Admin 144 - 514

Republic of the Philippines
Department of Public Works and Highways
Manila

Title/Description: THIRD STEERING COMMITTEE MEETING FOR THE DATA COLLECTION SURVEY ON PARAÑAQUE SPILLWAY IN METRO MANILA

Minutes of Meeting

Date:	Started	Adjourned	Venue
January 23, 2018	1:40 P.M.	4:30 P.M.	Operations Room, 2nd floor, DPWH Central Office, Port Area, Manila

Attendees:	Topics:
Please see attached marked "**ANNEX 1**"	1. Schedule 2. Findings 3. Design Scale and Hydrological/Runoff Inundation Analysis 4. Full Menu of Comprehensive Flood Management Plan for Laguna de Bay Lakeshore Area 5. Comprehensive Flood Management Plan 6. Preliminary Environmental and Social Analysis

Topic	Session Highlights and Discussion	Person Responsible
	The Meeting was chaired by Undersecretary Emil K. Sadain, CESO I, for UPMO Operations and Technical Services, Department of Public Works and Highways (DPWH). The results of the study were explained by Mr. Takahiro Mishina, Leader of the JICA Survey Team and discussions were made. The highlights of the meeting are summarized below:	
1. Call to Order	• Usec. Sadain called the meeting into order at 1:45 P.M. • Project Manager Leonila R. Mercado of the UPMO – Flood Control Management Cluster (FCMC) acknowledged the presence of the members/representatives of the Steering Committee. • After the acknowledgement, Usec. Sadain requested the JICA Survey Team to present the updates/status of the Survey.	

	• Mr. Mishina presented the results of the survey for the Parañaque Spillway together with the Comprehensive Flood Management Plan.	
2. Findings	• Usec. Sadain noted that the EIRR of Case B, Parañaque Spillway being the priority project for the Comprehensive Flood Management Project is estimated at 8.2 to 10.3%. He asked if in the computation of EIRR, the impact of the dam and retarding basin projects in the Pasig-Marikina River Improvement Project (PMRCIP, Phase 3 and 4) was included already. ➢ Mr. Mishina replied that the two mentioned projects must be considered separately from the Parañaque Spillway Study. He also explained that to increase the EIRR, further study must be undertaken on the particular methodology to be used as there are two (2) methods being considered (Shield Tunneling and NATM Technology). • Usec. Sadain inquired on the possibility of reducing the diameter of the tunnel from 12 meters to 10 meters in order to increase the EIRR. ➢ Mr. Mishina explained that reducing the diameter of the tunnel is not effective as it will also lessen the outflow of flood waters. Instead, he suggested to reduce the return period from 100 year to 50 year. • Usec. Sadain inquired if the CBK hydro power plant utilization of water was considered in the study. ➢ Mr. Mishina responded that it was already considered as the amount of water used by CBK is minimal and has no effect in the study. • In addition, Usec. Sadain informed that the DPWH has an on-going Feasibility Study (FS) and Detailed Engineering Design (DED) on Marikina Dam and proposed Road Network Projects for Laguna de Bay which is scheduled to commence in February 2018, wherein, some common references must be looked into for evaluation/assessment/analysis. There can be some economic impact that might increase the EIRR to make the Parañaque project more feasible. • Usec. Sadain also mentioned about the concern on the budget for Road Right-of-Way (RROW) and relocation of affected Informal Settler	JICA Survey Team

	Families (ISF). He emphasized that there should be more specific and definite numbers of ISF in order to realize the impact on the computed EIRR to increase its viability for approval. • Laguna Lake Development Authority (LLDA) Assistant General Manager Generoso M. Dungo asked if the proposed reclamation area of the LLDA with the Philippine Reclamation Authority (PRA) for a total area of 13,000 hectares has been included in the evaluation of the Study Team. ➢ The Consultant informed that it will visit the LLDA to clarify the information. • Parañaque City Environment and Natural Resources Office (CENRO) asked the particular benefits the LGU will receive from the Parañaque Spillway Project predominantly on their drainage system as they are experiencing flooding. ➢ Mr. Mishina replied that the Parañaque River was considered in the Pre-FS.	
3. Study on Parañaque Spillway	• Usec. Sadain asked how the calculations of Parañaque Spillway project can be adjusted to improve the EIRR of 7.3 -9.1% as the National Economic Development Authority (NEDA) requires an EIRR of 10% to approve any proposed project. • Dr. Glen Q. Tabios of the UP-National Hydraulic Research Center (UP-NHRC) recommended that the "return period" may not be the basis for the approval of the project as mentioned in the 2nd SC meeting. He clarified and stressed to the probability of including the scenario of Marikina Dam in the study using the Agos River towards the Pacific Ocean. ➢ PM Hipolito clarified that the Study is specific for the Parañaque area. However, it depends on the Study team if they have still time to include the scenario. ➢ The Study Team requested Dr. Tabios for the calculations he made for the said situation, and agreed to share his data.	JICA Study Team
4. Study on Combination of Flood Management Measures	• PM Hipolito has three (3) clarifications: o The term "residual area" used in the presentation.	

	➢ Mr. Mishina replied that they will modify the terms used in the sentence to make it clear. o Clarifications if in the modelling, the Study Team used the two (2) software (MIKE11 and RRI), and the viability of the results. ➢ Mr. Mishina explained that the MIKE11 needs the cross section data of the lake wherein no data is available. He said that if there is cross sectional data then RRI model can be used to provide short term scenario results. o The potential impact of a bill or law that requires any effluent or flood water to be treated prior to discharging. As this will have impact on the Operation and Maintenance cost and the design of the spillway. ➢ The Project Team answered that this matter will be studied/considered.	

Review and Confirmation:		
Prepared by:	Approved by:	Noted:
三品孝洋 **TAKAHIRO MISHINA**	**PATRICK B. GATAN, CESO III**	**EMIL K. SADAIN, CESO I**
Project Team Leader JICA Survey Team	Project Director UPMO – FCMC	Undersecretary for UPMO Operations and Technical Services
Position	Position	Position

ANNEX 1 ATTENDANCE SHEET

Date:	Started:	Adjourned:	Venue:
January 23,2018	1:30 PM	4:30 PM	2nd Floor Operations Room, Office of the Secretary, DPWH Head Office, Bonifacio Drive, Port Area Manila

ATTENDANCE SHEET			
Name	Office	Contact Number	Signature
1. Usec. Emil K. Sadain	DPWH-UPMO Operations		
2.Glen Q. Tabios	UP- National Hydraulic Research Center		
3.Michael Auguilar	LGU-Las Piñas		
4.Shellowin de Leon	LGU-Parañaque		
5.Ma. Teresa R. Quigue	LGU-Parañaque		
6.Justin de Ramos	DENR- NCR		
7.Renz Mario Gamido	DENR - NCR		
8.Dethermina Basillio	DILG-NCR		
9.George T. Gomez	MMDA		
10.Jonathan T. Gomez	MMDA		
11.Emiterio C. Hernandez	LLDA		
12. Generoso M. Dungo	LLDA		
13.Ruel S. Casimiro	DPWH-IV-A		
14.Leonardo Lingan	DPWH - BOD		
15.E.C Matangihan	DPWH- BOD		
16.Ricchelieu Felipe I. Lim	DPWH- BOD		
17.Constante A. Llanes Jr.	DPWH – Planning Service		
18.Leonila R. Mercado	DPWH – UPMO-FCMC		
19.Michael Alpasan	DPWH – UPMO-FCMC		
20.Mark Zaplan	DPWH – UPMO-FCMC		

ATTENDANCE SHEET			
Name	Office	Contact Number	Signature
21.Dolores M. Hipolito	DPWH – UPMO-FCMC		
22.Jesse C. Felizardo	DPWH-UPMO - FCMC		
23.Ayume Oshima	JICA -PP		
24.Kimiko Hayashi	JICA -PP		
25.Cathy Palanca	JICA PP		
26.Junji Miwa	JICA Expert		
27.Takafumi Nakui	JICA Expert		
28.Satoshi Takata	JICA Survey Team		
29.Takahiro Mishina	JICA Survey Team		
30.Geraldine Santos	JICA Survey Team		
31.Riza S. Nanas	JICA Survey Team		
32.Eleazar Rupido	JICA Survey Team		
33.			
34.			
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APPENDIX 1

