

資料 8 その他の資料・情報

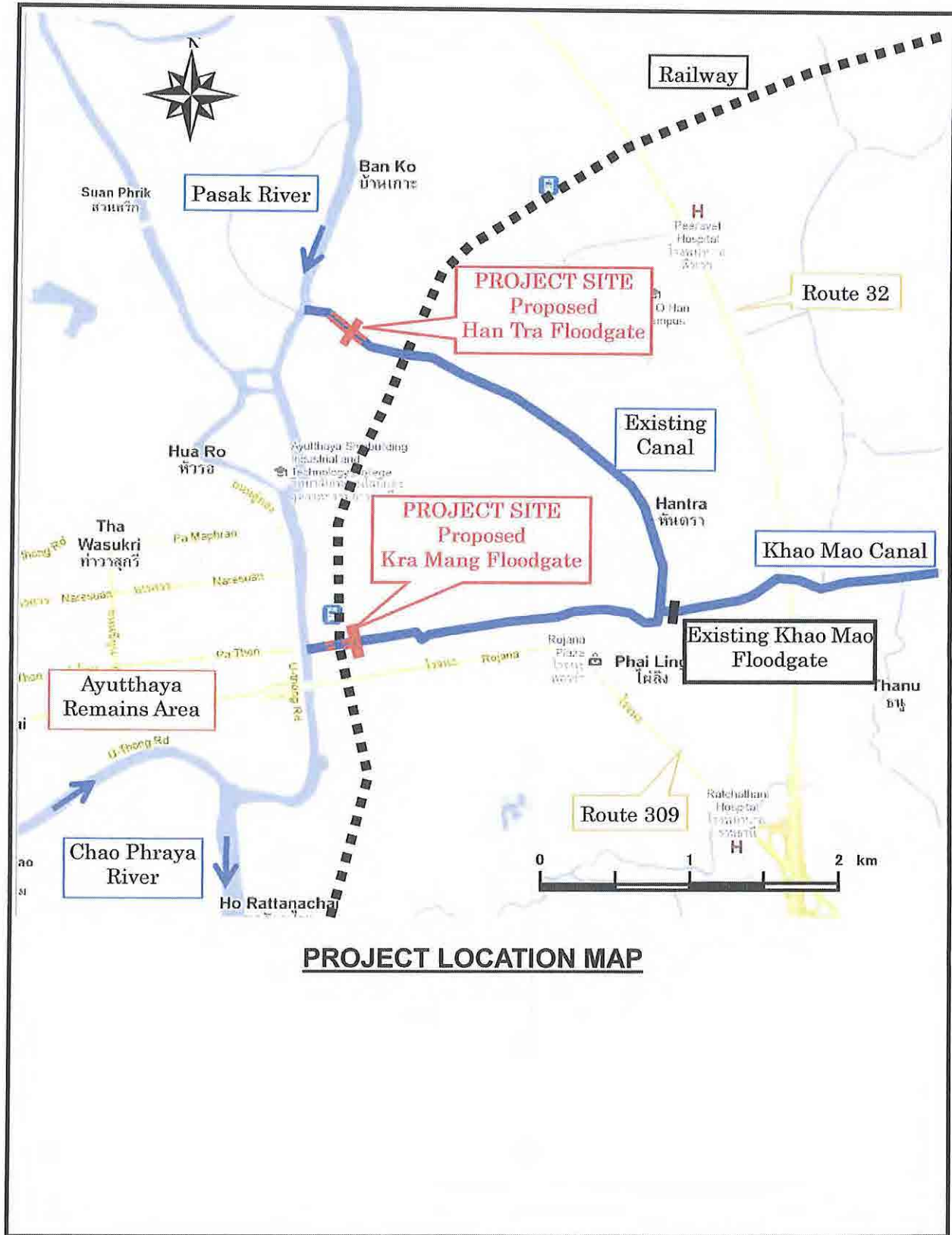
資料 8-1

テクニカルノート

TECHNICAL NOTE

In the technical meetings held on the 15th day of May, 2012 attended by the Royal Irrigation Department (hereinafter called "RID") and the JICA Survey Team (hereinafter called "the Team"), the basic conditions for the design of two floodgates (Kra Mang and Han Tra) and river protection works were discussed. A list of attendance is shown in Attachment-1. The following design conditions set based on the meetings were reconfirmed between RID Regional Irrigation Office 10 and the Team.

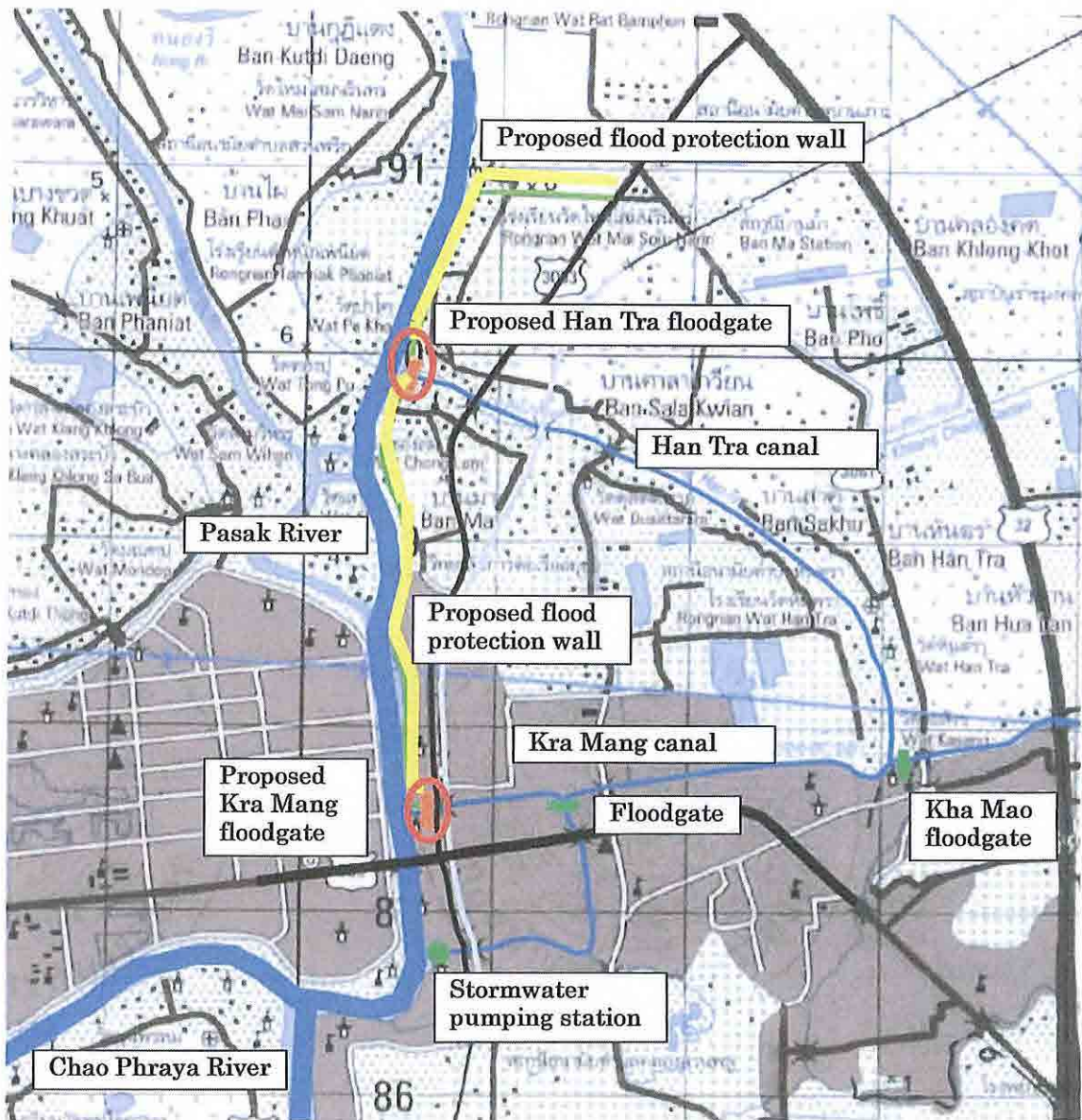
The Team stated that the agreed design conditions are tentative and that the final decision shall be made after further analysis and consultation with JICA and concerned parties in Japan, and RID Regional Irrigation Office 10 understood it.



