

VOLUME 4

OUTLINE DESIGN



The Project for Study on Improvement of Bridges
Through Disaster Mitigating Measures for Large Scale Earthquakes
In the Republic of the Philippines

Outline Design Drawings

of

Lambingan Bridge, Guadalupe Bridge, 1st Mandaue-Mactan Bridge, Palanit Bridge,
Mawo Bridge, Lilo-an Bridge, and Wawa Bridge

 **CTI** CTI Engineering International Co., Ltd.
Consulting Engineers

 **CHODAI CO., LTD.**
人・夢・技術 CONSULTING ENGINEERS & PLANNERS

NIPPON KOEI
Challenging mind, Changing dynamics

December, 2013

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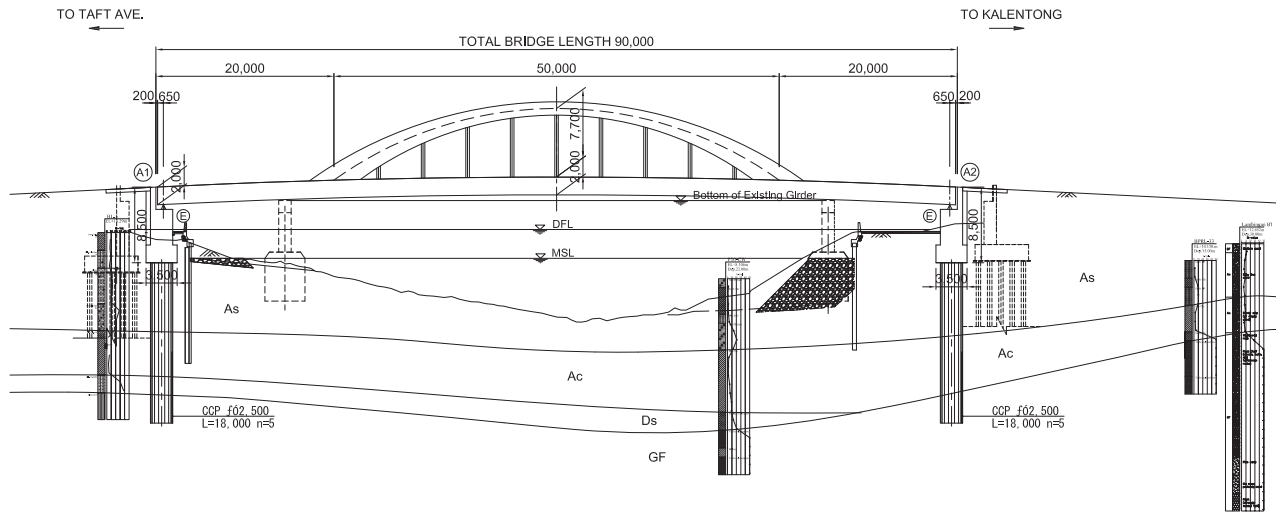
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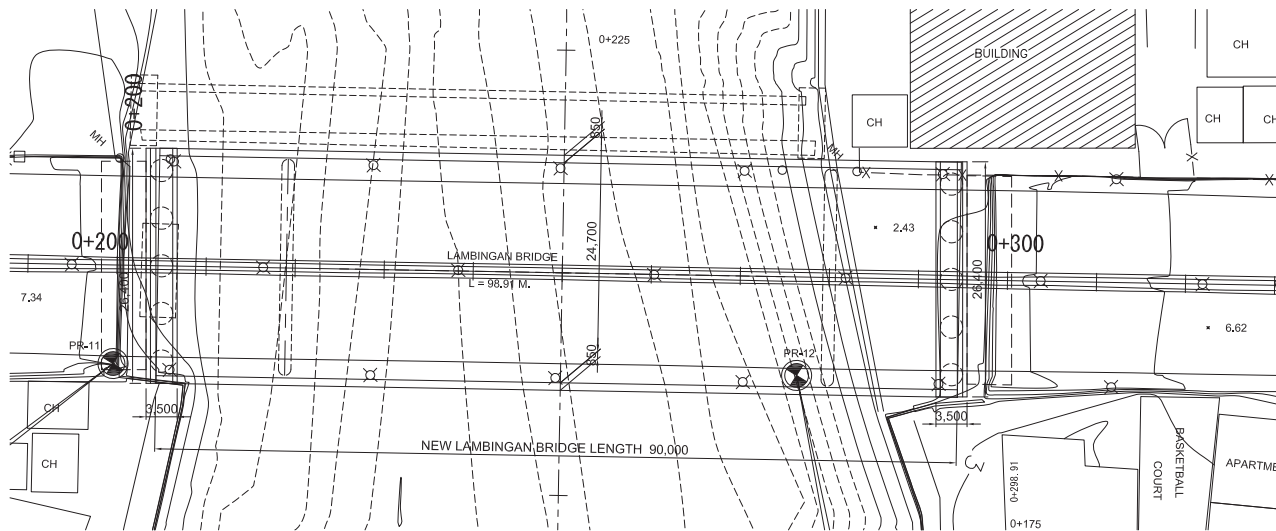


GENERAL VIEW OF LAMBINGAN BRIDGE

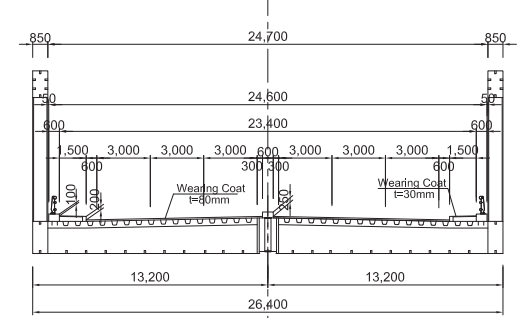
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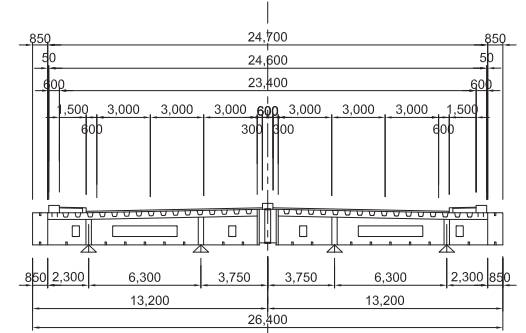
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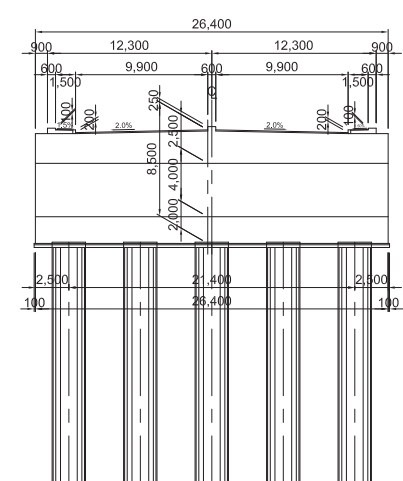
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SECTION @ ABUTMENT
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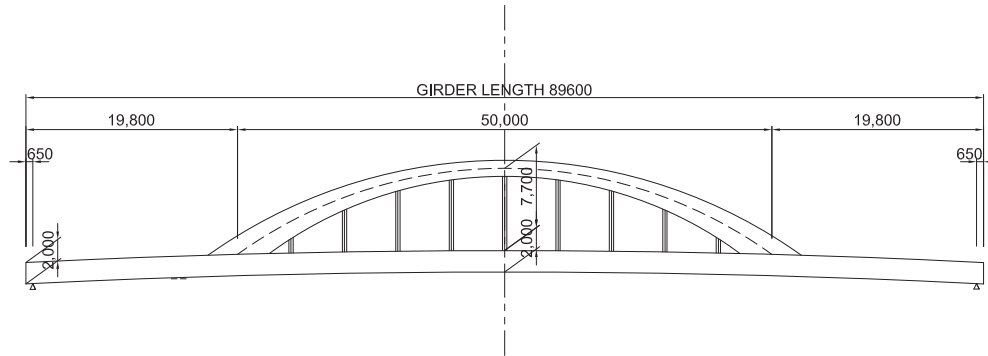
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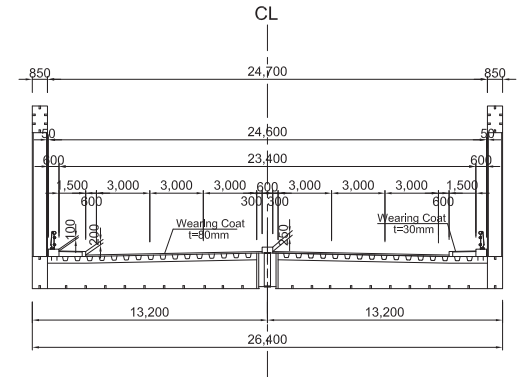
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STRUCTURAL DRAWING (SUPERSTRUCTURE) LAMBINGAN BRIDGE

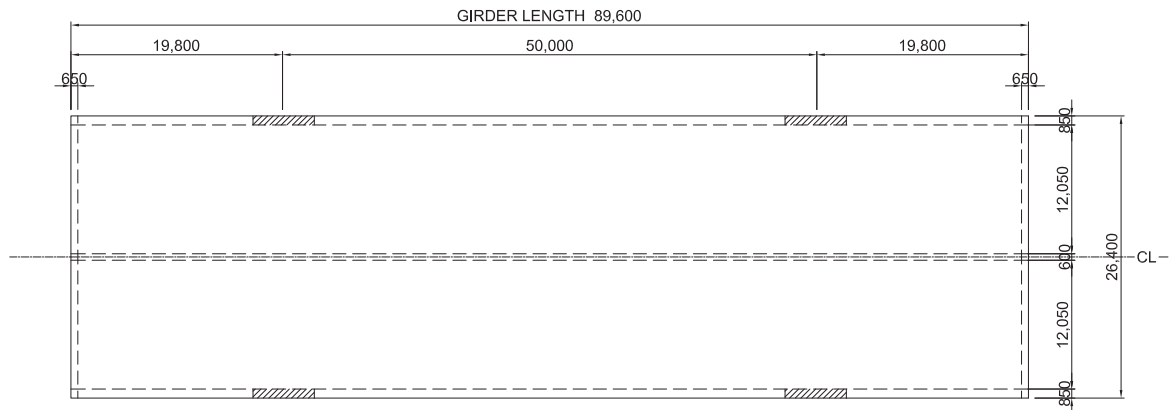
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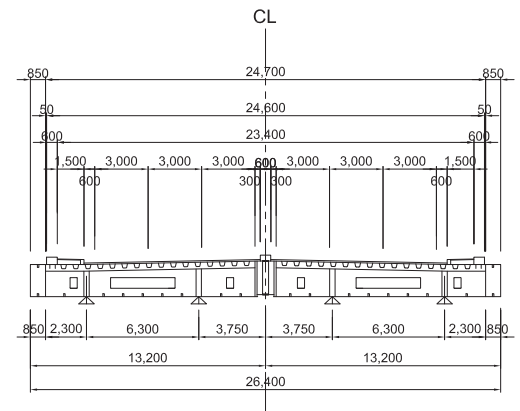
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PLAN VIEW
S=1:500



SECTION @ ABUTMENT
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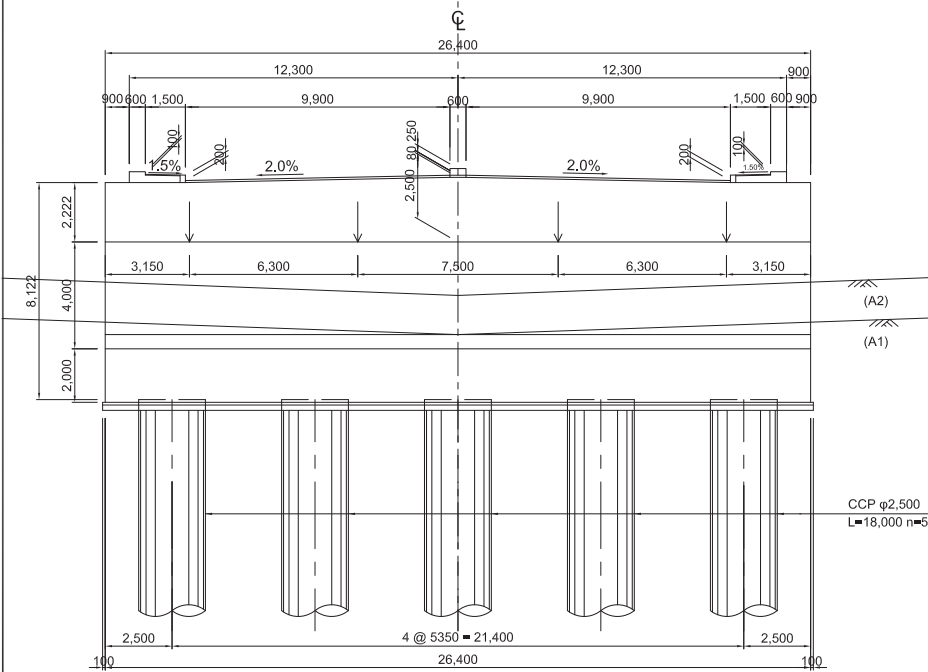


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 Japan International Cooperation Agency  DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	 CTI Engineering Co., Ltd.  Chodai Co., Ltd.  Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	LAMBINGAN BRIDGE	STRUCTURAL DRAWING (SUPERSTRUCTURE)	1-A2

STRUCTURAL DRAWING (SUBSTRUCTURE) LAMBINGAN BRIDGE

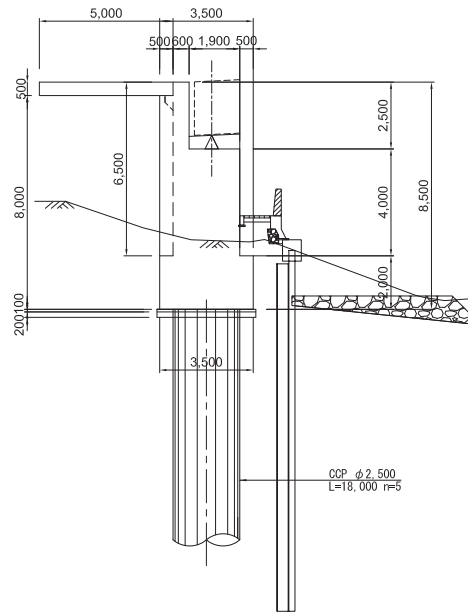
FRONT VIEW A1 & A2

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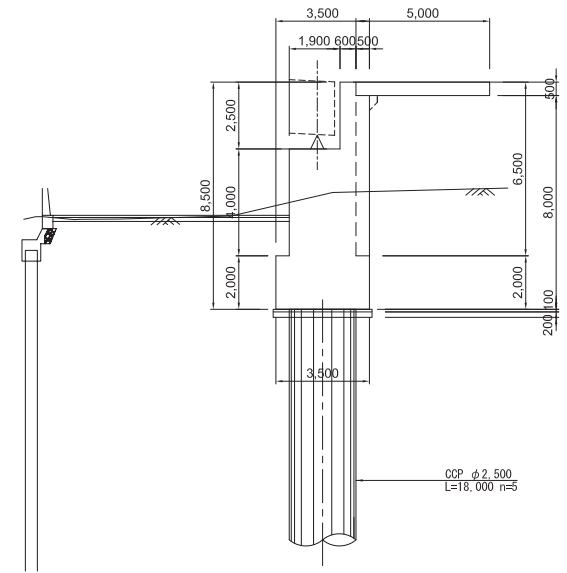
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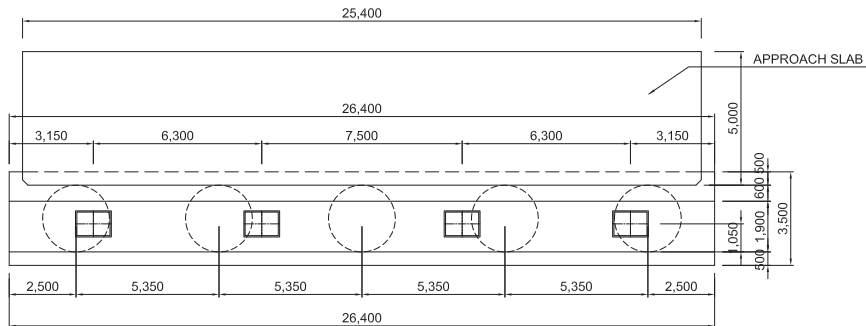
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FRONT VIEW A1 & A2