Appendix 1-4　4th　Steering Committee　2018/4/4

Data Collection Survey on Parañaque Spillway in Metro Manila

4th Steering Committee Meeting

April 4, 2018

Japan International Cooperation Agency

CTI Engineering International Co., Ltd. (CTII)
Nippon Koei Co., Ltd. (NK)
CTI Engineering Co., Ltd. (CTIE)

Schedule

- July 31,2017 : Started the Survey in the Philippines
- August 10-11,2017 : Site Investigation
- August 17,2017 : First Steering Committee
- November 03,2017 : Second Steering Committee
- January 23, 2018 : Third Steering Committee
- End of January, 2018 : Submission of Interim Report
- April 4, 2018 : Fourth Steering Committee
- Middle of April, 2018 : Submission of Draft Final Report
- Middle of May, 2018 : Submission of Final Report

Work Items \ Period	2017						2018					
	7	8	9	10	11	12	1	2	3	4	5	6
【A】Domestic Preparation Works and Consultation of IC/R with JICA												
【B】Comprehensive Flood Management Plan of Laguna de Bay Lakeshores Area												
【C】Pre-Feasibility Study of Paranaque Spillway												
Report		△ IC/R					△ IT/R		△ DF/R		△ F/R	

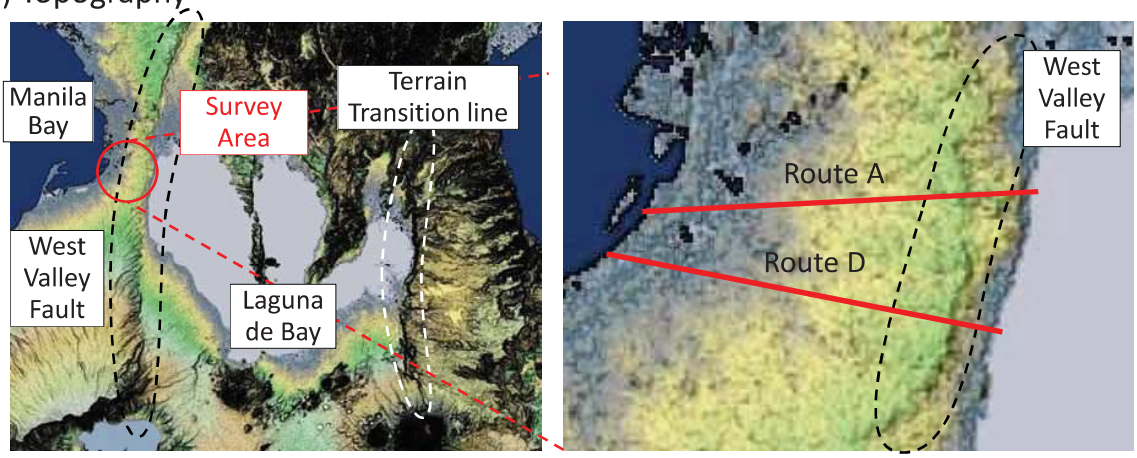
Source: JICA Survey Team

■ Topic (Results of Feasibility Study)

1. Topographical and Geological Condition
2. Basic Design of Parañaque Spillway
3. Construction Plan
4. Procurement Plan
5. Non-structural Measures
6. Operation and Maintenance
7. Environmental Issues
8. Water Quality
9. Implementation Plan
10. Preliminary Cost Estimate
11. Economic Evaluation and Verification of the Project
12. Study on Downstream River Channel

1. Topographical and Geological Condition

1) Topography



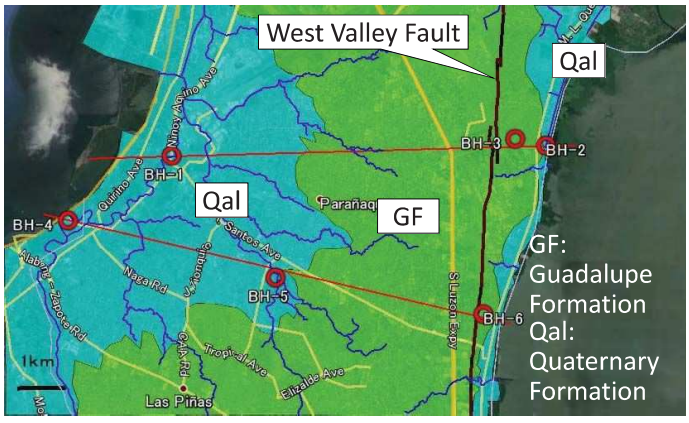
Source: SRTM, Visualized by JICA Survey Team

- The West Valley Fault in the Valley Fault System can be seen in north-south direction, west side of Laguna de Bay.
- The elevation becomes gradually higher toward Laguna de Bay. After the peak of hilly land at around 40m, the elevation drops at lakeshore area of Laguna de Bay.

Source: Google Earth, Visualized by JICA Survey Team

1. Topographical and Geological Condition

2) Geology



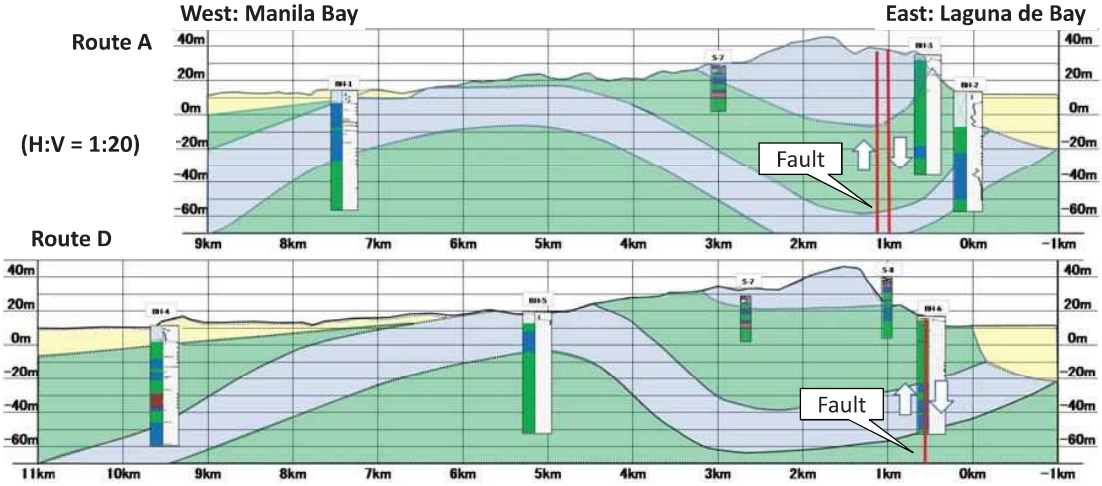
Source: Geology of the Philippines, MGB, revised by JICA Survey Team

Source: JICA Survey Team

- <u>Basement rock in this hilly land:</u>
  Pleistocene Guadalupe Formation (GF), mainly composed of volcanic clastic rocks (tuff, lapilli tuff, tuff gravel rock, volcanic ash silt etc.,) so-called “soft rocks.”
- <u>Lowlands on the western side of the hill and the lakeshore area of Laguna de Bay:</u>
  Holocene Quaternary Alluvium (Qal), unconsolidated deposits such as clay, silt, sand, and gravel covers the basement soft rocks.

1. Topographical and Geological Condition

3) Geology (Longitudinal Section and Soil Parameters)



Source: JICA Survey Team

- There are few cracks in the rocks, and the permeability is considered to be small.
- Uniaxial compressive strength of the basement rock is 24.2 Mpa on average.
- N values: Alluvium: approx.10 to 30, basement rocks excluding surface weathered: more than 50.