PROJECT LOCATION MAP

**REEVALUATION FOR FLOOD MITIGATION PLAN AT EASTERN AREA OF
PASAK RIVER**

Royal Irrigation Department (RID) under Ministry of Agriculture and Cooperatives (MOAC) had a flood mitigation plan at the eastern area of the left bank of the Pasak River. It consisted of two floodgates and permanent flood protection wall. The Han Tra floodgate was proposed at the confluence of the Pasak River and the Han Tra canal and The Kra Mang floodgate was also proposed at the confluence of the Pasak River and the Kra Mang canal. On the other hand, the permanent flood protection wall was proposed to connect between the Han Tra floodgate and the Kra Mang floodgate and from the Han Tra floodgate to the existing road located at about 2 km far from the Han Tra floodgate.



**RID's Original Flood Mitigation Plan at the Eastern Area of
the Left bank of the Pasak River**

The Government of Thailand (GOT) requested the Government of Japan (GOJ) to carry out construction of two floodgates. And GOT planned to construct the permanent flood protection wall by own budget. In the public consultation meeting on February 2012, the stakeholders disagreed to construct the Kra Mang floodgate at the planned location and they requested to change the construction site from the original site (about 10m far from the Pasak Rivrer) to the site between the road bridge and the railway bridge. And

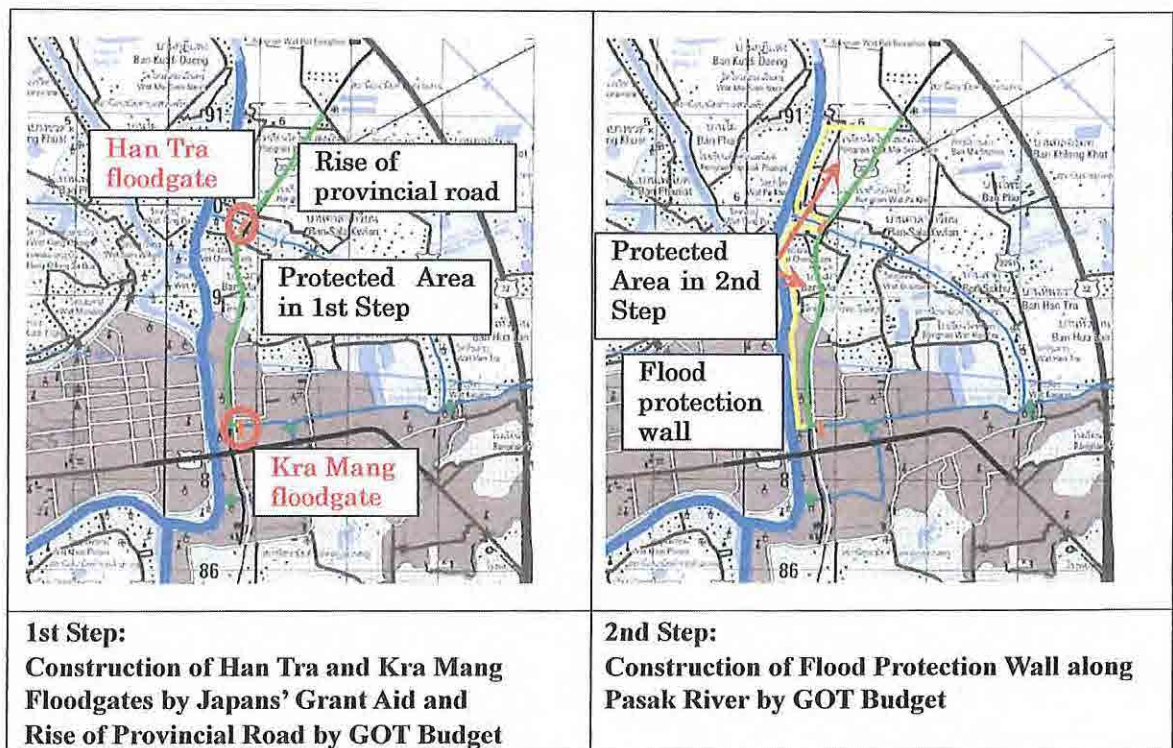
the flood protection wall construction was also disagreed because many resettlements were required along the Pasak River.

It was indicated that the construction works of the floodgates and flood protection wall was not able to carry out same time.

Therefore, the original plan was modified to stepwise development and RID agreed to it.

1st step (Grant Aid): Construction of two floodgates and to connect existing road by the wall. To protect eastern area of the existing road (Route 3053)

2nd step (GOT budget): Flood protection wall and connection wall between flood protection wall and the floodgates. To protect remaining area between the Pasak River and the existing road (Route 3053)



Amended Flood Mitigation Plan at the Eastern Area of the Left bank of the Pasak River

DESIGN CONDITIONS AGREED BETWEEN RID AND THE TEAM

1. Design of Floodgates

1.1 Technical Reference for Designing

The following codes, standards, guidelines and manuals are principal used in establishing design conditions of structures:

- Thai Industrial Standard (TIS)
- Japanese Industrial Standard (JIS)
- American Society for Testing and Materials (ASTM)
- American Concrete Institute (ACI)
- Japan Society of Civil Engineers (JSCE)
- Technical Criteria for River Works of Japan
- Engineering Manual for Irrigation & Drainage of Japan
- Royal Irrigation Department (RID) Standard.
- American Institute of Steel Construction (AISC)
- Japan Association of Dam & Weir Equipment Engineering
- European Committee for Standardization (CEN)
- International Electrotechnical Commission (IEC)
- Standard of the Japanese Electrotechnical Committee (JEC)
- The Standards of the Japan Electrical Manufacture's Association (JEM)
- Japanese Cable-makers Association Standards (JCS)
- Provincial Electricity Authority (PEA)

1.2 Procurement of Gate System

Gate system will be procured from Japanese juridical persons incorporated and registered under the laws of Japan. The procurement of the gate system, which will be in conformity with the specifications of this Project, in Thailand under full responsibility of the aforementioned Japanese physical persons or Japanese juridical persons will be acceptable.

1.3 Kra Mang Floodgate

1.3.1 Location

Kra Mang floodgate proposed to construct newly at just the upstream of the railway bridge, near the Ayutthaya railway station, over Kra Mang canal



Location of Proposed Kra Mang Floodgate

1.3.2 Main Body

1) Materials

Reinforced concrete made

2) Total Width of Floodgate

Span of piers: 8.0 m x 3 nos.

Pier width: 2.0 m x 4 nos.