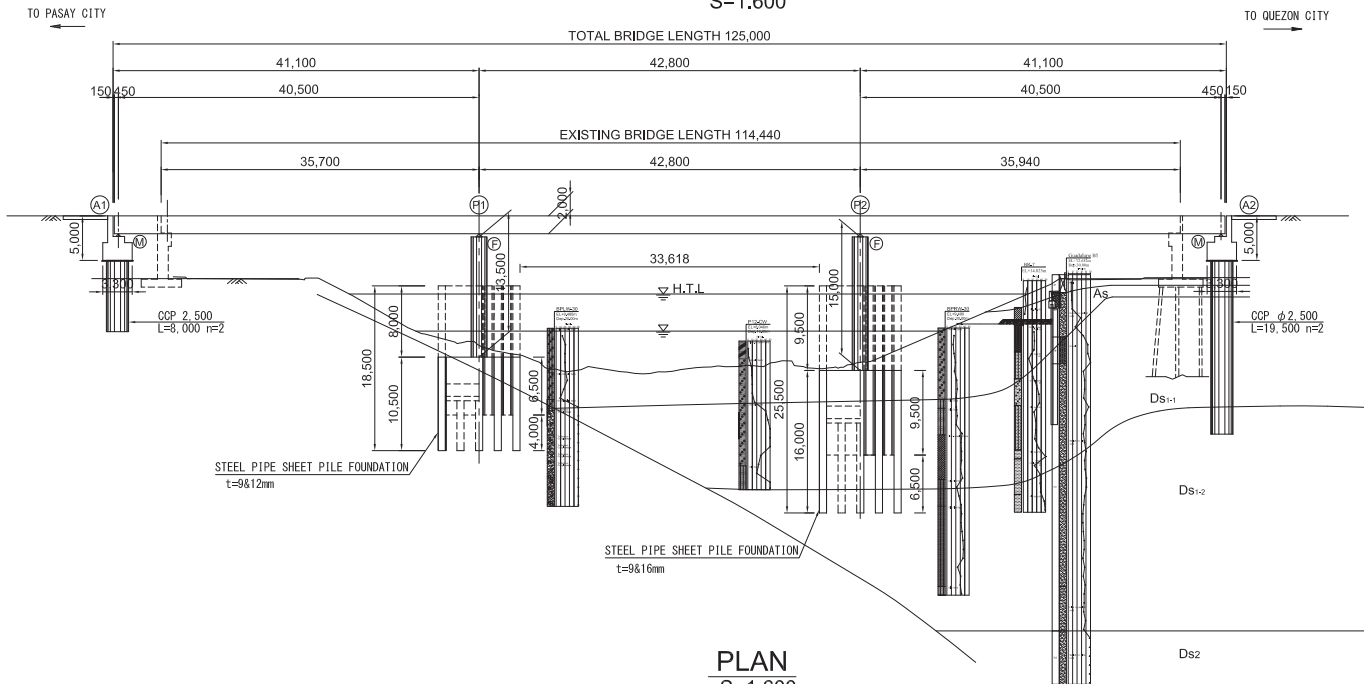
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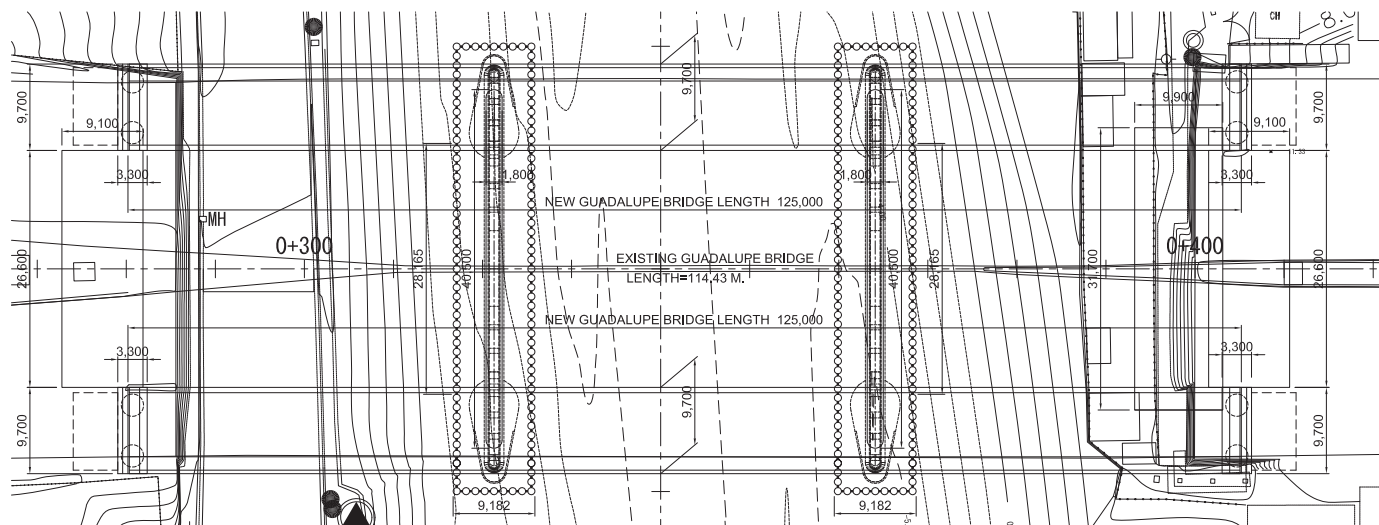
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GENERAL VIEW OF GUADALUPE BRIDGE (OUTER BRIDGE)

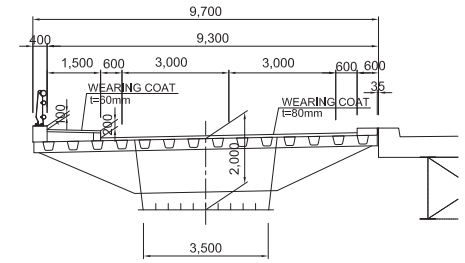
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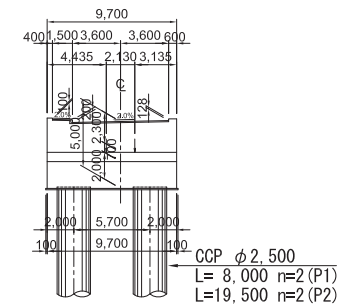
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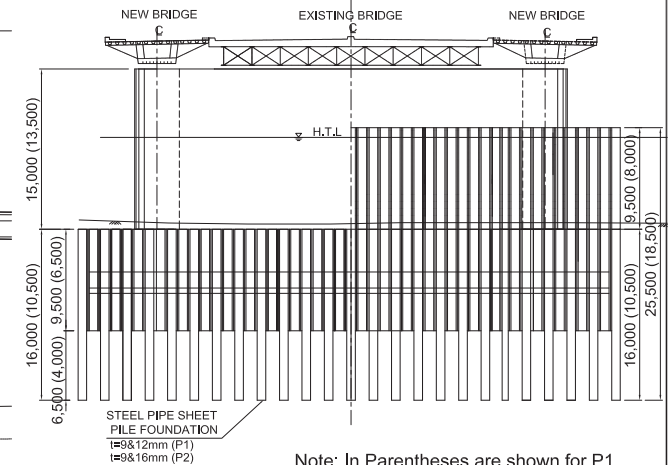
GIRDER SECTION
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A1, A2 ABUT
S=1:400



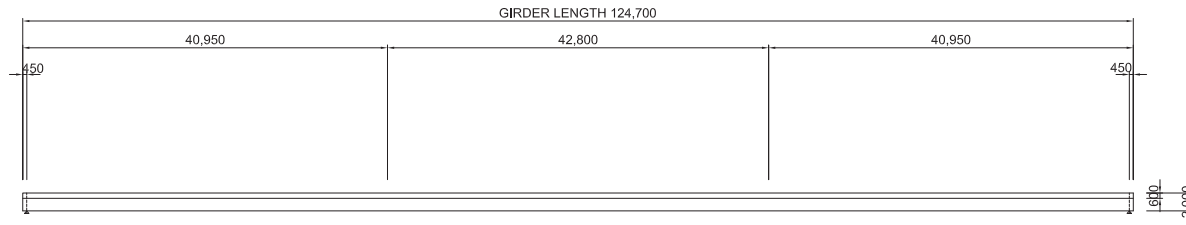
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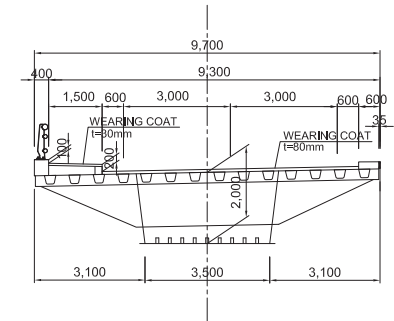
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		Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	GUADALUPE BRIDGE (OUTER BRIDGE)	GENERAL VIEW	1-B1

STRUCTURAL DRAWING (SUPERSTRUCTURE) GUADALUPE BRIDGE (OUTER BIDGE)

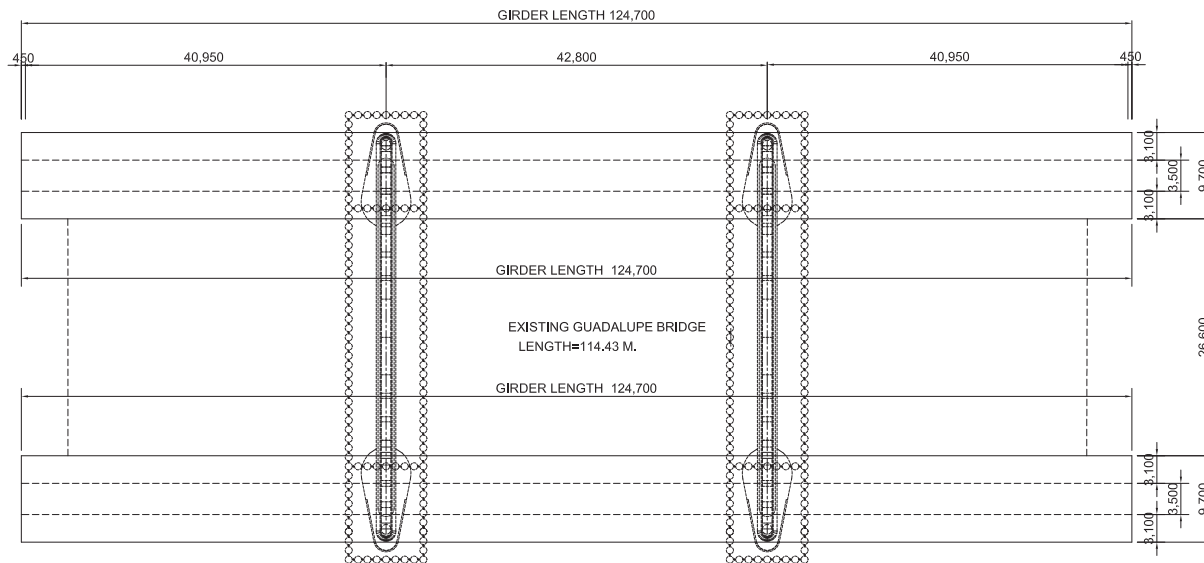
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GIRDER SECTION
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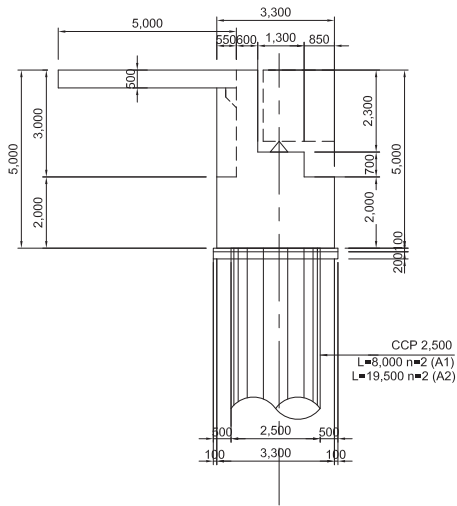
PLAN VIEW
S=1:600



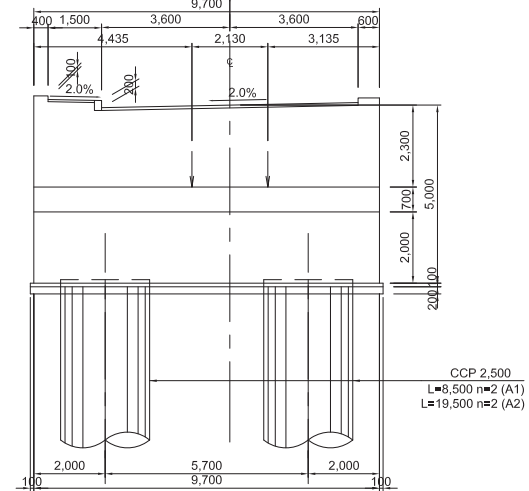
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Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	GUADALUPE BRIDGE (OUTER BRIDGE)	STRUCTURAL DRAWING (SUPERSTRUCTURE)	1-B2

STRUCTURAL DRAWING (SUBSTRUCTURE) GUADALUPE (OUTER BRIDGE) (1)

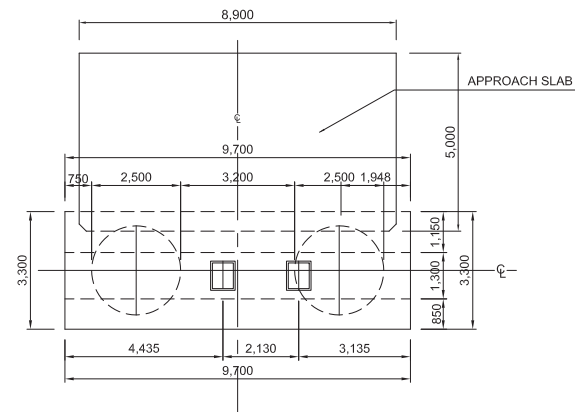
SIDE VIEW OF A1 & A2
S = 1:150








FRONT VIEW OF A1 & A2
S = 1:150



PLAN VIEW A1 & A2
S = 1:150

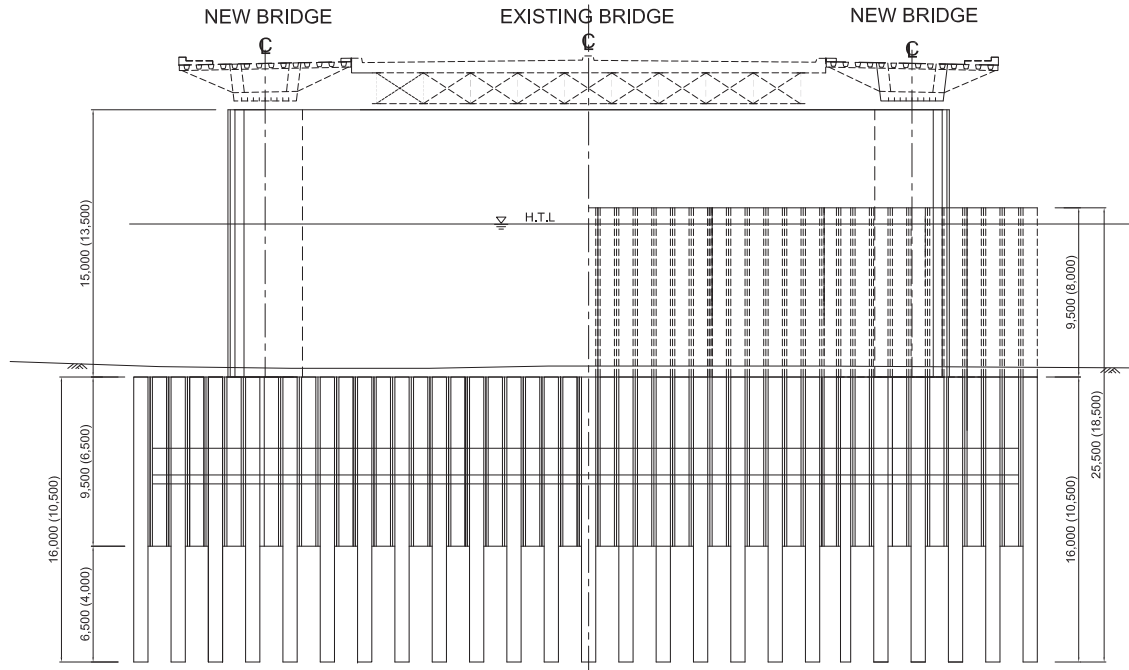


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 Japan International Cooperation Agency  DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	 CTI Engineering Co., Ltd.  Chodal Co., Ltd.  Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	GUADALUPE BRIDGE (OUTER BRIDGE)	STRUCTURAL DRAWING SUBSTRUCTURE (1)	1-B3

STRUCTURAL DRAWING (SUBSTRUCTURE) GUADALUPE (OUTER BRIDGE) (2)