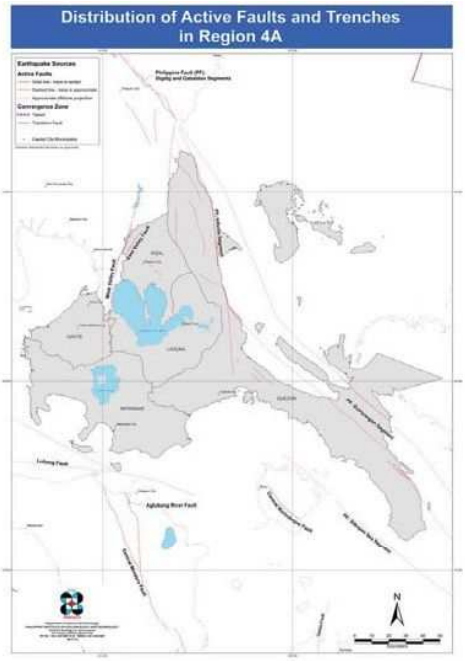
Alluvium Unconsolidated clay and silt, unconsolidated sand and gravel etc.

Massive Tuff Rock Lapilli tuff, sandy tuff, pumice tuff etc.

Layered Tuff Rock Fine tuff, volcanic ash silt, clay etc.

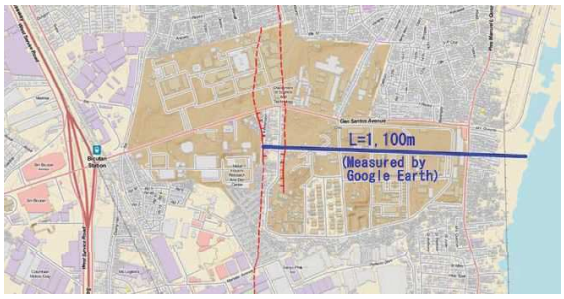
2. Basic Design of Parañaque Spillway

1) Countermeasure for West Valley Fault



Location Map of Geological Faults in Region-4A

Source: http://202.90.128.67/html/update_GGRDD/Maps/AF-and-Trenches/Regional/Luzon/Region%204A.png



Geological Fault Map of Lower Bicutan

Source: http://faultfinder.phivolcs.dost.gov.ph/

Geological Fault Map of Sucat

Source: http://faultfinder.phivolcs.dost.gov.ph/

2. Basic Design of Parañaque Spillway

1) Countermeasure for West Valley Fault

Table 7.2.1 Comparison of Countermeasures for Tunnel at West Valley Fault

Measure	Flexible Structure	Reinforced Lining	Repair after Movement	Open Channel
Summary	Flexible Structure is adapted at the fault against the deformation by the movement.	For soft ground, the lining shall be designed strongly enough to resist the deformation.	Basically, after the movement, the tunnel damages shall be repaired.	Open channel is adapted from Laguna de Bay to the fault because of easy to be fixed.
Problem	It may be difficult to adjust the deformation if the movement will be concentrated several meters.	It is very difficult for the stiff soil, because the load caused by the movement will be huge.	If move, it will be necessary to restore others. Therefore, obtaining the budget is difficult.	Land acquisition and resettlement are necessary between Laguna de Bay and Intake Facility.
Others	-	-	Expensive of O. & M. Cost	Easy for O. & M.
Cost	Generally expensive	Generally expensive	Initial cost is cheap but repair cost is expensive	Expensive for land acquisition and resettlement cost
Evaluation	Not impossible but the safety is not guaranteed.	Not impossible but the safety is not guaranteed.	Budget for repair will be a problem.	The most practical measure
	Δ	Δ	Δ	O: Selected

Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

2) Influence on Subway and Railway Projects

Table 7.2.2 Influence on Subway and Railway Projects

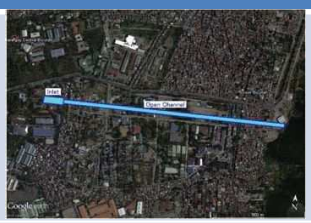
Type	Project Name	Summary	Influence of Spillway	Remarks
Railway	LTR-1 Cavite Extension	▪This line will pass from center of Manila through Parañaque City to Las Piñas City. ▪The line goes through the west side of San Dionisio River and crossing Zapote River.	▪No influence around Parañaque River ▪Outlet of the spillway is near the railroad line at Zapote River	▪Basically, no problem ▪Negotiation & measures will be necessary if Zapote River is used.
Subway	Mega Manila Subway Project (JICA)	This line will pass from center of Manila through Parañaque City to Las Piñas City.	No influence with the 50m-depth spillway plan	▪No problem ▪No clear progress after JICA's Data Collection Survey in 2015.
Railway	North-South Railway Project South Line	Existing line will be renovated to the doubled lines and/or viaduct bridge.	▪The inlet open channel crosses the railroad line at the ground level in Sucat. ▪The channel crosses a viaduct bridge in Lower Bicutan.	▪Basically, no problem ▪Negotiation & measures will be necessary if Sucat area is used.

Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

3) Location of Intake Facility

Table 7.2.3 Comparison of Intake Facility Location of Parañaque Spillway

Place	Lower Bicutan	Sucat
Location		
Spillway Length	Parañaque River System Lp=6.0km Zapote River Lz=9.1km	Parañaque River System Lp=6.8km Zapote River Lz=8.8km
Site Condition	It is necessary to relocate large-scale facilities, such as Polytechnic University of Philippines.	Mainly un-used ground is wildly spaced but adjacent to church.
Social Environment	1200m of the Open Channel is longer than Sucat and the land acquisition area is also wider.	600m of the Open Channel is shorter than Lower Bicutan and then fewer resettlements is advantage.
Cost	Basically more economical	More expansive due to longer tunnel
Evaluation	Even if wider land acquisition and many resettlements, more economical.	Advantage of social environment, especially the land acquisition.
	O: More economical	O: Easy Land Acquisition