Total width: 26.0 m

3) Design Water Level

Pasak side: HWL 6.0 m MSL as 2011 flood (same as HWL planned by RID)

LWL 0.5 m MSL

Canal side: HWL 3.5 m MSL same as at Khao Mao floodgate

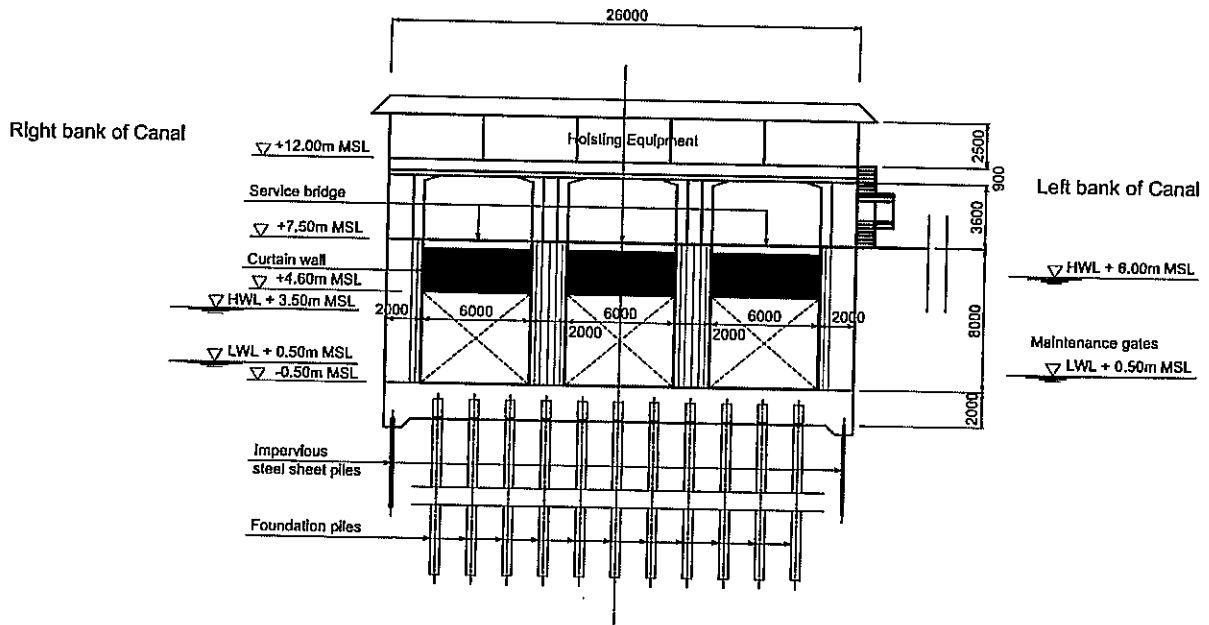
LWL 0.5 m MSL

4) Freeboard

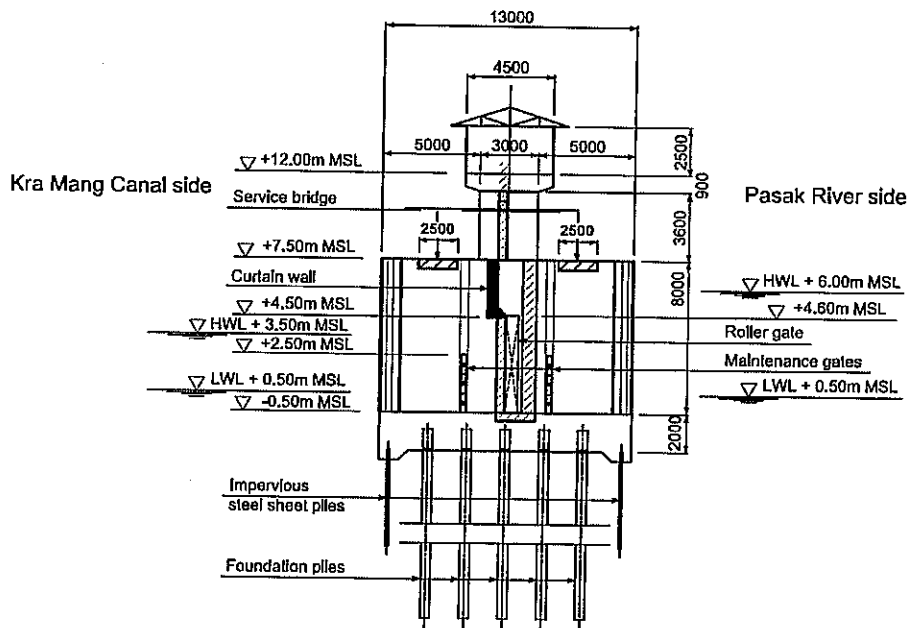
1.0 m above HWL 6.0m MSL

Technical Note

*Preparatory Survey on the Flood Prevention Project of
East Side of the Pasak River in Ayutthaya in the Kingdom of Thailand*



Front View of Proposed Kra Mang Floodgate



Section of Proposed Kra Mang Floodgate

1.3.3 Gates

- 1) Type
Stainless steel made roller gates
- 2) Number of Gate
Three (3) numbers
- 3) Clear Span
6.0 m
- 4) Height
5.1 m (5.0 m + Watertight area 0.1m)
- 5) Elevation of sill
- 0.50 m MSL
- 6) Hoisting system
Motorized wire-rope winch
- 7) Hoisting speed
Ordinary time: 0.3m/min
Emergent time: 1.5m/min
- 8) Lifting height
Ordinary time: 5.0 m
Inspection time: 6.0 m
- 9) Watertight system
Rear 4 sided rubber watertight (Watertight at both sides of Pasak River and Canal)
Curtain wall sealing at the upper area
- 10) Safety and protection device
Device for the safety and protection of the gate leaves, electrical and mechanical equipment, and control circuit will be provided.
- 11) Power source
3 phase x 4 wires x 380/220 V x 50 Hz
Reception from the commercial electricity
- 12) Backup power source
A generator will be considered.

1.3.4 Stoplogs

Stoplogs will be provided for repair and maintenance of the main roller gates during low water season.

- 1) Material: Metal

- 2) Size: 6.0 m (Clear span) x 1.0 m (Height) x 3 nos. x 2 sets
(Pasak and Canal sides)
- 3) Hoisting device: Chain hoists

1.3.5 Service bridge

The service bridge will be provided among the piers at both sides of Pasak River and Canal for the convenience of the operation, inspection and maintenance works of the gate system.

The service bridges will be a foot bridge as follows,

- 1) Type: Reinforced concrete slab
- 2) Width: 2.5 m

1.3.6 Riverbank Protection

Riverbank protection for the right and left banks will be provided toward both Canal (upstream) and Pasak River (downstream) from the floodgate.

- 1) Length
 - Canal side: Approximately 10 m
 - Pasak side: To the embankment of the provincial road bridge
- 2) Type
 - Canal side: Concrete retaining wall and sheet pile embedded concrete slope crib work
 - Pasak side: Concrete retaining wall and Earth dyke

1.3.7 Riverbed Protection

Riverbed protection will be provided toward both Canal and Pasak River from the floodgate.

- 1) Length
 - Canal side: Approximately 10 m
 - Pasak side: To and underneath the provincial road bridge
- 2) Type:
 - Canal side: Concrete apron with energy dissipater and Gabion mattress
 - Pasak side: Concrete apron with energy dissipater and Gabion mattress

1.4 Han Tra Floodgate

1.4.1 Location

Han Tra floodgate will be also newly constructed at just the downstream of the provincial road bridge over Han Tra canal.



Location of Proposed Han Tra Floodgate

1.4.2 Main Body

1) Materials

Reinforced concrete made

2) Total Width of Floodgate

Span of piers: 8.0 m x 3 nos.

Pier width: 2.0 m x 4 nos.

