

Appendix 5: Department of Highways' Committee for the Project



คำสั่งกรมทางหลวง

ที่ บ.๑/ ๓๓ /๒๕๕๕

เรื่อง แต่งตั้งคณะกรรมการพิจารณาแบบรายละเอียดและข้อกำหนดมาตรฐานการก่อสร้าง
โครงการบูรณะทางหลวงพิเศษระหว่างเมืองหมายเลข ๙ ถนนวงแหวนรอบนอก (ด้านตะวันออก)
ภายใต้โครงการความช่วยเหลือแบบให้เปล่าจากรัฐบาลญี่ปุ่น

เพื่อประโยชน์แก่ทางราชการและเพื่อให้โครงการบูรณะทางหลวงพิเศษระหว่างเมืองหมายเลข ๙
ถนนวงแหวนรอบนอก (ด้านตะวันออก) ภายใต้โครงการความช่วยเหลือแบบให้เปล่าจากรัฐบาลญี่ปุ่น
เป็นไปอย่างมีประสิทธิภาพ รวดเร็ว และถูกต้องสมบูรณ์ จึงแต่งตั้งคณะกรรมการพิจารณาแบบรายละเอียด
และข้อกำหนดมาตรฐานการก่อสร้าง โครงการบูรณะทางหลวงพิเศษระหว่างเมืองหมายเลข ๙
ถนนวงแหวนรอบนอก (ด้านตะวันออก) ร่วมกับคณะที่ปรึกษาของ JICA ดังนี้-

๑. องค์ประกอบ

- | | | |
|------|---|----------------------------|
| ๑.๑ | รองอธิบดีฝ่ายวิชาการ | ประธานกรรมการ |
| ๑.๒ | ผู้อำนวยการสำนักแผนงาน | กรรมการ |
| ๑.๓ | ผู้อำนวยการสำนักสำรวจและออกแบบ | กรรมการ |
| ๑.๔ | ผู้อำนวยการสำนักบริหารโครงการทางหลวงระหว่างประเทศ | กรรมการ |
| ๑.๕ | ผู้อำนวยการสำนักก่อสร้างทางที่ ๒ | กรรมการ |
| ๑.๖ | ผู้อำนวยการสำนักวิเคราะห์และตรวจสอบ | กรรมการ |
| ๑.๗ | ผู้อำนวยการกองทางหลวงพิเศษระหว่างเมือง | กรรมการ |
| ๑.๘ | ผู้อำนวยการสำนักงานสิ่งแวดล้อมและการมีส่วนร่วมของประชาชน | กรรมการ |
| ๑.๙ | ผู้อำนวยการสำนักงานบำรุงทางหลวงพิเศษระหว่างเมือง | กรรมการ |
| ๑.๑๐ | นายปัญญา ชูพานิช ผู้อำนวยการกลุ่มบริหารโครงการเงินกู้และเงินช่วยเหลือ (สค.) | กรรมการและเลขานุการ |
| ๑.๑๑ | นายปริญญา มฤตสาธร วิศวกรโยธาปฏิบัติการ (สค.) | กรรมการและผู้ช่วยเลขานุการ |

๒. อำนาจหน้าที่

- ๒.๑ พิจารณาและให้ความเห็นชอบร่างแบบรายละเอียด (Detailed Designs)
- ๒.๒ พิจารณาและให้ความเห็นชอบร่างข้อกำหนดมาตรฐานการก่อสร้าง (Specifications)
- ๒.๓ ให้ข้อมูลที่จำเป็นแก่ที่ปรึกษาในการจัดทำร่าง Detailed Designs และ Specifications
- ๒.๔ ดำเนินการอื่นๆ ตามที่เห็นสมควร

ทั้งนี้ ตั้งแต่บัดนี้เป็นต้นไป

สั่ง ณ วันที่ ๑๔ มีนาคม พ.ศ. ๒๕๕๕

(นายวันชัย ภาคลักษณ์)
อธิบดีกรมทางหลวง

09 March 2012

Subject: Request for setting up of Department of Highways' Committee for The Rehabilitation Project of The Outer Bangkok Ring Road (East Portion) under Japan's Grant Aid

Dear Director General,

According to Japan's Grant Aid to Department of Highways for The Rehabilitation of the Outer Bangkok Ring Road (East Portion), JICA on behalf of Government of Japan assigned CTI Engineering International group for the preparatory survey task.

The Minutes of Discussion between Department of Highways and JICA representatives has signed on 27 February 2012, to allow CTI start their working on surveying, investigation, highway detailed design and specifications. The working complete date is determined as end of August 2012.

Therefore, I would like to request for setting up of the Committee that the members should be selected from related divisions. The purpose is to encourage the works and to attend the joint meeting with JICA consultant team in terms of detailed design and specifications' consideration and agreement approval.

This is for your consideration and approval.

Chayatarn Promsorn

Director of Bureau of International Highways Cooperation

15 March 2012

Subject: Setting up of Department of Highways' Committee for The Rehabilitation Project of The Outer Bangkok Ring Road (East Portion) under Japan's Grant Aid

For government advantage and effectiveness of the mentioned project, I therefore would like to set up Department of Highways' Committee as follows.

1. Members

1.1 Deputy Director General for Engineering	Chairman
1.2 Director of Bureau of Planning	Member
1.3 Director of Bureau of Location and Design	Member
1.4 Director of Bureau of International Highways Cooperation	Member
1.5 Director of Bureau of Highways Construction 2	Member
1.6 Director of Bureau of Material Analysis and Inspection	Member
1.7 Director of Inter-City Motorway Division	Member
1.8 Director of Office of Environmental and Public Participation, Bureau of Planning	Member
1.9 Director of Office of Inter-City Motorway Maintenance District, Inter-City Motorway Division	Member
1.10 Mr. Panya Chupanich	Member and Secretary
1.11 Mr. Parin Mruetusatorn	Member and Assistant Secretary

2. Duties

- 2.1 To consider and provide agreement for detailed designs proposed by JICA consultant
- 2.2 To consider and provide agreement for specifications proposed by JICA consultant
- 2.3 To provide necessary information to JICA consultant for the preparing of detailed designs and specifications
- 2.4 Others (if required)

Wanchai Parkluck

Director General

Appendix 6: Technical Notes

THE PREPARATORY SURVEY
ON
THE REHABILITATION PROJECT
OF
THE OUTER BANGKOK RING ROAD (EAST PORTION)
IN THE KINGDOM OF THAILAND
TECHNICAL NOTES

MAY 2012

CTI ENGINEERING INTERNATIONAL CO., LTD.

ORIENTAL CONSULTANTS CO., LTD.

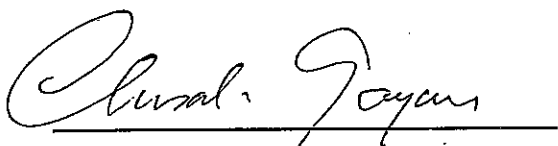
NIPPON KOEI CO., LTD.

CTI ENGINEERING CO., LTD.



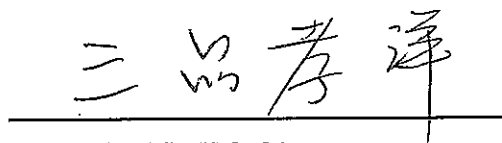
The Survey Team of Japan International Cooperation Agency (hereafter referred to as JICA Survey Team) and the members of Department of Highways' Committee for the "The Rehabilitation Project of The Outer Bangkok Ring Road (East Portion)," (hereinafter referred to the Project) have agreed upon items of the technical issues during the meeting held on May 15, 2012. The items of the technical discussion are discussed in (Annex-1) and the list of participants is shown in (Annex-2).

Bangkok, May 15, 2012



Mr. Chusak Gaywée

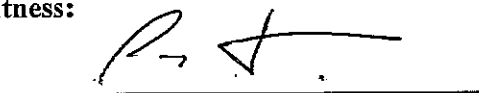
Chairman
Deputy Director General for Engineering
Department of Highways (DOH)



Mr. MISHINA Takahiro

Leader of Component 2,
Preparatory Survey Team
Japan International Cooperation Agency

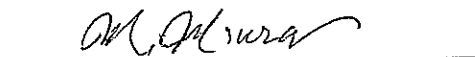
Witness:



Dr. Punya Chupanit

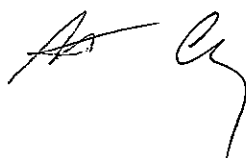
Committee Secretary
Department of Highways (DOH)

Witness:



Mr. MIURA Minoru

Chief Engineer
Preparatory Survey Team
Japan International Cooperation Agency



Technical Note

1 Technical Approach

1.1 Sections of the road to be heightened

The study shall be planned based on the contents discussed in February 2012 with DOH. However, the section of the road to be heightened that was determined in February will be changed to the sections mentioned below. These new sections have been determined based on the results of the topographic survey carried out under this project. (Refer to Appendix-1)

Elevating plan 1: *Minus twenty (-20) cm from the largest recorded flood level in 2011 (historical highest flood level)*
North bound: Sta.10+600 to Sta.11+185, Sta.11+500 to Sta.20+580, Sta.23+690 to Sta.24+570, Sta.25+400 to Sta.29+200

Elevating plan 2*: *Plus ten (10) cm from the largest recorded flood level in 2011 (historical highest flood level)*
North bound: Sta.24+570 to Sta.25+400

Total Length **15.18km**

* The scope for this plan is tentative and will be decided following discussions between JICA and DOH.