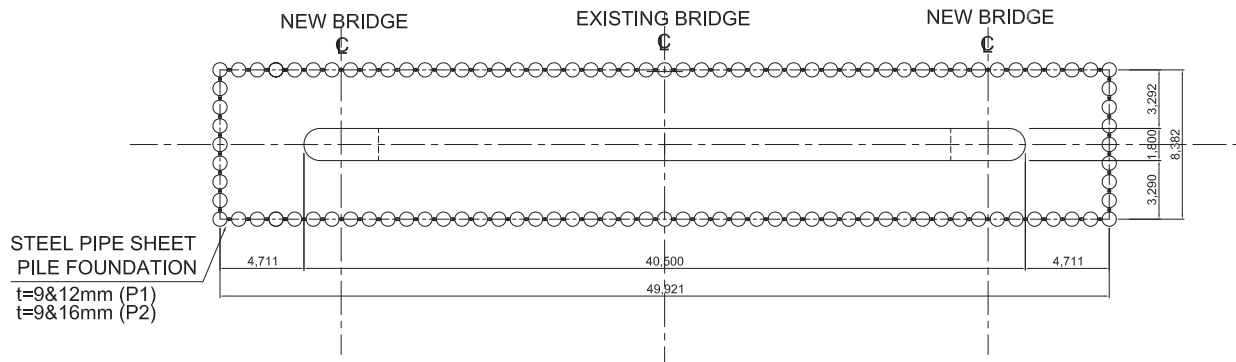
FRONT VIEW OF P1 & P2

S = 1:300



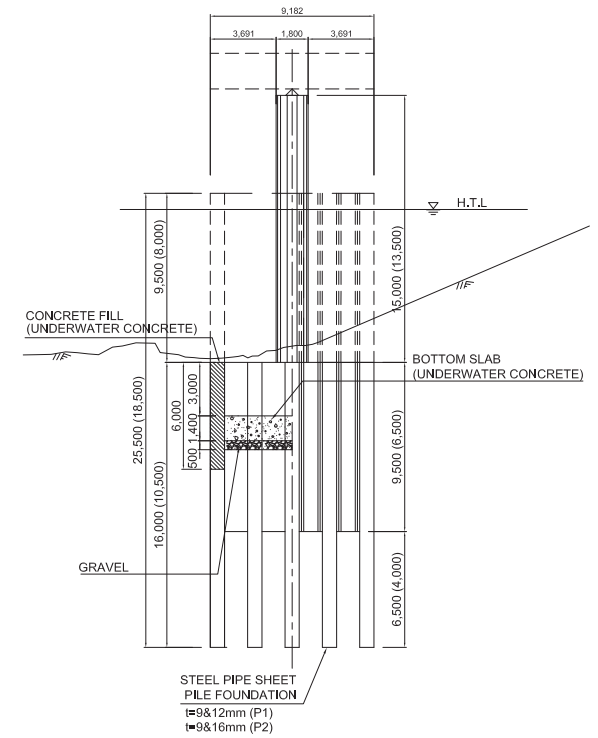
PLAN VIEW OF P1 & P2

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SIDE VIEW OF P1 & P2

S = 1:300



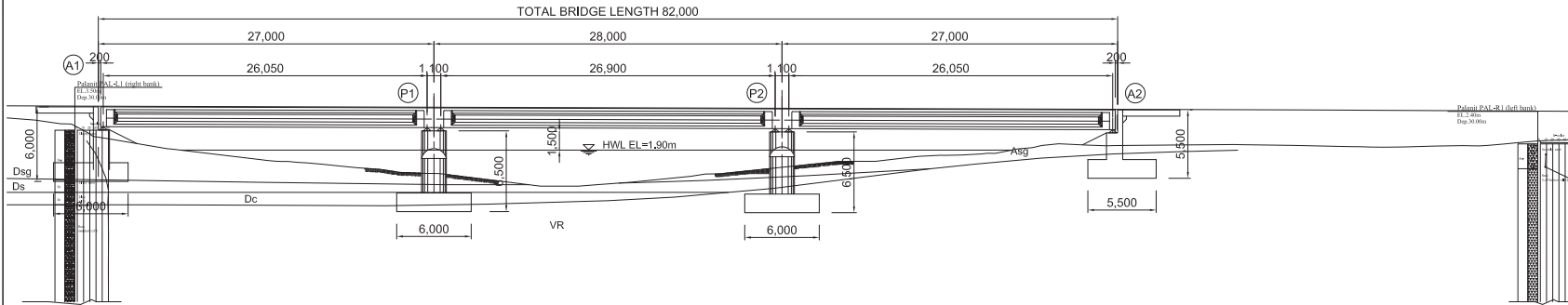
Note: In Parentheses are shown for P1

Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
 Japan International Cooperation Agency	 DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	 CTI Engineering Co., Ltd.  Chodal Co., Ltd.  Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	GUADALUPE BRIDGE (OUTER BRIDGE)	STRUCTURAL DRAWING SUBSTRUCTURE (2)

GENERAL VIEW OF PALANIT BRIDGE

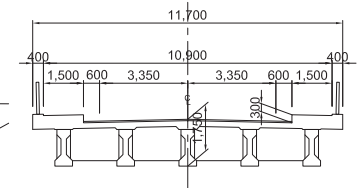
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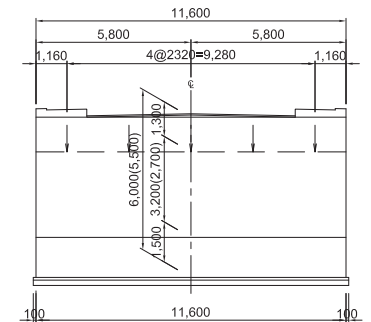
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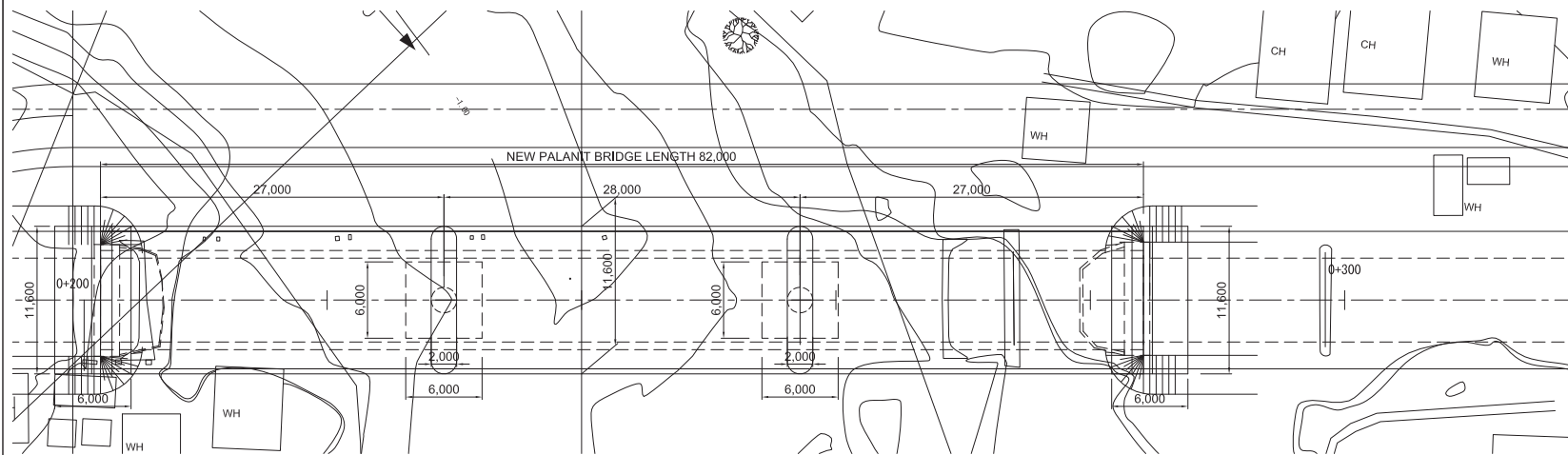
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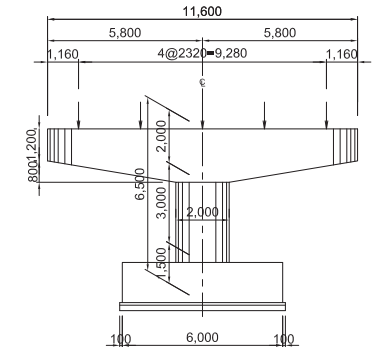
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P1,P2 PIER

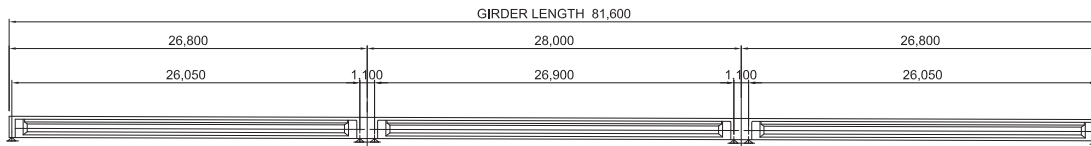
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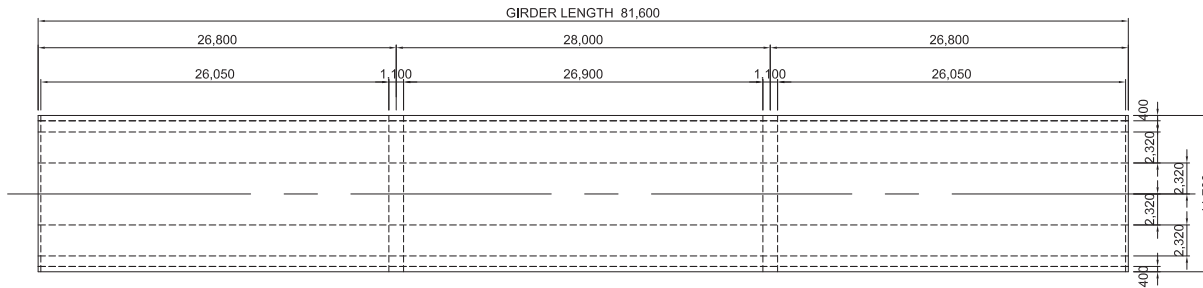
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Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	PALANIT BRIDGE	GENERAL VIEW	1-C1

STRUCTURAL DRAWING (SUPERSTRUCTURE) PALANIT BRIDGE

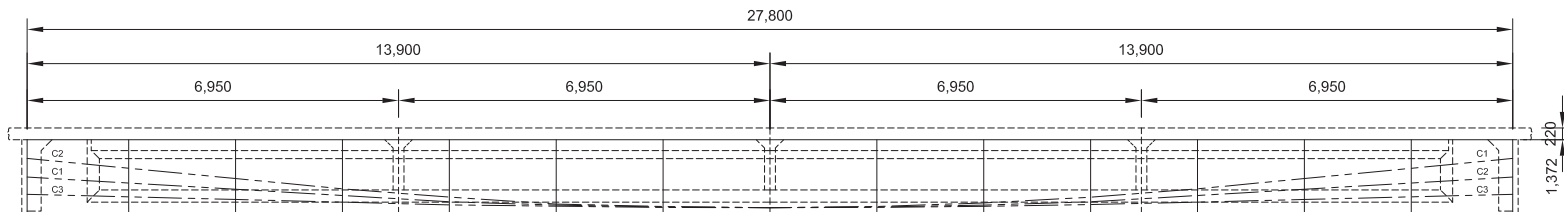
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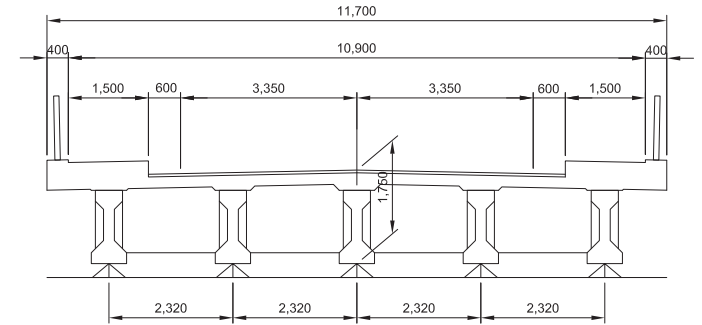
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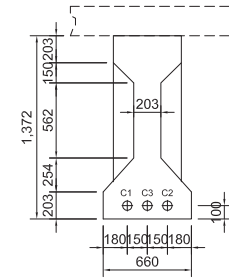
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SCALE 1:100



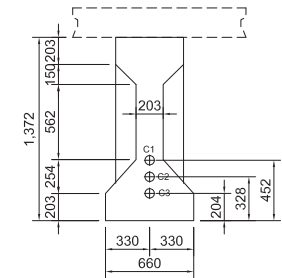
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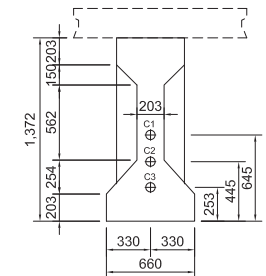
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SECTION @ 8.00M
SCALE 1:40



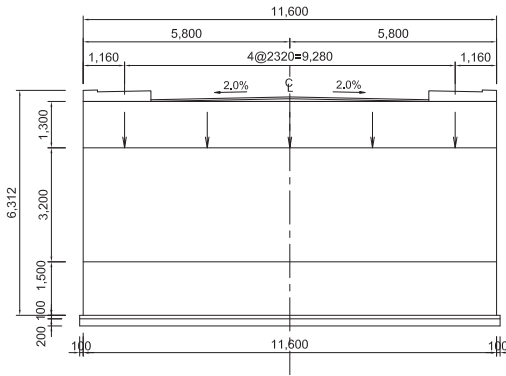
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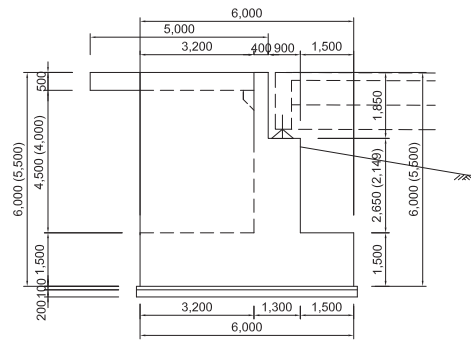
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STRUCTURAL DRAWING (SUBSTRUCTURE) PALANIT BRIDGE

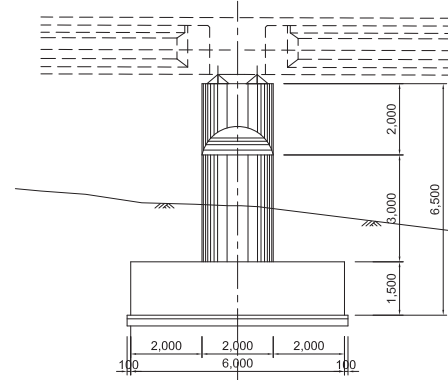
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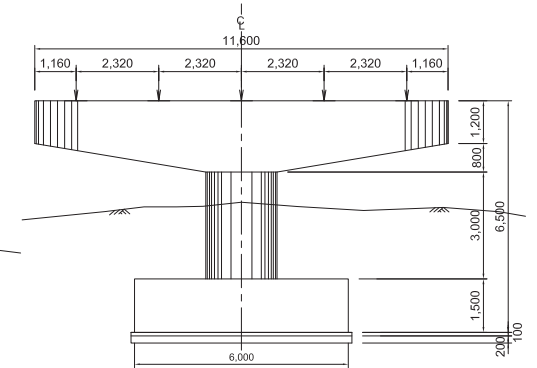
SIDE VIEW A1 & A2
SCALE = 1:150



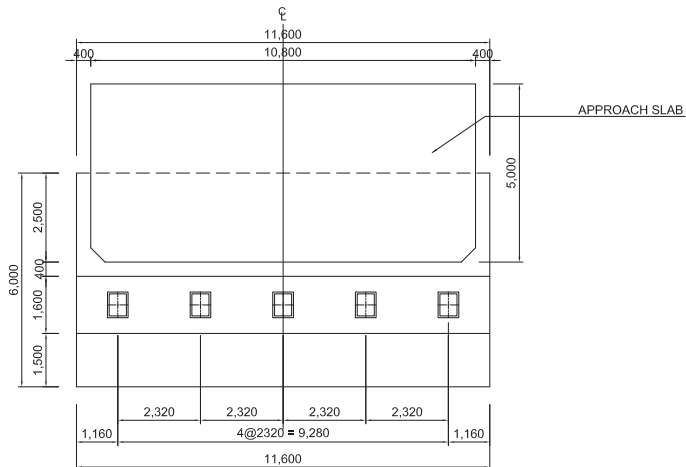
FRONT VIEW P1 & P2
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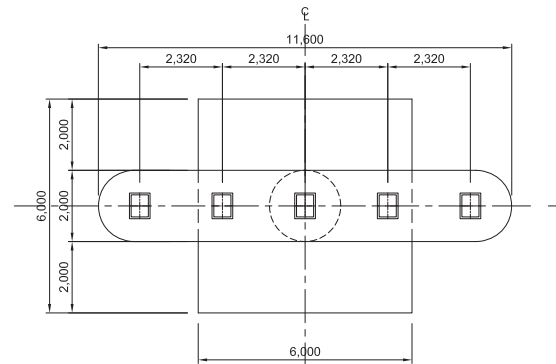
SIDE VIEW OF P1 & P2
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PLAN VIEW OF A1 & A2
SCALE = 1:150