Total width: 26.0 m

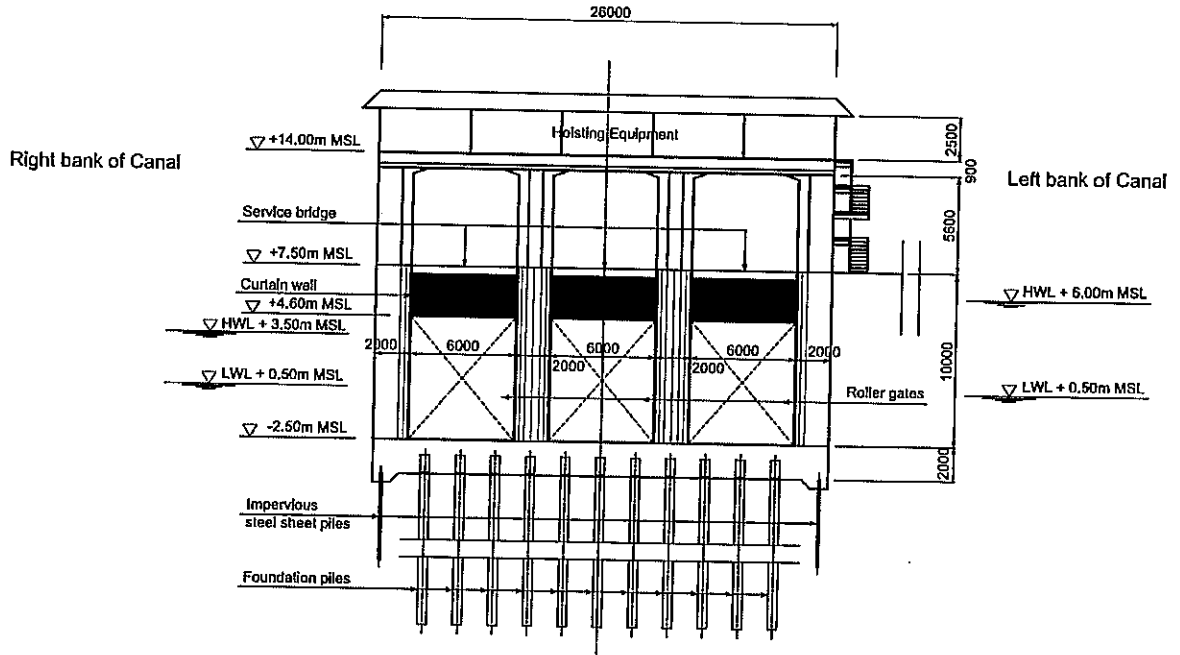
3) Design Water Level

Pasak side: HWL 6.0 m MSL as 2011 flood (same as HWL planned by RID)
LWL 0.5 m MSL

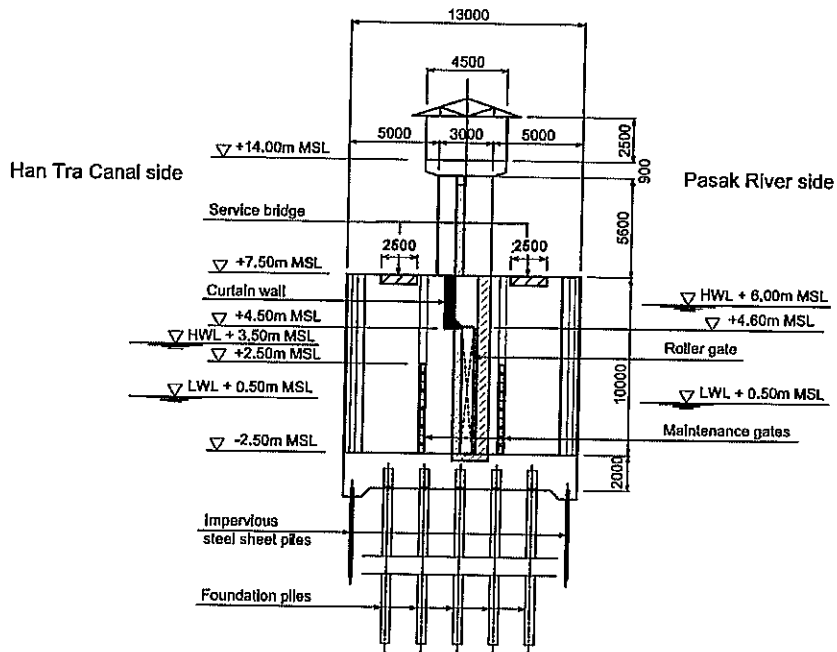
Canal side: HWL 3.5 m MSL same as at Khao Mao floodgate
LWL 0.5 m MSL

4) Freeboard

1.0 m above HWL 6.0m MSL



Front View of Proposed Han Tra Floodgate



Section of Proposed Han Tra Floodgate

1.4.3 Gates

- 1) Type
Stainless or steel made roller gates
- 2) Number of Gate
Three (3) numbers
- 3) Clear Span
6.0 m
- 4) Height
7.1 m (7.0 m + Watertight area 0.1m)
- 5) Elevation of sill
- 2.50 m MSL
- 6) Hoisting system
Motorized wire-rope winch
- 7) Hoisting speed
Ordinary time: 0.3m/min
Emergent time: 1.5m/min
- 8) Lifting height
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- 9) Watertight system
Rear 4 sided rubber watertight (Watertight at both sides of Pasak River and Canal)
Curtain wall sealing at the upper area
- 10) Safety and protection device
Device for the safety and protection of the gate leaves, electrical and mechanical equipment, and control circuit will be provided.
- 11) Power source
3 phase x 4 wires x 380/220 V x 50 Hz
Reception from the commercial electricity
- 12) Backup power source
A generator will be considered.

1.4.4 Stoplogs

Stoplogs will be provided for repair and maintenance of the main roller gates during low water season.

- 1) Material: Metal

- 2) Size: 6.0 m (Clear span) x 1.0 m (Height) x 5 nos. x 2 sets
(Pasak and Canal sides)
- 3) Hoisting device: Chain hoists

1.4.5 Service bridge

The service bridge will be provided among the piers at both sides of Pasak River and Canal for the convenience of operation, inspection and maintenance of the gate system.

The service bridges will be a foot bridge as follows,

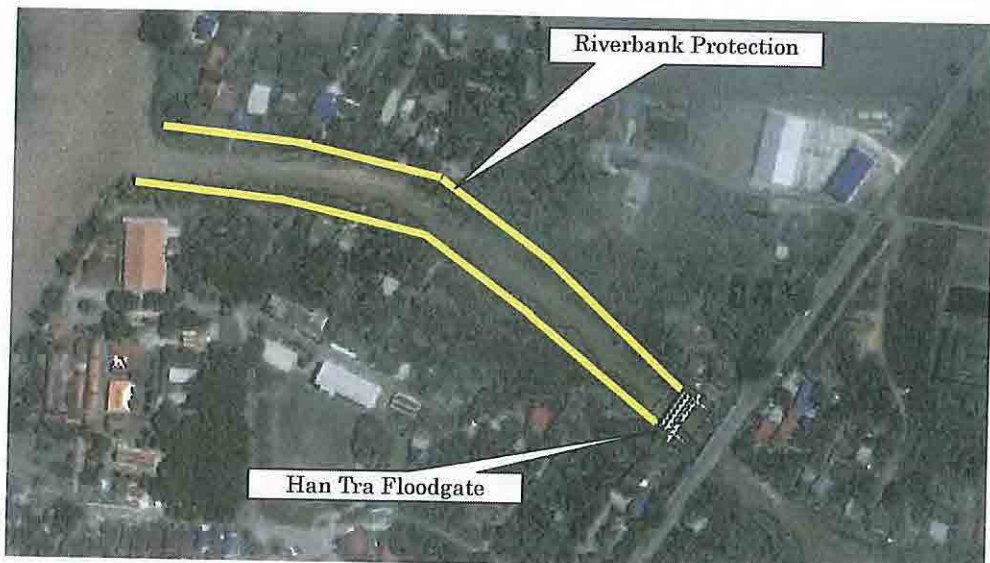
- 1) Type: Reinforced concrete slab
- 2) Width: 2.5 m

1.4.6 Riverbank Protection

Riverbank protection for the right and left banks will be provided toward both Canal (upstream) and Pasak River (downstream) from the floodgate.