Legend: ◎;Excellent、○;Good、△;Not Good/Some Problem、×;Difficult/ Impossible

Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

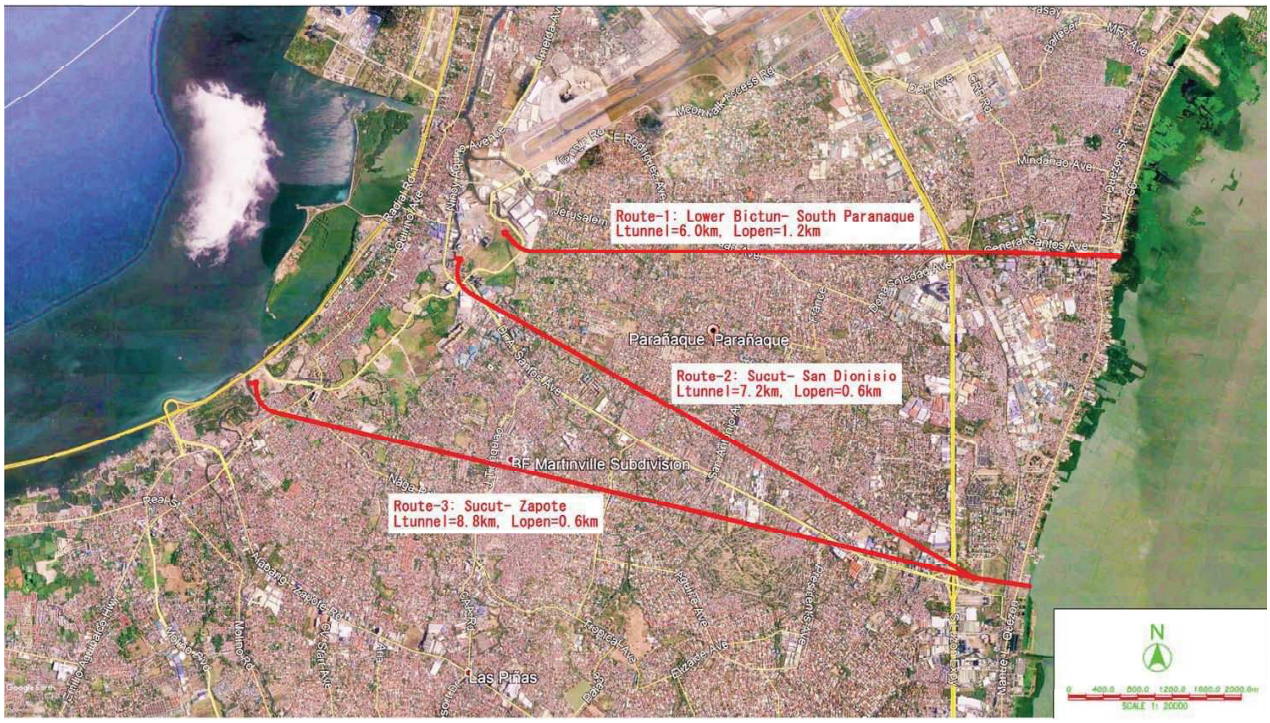
4) Location of Drainage Facility

Table 7.2.4 Comparison of Drainage Facility Location of Parañaque Spillway

River	South Parañaque River	San Dionisio River	Zapote River
Location			
Spillway Length	South Parañaque- Lower Bicutan Spillway Lp=6.0km Open Channel Lo=1.2km South Parañaque- Sucat Spillway Lp=6.8km Open Channel Lo=0.6km	San Dionisio- Lower Bicutan Spillway Lp=6.6km Open Channel Lo=1.2km San Dionisio- Sucat Spillway Lp=7.2km Open Channel Lo=0.6km	Zapote River- Lower Bicutan Spillway Lp=9.1km Open Channel Lo=1.2km Zapote River- Sucat Spillway Lp=8.8km Open Channel Lo=0.6km
Site	There is sufficient open space area.	There is adequate open space area.	There is substantial open space area at the right.
River Improve-ment	The channel width around the drainage facility is not enough.	The confluence with South Parañaque River and its upstream are narrow.	There are a few problems because of the wide river and near the river mouth.
LPPCHEA	Relatively large influence than Zapote River Case.	Relatively large influence than Zapote River Case.	Relatively small influence than Parañaque River Case.
Cost	The cheapest plan	The intermediate plan	The most expensive plan
Eval.	O: High Possibility	O: Possible	O: Promising

2. Basic Design of Parañaque Spillway

5) Alignment Plan of Spillway



Alignment Plan of Parañaque Spillway

Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

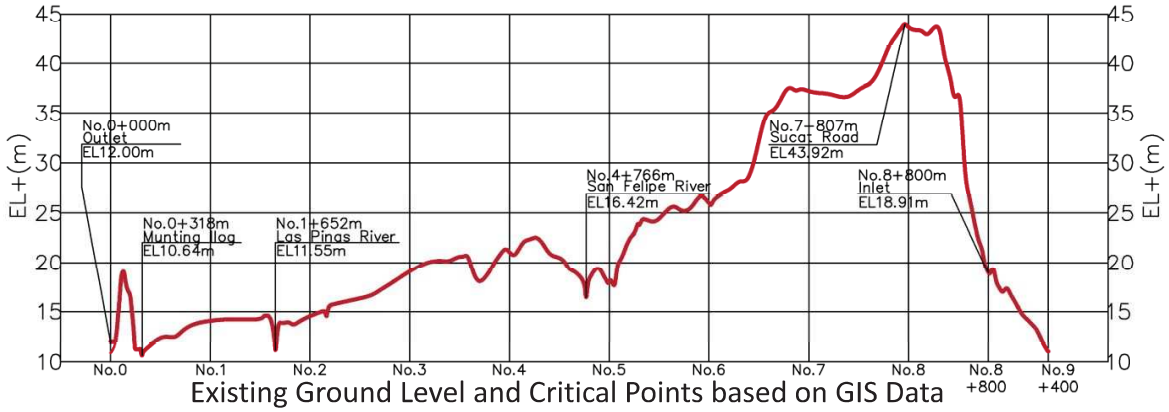
5) Alignment Plan of Spillway

Table 7.2.5 Comparison of Alignment Plan of Parañaque Spillway

Route	Route-1: Lower Bicutan to South Parañaque River	Route-2: Sucat to San Dionisio River	Route-3: Sucat to Zapote River
Summary	Basically straight line between Lower Bicutan and South Parañaque River	Basically straight line between Sucat and San Dionisio River	Basically straight line between Sucat and Zapote River
Spillway Length	South Parañaque- Low. Bicutan Spillway Lp=6.0km Open Channel Lo=1.2km	San Dionisio- Sucat Spillway Lp=7.2km Open Channel Lo=0.6km	Zapote River- Sucat Spillway Lp=8.8km Open Channel Lo=0.6km
Site	It is necessary to relocate large-scale facilities. such as Polytechnic University	Mainly un-used ground is wildly spaced but adjacent to church.	
River Improve-ment	Widely required river improvement area due to the narrow channel.	Required river improv. area is up & down streams of drainage facility.	Required river improv. area is smallest among 3 rivers.
Social Environ-ment	The length of 1200m of the Open Channel is longer than Sucat.	It is necessary to make the resettlement of Laguna de Bay lakeshore area.	
LPPCHEA	Relatively large influence than Zapote River Case.	Relatively small influence than Parañaque River Case.	
Cost	The cheapest plan	The intermediate plan	The most expensive plan
Eval.	O: Possible	Δ	O: Promising

2. Basic Design of Parañaque Spillway

6) Longitudinal Plan (Route-3)



Existing Ground Level and Critical Points based on GIS Data

Table 7.2.7 Longitudinal Plan of Shield Tunneling Method

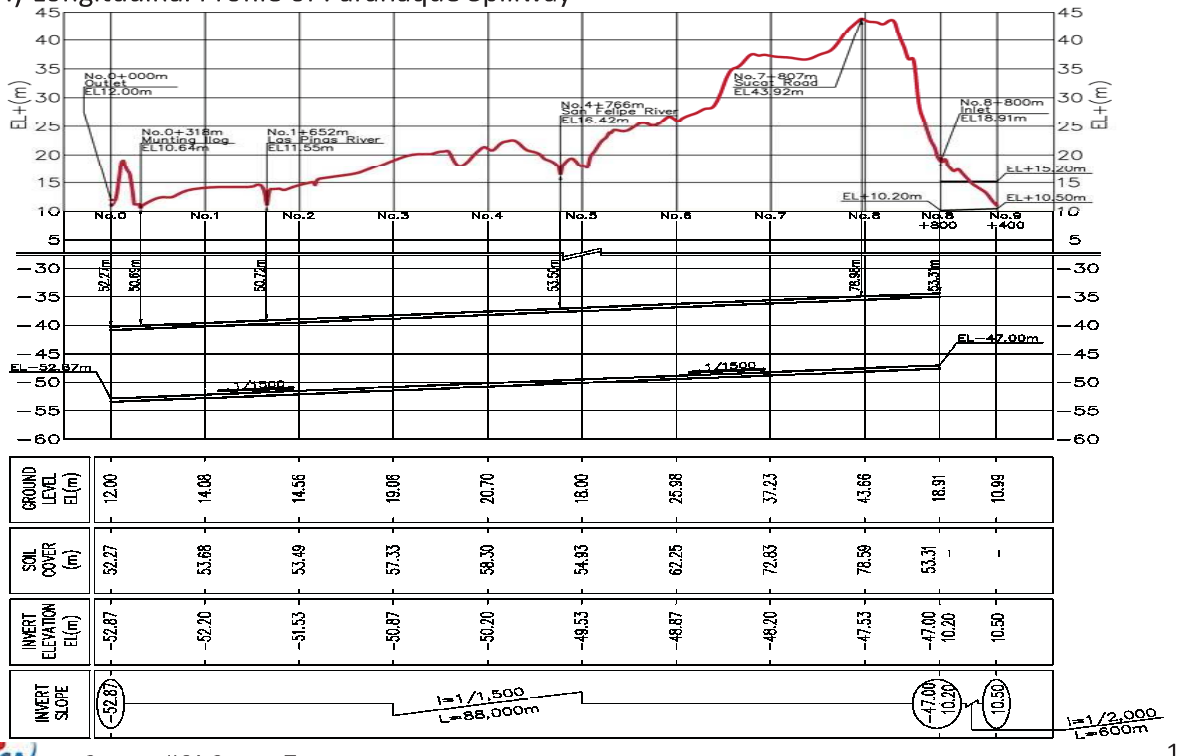
Station	Cumul. Dis. (m)	Place	Ground Level EL(m)	Invert Elevation EL(m)	Slope	Soil Cover (m)	Note
No.0+000	0m	Outlet Shaft	+12.00	-52.87	1/1,500	52.27	Complemented
No.0+318	318m	Munting Ilog	+10.64	-52.65		50.69	Critical Point
No.1+652	1,652m	Las Piñas River	+11.55	-51.77		50.72	
No.4+766	4,766m	San Felipe River	+16.42	-49.68		53.50	
No.7+807	7,807m	The highest Point	+43.92	-47.66		78.98	
No.8+800	8,800m	Inlet Shaft	+18.91	-47.00		53.31	
		Down. of Open Channel		+10.20	1/2,000	—	Open Channel
No.9+400	9,400m	Upst. of Open Channel	+10.99	+10.50		—	Section

Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

7) Outline Drawing (Route-3)

i) Longitudinal Profile of Parañaque Spillway

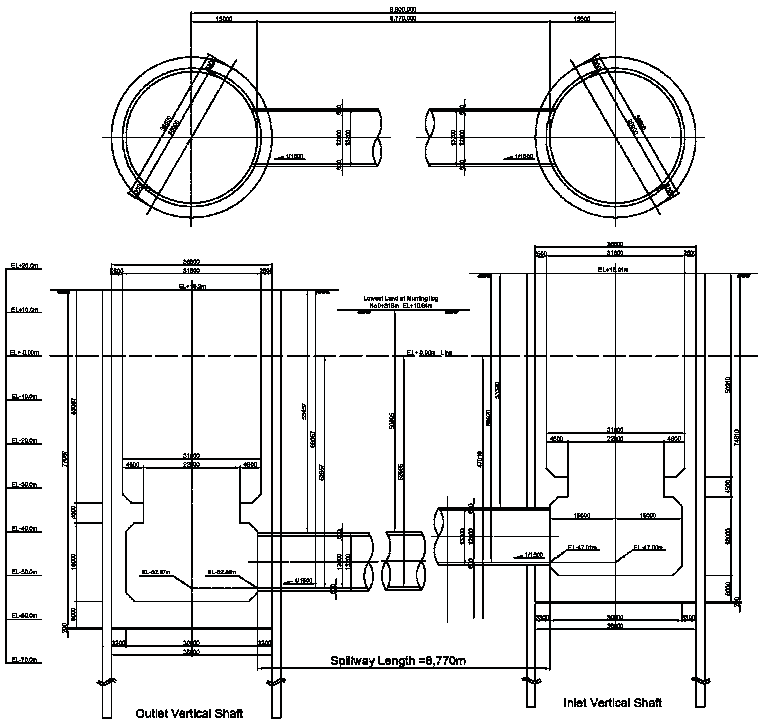


Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

7) Outline Drawing (Route-3)

ii) Plan Drawing of Vertical Shaft of Inlet and Outlet

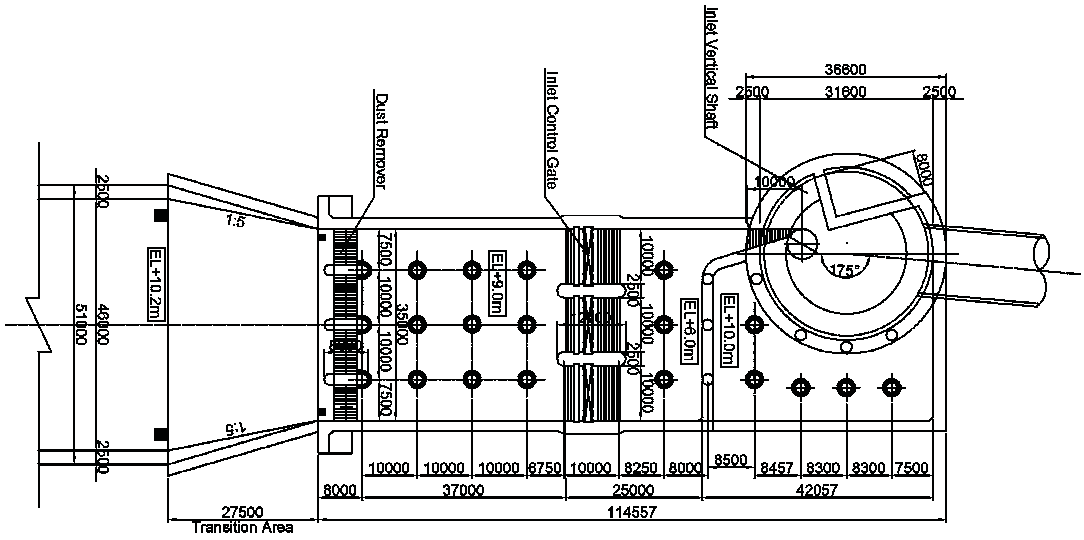


Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

7) Outline Drawing (Route-3)

iii) Plan Drawing of Intake Facility

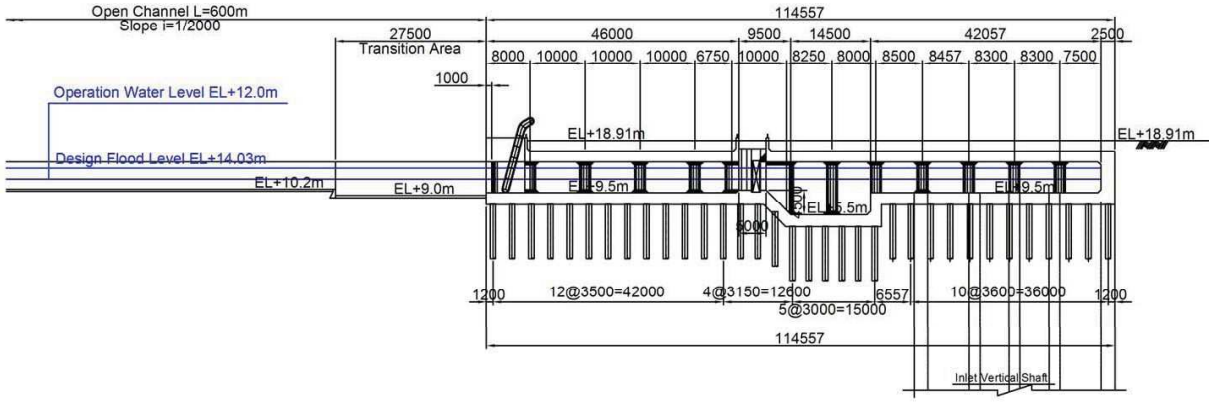


Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

7) Outline Drawing (Route-3)

iv) Cross Section Drawing of Intake Facility

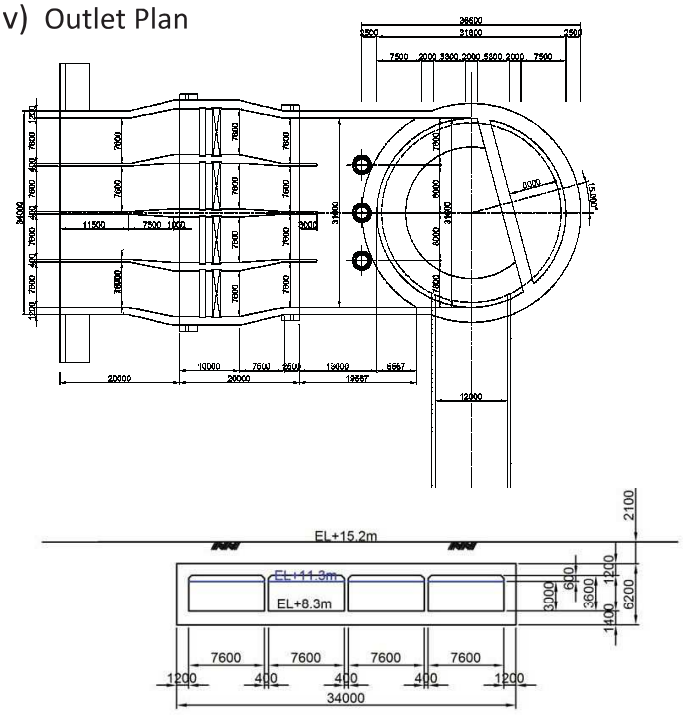


Source: JICA Survey Team

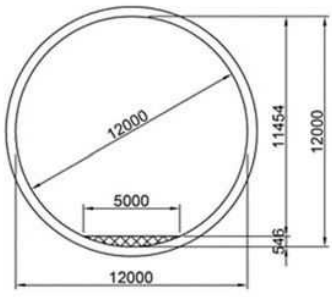
2. Basic Design of Parañaque Spill

7) Outline Drawing (Route-3)