1.2 Design Standard

Design policy and standards for the design of road rehabilitation will be applied in accordance with the Inception Report as given below;

- 1) The design flood level is determined from the largest recorded flood level observed in 2011;
- 2) AASHTO (American Association of the State Highway and Transportation Officials) or Thai Design Standards based on AASHTO will be basically applied to the Project;
- 3) The Japanese Standards will be applied if there is no applicable item in the AASHTO or Thai Design Standards;
- 4) AASHTO Guide for Design of Pavement Structures 1993 will be applied for pavement calculation.

1.3 Slope Protection

Block sodding and topsoil 20cm (Clay) will be planned for slope protection for the road section to be raised. The slope of fill/embankment will be 1 on 4 in principal (same as the existing design).

1.4 Road Drainage System

The existing drainage system will be studied by estimation of run off volume and required capacity of the drainage facilities. The road surface drainage will be discharged to the existing drainage facilities. Additional drainage will be provided only if the existing drainage facilities lack capacity.

Rehabilitation of the existing facilities will be studied for facilitating smooth drainage within the raising section. However, this treatment will be limited inside the existing fence.

1.5 Overhead Crossing Structures

The existing overhead crossing structures will be elevated in case the vertical clearance required (as designated by DOH) is affected by the heightening of the road. The overhead crossing structures will include gate-type signboards and overhead pedestrian crossing near the toll gate. The roads, ramps traversing the objective road will not be included. Vertical clearance at these locations shall comply at least with the absolute criteria of DOH Motorway Standard.

1.6 Toll Gate

- 1 The scope for the toll gate area will be limited to the north bound as demarcated in the initial scope.
- 2 The works to be covered in the Project are the raising of existing road surface level and the structures of the toll gate.
- 3 The facilities related to the operation system such as detectors, machines and equipment, traffic signal etc. will not be included.

1.7 Service Road along NR.9

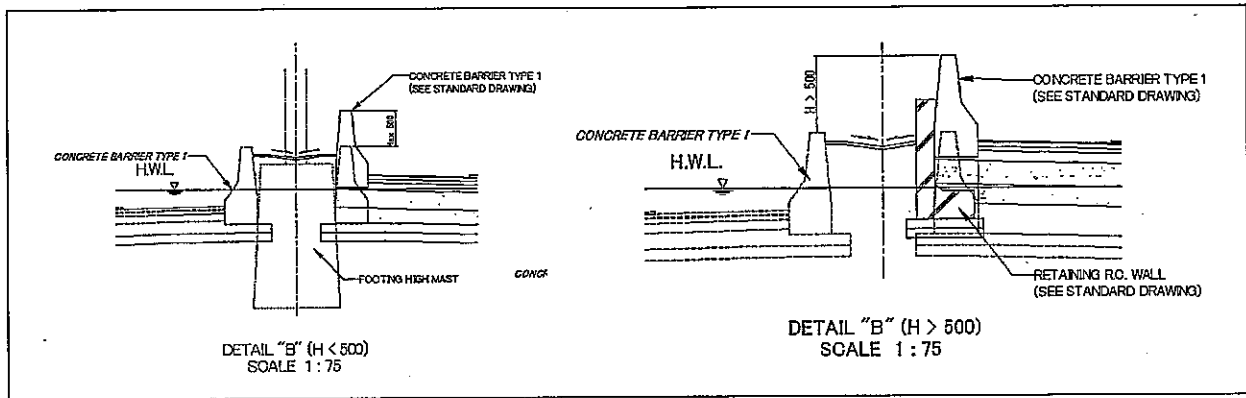
Heightening of service road along NR.9 will be out of project scope. The adjustment of ON and OFF ramp profile will be within the scope. However, the Preparatory Survey Team shall propose a conceptual plan for heightening of such service roads for DOH's implementation.

1.8 Median

The existing concrete barrier for median within the project section shall basically be removed and reconstructed.

The structure of the median for raising section is as below;





1.9 Other road appurtenant facilities (except overhead structures)

Any other road appurtenant facilities such as light poles, traffic sign installed on the shoulder, kilometer post etc., shall be out of project scope in principle. However, the existing facilities which will not be able to accommodate DOH standard due to rise of road elevation shall be studied in detail in further step.

2 Alignment Design

2.1 Design Speed

120km/h

2.2 Vertical Gradient

Vertical gradient shall be applied in accordance with Thailand geometric design standard for motorway.

2.3 Normal crossfall

Normal crossfall of 2.5% which is same as existing design will be applied.

3 Pavement Design

In principal, pavement structure will be the same as of the existing pavement. The existing layer asphalt concrete pavement (surface course, base course and bound base course) shall be removed and new pavement shall be constructed above the existing base course. However, the damaged base course or sub-grade, which may be identified not suitable by the CBR test conducted under this Project, shall be removed and reconstructed by new adequate material and method of statement. The composition of the existing asphalt pavement structure according to the AS-built drawings is as follows;

Surface Course	: Asphalt Concrete t=5cm
Binder Course	: Asphalt Concrete t=5cm
Bound Base	: Asphalt Concrete t=10cm

Base Course : Cement treatment base course t=25cm (unconfined compression strength 24.5 kg/cm²)
Sub-Base : t=20cm (CBR>25)
Sub-Grade : t=60cm (CBR>10)
Original Ground : CBR>2

The pavement structure shown above will be reviewed and its rationality will be verified by using the traffic survey results conducted by DOH. It is also required to review the design documents of existing road construction for verification of the pavement structure.

The performance period of 10 years will be adopted for the pavement design for following reasons.

1. This will be in line with the performance period of other sections. As such, the entire section will be subject to upgrading in the same period, which will enable smooth and appropriate planning for upgrading of the existing pavement.
2. Review of widening assumed to be required in view with the growth rate of the traffics.

4 Road Appurtenant Facilities

The design standards of DOH will be applied for the design of road appurtenant facilities.

5 Construction Planning

5.1 Construction method

The Survey Team has proposed construction plan as shown in **Appendix-2**, to be applied during construction. According to the plan, 3 north bound lanes and 3 south bound lanes will be secured for traffic

5.2 Disposal area for the construction debris

The construction debris such as asphalt concrete and reinforcement concretes generated by the project shall be transported to the sites where the DOH will instruct with borne by the Project. However, its treatment after the transportation shall be responsibility of the DOH.

5.3 Construction Yard

The DOH will prepare 3 locations with area of approximately 5,000m² (50mx100m) along NR.9 for the project for the construction yards including project office, motor pool, material stock yards etc.,. In case the property is belonging to the private owner, the DOH will take all responsibility to conclude agreement of its use with the land owner.

5.4 Toll Fee

The toll fee required for the vehicles and equipment related to this Project will be borne by Japan side. However, DOH shall obtain any necessary permits to allow these vehicles and equipment to enter and exit the motorway.

5.5 Responsibility for the Detailed Design


Based on the results of the Preparatory Survey and additional surveys, JICA will prepare detailed design drawings and bid documents which will be used as a reference documents for conducting the bidding procedure. It will be the obligation of the Government of Thailand to take necessary procedures to authorize the detailed design drawings and the bid documents after receiving the above mentioned reference documents.

6 Progress Report

The Preparatory Survey Team will prepare the progress report of the Preparatory Survey. JICA will dispatch a mission to explain its contents in May.

The contents of the progress report will consist of technical notes, detailed section to be heightened, typical cross section, and preliminary drawing of major civil works.

The undertakings of each government will be explained on that occasion.



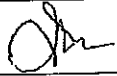
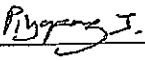
The Rehabilitation Project of the Outer Bangkok Ring Road (East Portion)
In the Kingdom of Thailand
On 15 May 2012 at 9.30 a.m.