1) Length

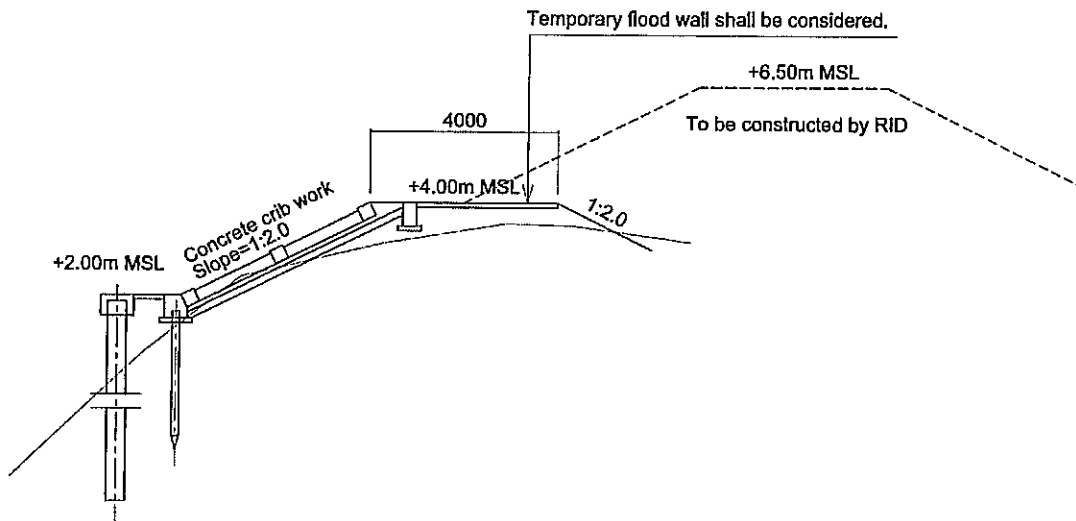
- Canal side: To the embankment of the provincial road bridge
- Pasak side: River protection work down to the confluence of Pasak River will be studied waiting for the result of an environmental and social study conducted by the Consultant.



Location of Riverbank Protection

2) Type

- Canal side: Concrete retaining wall
Pasak side: Concrete retaining wall and sheet pile embedded concrete slope crib work with a temporary retaining wall



Typical Cross Section of Riverbank Protection

1.4.7 Riverbed Protection

Riverbed protection will be provided toward Canal and Pasak River from the floodgate.

1) Length

- Canal side: To and underneath the provincial road bridge
Pasak side: Approximately 20 m

2) Type:

- Canal side: Concrete apron with energy dissipater and Gabion mattress
Pasak side: Concrete apron with energy dissipater and Gabion mattress

1.5 Parameters for Concrete Structural Design

The parameters for the design of concrete structures are tabulates as follows.

1) Unit weight of materials

Unit weight of construction materials (KN/m^3){ kgf/m^3 }

Materials	Unit weight
Steel	77.0 {7,850}
Stainless steel (SUS304)	77.8 {7,930}
Reinforced concrete	24.5 {2,500}
Plain concrete	23.0 {2,350}
Cement mortar	21.0 {2,150}
Sand · Gravel · Crushed stone	18.6 {1,900}
Water	9.8 {1,000}
Timber	8.0 {800}

2) Reinforcement

The reinforcement for concrete based on TIS-24-2527 (for deformed bars) and TIS-20-2527 (for round bars) will be used. The design parameters are tabulates as follows.

Physical constant of reinforcement (N/mm^2){ kgf/cm^2 }

Material	Unit weight
Young's modulus	2.0×10^5 { 2.1×10^6 }
Shear elastic modulus	7.7×10^4 { 8.1×10^5 }
Linear expansion coefficient	12×10^{-6}
Poisson's ratio	0.30

Allowable stress of deformed rebars (N/mm^2){ kgf/cm^2 }

kind of stress and component		Kind of rebar	SD30
Tensile stress	In case influence of impact load or an earthquake is not included in the combination of load	General component	150{1,500}
		The component prepared in underwater or below the groundwater level	150{1,500}
	The basic value in the case of including the influence of impact load or an earthquake in the combination of load		
Compressive stress			150{1,500}

3) Concrete

Design strength of concrete (N/mm^2){ kgf/cm^2 }

Kind of component	Design strength f_c
Plain concrete	18 {180}
Reinforced concrete	21 {210}

Young's modulus of concrete (N/mm^2){ kgf/cm^2 }

Design strength	21 {210}
Young's modulus	2.35×10^4 { 2.35×10^5 }
Young's modulus ratio	15
Linear expansion coefficient	10×10^{-6}

Allowable stress of concrete for reinforced concrete (kgf/cm^2)

Design strength	f_c	-	210
Extreme fiber stress in compression	f_c	$0.45f_c$	94.5
Shear stress :			
Plain concrete at beam	V_c	$0.29(f_c)^{1/2}$	4.2
Plain concrete at joist	V_c	$0.32(f_c)^{1/2}$	4.6
With reinforcement at shear stress	V_c	$1.32(f_c)^{1/2}$	19.1
Slabs and foundations, along the edge	V_c	$0.53(f_c)^{1/2}$	7.7
Bearing stress :			
On full area	f_c	$0.25f_c$	52.5
On one-third area or less	f_c	$0.37f_c$	77.7
Bond stress			
Deformed bars without special anchorage	U	$0.05f_c$	10.5

Source: The Teaching of Concrete, Department of Civil Engineering,
Faculty of Engineering, Chulalongkorn University, 1980

Allowable stress of plain concrete (N/mm^2){ kgf/cm^2 }

The kind of stress	Allowable stress	Comment
Extreme fiber stress in compression	$f_c/4 \leq 5.5$ {55}	f_c : Design strength of concrete
Bending tensile stress	$f_c/80 \leq 0.3$ {3}	
Shear stress	$f_c/100 + 0.15$ {1.5}	
Bearing stress	$0.3f_c \leq 6.0$ {60}	

Premium coefficient of allowable stress

Combination of loads		Premium coefficient
Primary load except live load and impact load + Influence of an earthquake		1.5
Combination of loads during construction	In case the stress at the time of completion becomes remarkably low	1.5
	In case the stress at the time of completion becomes comparable as allowable stress	1.25