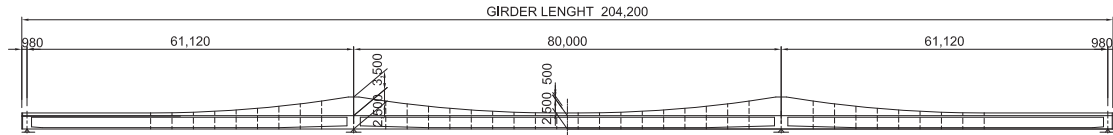
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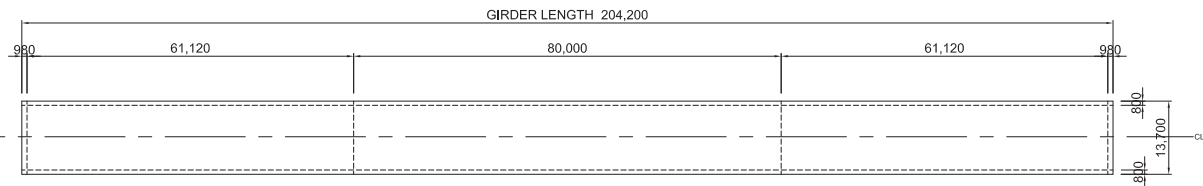
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STRUCTURAL DRAWING (SUPERSTRUCTURE) MAWO BRIDGE

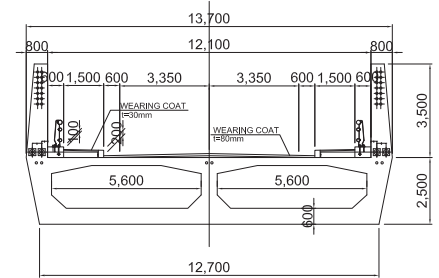
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S=1:1000



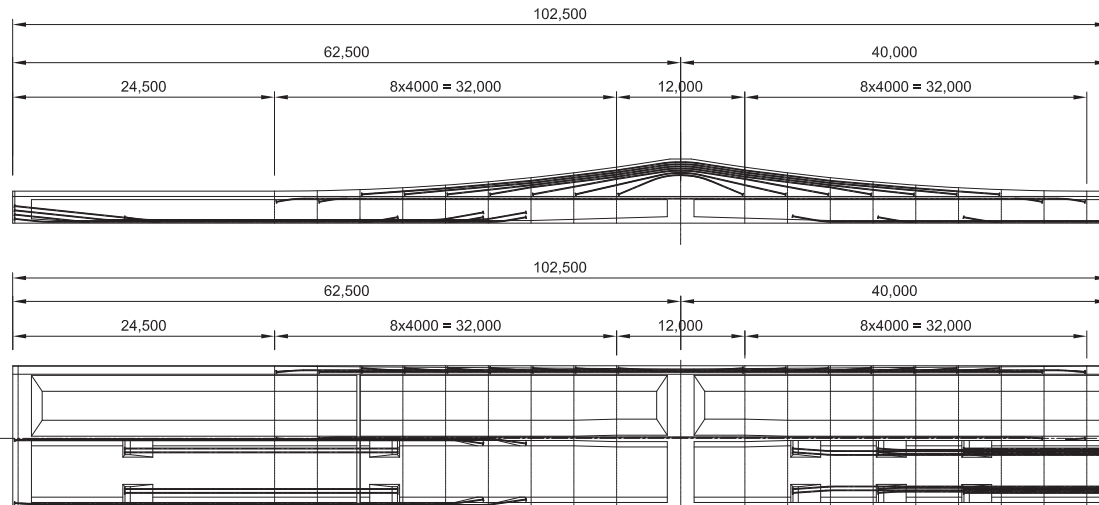
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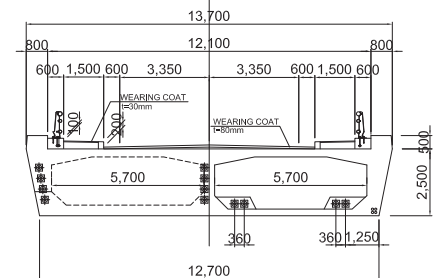
SECTION @ PIER
SCALE 1:200








GIRDER PC CABLE ARRANGEMENT
SCALE 1:500



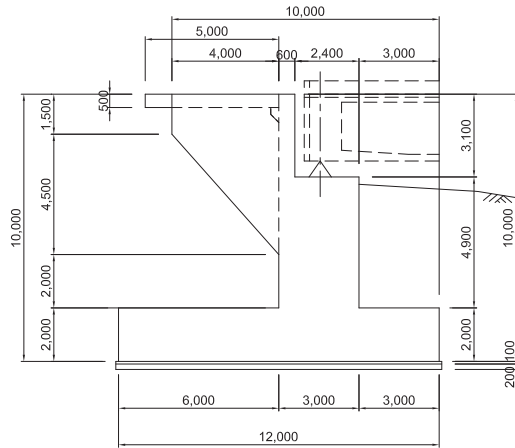
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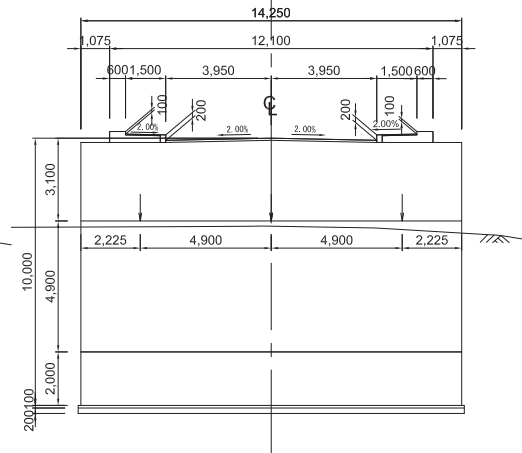
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		  	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	MAWO BRIDGE	STRUCTURAL DRAWING (SUPERSTRUCTURE)

STRUCTURAL DRAWING (SUBSTRUCTURE) MAWO BRIDGE (1)

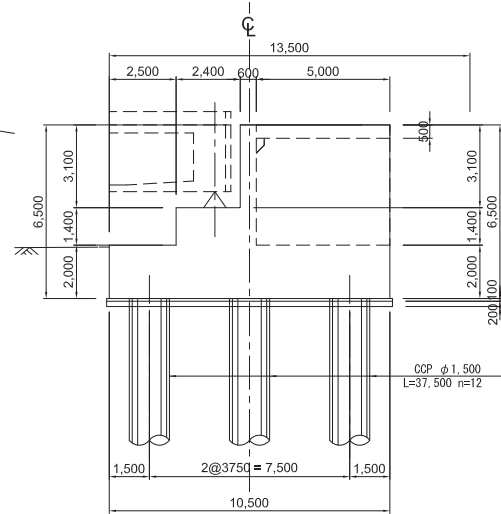
SIDE VIEW OF A1
S = 1:200



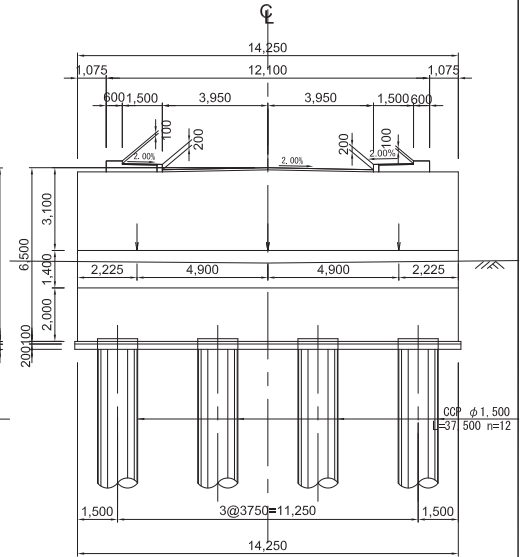
FRONT VIEW OF A1
S = 1:200



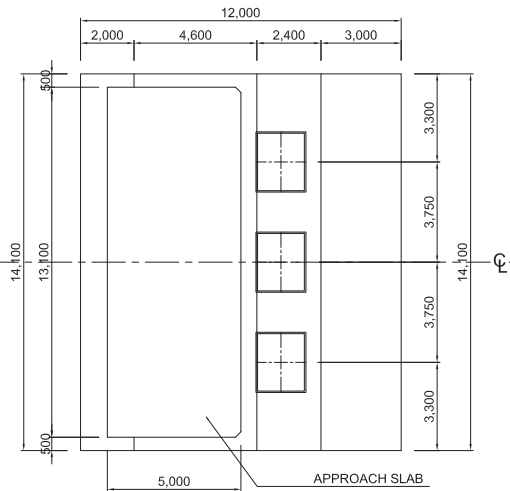
SIDE VIEW OF A2
S = 1:200



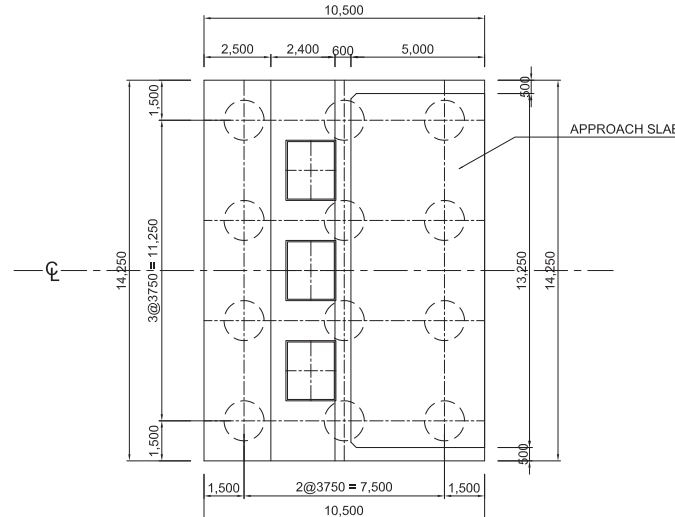
FRONT VIEW OF A2
S = 1:200



PLAN VIEW OF A1
S = 1:200



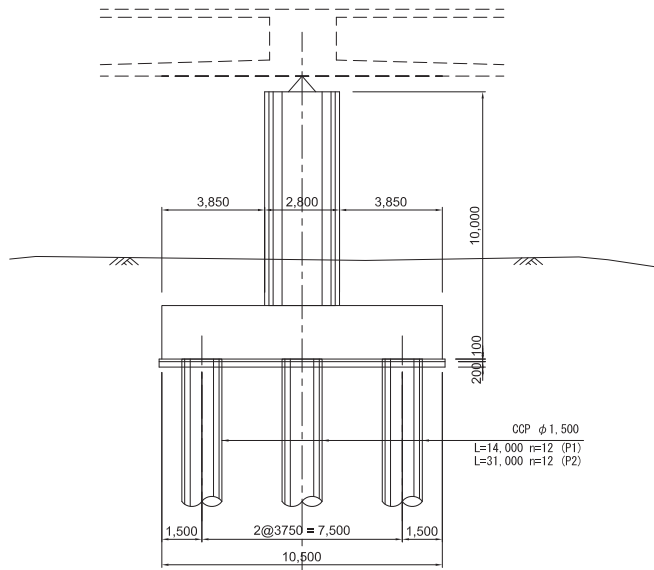
PLAN VIEW OF A2
S = 1:200



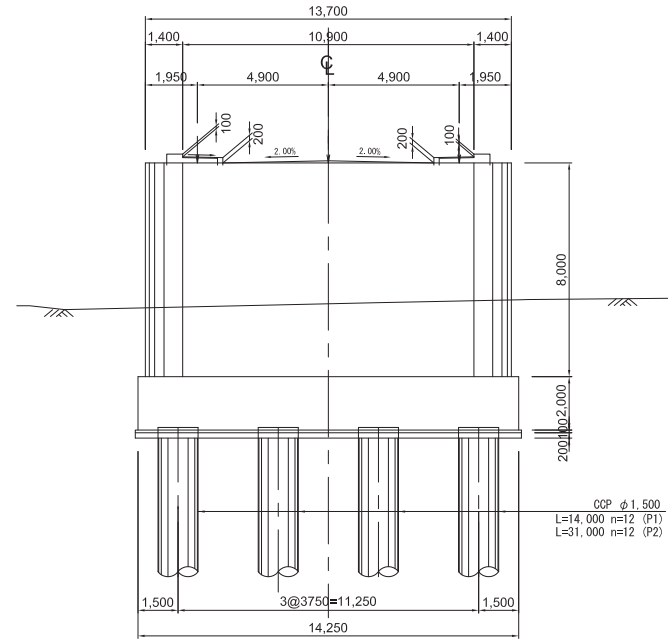
Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodal Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	MAWO BRIDGE	STRUCTURAL DRAWING SUBSTRUCTURE (1)	1-D3

STRUCTURAL DRAWING (SUBSTRUCTURE) MAWO BRIDGE (2)

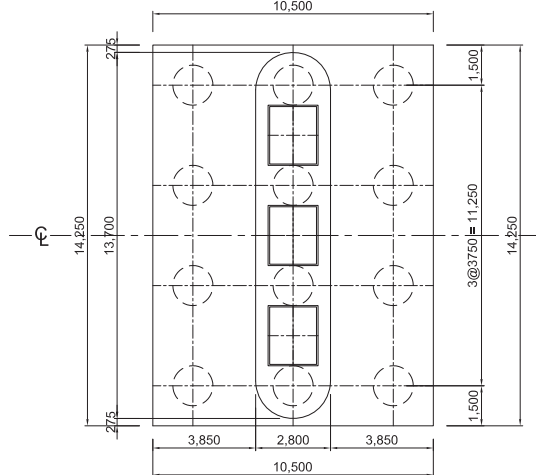
SIDE VIEW OF P1 & P2
S = 1:200








FRONT VIEW OF P1 & P2
S = 1:200



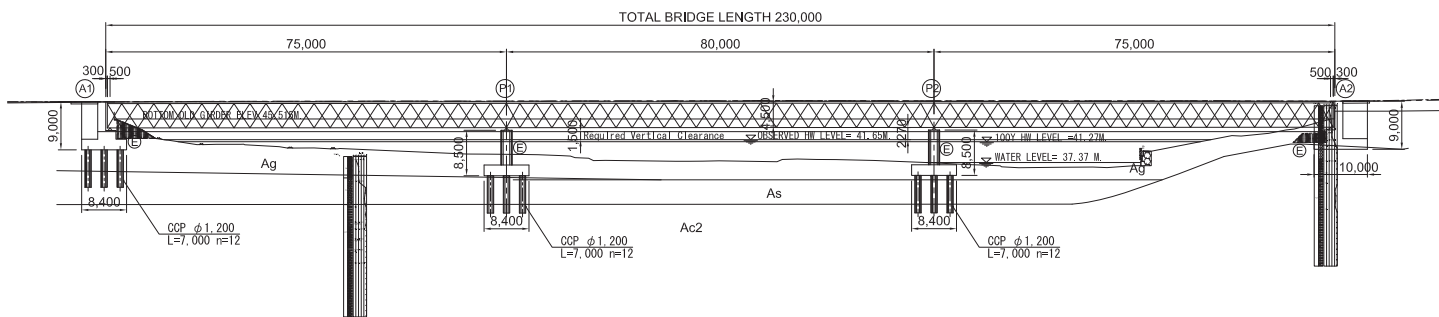
PLAN VIEW OF P1 & P2
S = 1:200



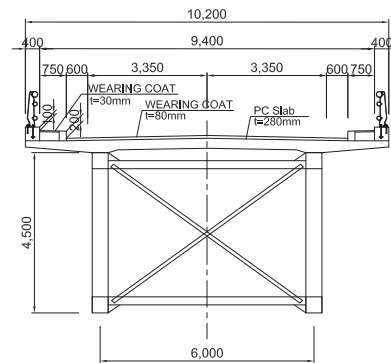
Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
 Japan International Cooperation Agency  DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	 CTI Engineering Co., Ltd.  Chodal Co., Ltd.  Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	MAWO BRIDGE	STRUCTURAL DRAWING SUBSTRUCTURE (2)	1-D4