v) Outlet Plan



Vi) Tunnel Cross Section

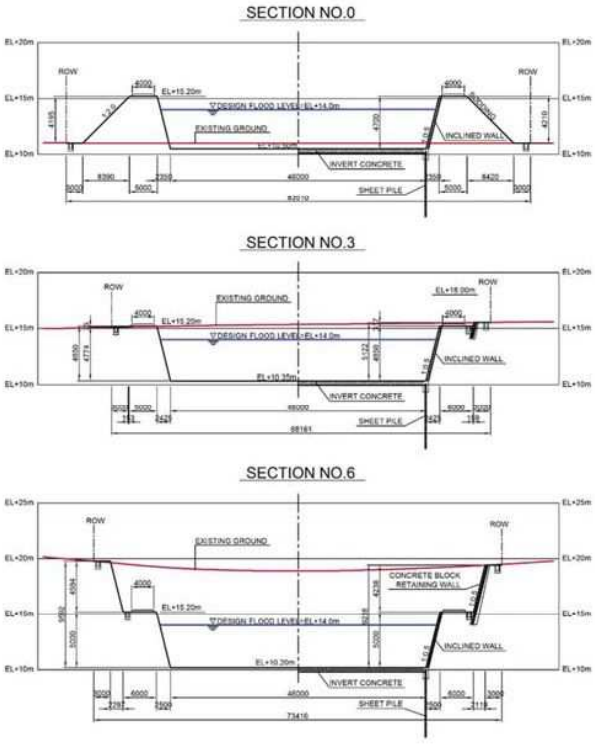


Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

7) Outline Drawing (Route-3)

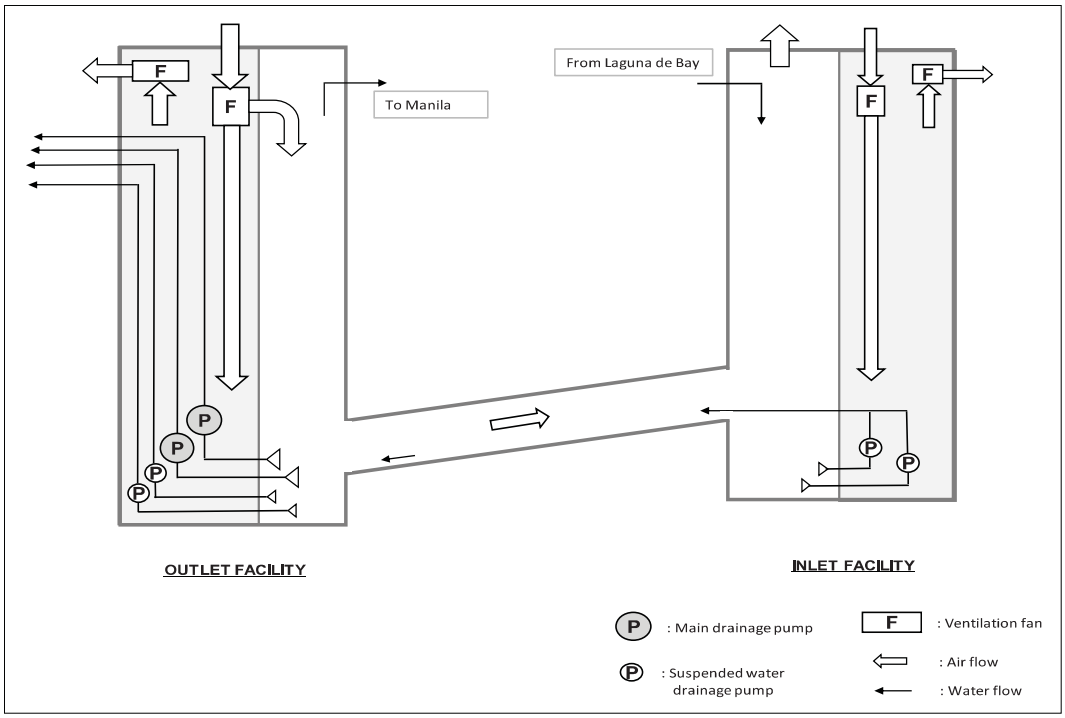
vii) Standard Cross Section of Intake Open Channel



Source: JICA Survey Team

2. Basic Design of Parañaque Spillway

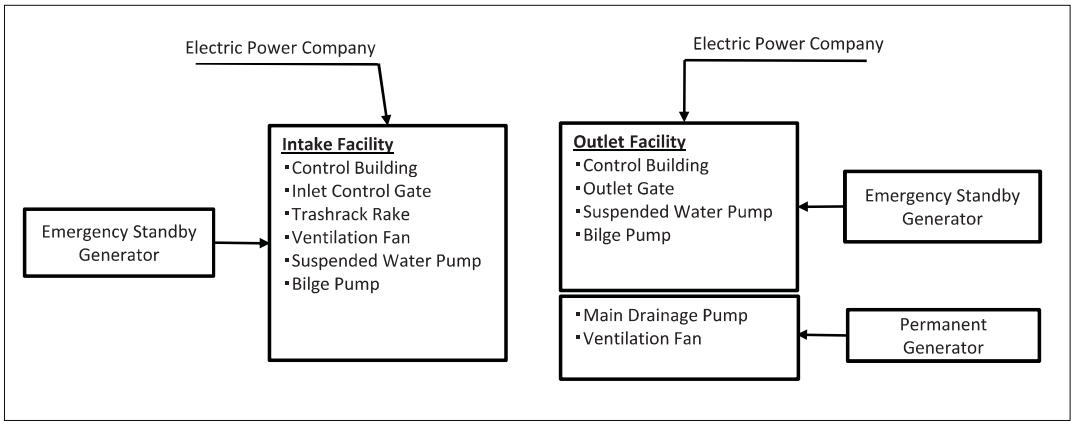
Design of Pump and Gate



Drainage and Ventilation System Diagram

2. Basic Design of Parañaque Spillway

Design of Pump and Gate



Electric Power Supply System

Outlet Facility

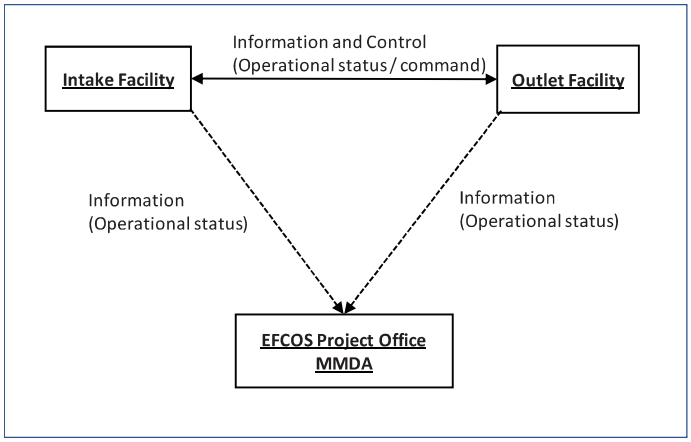
Main drainage pump : 1.4m^3/sec x 1,300kW x 2 units Drainage period of 5 days

Ventilation fan : 2,200m^3/min Required amount of ventilation for the tunnel

These two equipment are supplied electricity by permanent generator (in-house power generator).

2. Basic Design of Parañaque Spillway

Design of Pump and Gate



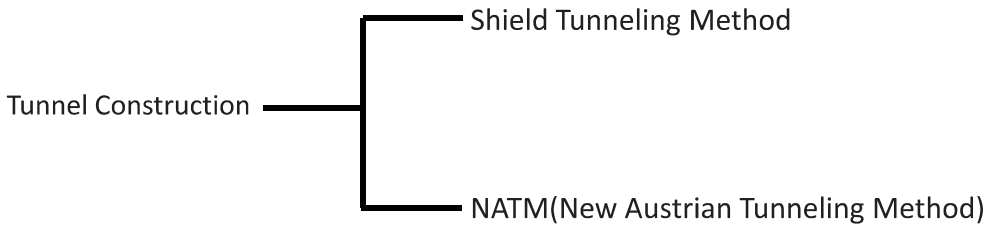
Supervisory Control System

Information and Control
(Between both Facilities)
- Water level
- Operational Status
- Remote Control of Equipment
- Video Monitoring

(Inflow / Discharge, Operation of Equipment, Security in the premises)

Information to EFCOS Project Office
- Water level
- Operational status of the equipment
  (Source on/off, Pump run/stop, Gate open/close, etc.)