Meeting Room of the Bureau of International Highways Cooperation,
Department of Highways

Name	Position/Office	Contact number	Signature
Mr. Chusak Gaywee	Deputy Director General		
Mr. Chusak Gaywee	Director, Bureau of Planning		
Mr. Sombat Jaroenpat Mr. Anuparp Charoen	Director, Bureau of Location and Design		
Mr. Chayatan Phromsorn	Director, Bureau of International Highways Cooperation		
Mr. Phaithun Khumvongdi	Director, Bureau of Highway Construction 2		
Mr. Montri Dechasakulson	Director, Bureau of Material Analysis and Inspection	Montri x 4300	Montri
Mr. Sittichai Boonsaat	Director of Inter-city Motorway Division		
Mr. Surajit Thipayakesorn	Director, Office of Environment and Public Involvement	081 8432767	ty.
Mr. Yongyos Vonnapradite	Director, Inter-city Motorway Maintenance District		081-6182337
Mr. Punya Chupanit	Director of Management Group Bureau of International Highways Cooperation	0863103750	
Mr. Somnuek Wangparmit	Inter-city Motorway		081-9281024
MR. RUNG BUAYAIRAKSA			087-5090770
MR. WIN TRIVITAYANURAK	Environmentalist Office of Environment and Public Involvement	081808318	
MR. NIPHAON YAIARON	Inter-city Motorway	0811328877	
MR. NOTTASAK ARITAPUK	PH	0813568182	

The Rehabilitation Project of the Outer Bangkok Ring Road (East Portion)
 In the Kingdom of Thailand
 On 15 May 2012 at 9.30 a.m.

Meeting Room of the Bureau of International Highways Cooperation,
 Department of Highways

No.	Name	Position/Office	Contact number	Signature
16.	MR. BOONKUA JAMBANJONG	DIRECTOR OF ANA CYCLE GROUP	023546753	
17.	MR. PIYAPONG JINATTANAKULPAISARN	CIVIL ENGINEER	'	
18.				
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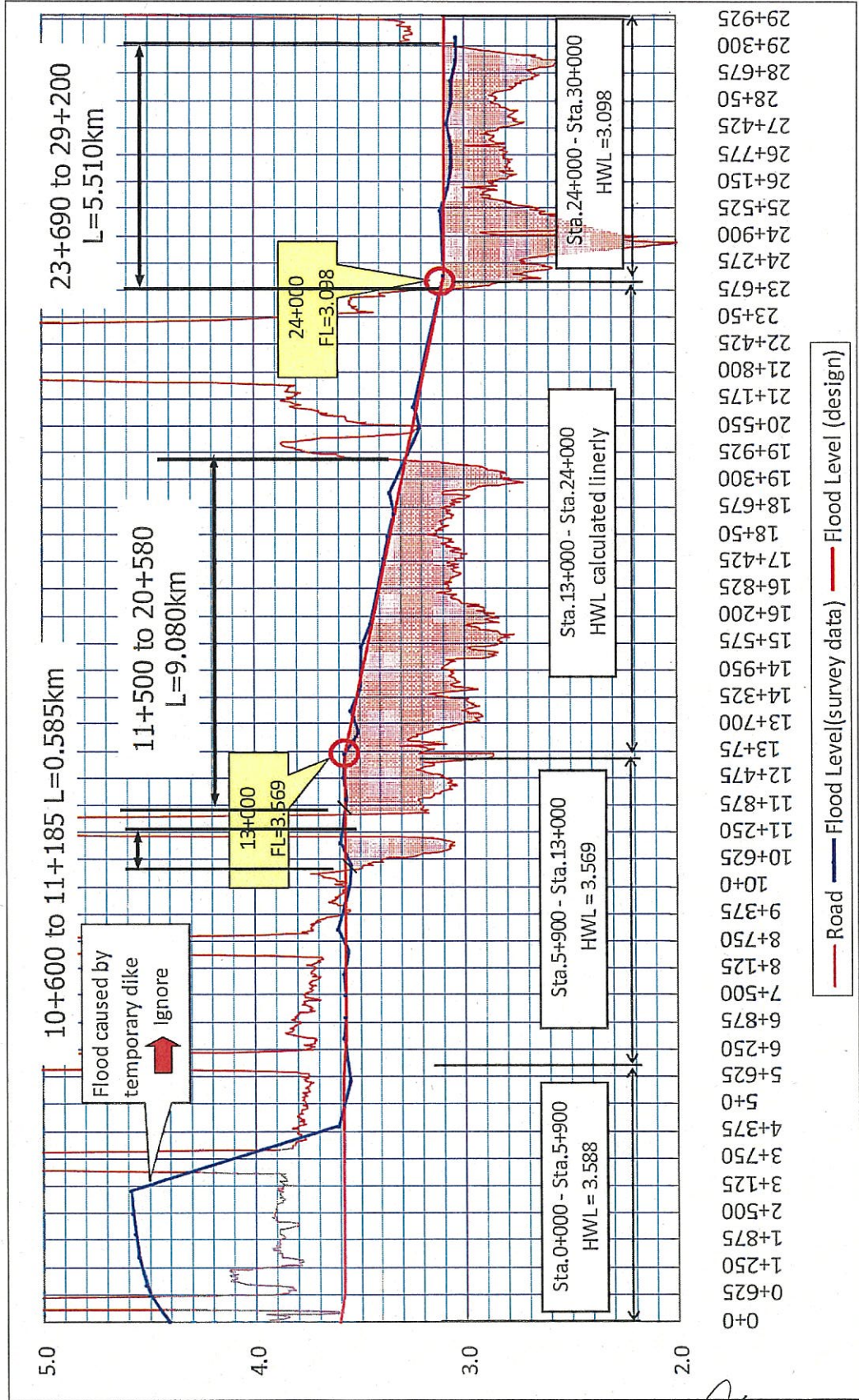


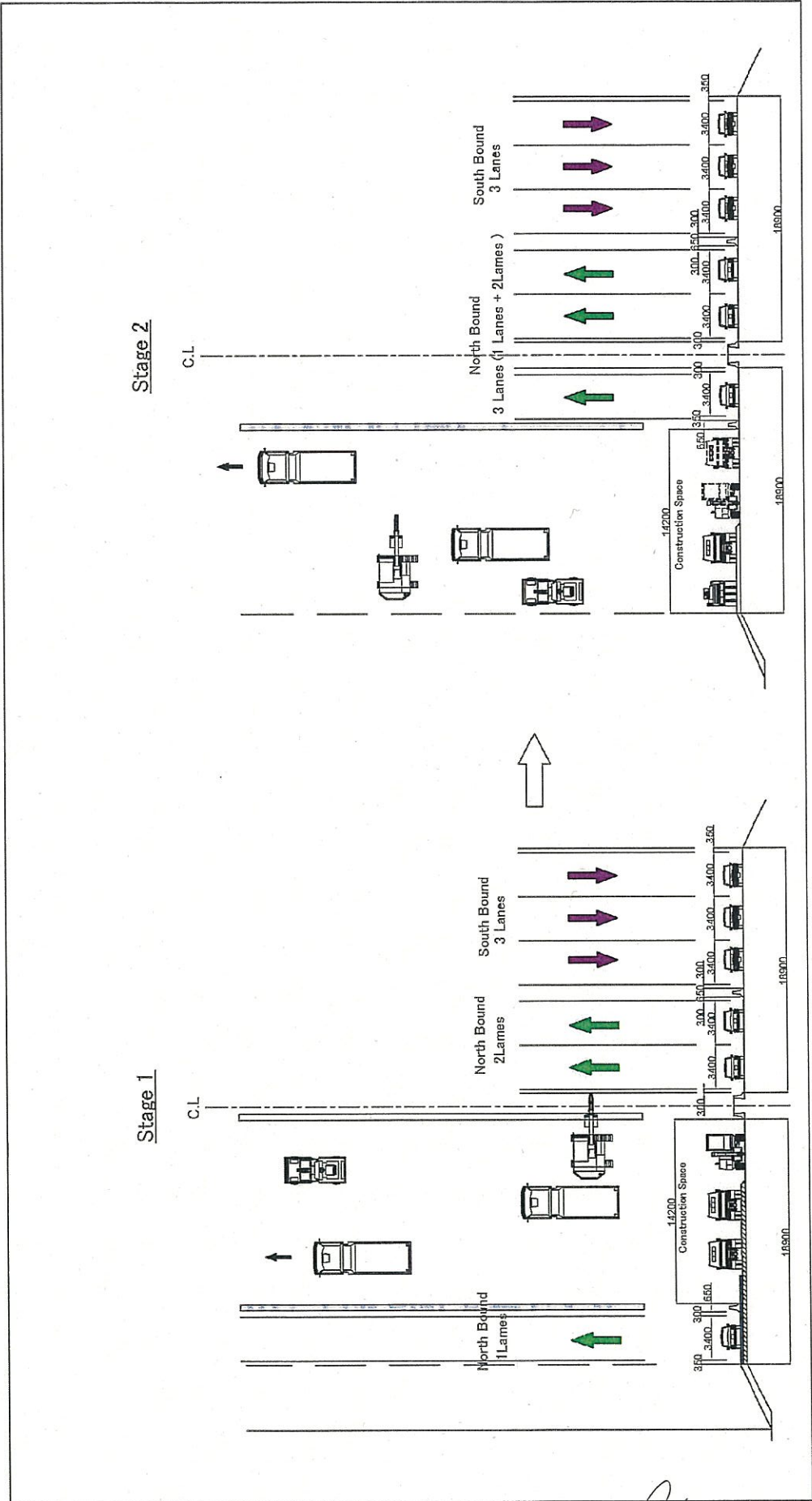

The Rehabilitation Project of the Outer Bangkok Ring Road (East Portion)
 In the Kingdom of Thailand
 On 15 May 2012 at 9.30 a.m.