GENERAL VIEW OF WAWA BRIDGE

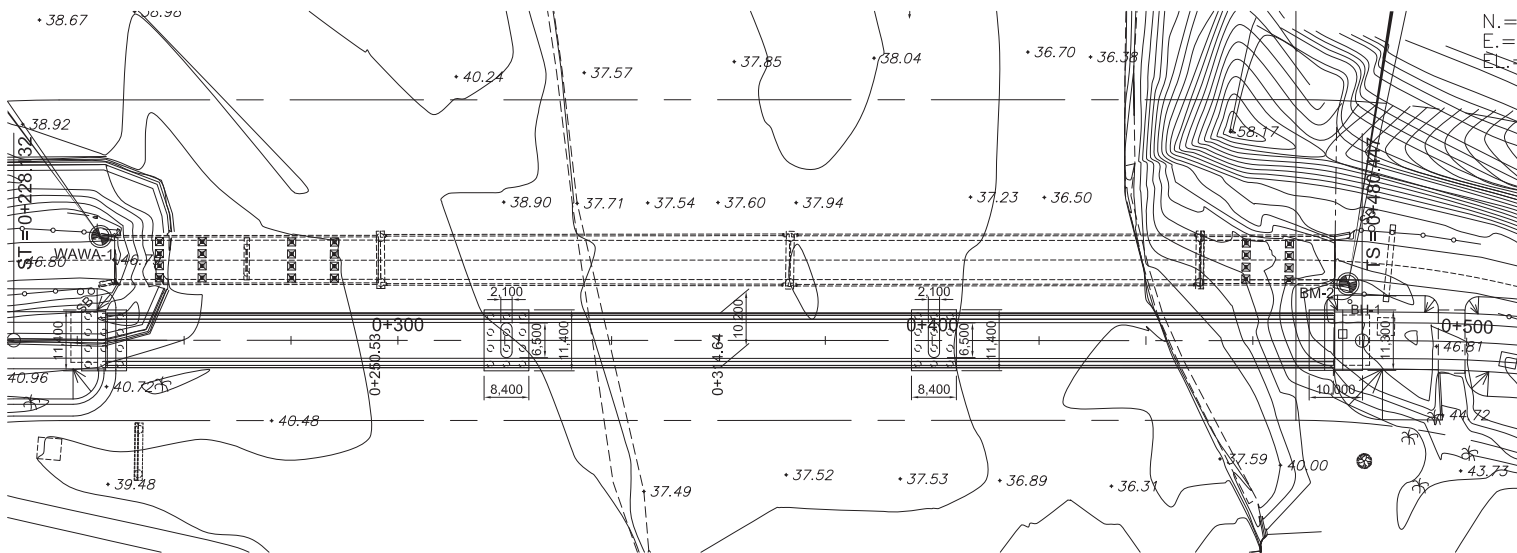
ELEVATION
S=1:1000



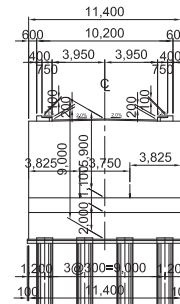
GIRDER SECTION
S=1:150



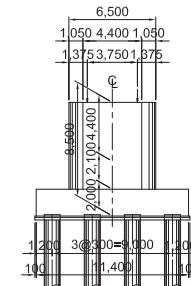
PLAN
S=1:1000



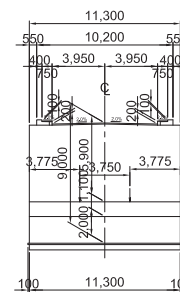
A1 ABUT
S=1:400








P1,P2 PIER
S=1:400



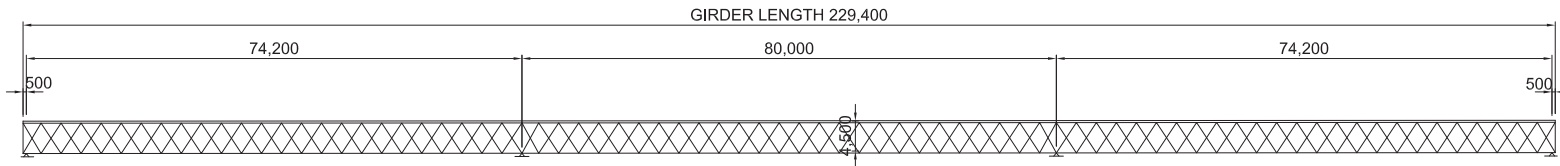
A2 ABUT
S=1:400



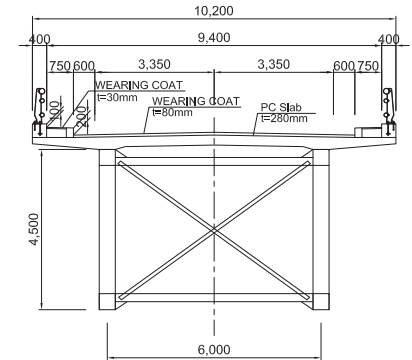
Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
 Japan International Cooperation Agency  DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	 CTI Engineering Co., Ltd.  Chodai Co., Ltd.  Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	WAWA BRIDGE	GENERAL VIEW	1-E1

STRUCTURAL DRAWING (SUPERSTRUCTURE) WAWA BRIDGE

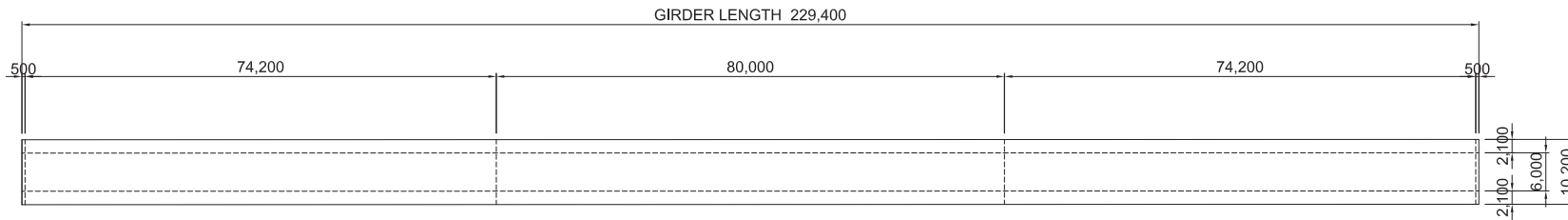
SIDE VIEW
S=1:800



GIRDER SECTION
S=1:150



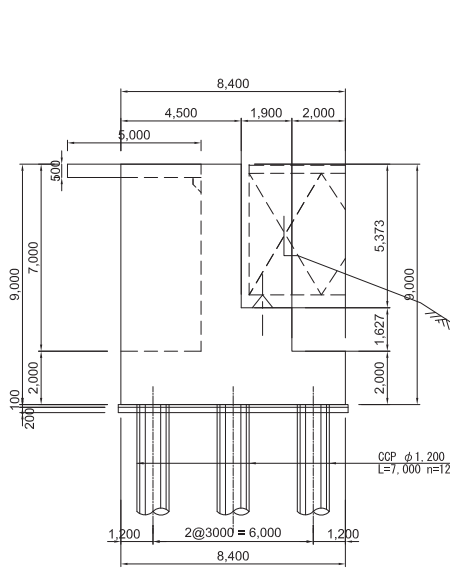
PLAN VIEW
S=1:800



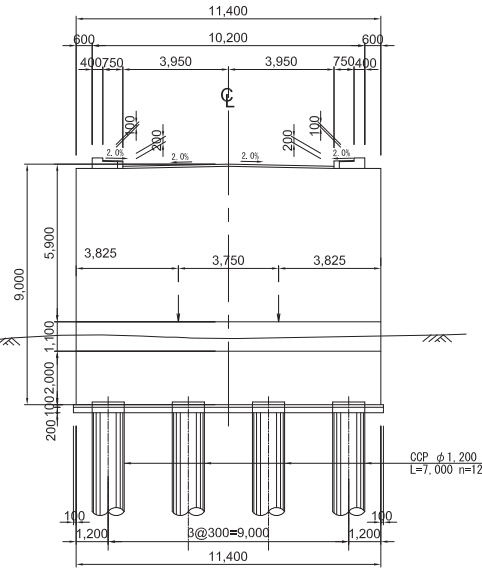
Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	WAWA BRIDGE	STRUCTURAL DRAWING (SUPERSTRUCTURE)	1-E2

STRUCTURAL DRAWING (SUBSTRUCTURE) WAWA BRIDGE (1)

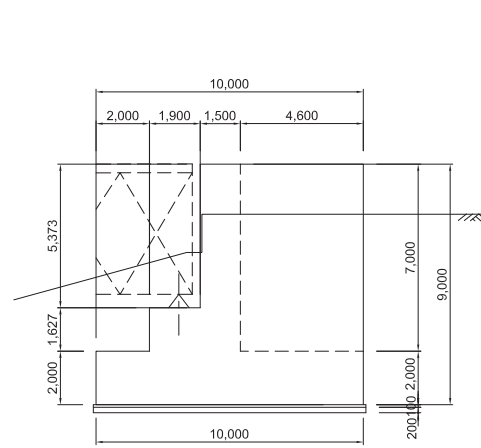
SIDE VIEW OF A1
S = 1:200



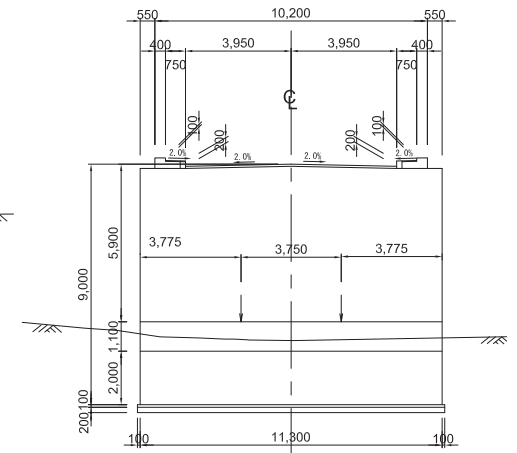
FRONT VIEW OF A1
S = 1:200



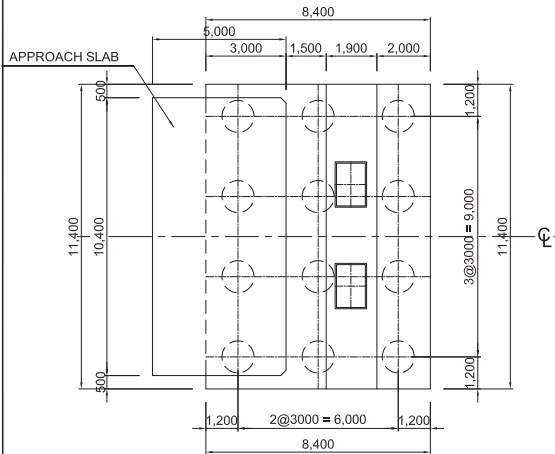
SIDE VIEW OF A2
S = 1:200



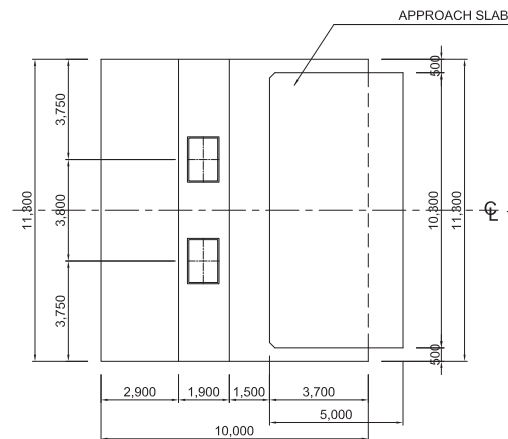
FRONT VIEW OF A2
S = 1:200








PLAN VIEW OF A1
S = 1:200



PLAN VIEW OF A2
S = 1:200

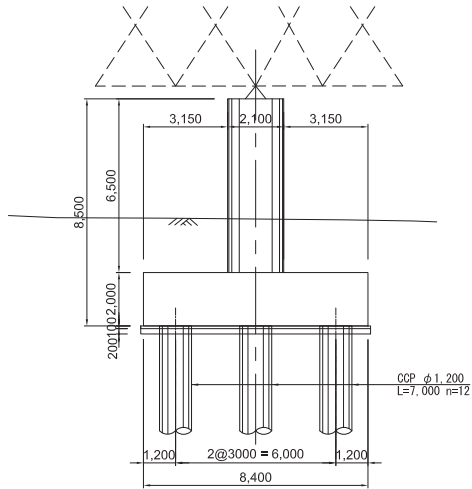


Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
 Japan International Cooperation Agency  DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	 CTI Engineering Co., Ltd.  Chodal Co., Ltd.  Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	WAWA BRIDGE	STRUCTURAL DRAWING SUBSTRUCTURE (1)	1-E3

STRUCTURAL DRAWING (SUBSTRUCTURE) WAWA BRIDGE (2)

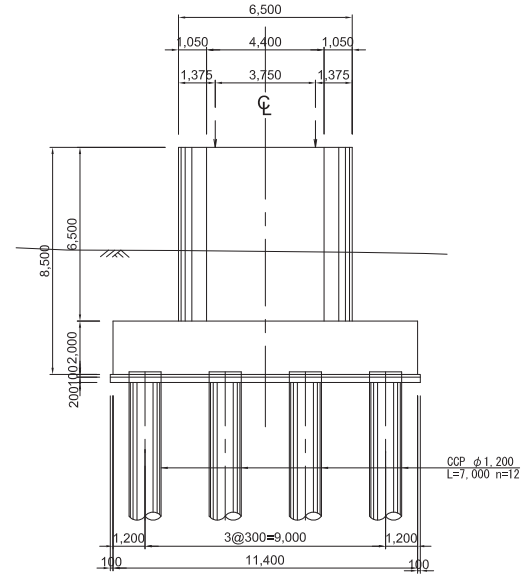
SIDE VIEW OF P1 & P2

S = 1:200



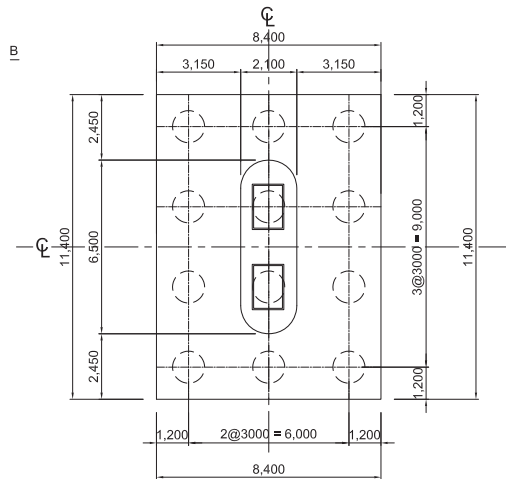
FRONT VIEW OF P1 & P2






S = 1:200



PLAN VIEW OF P1 & P2

S = 1:200

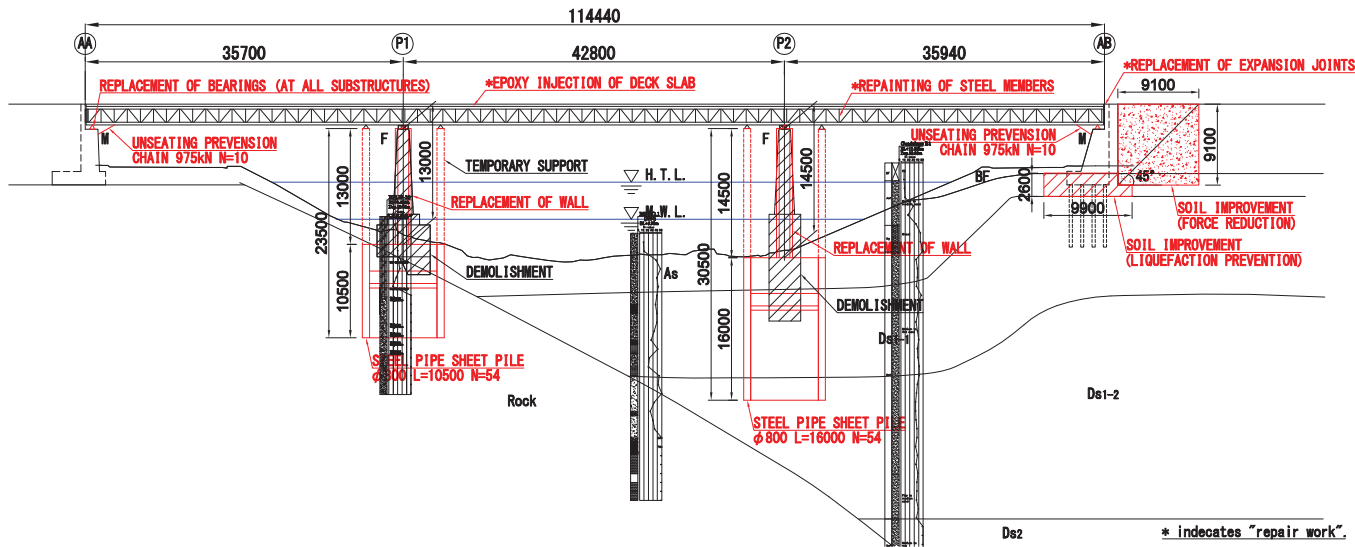


Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
 Japan International Cooperation Agency  DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	 CTI Engineering Co., Ltd.  Chodal Co., Ltd.  Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	WAWA BRIDGE	STRUCTURAL DRAWING SUBSTRUCTURE (2)	1-E4

GENERAL VIEW OF GUADALUPE BRIDGE (INNER BRIDGE)