4) Seismic coefficient

Horizontal coefficient $k_h = 0.1$

Vertical coefficient Not considered

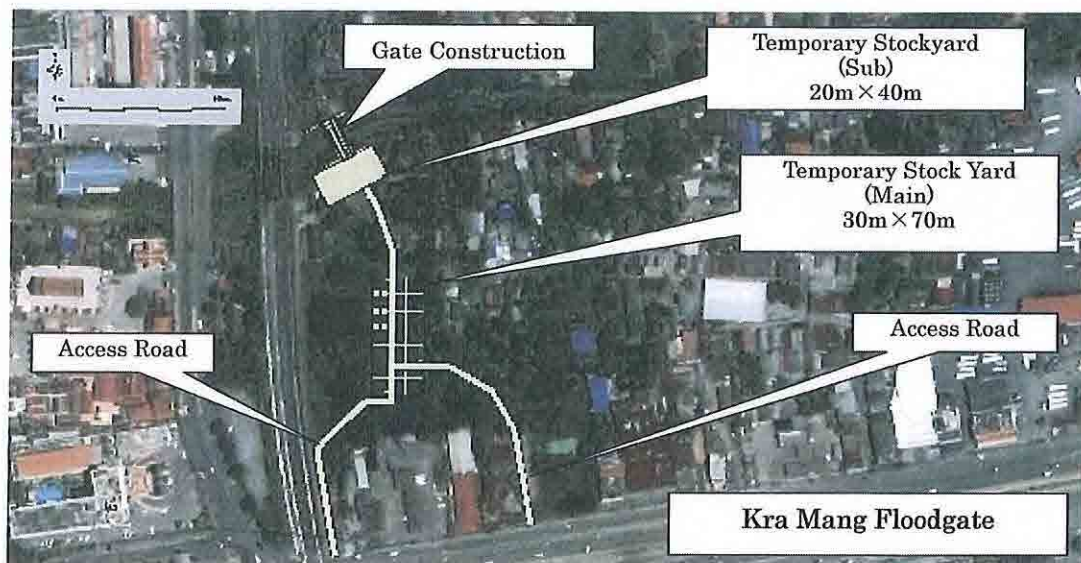
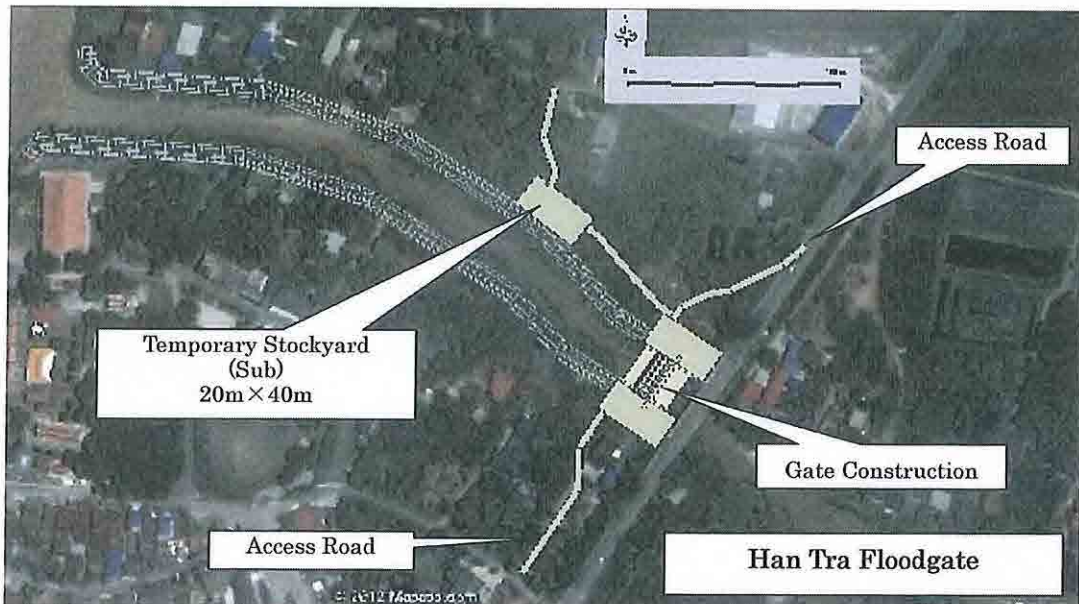
At the project sites of Ayutthaya

Seismic coefficient for the structural design is obtained in accordance with PGAo/G announced by Dr. Pennung Wanitchai, 2001.

PGAo is acceleration-dependent seismic risk in 50 year return period while G is gravity force.

2. Temporary Stockyards and Contractor's Base Camps

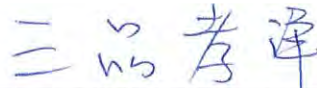
Temporary stockyards including the contractor's base camps for the storage of the construction materials and machineries, and the access roads are proposed to set up at the following locations adjacent to the proposed flood gates throughout the construction period.



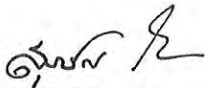
Lop Buri in May 15, 2012



Mr. Weerawot SIRIKUL
Chief Engineer
RID Regional Irrigation Office 10



Mr. Takahiro MISHINA
Chief Engineer
JICA Survey Team



Mr. Suparat KOSUMAPINUN
Design Group
RID Regional Irrigation Office 10



Mr. Chensak SUPHAKUL
Engineer
RID Regional Irrigation Office 10



Mr. Prasit SITHIYOS
Geologist
RID Regional Irrigation Office 10

LIST OF ATTENDANCE

Preparatory Survey on the Flood Prevention Project of
East Side of the Pasak River in Ayutthaya in the Kingdom of Thailand

Date: 15th May, 2012

Location: Conference room, RID Region 10 office

	Name	Affiliation	Position	Mobile Phone	Signature
1.	MR. WEESAJOT SIRIKUL	Chief Engineer	RID 10	0848746196	
2.	MR. PRASIT SITHIYOS	Geologist	Geological Group RID. 10	081-893-2466	
3.	MR. SUPARAT KOSUMAPINUN	Irrigation Engineering	Design Group	081-6152901	
4.	MR. CHENSAK SUPHAKUL	Irrigation Engineer	RID. 10	081-4211319	
5.	Mr. Minoru KIMISHIMA	COST ESTIMATOR	JICA STUDY team		
6.	Mr. KAJIURA	Structural Design Engineer	"		
	Mr. Tatsuji Ito	Civil Engineer	"		
	Mr. Y. Azuma	Structural Design Eng.	"		
	Mr. Masaki ISHII	Structural Design Engineer	"		
	Mr. Sametjai Maniruel	Design Engineer	TEAM	0869010872	
	Mr. Chemsit Chumman	Hydraulic Structure Engineer	TEAM	04976746046	
	Sineenat Chaisakda nukool	Hydraulic Structure Engin	TEAM	089-8362413	