Meeting Room of the Bureau of International Highways Cooperation,
 Department of Highways

No.	Name	Position/Office	Contact number	Signature
1.	Takahiro MISHINA	JICA Study Team/Chief Engineer	086-075-7961	
2.	Robinson SHRESTHA	JICA Study Team/Road Engineer	089-035-9861	
3.	Daisaku KIYOTA	JST / Env. Engineer	—	
4.	Keisuke KIYOTAN	JICA STUDY TEAM/Road Engineer	085-233-8909	
5.	Hidetaka Sagara	JICA STUDY TEAM/Road Eng.	—	
6.	Jikeyo - Ryu	"	089-	
7.	Yoshiaki Sunouchi	"	"	
8.	LONG CHANTHAN	JICA STUDY TEAM/CE	—	
9.	Saranoot Suebchaiwang	JST / Civil Engineer		
10.				
11.				
12.				
13.				
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Diagram of Rehabilitation Plan for Road No.9





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Appendix 7: List of Information Acquirement

7. List of Information Acquirement

Information Acquirement From Department of Highways

No.	Description	Data Type	Original /Copy	Source	Received
1	Standard of Equivalent Single Axle Load	Paper	Copy	Department of Highway	March-12
1.1	Applicable ESAL in Thailand	Paper	Copy	Department of Highway	March-12
2	Standard of Reinforcement bar such as strength and size	Paper	Copy	Department of Highway	March-12
3	Standard Design Mix and Specification of Asphalt Concrete	Paper	Copy	Department of Highway	March-12
4	Standard Design Mix and Specification of Cement Concrete	Paper	Copy	Department of Highway	March-12
5	Standard Drawings for Highway Construction	Book	Original	Department of Highway	March-12
6	Traffic Sign Manual	Electronic File	Copy	Department of Highway	March-12
7	Traffic Sign Manual for Highway Under Construction	Book	Original	Department of Highway	March-12
8	Highway Maintenance Manual	Book	Copy	Department of Highway	July-12
9	Pavement Design Calculation Done in 2000 and 2009	Paper	Copy	Department of Highway	March-12
9.1	Pavement Design Calculation of Route 9 (Including Traffic volume demand for this design)	Paper	Copy	Department of Highway	March-12
10	Drawing Template for Project Title	Electronic File	Copy	Department of Highway	April-12
11	As-built Drawing	Electronic File	Copy	Department of Highway	April-12
12	Plan Drawing	Electronic File	Copy	Department of Highway	April-12
13	Longitudinal Section Drawing	Electronic File	Copy	Department of Highway	April-12
14	Cross Section Drawing	Electronic File	Copy	Department of Highway	April-12
15	Drainage system design	Book	Copy	Department of Highway	March-12
16	Technical Specification	Book	Original	Department of Highway	March-12
17	All of Toll Booth Drawing which is applied to Route 9 Northbound at sta.25+150	Paper	Copy	Department of Highway	April-12
18	Daily Rainfall Data for passed 10 years	Paper	Copy	Department of Highway	April-12
19	Observation data at Route 9 such as flooding elevation	Paper	Copy	Department of Highway	March-12
20	Description of Benchmarks	Paper	Copy	Department of Highway	April-12
21	GPS control points along Route 9	Electronic File	Copy	Department of Highway	April-12
22	5 years Budget Allocation and Expenditure as follows:	Paper	Copy	Department of Highway	April-12
	- Ministry of Transport				
	- Department of Highways				
	- Maintenance of All Road				
	- Maintenance of Motorway				
23	Borrow pit location along or near by Route 9	Paper	Copy	Department of Highway	April-12
24	List of general contractors	Paper	Copy	Department of Highway	April-12
25	Master Plan on Water Resource Management	Paper	Copy	Strategic Committee for Water Resource Management : SCWRM	February-12

Information Acquirement From Royal Irrigation Department

No.	Description	Data Type	Original /Copy	Source	Received
1	Chao Phraya Dam Control Office: Presentation Materials and Video of Spillway Damage	Paper and Electronic File	Copy	Royal Irrigation Department	January-12
2	Northern Lungshit Office: Presentation Materials for Flooding Damage to Water Gate	Paper and Electronic File	Copy	Royal Irrigation Department	January-12
3	Regional Office 12: Flooding Damage Map	Paper and Electronic File	Copy	Royal Irrigation Department	January-12
4	Nakorn Luang Operation and Maintenance Project Under Regional Office 10: Damage Map	Paper and Electronic File	Copy	Royal Irrigation Department	January-12
5	Maharat Operation and Maintenance Project Under Regional Office 10: Presentation Materials Flooding Damage	Paper and Electronic File	Copy	Royal Irrigation Department	January-12
6	Flooding Damage to Rojana Industrial Park Public and Transportation Infrastructure for Supply Chain	Paper and Electronic File	Copy	ROJANA INDUSTRIAL PARK PUBLIC CO.,LTD.	January-12

DEPARTMENT OF HIGHWAYS MINISTRY OF TRANSPORT KINGDOM OF THAILAND

**PREPARATORY SURVEY
ON
THE REHABILITATION PROJECT OF
THE OUTER BANGKOK RING ROAD**

**FINAL REPORT
DETAILED DESIGN DRAWINGS**

JAPAN INTERNATIONAL COOPERATION AGENCY

CTI ENGINEERING INTERNATIONAL CO., LTD.

ORIENTAL CONSULTANTS CO., LTD.

NIPPON KOEI CO., LTD.

CTI ENGINEERING CO., LTD.

CONTENTS OF DRAWINGS

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1. GENERAL				
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2. MOTORWAY				
2-1	TYPICAL CROSS SECTIONS	6	MW- 1 - MW- 6	6-11
2-2	PLAN / PROFILE OF MOTORWAY	43	MW- 7 - MW- 49	12-54
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5-2	HEIGHT ADJUSTMENT OF EXISTING CATCH BASIN AT SHOULDER	1	DR- 2	152
5-3	DETAILS OF INLET CATCH BASIN AT MEDIAN & PIPE CULVERT	2	DR- 3 - DR- 4	153-154
5-4	DETAILS OF OUTLET CATCH BASIN AT SHOULDER	1	DR- 5	155
5-5	DETAILS OF INLET / OUTLET PROTECTION	2	DR- 6 - DR- 7	156-157
6. MEDIAN WORK				
6-1	CONCRETE BARRIER	3	CB- 1 - CB- 3	158-160
6-2	L-TYPE PRECAST CONCRETE WALL	1	CB- 4	161
6-3	DETAILS OF SIGN POST AT MEDIAN	1	CB- 5	162
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7-1	DETAILS OF GUARDRAIL	2	SW- 1 - SW- 2	163-164
7-2	DETAILS OF GUIDE POST	1	SW- 3	165
7-3	DETAILS OF SIGN POST	3	SW- 4 - SW- 6	166-168
7-4	DETAILS OF SIGNAGE & PAVEMENT MARKING	2	SW- 7 - SW- 8	169-170
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7-6	STAIRWAY WORK	1	SW- 10	172
8. TRAFFIC MANAGEMENT DURING CONSTRUCTION				
		40		173-212