ELEVATION

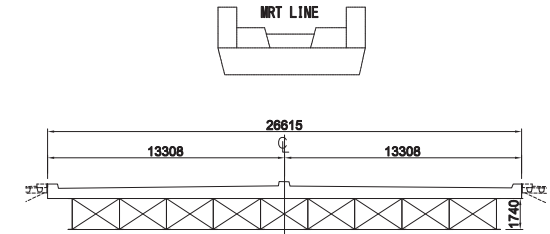
SCALE 1:600



CROSS SECTION

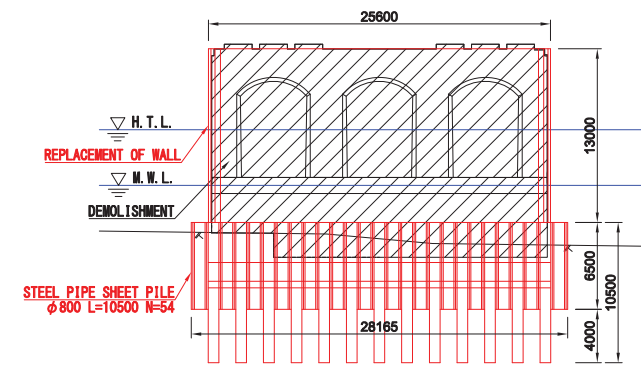
Steel Trussed I-Girder

SCALE 1:300



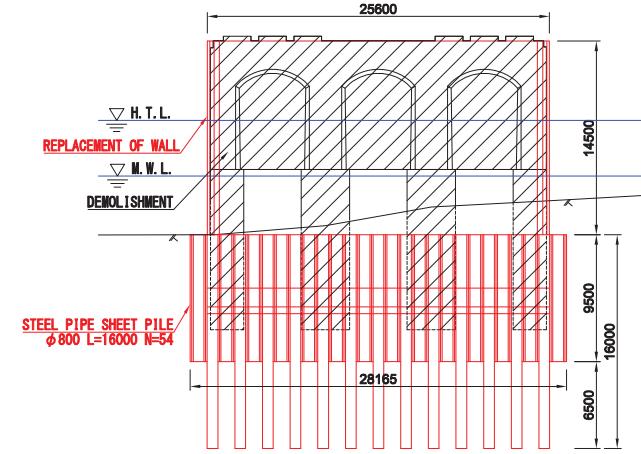
P1

SCALE 1:400



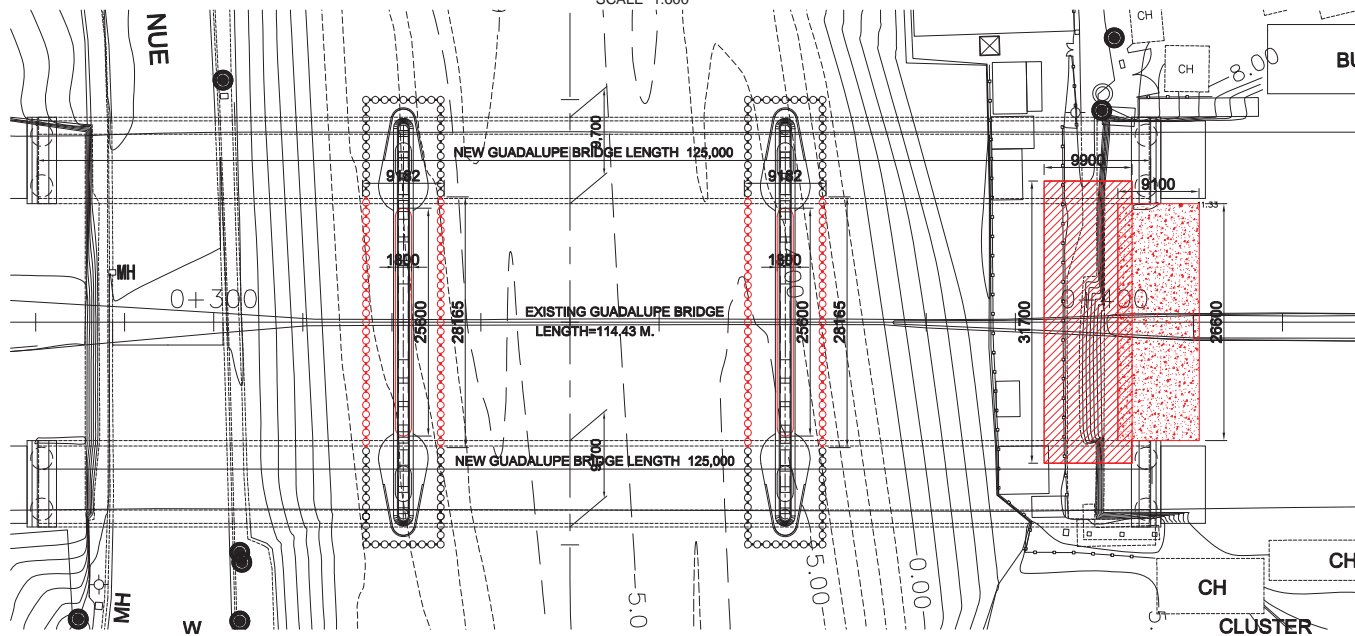
P2

SCALE 1:400



PLAN

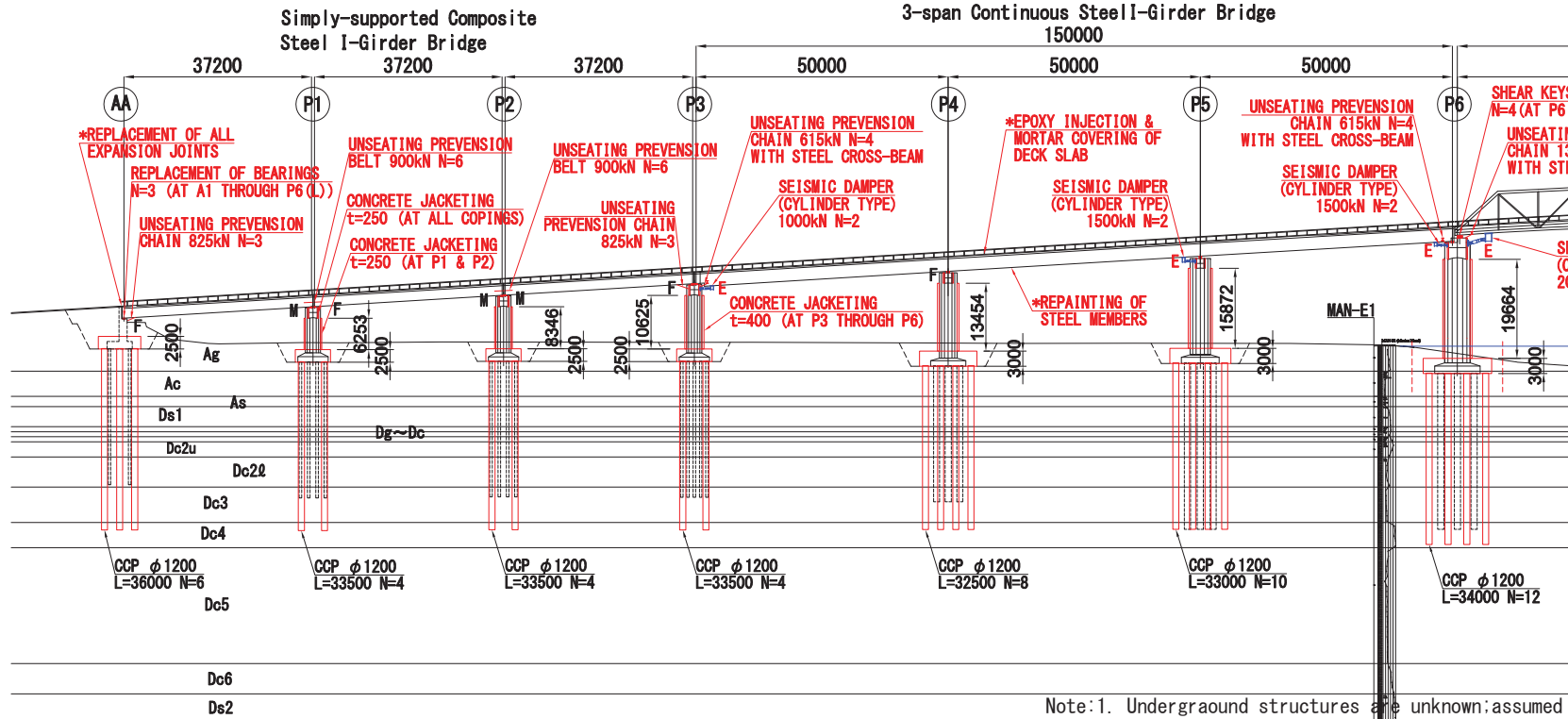
SCALE 1:600



Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodal Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	GUADALUPE BRIDGE	GENERAL VIEW (INNER BRIDGE)	2-A1

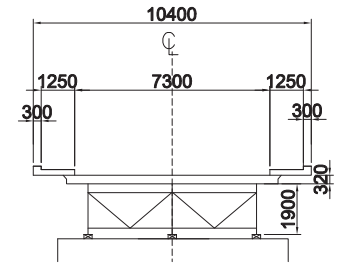
GENERAL VIEW OF 1st MANDAUE-MACTAN BRIDGE(1)

ELEVATION
SCALE 1:1000



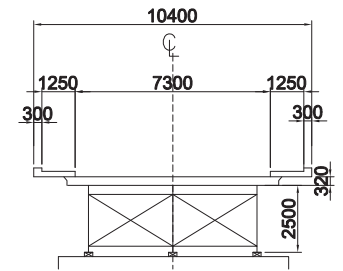
CROSS SECTION

Simply-supported Composite Steel I-Girder Bridge
SCALE 1:200



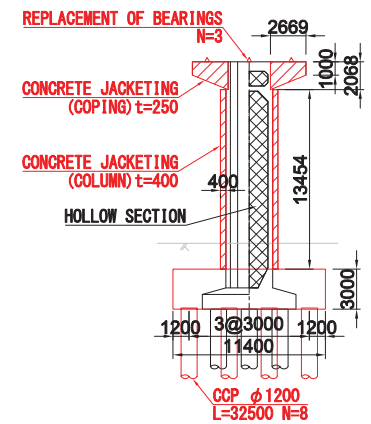
Continuous Steel I-Girder Bridge

SCALE 1:200

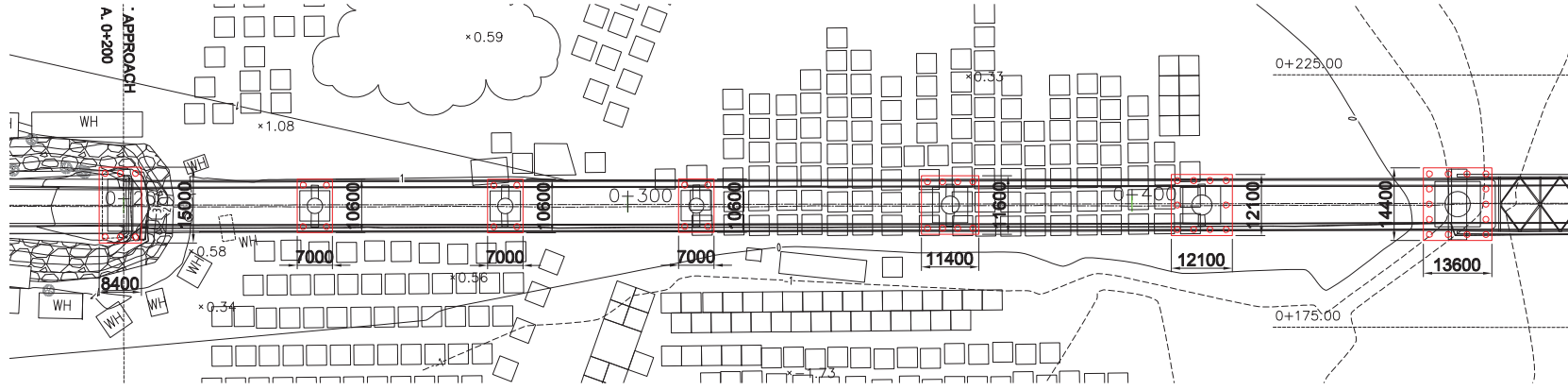


P4

SCALE 1:400



PLAN
SCALE 1:1000



Note: 1. Underground structures are unknown; assumed
2. * indicates "repair work".

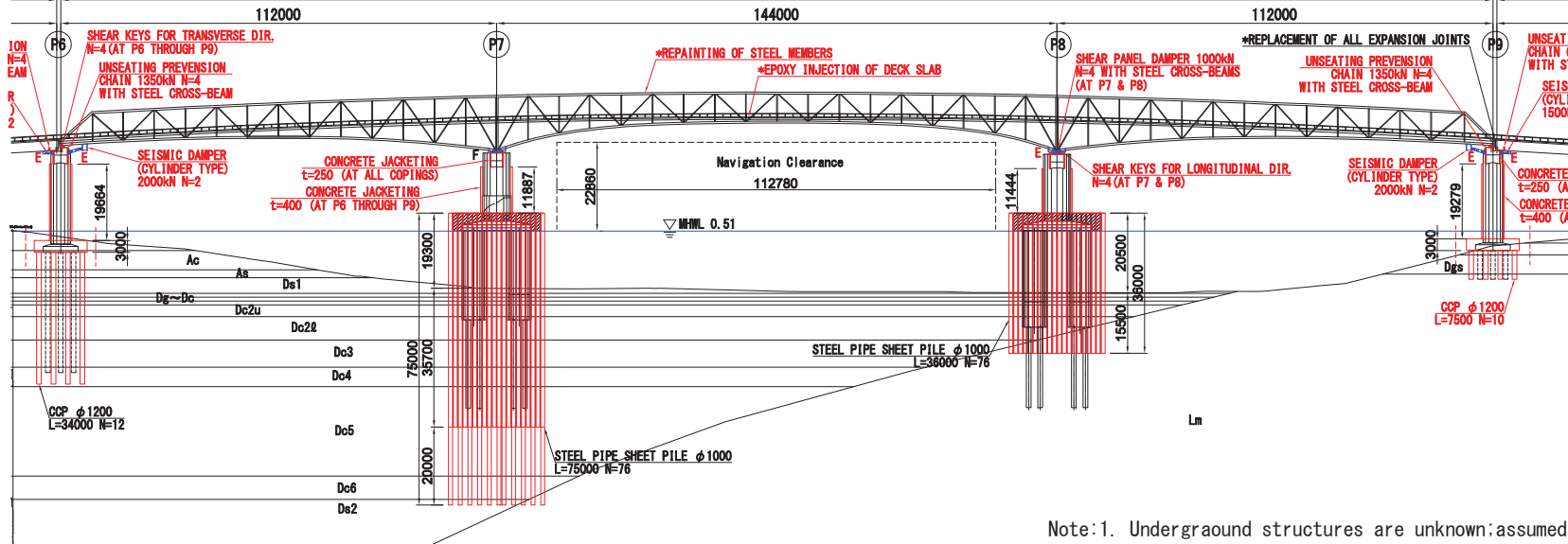
Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	1st MANDAUE - MACTAN BRIDGE	GENERAL VIEW (1)	2-B1

GENERAL VIEW OF 1st MANDAUE-MACTAN BRIDGE(2)

ELEVATION

SCALE 1:1300

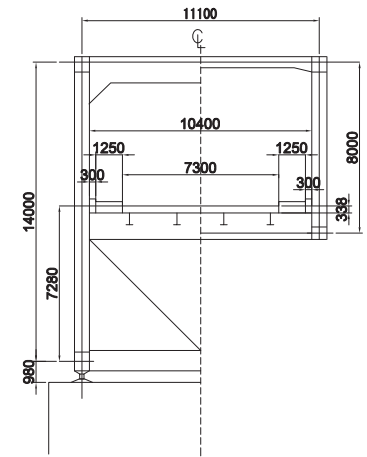
3-span Continuous Steel Through Truss Bridge
368000



CROSS SECTION

SCALE 1:250

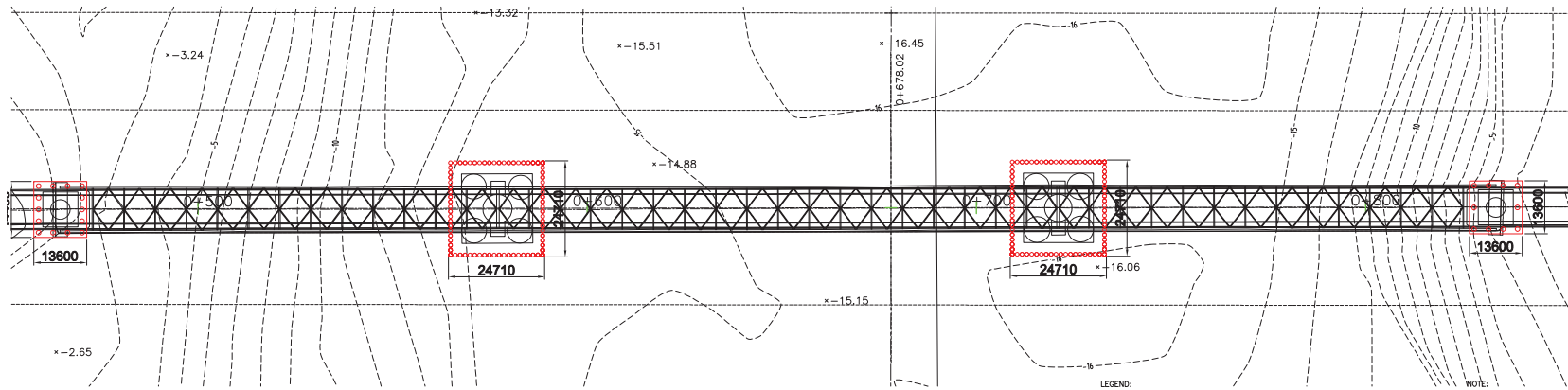
Continuous Steel Through Truss Bridge



Note: 1. Underground structures are unknown; assumed
2. * indicates "repair work".