資料 9 設計図

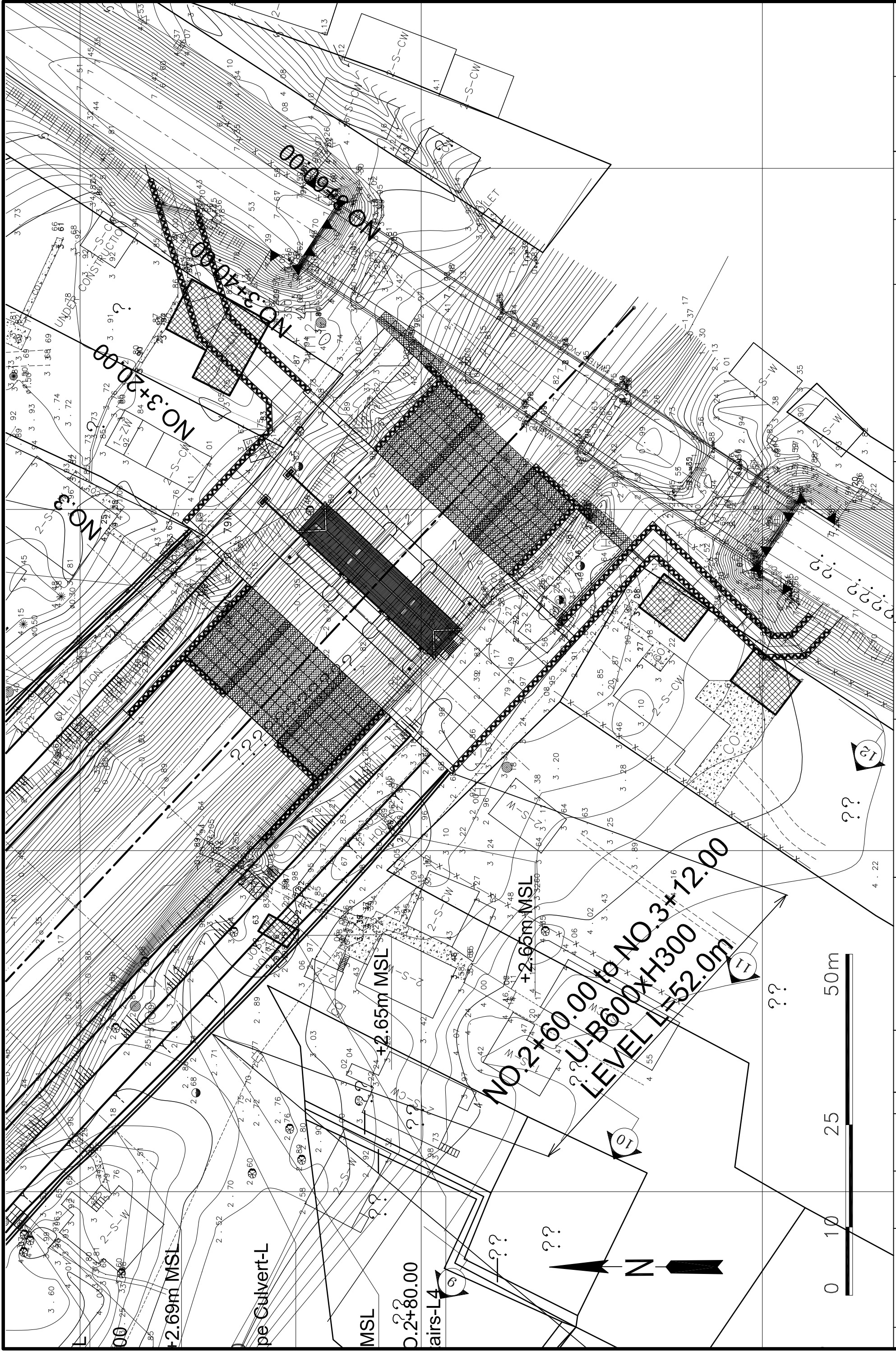


CONTROL POINTS :

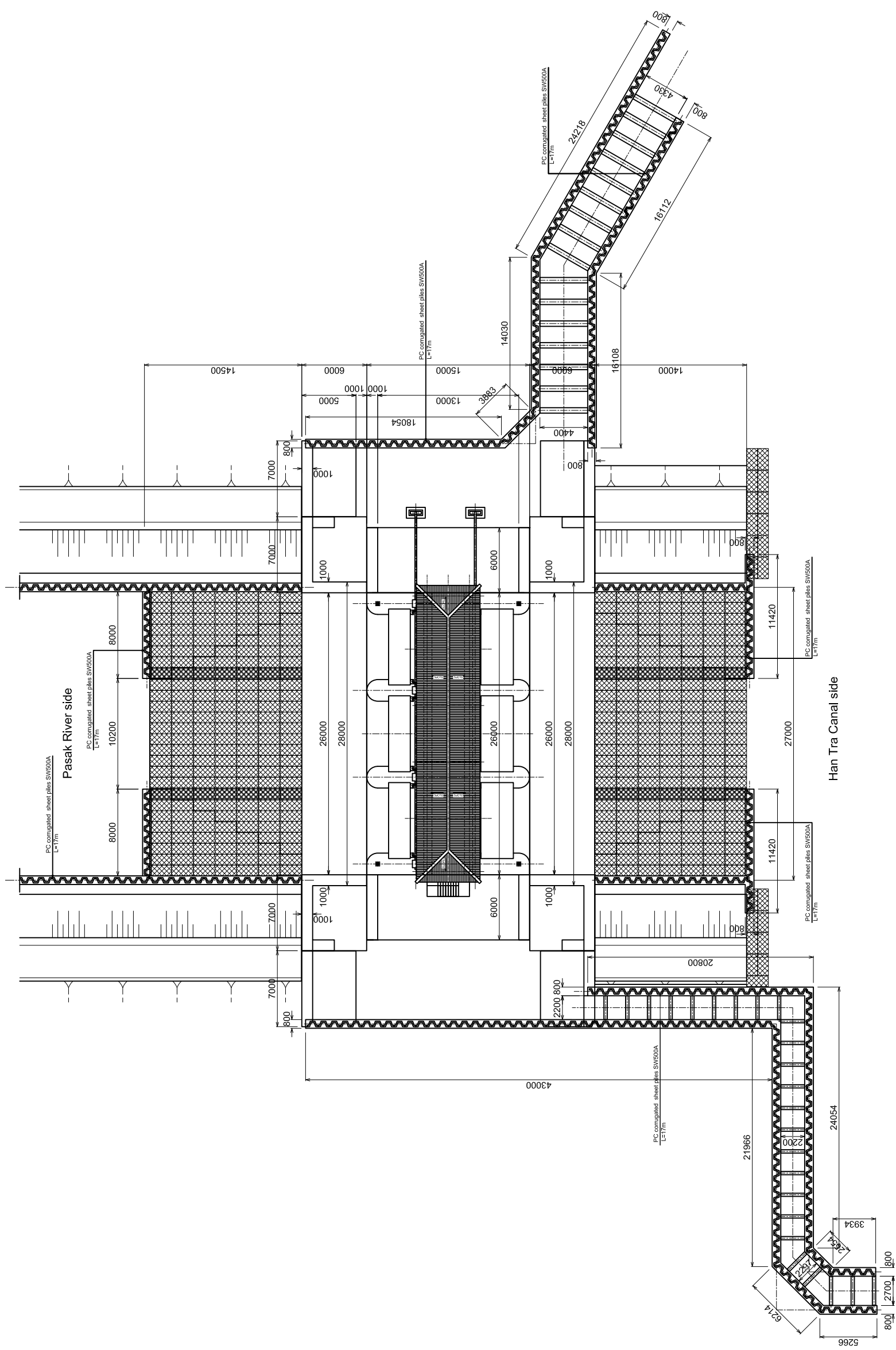
STA.	N (m)	E (m)	ELEV.(m)
GPS200	1589733.197	670466.650	5.224
GPS201	1588870.991	670485.710	5.234
202	1588875.423	670245.223	4.929
203	1588971.376	670605.052	1.454
204	1589231.759	670842.935	7.891
206	1589767.187	670845.901	7.852
303	1589700.168	670841.451	7.994
321	1588814.664	670843.833	2.987
322	1588848.029	670745.182	3.179
323	1588866.938	670748.286	2.995
BH-HD-10-01181	1588870.891	670504.627	5.040

REV. NO.	DESCRIPTION	CONSULTANT CHECKED	DATE	REV. NO.	DATE	APPROVED BY

PROJECT TITLE	OWNER	SHEET CONTENTS	KINGDOM OF THAILAND	APPROVED BY	REV. NO.	DATE	DATE	SCALE:
Preparatory Survey on the Flood Prevention Project of East Side of the Pask River in Ayutthaya in the Kingdom of Thailand	Royal Irrigation Department Ministry of Agriculture and Cooperatives	(CIVIL WORKS) HAN TRA FLOODGATE AND CANAL OVERALL LAYOUT						AUGUST 2012
DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY
JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER	JSHI Masahiro STRUCTURAL ENGINEER
CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY
MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER	MISHIMA Takahiro TEAM LEADER
DATE:	DATE:	DATE:	DATE:	DATE:	DATE:	DATE:	DATE:	DATE:
AUGUST 2012	AUGUST 2012	AUGUST 2012	AUGUST 2012	AUGUST 2012	AUGUST 2012	AUGUST 2012	AUGUST 2012	AUGUST 2012
DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.
HT-F&SBP-001	HT-F&SBP-001	HT-F&SBP-001	HT-F&SBP-001	HT-F&SBP-001	HT-F&SBP-001	HT-F&SBP-001	HT-F&SBP-001	HT-F&SBP-001
SHEET NO.	SHEET NO.	SHEET NO.	SHEET NO.	SHEET NO.	SHEET NO.	SHEET NO.	SHEET NO.	SHEET NO.