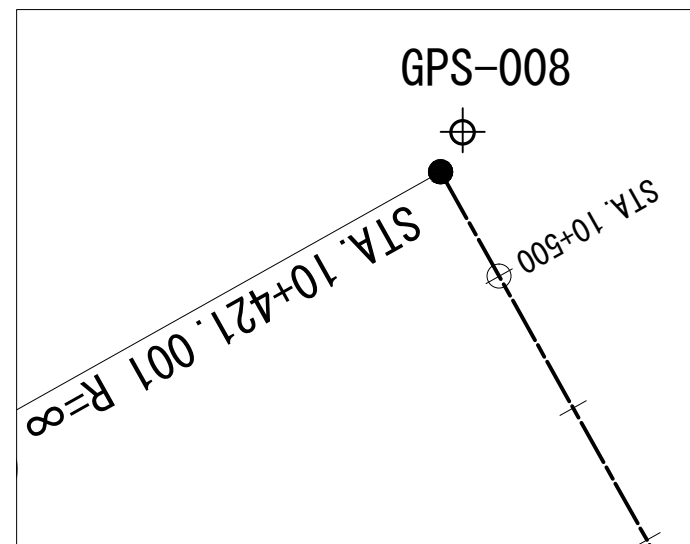
1. GENERAL

1-1 PROJECT LOCATION MAP

1-2 ALIGNMENT LAYOUT

ALIGNMENT DATA

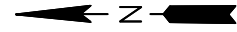
Point	STA.	Coordinate		Tangent Length	Radius	Curve Length	Bearing	Deflection Angle
		Easting	Northing	(m)	(m)	(m)	(dd-mm-ss)	(dd-mm-ss)
BC1		12+773.680	682868.1065	1558216.1049		1145.9180	465.5454	150-42-39.5897
IP 1	RT	13+009.708	682972.1180	1557952.5316	236.028			23-16-38.0004
EC1		13+239.225	683008.2949	1557775.5199		1145.9180	3570.1556	173-59-17.5901
BC2		16+809.381	683382.2079	1554224.9988		2864.7790	281.4574	173-59-17.5901
IP 2	RT	16+950.223	683385.5017	1554027.2130	140.842			5-37-45.0002
EC2		17+090.838	683397.8992	1553944.0925		2864.7790	2641.8926	179-37- 2.5903
BC3		19+732.731	683415.5413	1551302.2588		-1432.3970	583.9038	179-37- 2.5903
IP 3	LT	20+028.794	683406.0613	1550948.4841	296.063			23-21-22.0003
EC3		20+316.635	683536.7034	1550735.1890		-1432.3970	3583.9683	156-15-40.5900
BC4		23+900.603	684982.5073	1547447.5948		1162.5130	495.9925	156-15-40.5900
IP 4	RT	24+152.431	685069.4097	1547166.2184	251.828			23-44-19.4100
EC4		24+396.595	685080.8667	1546979.6059		1162.5130	3848.1576	180- 0- 0.0000
BC5		28+244.753	685080.8667	1543124.6042		1883.2140	444.5479	180- 0- 0.0000
IP 5	RT	28+468.065	685016.0766	1542843.2498	223.312			13-31-30.4800
EC5		28+689.301	685028.6403	1542684.1734		1883.2140		193-31-30.4800



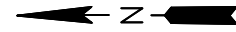
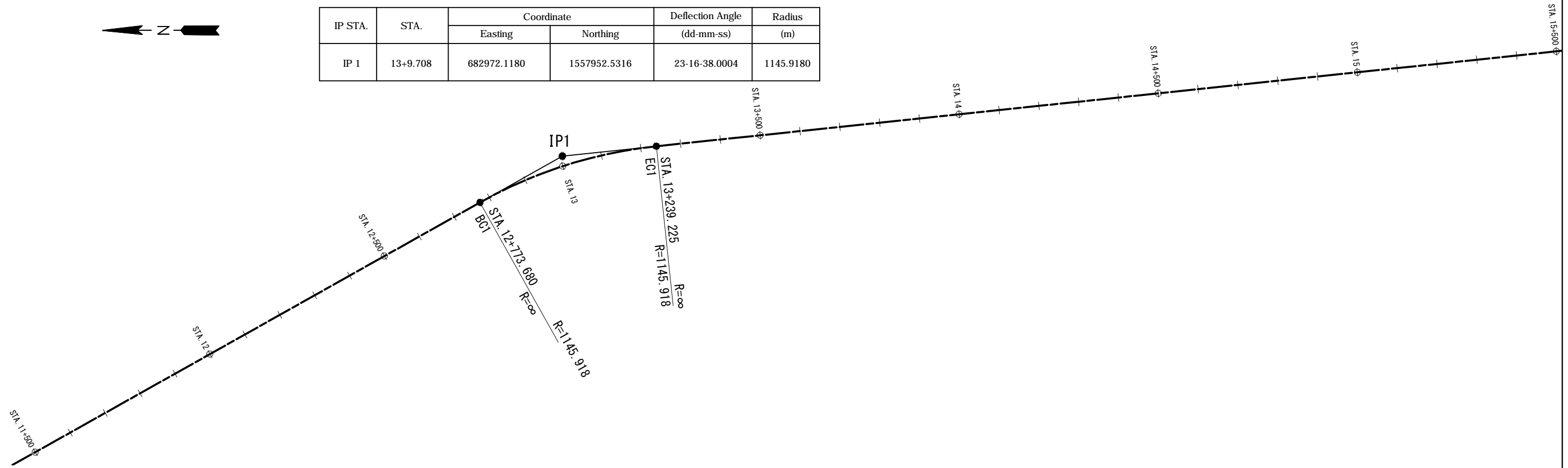
LOCATION OF GPS-008

- NOTE:**
1. THE COORDINATE SHOWS EASTING AND NORTHING CALCULATED BY USING DOH CONTROL POINT GPS-008, CURVES RADIUS AND PI STATIONS SHOWN IN DOH AS-BUILT DRAWINGS YEAR 2008-9.
 2. GPS-008 COORDINATES UTM WGS84 SYSTEM MEASURED BY JICA STUDY TEAM (681720.204,1560236.223), AND DOH BEARING (150D 44M 20.59S) AND OFFSET (29.707 M.) LEFT SIDE OFFSET FROM ROUTE 9 CENTERLINE STA.10+421.001
 3. ALIGNMENT LAYOUT IS SHOWN ONLY FOR ROAD RAISING AREA

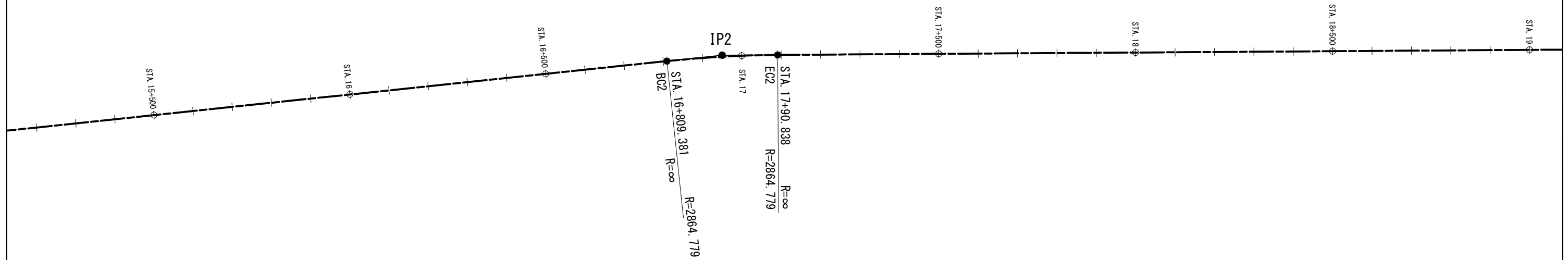
REV. NO.	DESCRIPTION	ENGINEER		DOH		REV. NO.	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF TRANSPORT DEPARTMENT OF HIGHWAYS	HIGHWAY ROUTE NO. 9	OWNER	PROJECT TITLE	CTI ENGINEERING INTERNATIONAL CO., LTD. ORIENTAL CONSULTANTS CO., LTD. NIPPON KOEI CO., LTD. CTI ENGINEERING CO., LTD.	DESIGNED BY	CHECKED BY	DATE:	SCALE:
		CHECKED	DATE	CHECKED	DATE				ALIGNMENT LAYOUT	The Inter-City Motorways Division Department of Highways Ministry of Transport	The Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road		SAGARA Hidetaka ROAD ENGINEER	WATANABE Ryohei CHIEF ENGINEER	AUGUST 2012	
								KM. 12+000 TO KM. 30+000						DWG. NO.	SHEET NO.	
														G-2	2	



IP STA.	STA.	Coordinate		Deflection Angle (dd-mm-ss)	Radius (m)
		Easting	Northing		
IP 1	13+9.708	682972.1180	1557952.5316	23-16-38.0004	1145.9180

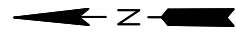


IP STA.	STA.	Coordinate		Deflection Angle (dd-mm-ss)	Radius (m)
		Easting	Northing		
IP 2	16+950.223	683385.5017	1554027.2130	5-37-45.0002	2864.7790