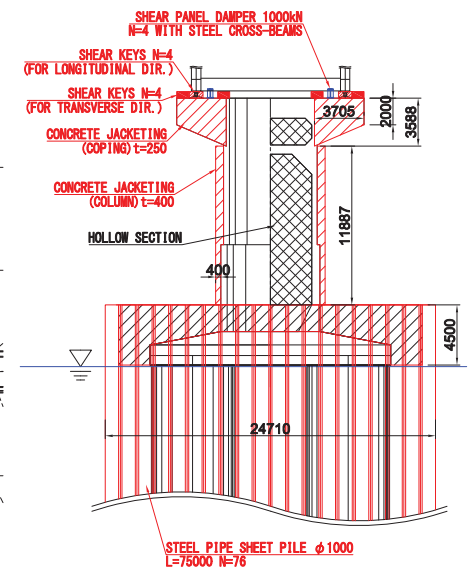
PLAN

SCALE 1:1300



P7

SCALE 1:400

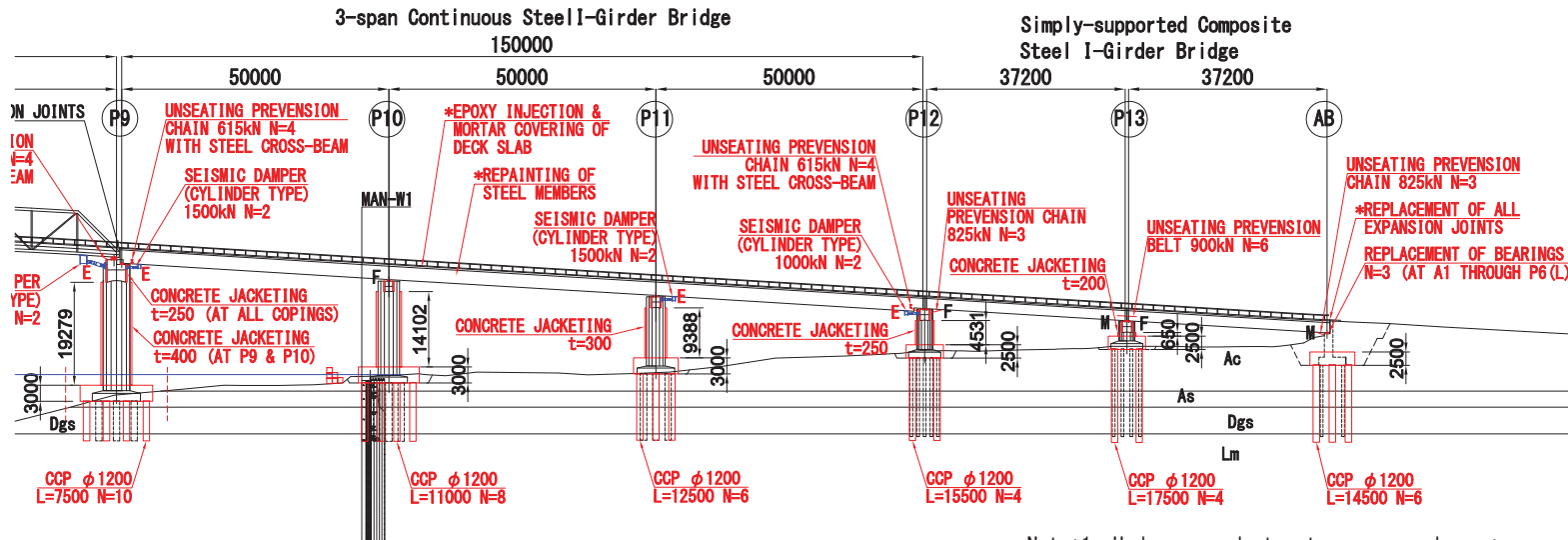


Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	1st MANDAUE - MACTAN BRIDGE	GENERAL VIEW (2)	2-B2

GENERAL VIEW OF 1st MANDAUE-MACTAN BRIDGE(3)

ELEVATION

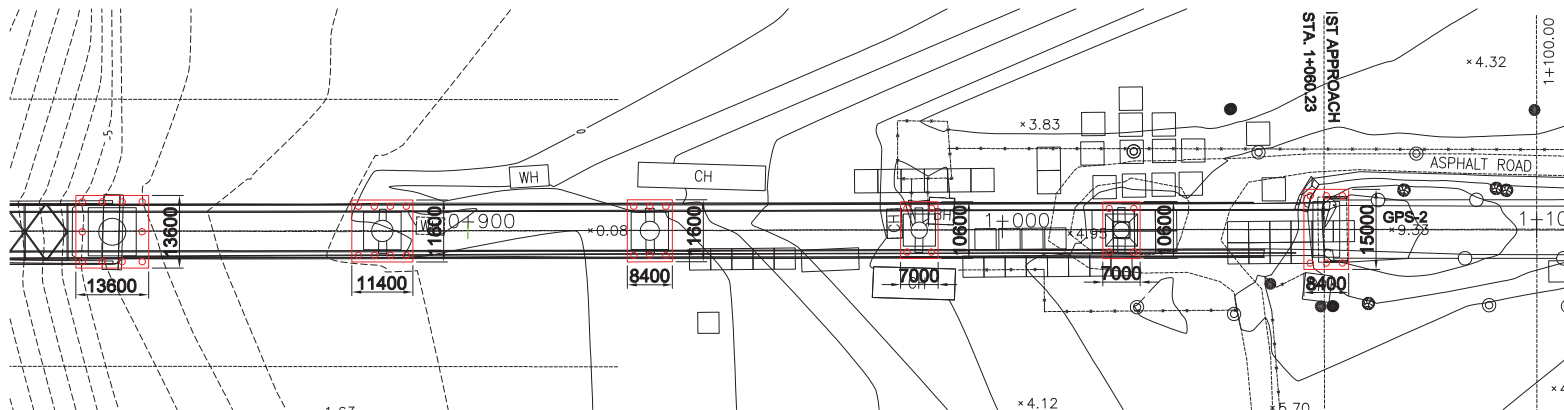
SCALE 1:1000



Note: 1. Underground structures are unknown; assumed
2. * indicates "repair work".

PLAN

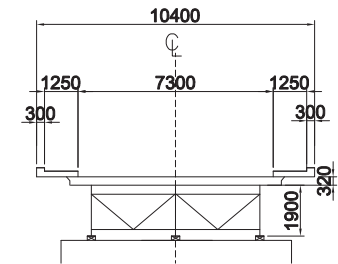
SCALE 1:1000



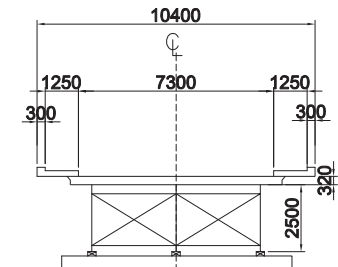
CROSS SECTION

SCALE 1:200

Simply-supported Composite Steel I-Girder Bridge

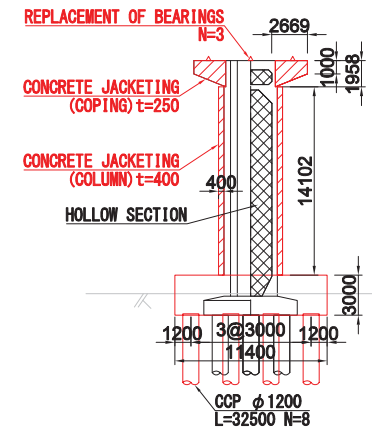


Continuous Steel I-Girder Bridge



P10

SCALE 1:400

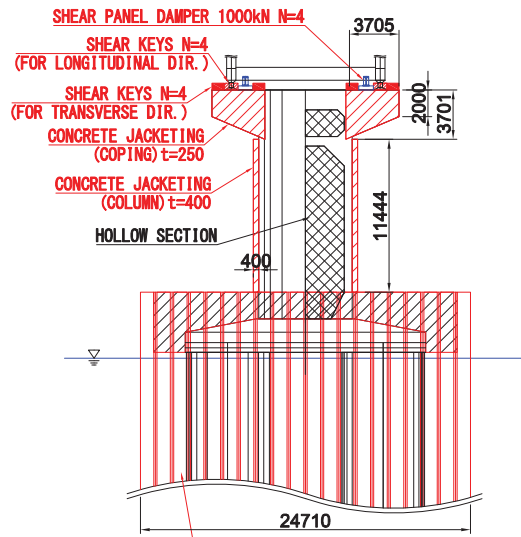


Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	1st MANDAUE - MACTAN BRIDGE	GENERAL VIEW (3)	2-B3

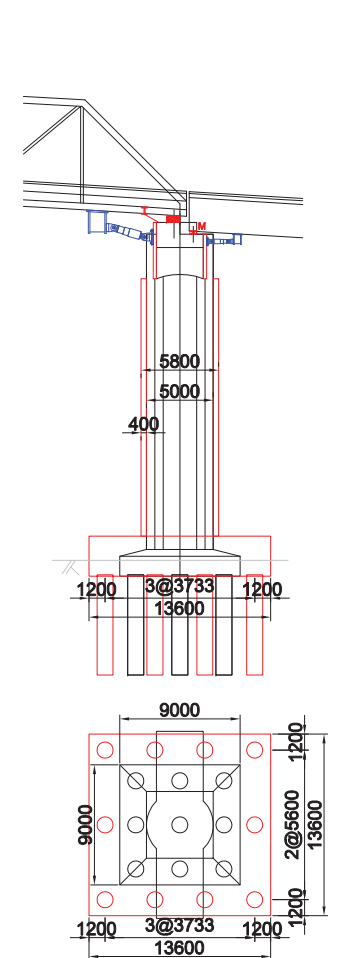
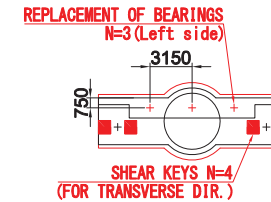
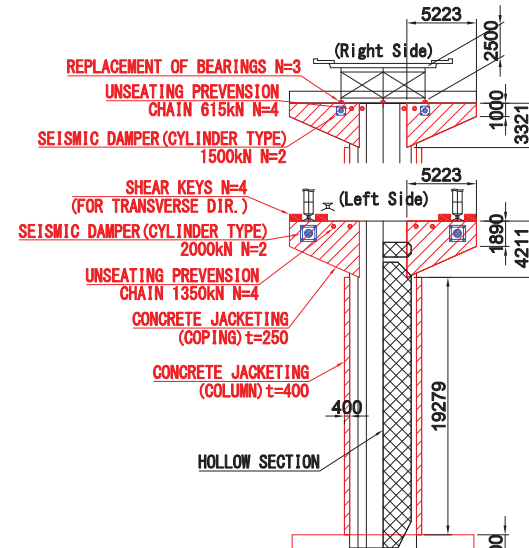
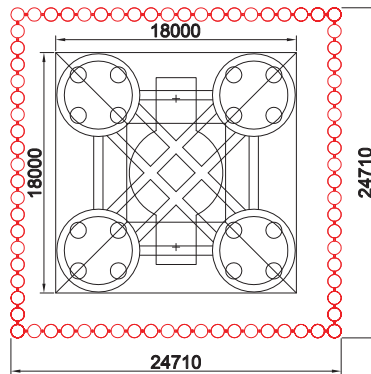
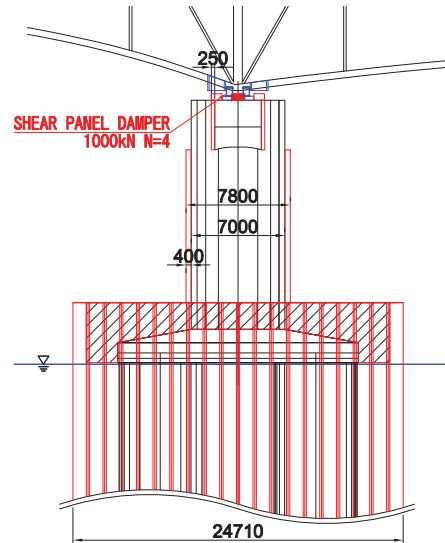
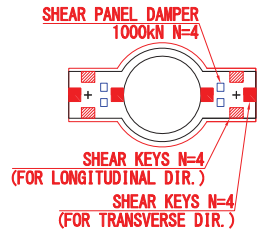
STRUCTURAL DRAWING OF 1st MANDAUE-MACTAN BRIDGE (3)

PIER - 8
SCALE 1:400

PIER - 9
SCALE 1:400

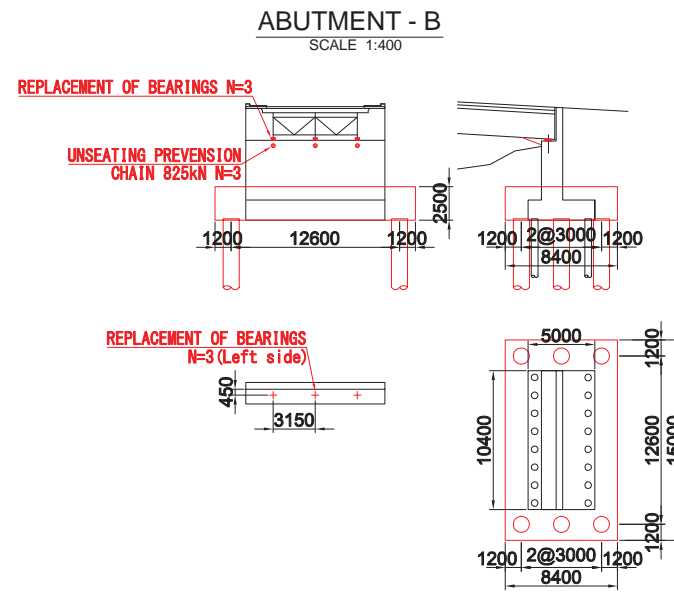
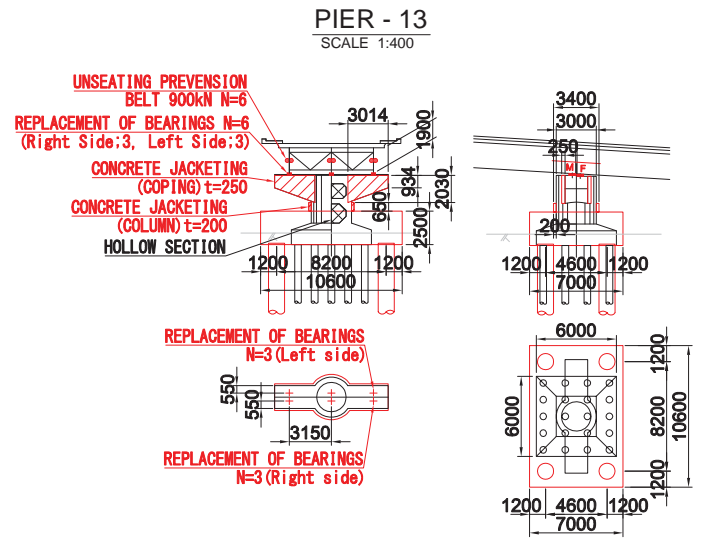
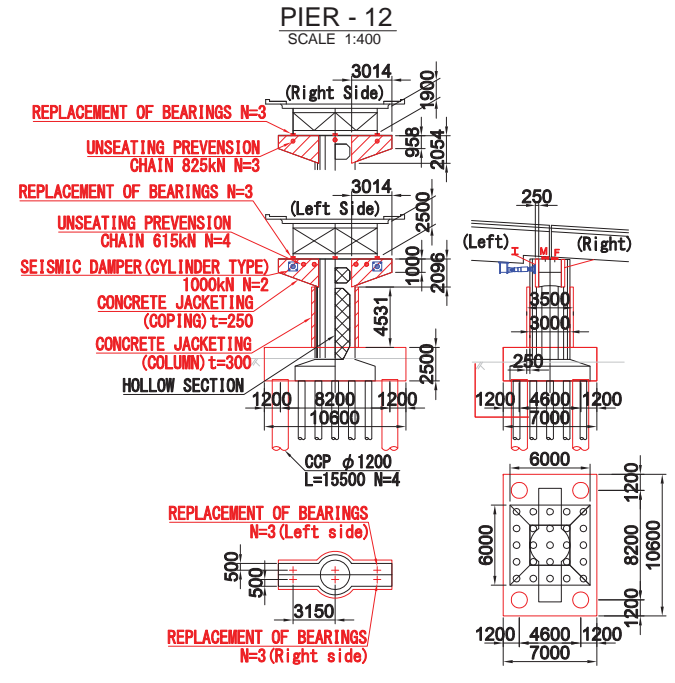
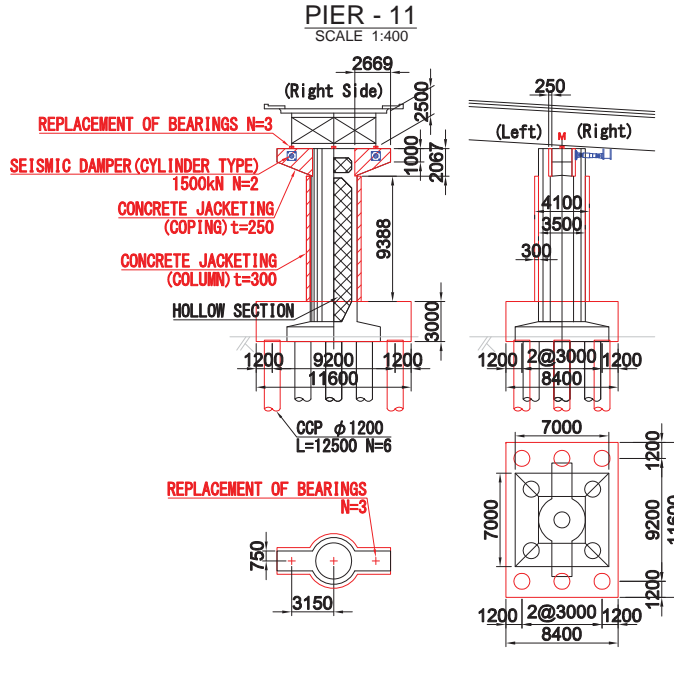
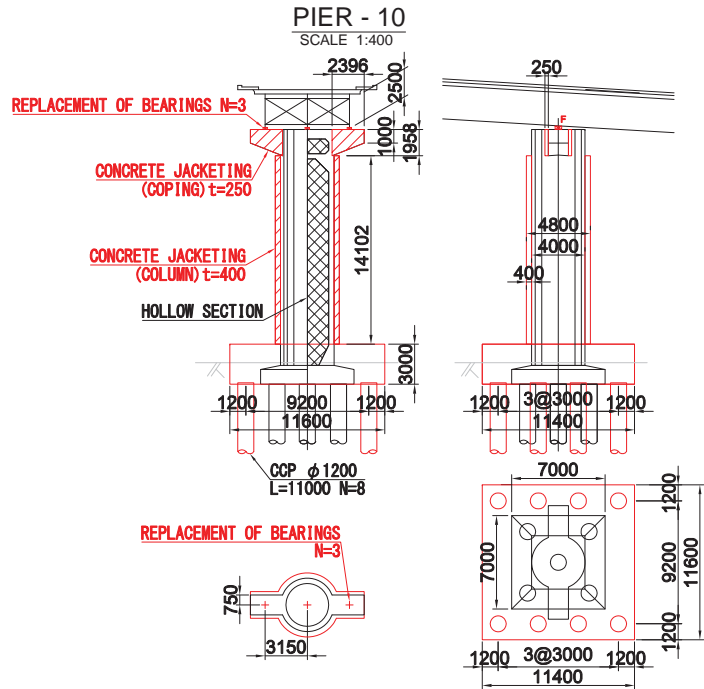