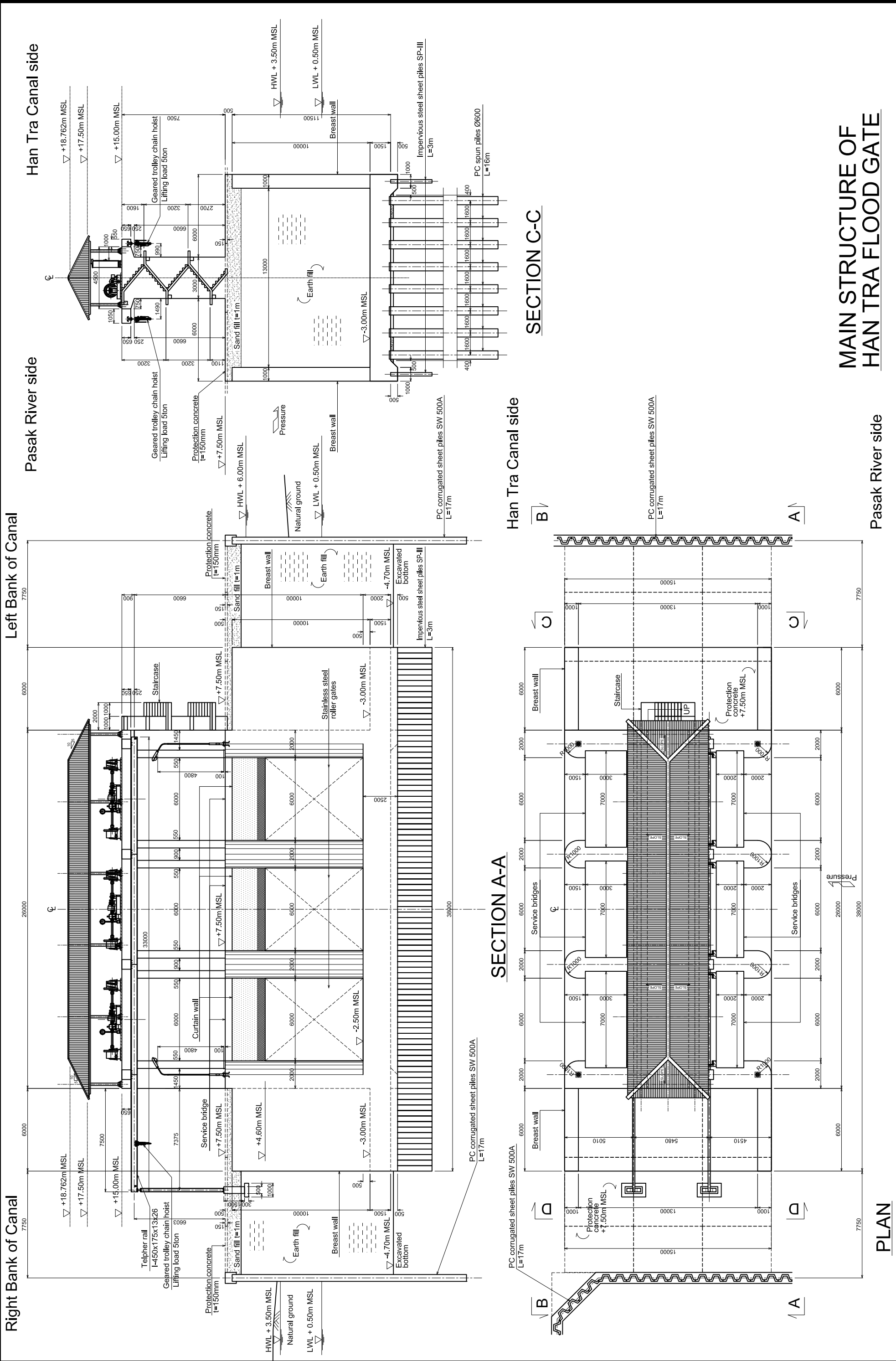


REV. NO.	DESCRIPTION	CONSULTANT CHECKED	DATE	REV. NO.	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF AGRICULTURE AND COOPERATIVES ROYAL IRRIGATION DEPARTMENT		SHEET CONTENTS (CIVIL WORKS) HAN TRA FLOODGATE LAYOUT		OWNER	PROJECT TITLE		DESIGNED BY	CHECKED BY	DATE	SCALE
							Royal Irrigation Department Ministry of Agriculture and Cooperatives	Preparatory Survey on the Flood Prevention Project of East Side of the Pasak River in Ayutthaya in the Kingdom of Thailand	CTI ENGINEERING INTERNATIONAL CO., LTD. ORIENTAL CONSULTANTS CO., LTD. NIPPON KOEI CO., LTD. CTI ENGINEERING CO., LTD.	JSHI Masahiro STRUCTURAL ENGINEER	MISHINA Takahiro TEAM LEADER	AUGUST 2012 HT-F&BP-002	AUGUST 2012 HT-F&BP-002	AUGUST 2012 HT-F&BP-002	AUGUST 2012 HT-F&BP-002	AUGUST 2012 HT-F&BP-002



PLAN OF HAN TRA FLOOD GATE

REV. NO.	DESCRIPTION	CONSULTANT CHECKED	DATE	REV. NO.	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF AGRICULTURE AND COOPERATIVES ROYAL IRRIGATION DEPARTMENT	SHEET CONTENTS (CIVIL WORKS) HAN TRA FLOODGATE PLAN	OWNER Royal Irrigation Department Ministry of Agriculture and Cooperatives	PROJECT TITLE The Flood Prevention Project of East Side of the Pasak River in Ayutthaya in the Kingdom of Thailand	CTI ENGINEERING INTERNATIONAL CO., LTD. ORIENTAL CONSULTANTS CO., LTD. NIPPON KOEI CO., LTD. CTI ENGINEERING CO., LTD.	DESIGNED BY JSHI Masaki STRUCTURAL ENGINEER	CHECKED BY MISHINA Takahiro TEAM LEADER	DATE: AUGUST 2012 DWG. NO. HT-FG-001	SCALE: SHEET NO.



MAIN STRUCTURE OF HAN TRA FLOOD GATE

Pasak River side

PLAN

SECTION C-C

SECTION A-A

REV. NO.	DESCRIPTION	CONSULTANT CHECKED	DATE	APPROVED BY	REV. NO.	DATE	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF AGRICULTURE AND COOPERATIVES ROYAL IRRIGATION DEPARTMENT	SHEET CONTENTS (CIVIL WORKS) HAN TRA FLOODGATE MAIN STRUCTURE PLAN AND SECTIONS	OWNER Royal Irrigation Department Ministry of Agriculture and Cooperatives in the Kingdom of Thailand	PROJECT TITLE Preparatory Survey on the Flood Prevention Project of East Side of the Pasak River in Ayutthaya in the Kingdom of Thailand	DESIGNED BY JSHI Masahiro STRUCTURAL ENGINEER	CHECKED BY MISHINA Takahiro TEAM LEADER	DATE: AUGUST 2012	SCALE: SHEET NO. HT-FG-002