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## ALIGNMENT WITH RAINBOW SUITE

- Performance security.
- Employer's financial arrangements.
- Limitation of liability:
  - exclusion of so called indirect and consequential loss;
  - cap on liability.

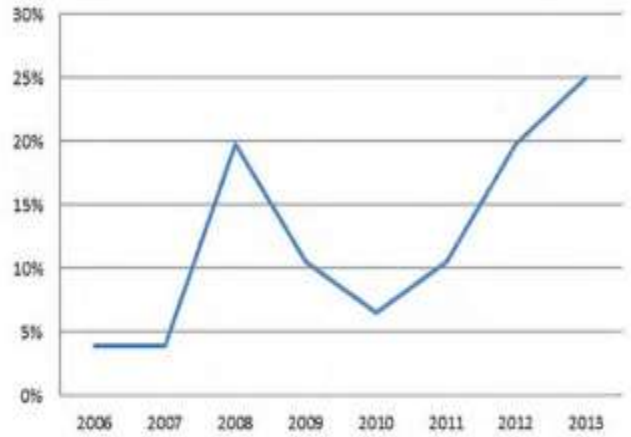
IADC

INTERNATIONAL ASSOCIATION OF DREDGING COMPANIES

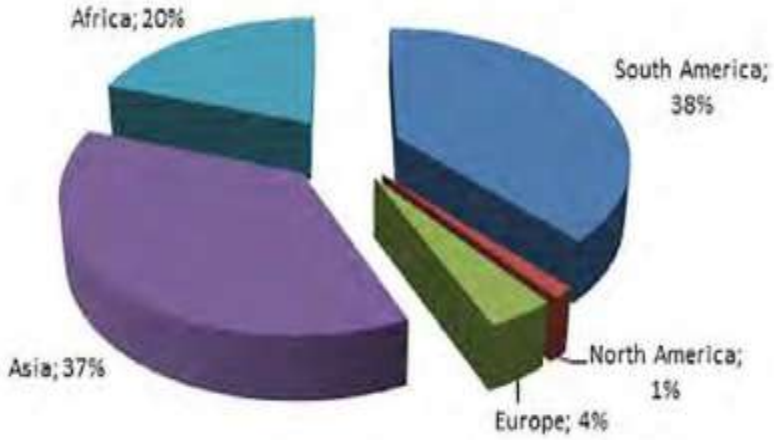
# Dredgers Contract 2nd Ed (2016 Blue-Green Book)

## USAGE OF THE FIRST EDITION

- Widespread in India, Indonesia, Nigeria and the Philippines.
- Growing usage in Central and South America.
- Low usage in UK and Europe.




D&R Usage 2006-2013: 76 awarded






IADC

INTERNATIONAL ASSOCIATION OF DREDGING COMPANIES

# Dredgers Contract 2nd Ed (2016 Blue-Green Book)



## AIM FOR SECOND EDITION

- Wider usage.
- Translations in Spanish, Portuguese, French, German and Russian.

*"most beneficial distribution of risks is to allocate each risk to the party that is best able to deal with and handle that particular risk. Such risk distribution will in general lead to the lowest contract price"*

FIDIC Procurement Procedure Guide

# CONCLUSION

In summary, the river flow condition is a key factor in river mining, and the sequence of mining operations should be properly evaluated during planning and execution.

Mining engineers should systematically document all excavation stages to ensure timely reporting of accidents or disasters to the relevant authorities with supporting evidence.

Due to the nature of work in a flowing river environment, the safety of workers and equipment must be carefully managed.

During drilling and blasting activities in water, careful control measures are required to minimize the risk of misfires.

# Q & A

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# Thank you