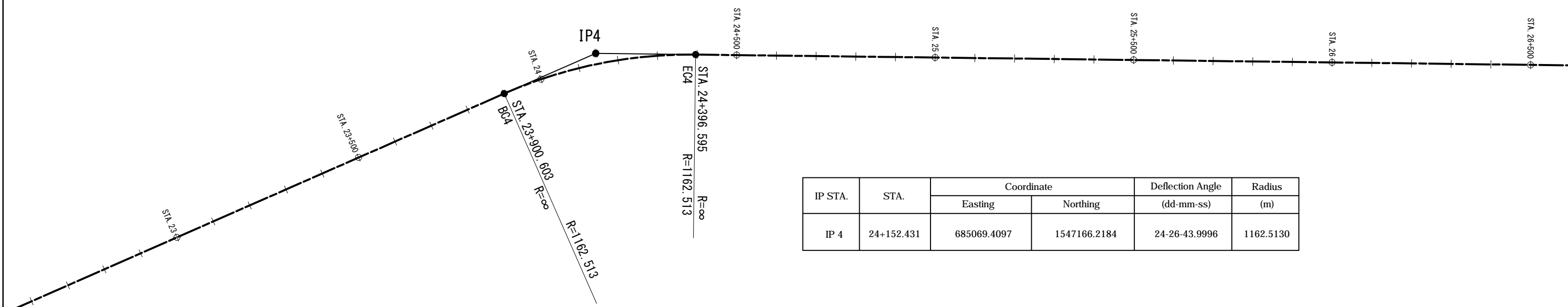
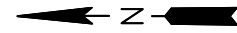
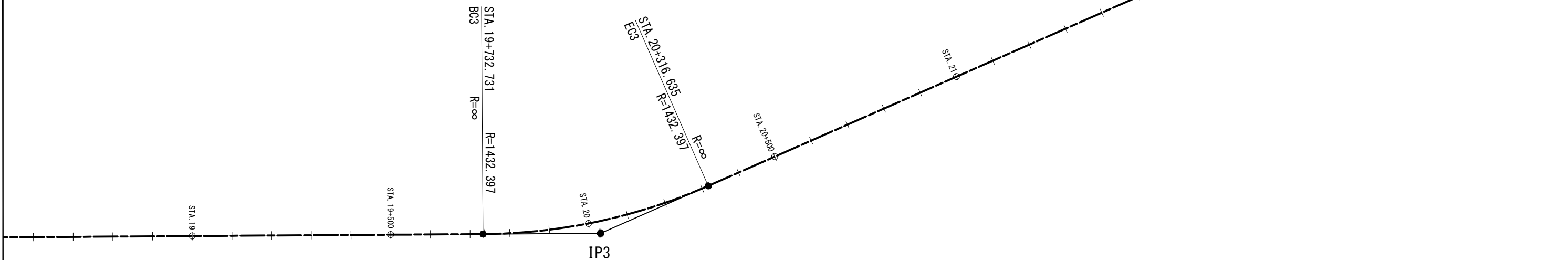


ALIGNMENT LAYOUT

REV. NO.	DESCRIPTION	ENGINEER		DOH		REV. NO.	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF TRANSPORT DEPARTMENT OF HIGHWAYS	HIGHWAY ROUTE NO. 9	OWNER	PROJECT TITLE	CTI ENGINEERING INTERNATIONAL CO., LTD. ORIENTAL CONSULTANTS CO., LTD. NIPPON KOEI CO., LTD. CTI ENGINEERING CO., LTD.	DESIGNED BY	CHECKED BY	DATE	SCALE
		CHECKED	DATE	CHECKED	DATE				ALIGNMENT LAYOUT	The Inter-City Motorways Division Department of Highways Ministry of Transport	The Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road		SAGARA Hidetaka ROAD ENGINEER	WATANABE Ryohei CHIEF ENGINEER	AUGUST 2012	G-3
								12+000 TO KM. 30+000								

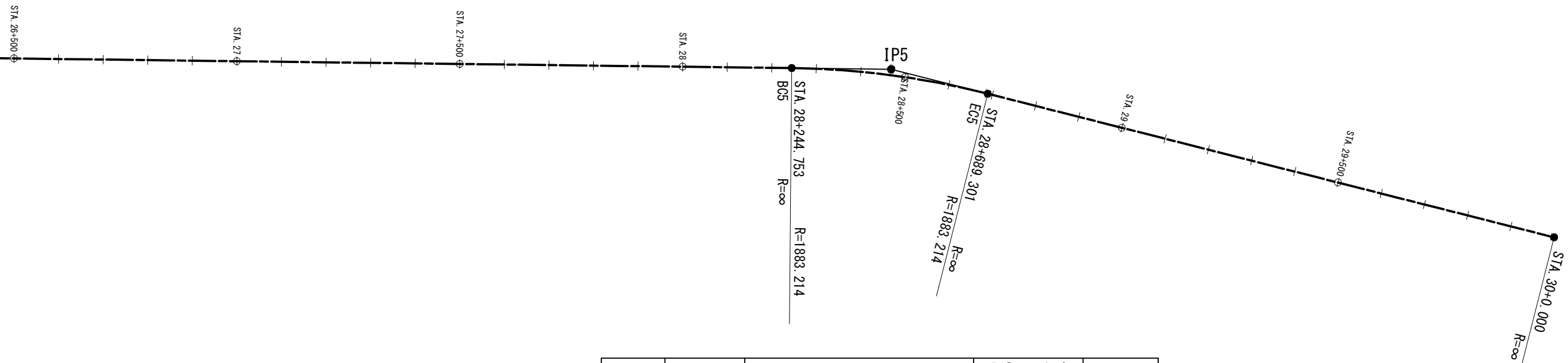
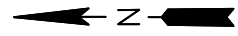


IP STA.	STA.	Coordinate		Deflection Angle (dd-mm-ss)	Radius (m)
		Easting	Northing		
IP 3	20+28.794	683406.0613	1550948.4841	23-21-22.0001	1432.3970








IP STA.	STA.	Coordinate		Deflection Angle (dd-mm-ss)	Radius (m)
		Easting	Northing		
IP 4	24+152.431	685069.4097	1547166.2184	24-26-43.9996	1162.5130

REV. NO.	DESCRIPTION	ENGINEER CHECKED DATE	DOH CHECKED DATE	REV. NO.	APPROVED BY	 KINGDOM OF THAILAND MINISTRY OF TRANSPORT DEPARTMENT OF HIGHWAYS	HIGHWAY ROUTE NO. 9	OWNER	PROJECT TITLE	 CTI ENGINEERING INTERNATIONAL CO., LTD. ORIENTAL CONSULTANTS CO., LTD. NIPPON KOEI CO., LTD. CTI ENGINEERING CO., LTD.	DESIGNED BY	CHECKED BY	DATE	SCALE
							ALIGNMENT LAYOUT	The Inter-City Motorways Division Department of Highways Ministry of Transport	The Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road		SAGARA Hidetaka ROAD ENGINEER	WATANABE Ryohei CHIEF ENGINEER	AUGUST 2012	
							KM. 12+000 TO KM. 30+000						DWG. NO. G-4	SHEET NO. 4

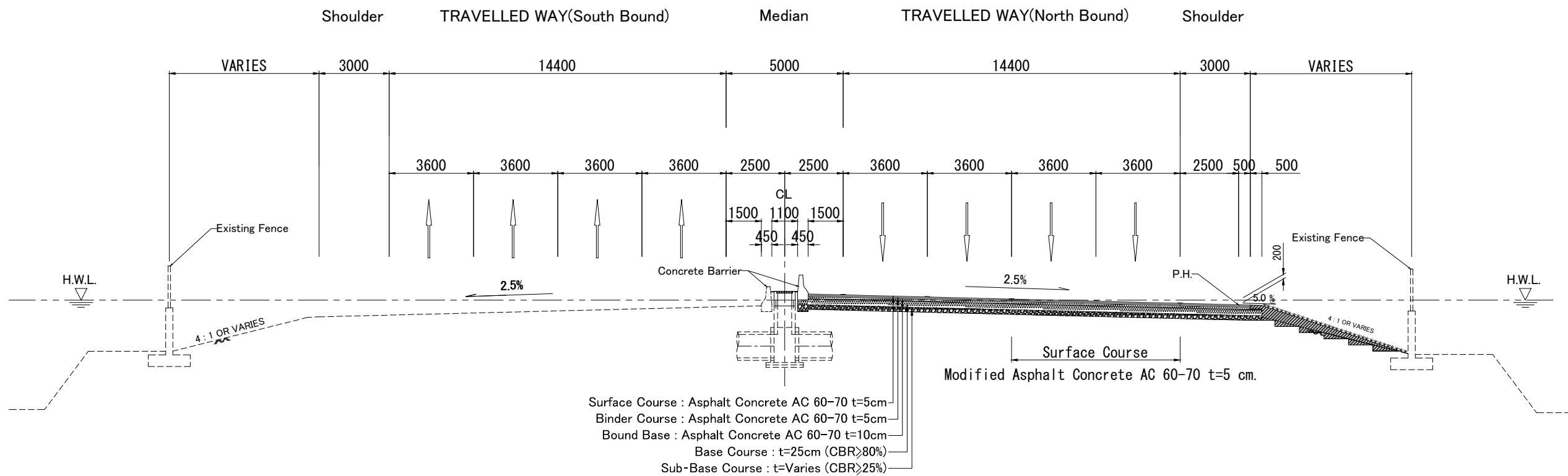


IP STA.	STA.	Coordinate		Deflection Angle (dd-mm-ss)	Radius (m)
		Easting	Northing		
IP 5	28+468.065	685016.0766	1542843.2498	13-31-30.4805	1883.2140