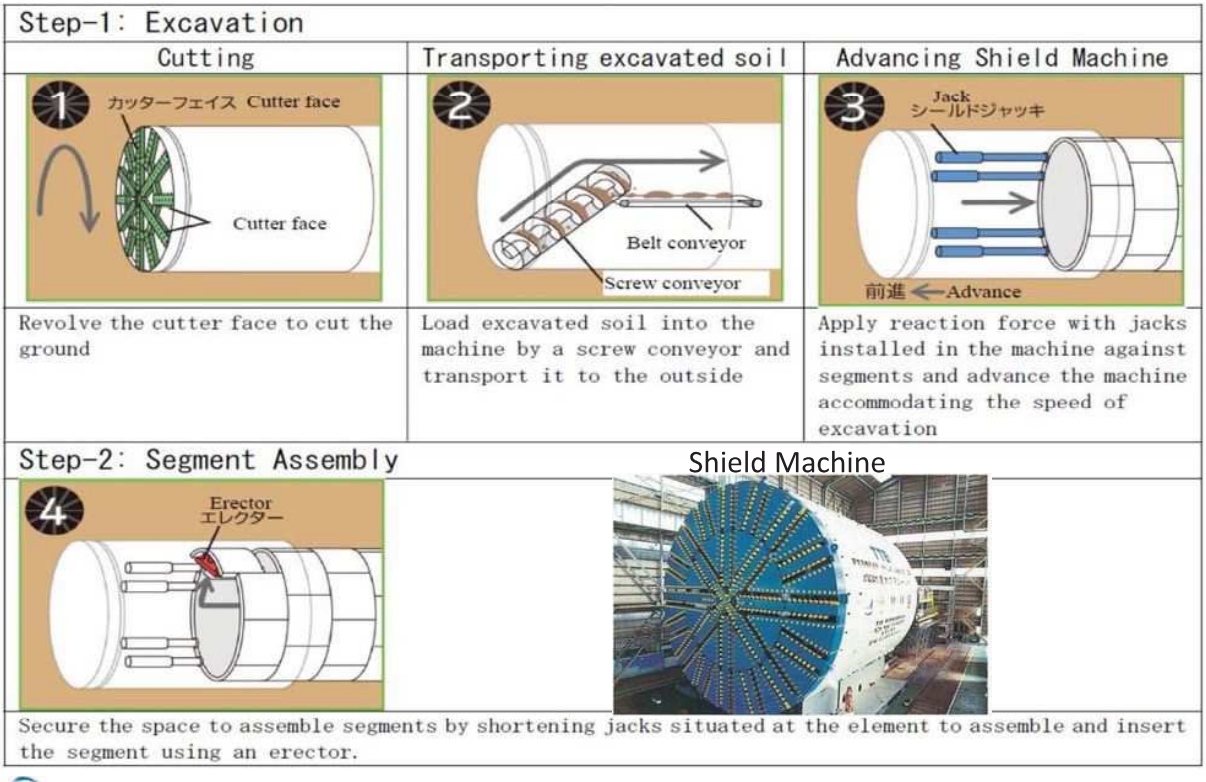
3. Construction Plan
a. Tunnel Construction



Shield Tunneling Method : Excavate with the shield machine by stabilizing the face against earth pressure and water pressure using mud pressure or muddy water pressure and assemble segments to retain the ground

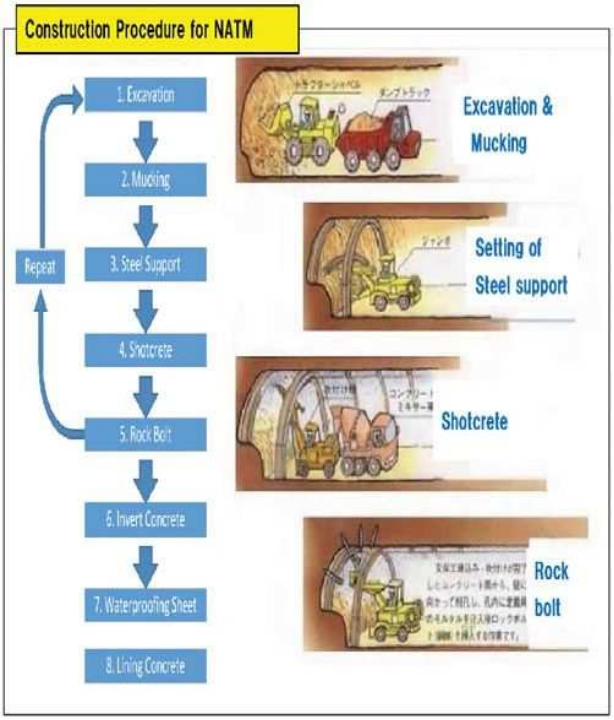
NATM : Excavate by stabilizing the ground using shotcrete, rockbolts and steel support etc. utilizing the support function of surrounding ground

3. Construction Plan
b. Shield Tunneling Method (Construction Procedure)

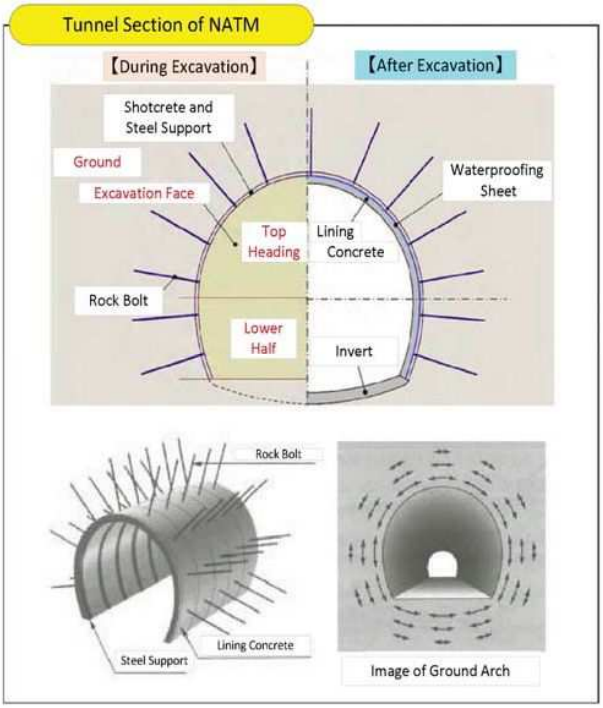


Source: North Line HP from Metropolitan Expressway Company Limited

3. Construction Plan
c. NATM (Construction Procedure and Cross Section)



Source: Design Practice to Understand the Concept Well 7 from Tunnel Designing



Source: Design Practice to Understand the Concept Well 7 from Tunnel Designing

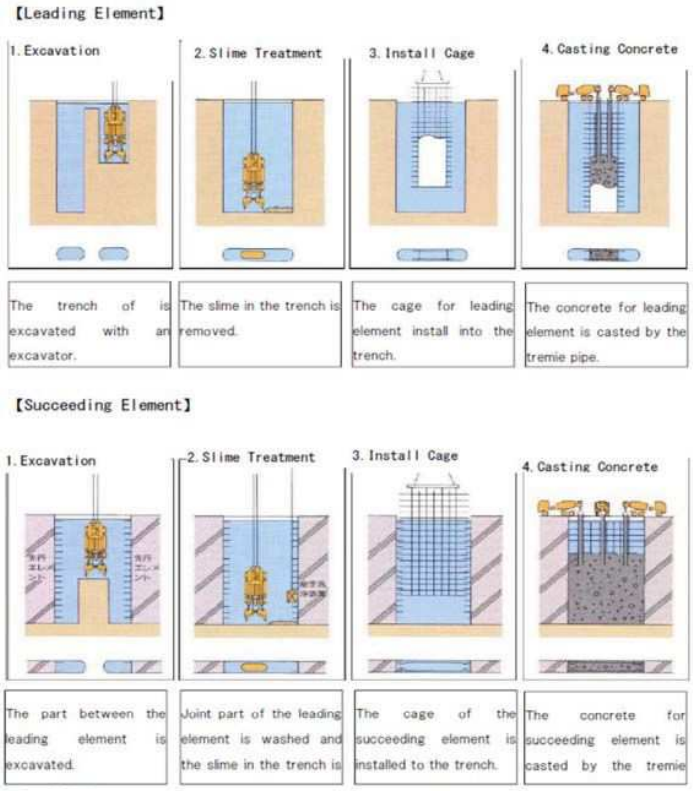
3. Construction Plan
d. Shafts Construction

- Shafts Construction
  - RC Diaphragm Wall Method
  - Open-Caisson Method

RC Diaphragm Wall Method : Inserting reinforcement cages into drilling grooves excavated using slurry and replacing slurry with concrete to cast continuous RC wall

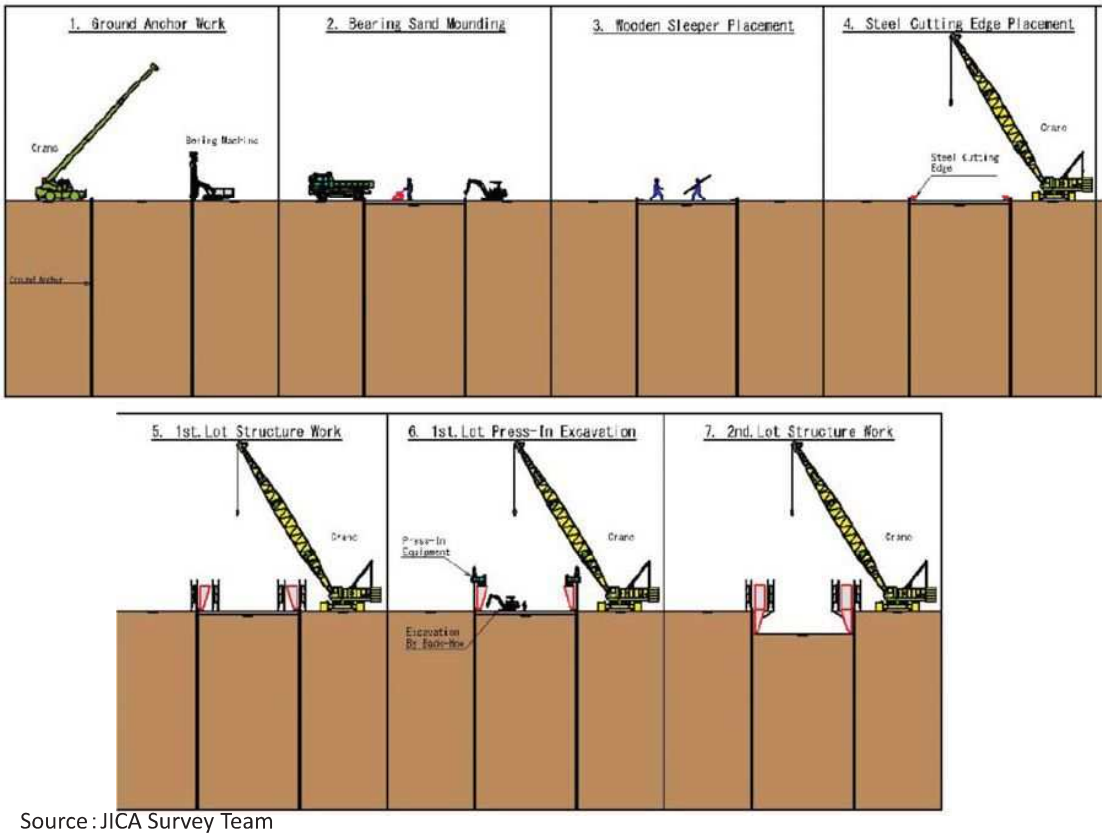
Open-Caisson Method : The main frame of caisson to be installed into the ground by using reaction force of dead weight and ground anchors

3. Construction Plan
e. RC Diaphragm Wall Method (Construction Procedure)



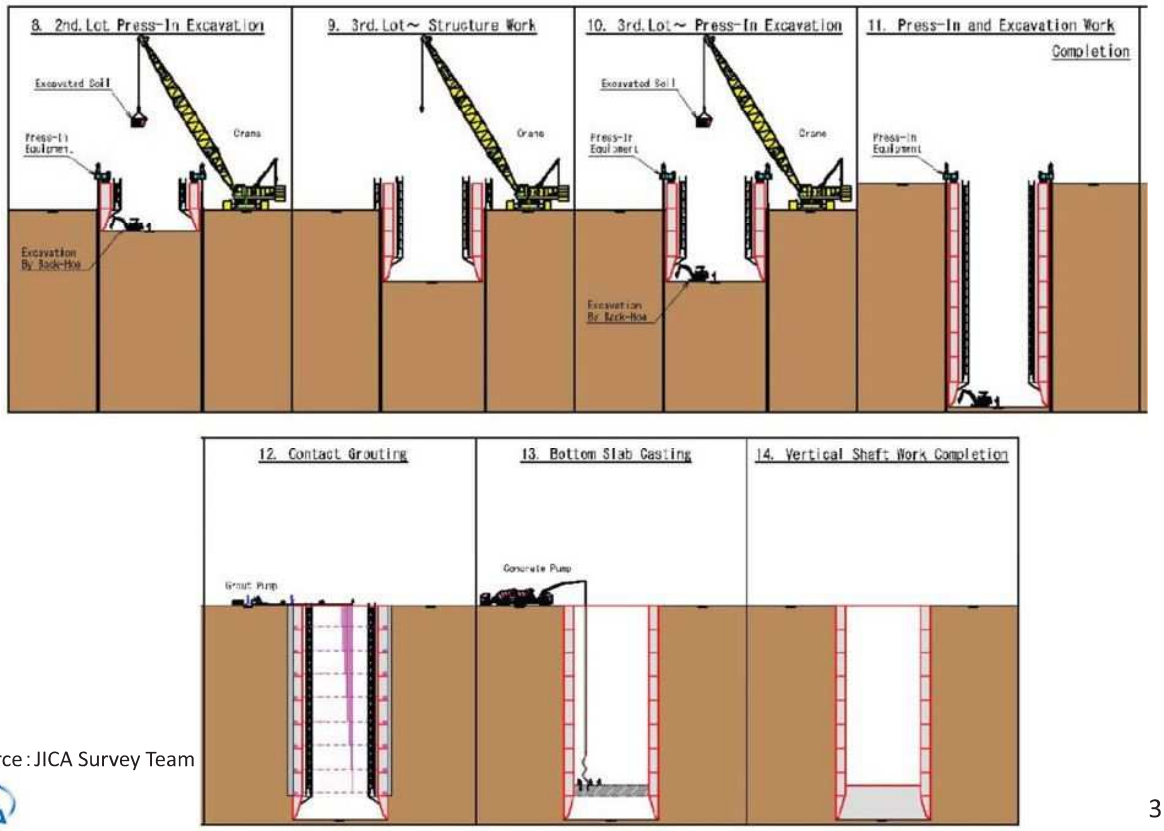
Source: Source: Diaphragm Wall Association (http://www7b.biglobe.ne.jp/~renpeki/index.html)

3. Construction Plan
f. Open –Caisson Method (Construction Procedure-1)



Source : JICA Survey Team

3. Construction Plan
f. Open –Caisson Method (Construction Procedure 2)



Source : JICA Survey Team

3. Construction Plan
g. Surplus Soil Disposal

- **Surplus Soil Volume**

	Route and Method	Soil Volume (m3)
Option1	Route-1 , Shield	1,700,000
Option2	Route-1, NATM	1,800,000
Option3	Route-3, Shield	1,650,000
Option4	Route-3, NATM	1,750,000

- **Disposal Site** : Designated Disposal Site in Laguna Lake to be secured (within 10km from the launching Shaft)

- Another Option: Re-use of surplus soil ; **permanent reclamation land** in Laguna Lake (estimated construction cost=about 2,300 million PHP Area:45ha, Height: 4m, Volume: 1,800,000m^3