REV. NO.	DESCRIPTION	ENGINEER		DOH		REV. NO.	APPROVED BY	 KINGDOM OF THAILAND MINISTRY OF TRANSPORT DEPARTMENT OF HIGHWAYS	HIGHWAY ROUTE NO. 9	OWNER	PROJECT TITLE	 CTI ENGINEERING INTERNATIONAL CO., LTD.  ORIENTAL CONSULTANTS CO., LTD.  NIPPON KOEI CO., LTD.  CTI ENGINEERING CO., LTD.	DESIGNED BY	CHECKED BY	DATE :	SCALE :
		CHECKED	DATE	CHECKED	DATE				The Inter-City Motorways Division Department of Highways Ministry of Transport	The Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road	SAGARA Hidetaka ROAD ENGINEER		WATANABE Ryohei CHIEF ENGINEER	AUGUST 2012		
								ALIGNMENT LAYOUT						DWG. NO.	SHEET NO.	
								KM. 12+000 TO KM. 30+000						G-5	5	

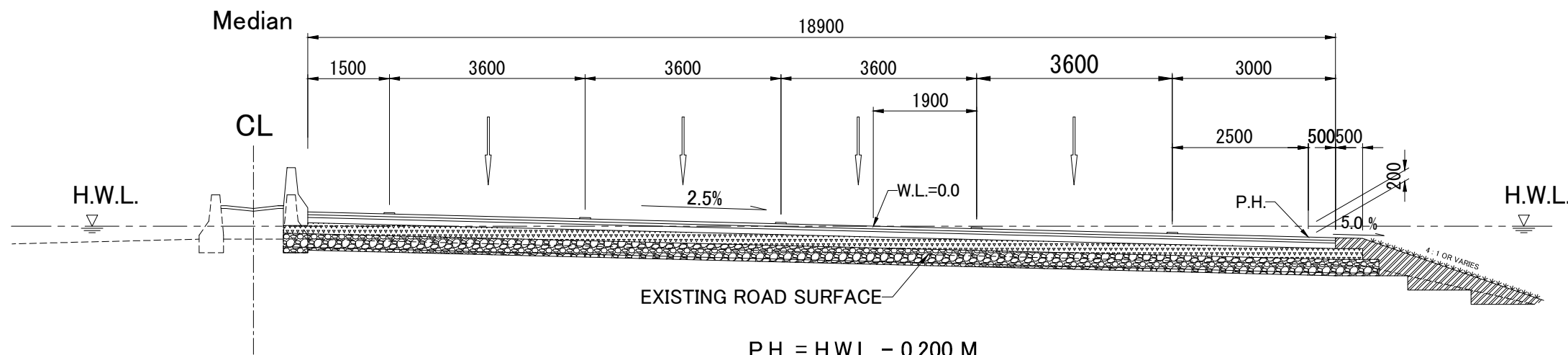
2. MOTORWAY

2-1 TYPICAL CROSS SECTIONS



P.H. = H.W.L. - 0.200 M
 TYPICAL CROSS SECTION (WHOLE SECTION)
 SCALE 1 : 200

STA. 10+600 TO STA.11+124
 STA. 11+558 TO STA.20+580
 STA. 23+690 TO STA.24+400
 STA. 25+600 TO STA.29+200

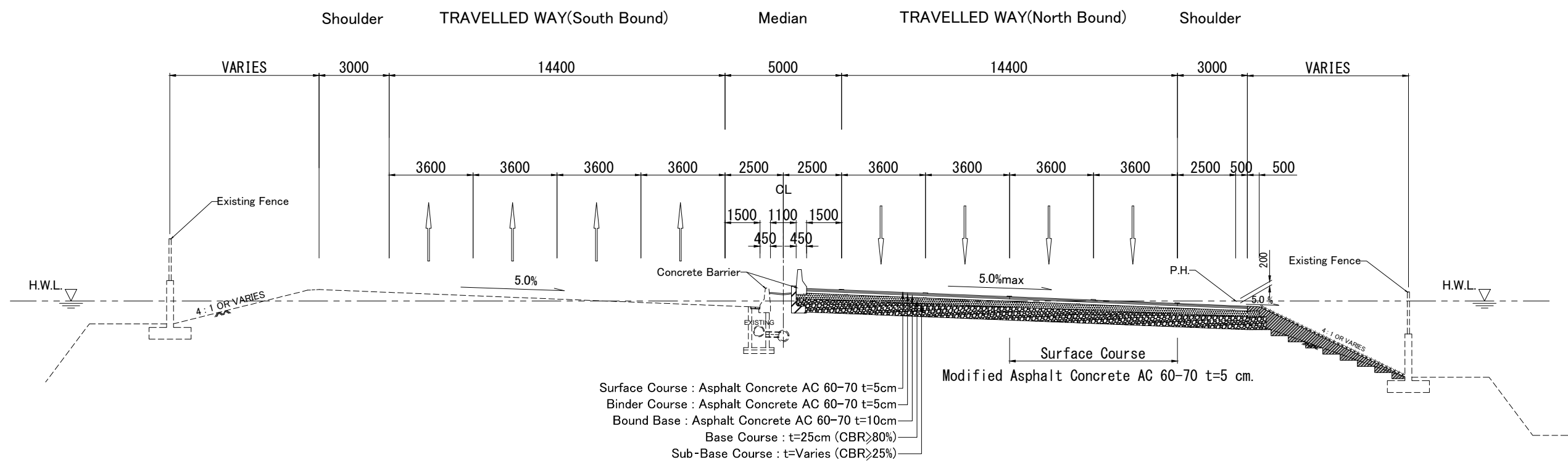


P.H. = H.W.L. - 0.200 M
 TYPICAL CROSS SECTION (NORTH BOUND SECTION)
 SCALE 1 : 100

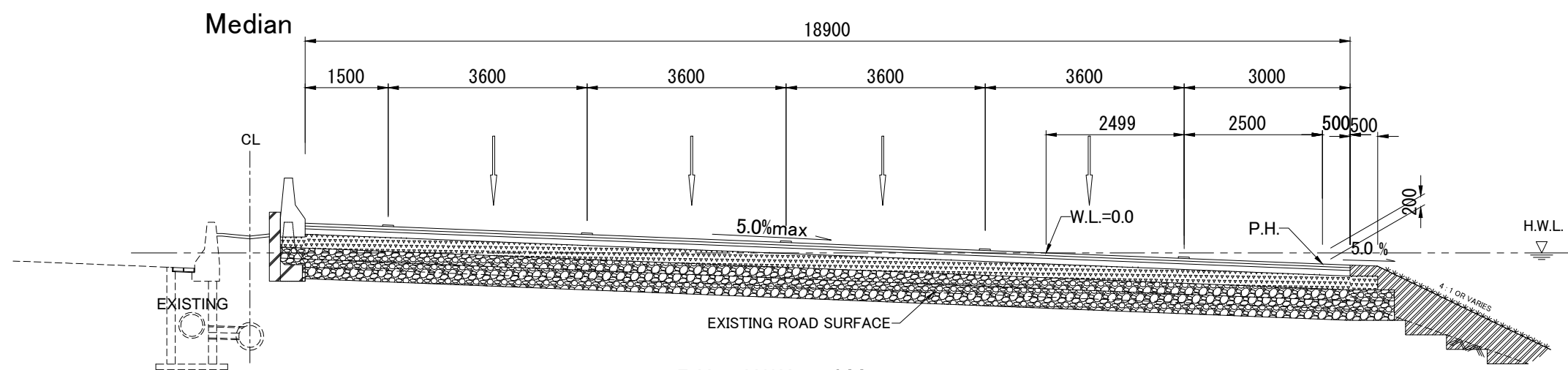
NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE INDICATED.
2. THE EXISTING ASPHALT SHALL BE REMOVED COMPLETELY.
3. H.W.L. : THE HISTORICAL HIGHEST FLOOD LEVEL RECORDED IN 2011.
4. P.H. : PROPOSED PROFILE HEIGHT.
5. SURFACE COURSE FOR TWO OUTER LANES SHALL BE MODIFIED ASPHALT CONCRETE.

REV. NO.	DESCRIPTION	ENGINEER		DOH		REV. NO.	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF TRANSPORT DEPARTMENT OF HIGHWAYS	HIGHWAY ROUTE NO. 9	OWNER The Inter-City Motorways Division Department of Highways Ministry of Transport	PROJECT TITLE The Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road	DESIGNED BY SAGARA Hidetaka ROAD ENGINEER	CHECKED BY WATANABE Ryohei CHIEF ENGINEER	DATE :	SCALE :
		CHECKED	DATE	CHECKED	DATE									AUGUST 2012	1:100 / 1:200
														DWG. NO.	SHEET NO.
														MW-2	7



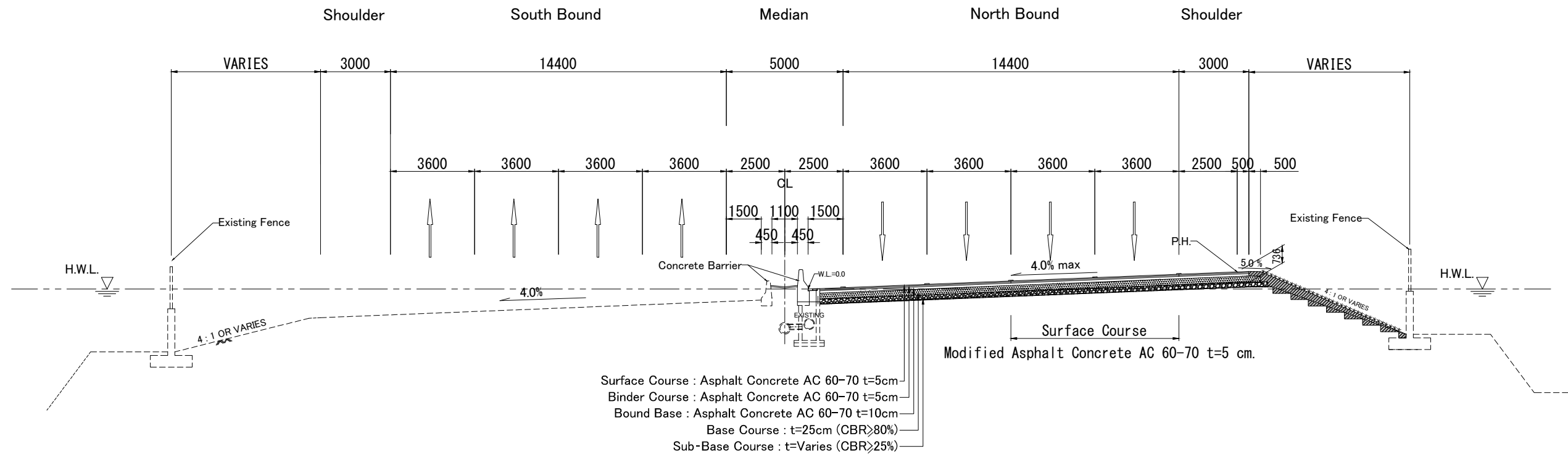
P.H. = H.W.L. - 200 mm
TYPICAL CROSS SECTION (RIGHT TURN CURVE WHOLE SECTION)
 SCALE 1 : 200



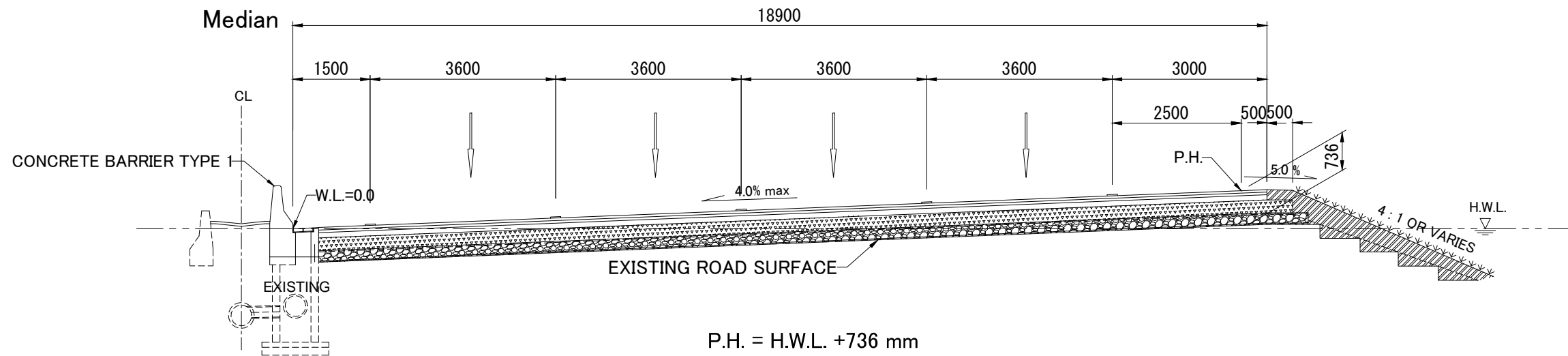
P.H. = H.W.L. - 200 mm
TYPICAL CROSS SECTION (NORTH BOUND RIGHT TURN CURVE SECTION)
 SCALE 1 : 100

- NOTES :**
1. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE INDICATED.
 2. THE EXISTING ASPHALT SHALL BE REMOVED COMPLETELY.
 3. H.W.L. : THE HISTORICAL HIGHEST FLOOD LEVEL RECORDED IN 2011.
 4. P.H. : PROPOSED PROFILE HEIGHT.
 5. SURFACE COURSE FOR TWO OUTER LANES SHALL BE MODIFIED ASPHALT CONCRETE.

REV. NO.	DESCRIPTION	ENGINEER		DOH		REV. NO.	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF TRANSPORT DEPARTMENT OF HIGHWAYS	HIGHWAY ROUTE NO. 9	OWNER	PROJECT TITLE	CTI ENGINEERING INTERNATIONAL CO., LTD. ORIENTAL CONSULTANTS CO., LTD. NIPPON KOEI CO., LTD. CTI ENGINEERING CO., LTD.	DESIGNED BY	CHECKED BY	DATE :	SCALE :
		CHECKED	DATE	CHECKED	DATE				The Inter-City Motorways Division Department of Highways Ministry of Transport	The Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road	SAGARA Hidetaka ROAD ENGINEER		WATANABE Ryohei CHIEF ENGINEER	AUGUST 2012	1:100 / 1:200	
								TYPICAL CROSS SECTION						DWG. NO.	SHEET NO.	
														MW-4	9	



P.H. = H.W.L. +736 mm
 TYPICAL CROSS SECTION (LEFT TURN CURVE WHOLE SECTION)
 SCALE 1 : 200



P.H. = H.W.L. +736 mm
 TYPICAL CROSS SECTION (NORTH BOUND LEFT TURN CURVE SECTION)
 SCALE 1 : 100

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE INDICATED.
2. THE EXISTING ASPHALT SHALL BE REMOVED COMPLETELY.
3. H.W.L. : THE HISTORICAL HIGHEST FLOOD LEVEL RECORDED IN 2011.
4. P.H. : PROPOSED PROFILE HEIGHT.
5. SURFACE COURSE FOR TWO OUTER LANES SHALL BE MODIFIED ASPHALT CONCRETE.

REV. NO.	DESCRIPTION	ENGINEER		DOH		REV. NO.	APPROVED BY	KINGDOM OF THAILAND MINISTRY OF TRANSPORT DEPARTMENT OF HIGHWAYS	HIGHWAY ROUTE NO. 9	OWNER The Inter-City Motorways Division Department of Highways Ministry of Transport	PROJECT TITLE The Preparatory Survey on the Rehabilitation Project of the Outer Bangkok Ring Road	DESIGNED BY SAGARA Hidetaka ROAD ENGINEER	CHECKED BY WATANABE Ryohei CHIEF ENGINEER	DATE :	SCALE :
		CHECKED	DATE	CHECKED	DATE									AUGUST 2012	1:100 / 1:200
														DWG. NO.	SHEET NO.
														MW-5	10