STEEL PIPE SHEET PILE ϕ 1000
L=36000 N=76



Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	1st MANDAUE - MACTAN BRIDGE	STRUCTURAL DRAWING (3)	2-B6

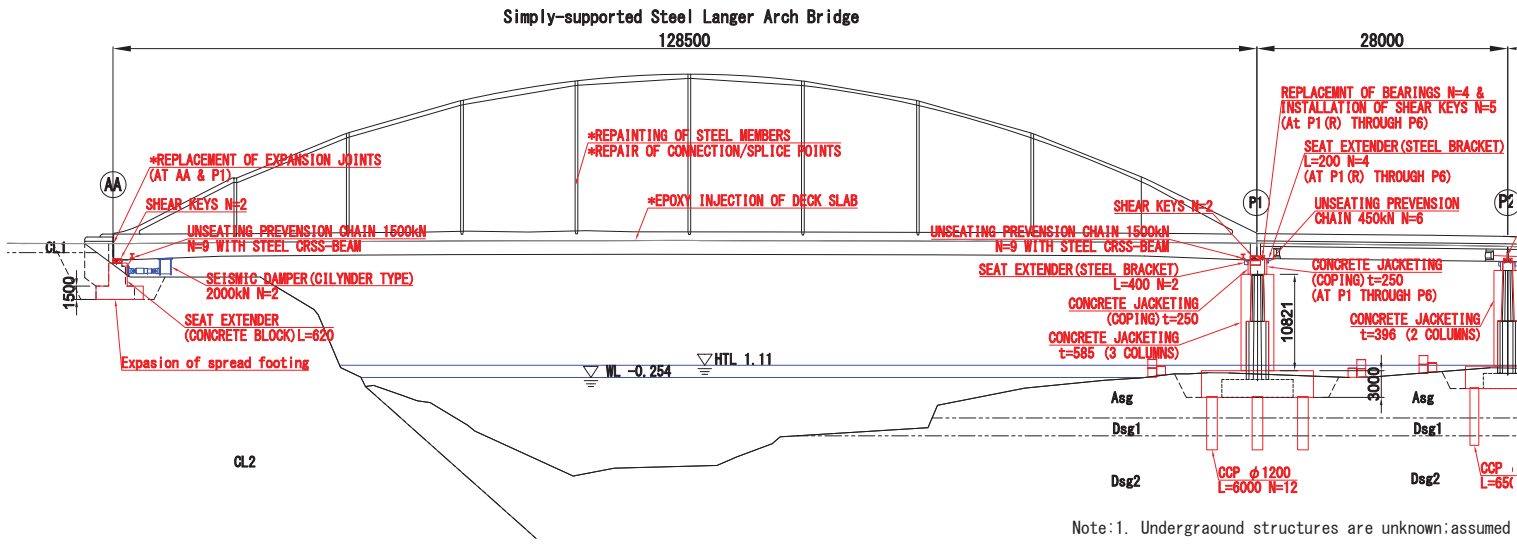
STRUCTURAL DRAWING OF 1st MANDAUE-MACTAN BRIDGE (4)



Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency	DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitigating Measures for the Large Scale Earthquakes in the Republic of the Philippines	1st MANDAUE - MACTAN BRIDGE	STRUCTURAL DRAWING (4)
					2-B7

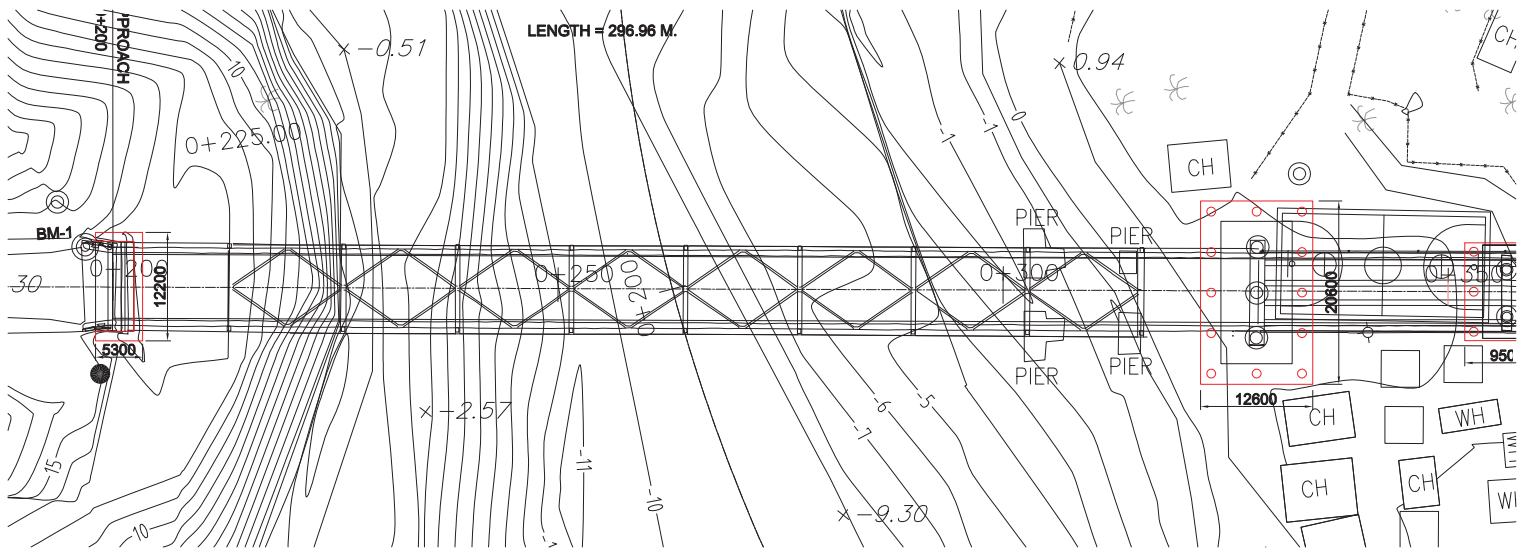
GENERAL VIEW OF LILO-AN BRIDGE (1)

ELEVATION
SCALE 1:600



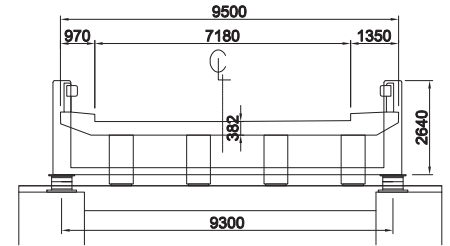
Note: 1. Underground structures are unknown: assumed
2. * indicates "repair work".

PLAN
SCALE 1:600

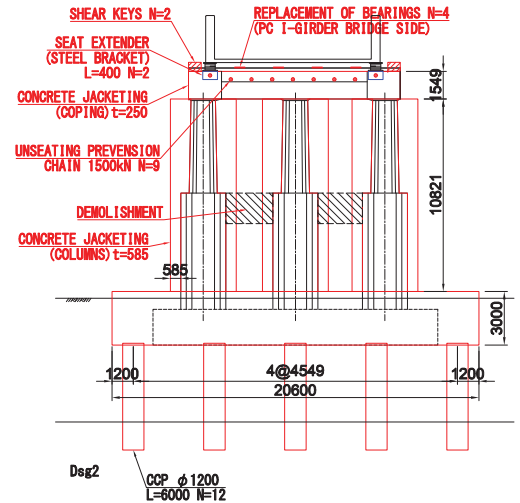


CROSS SECTION

Steel Langer Arch Bridge (at P1)
SCALE 1:150



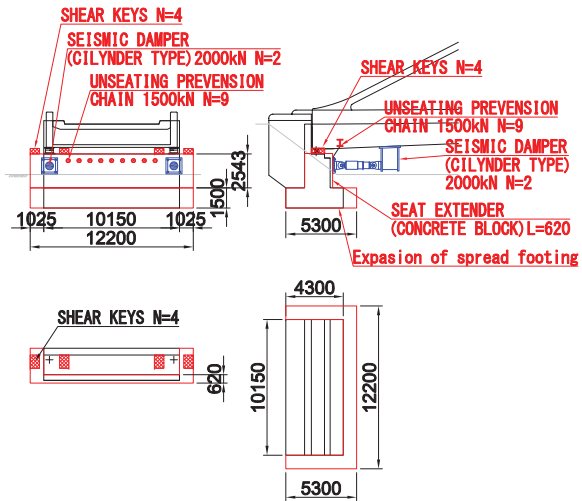
P1
SCALE 1:300



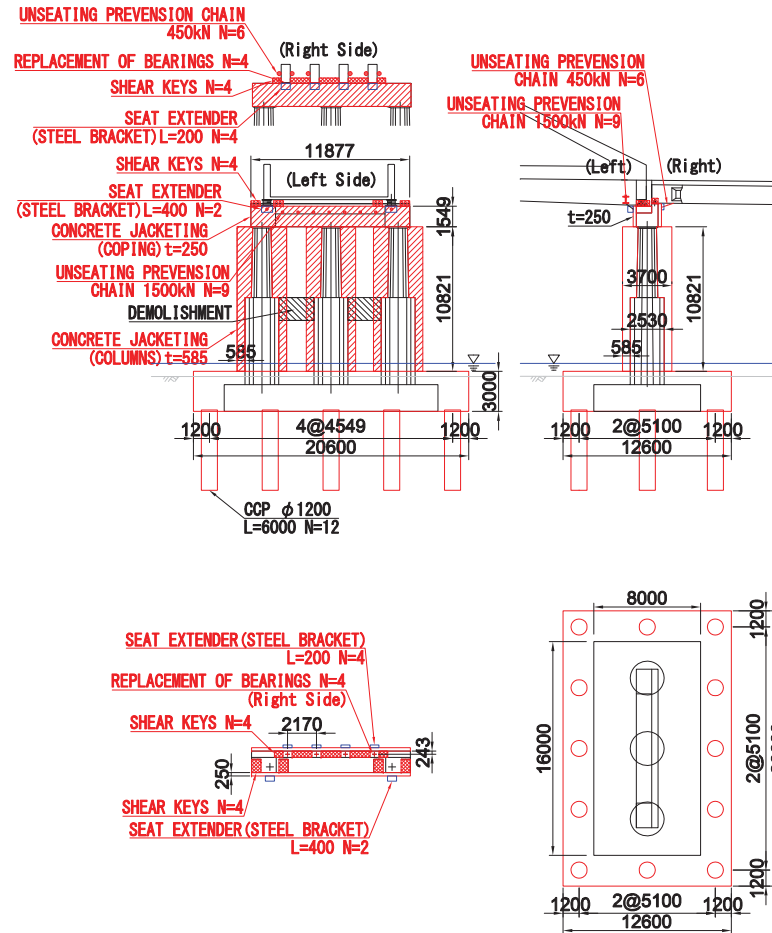
Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koel	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	LILO-AN BRIDGE	GENERAL DRAWING (1)	2-C1

STRUCTURAL DRAWING OF LILO-AN BRIDGE (1)

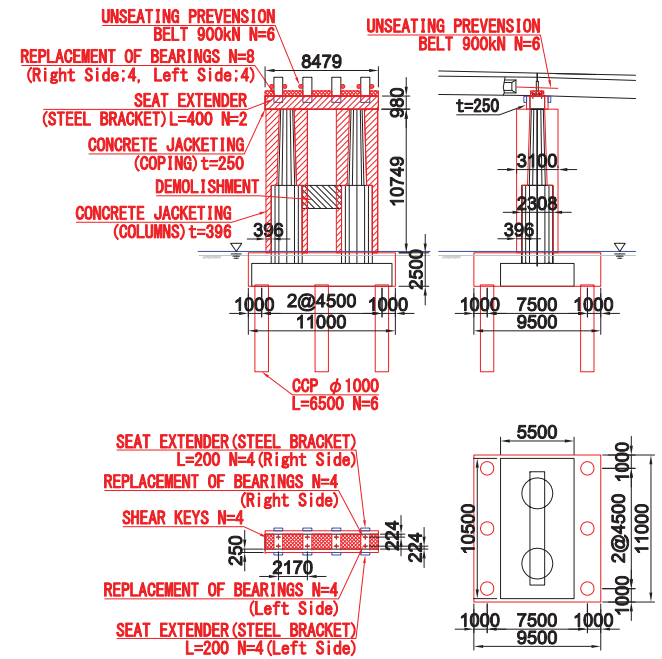
ABUTMENT - A
SCALE 1:400



PIER - 1
SCALE 1:400



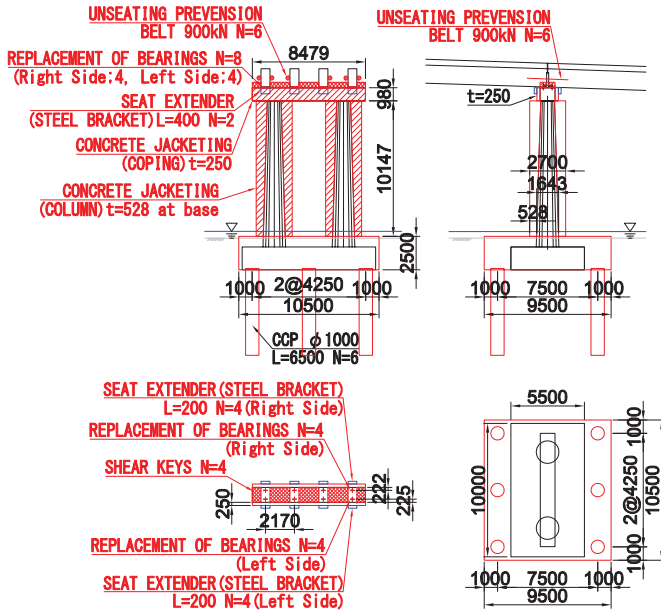
PIER - 2
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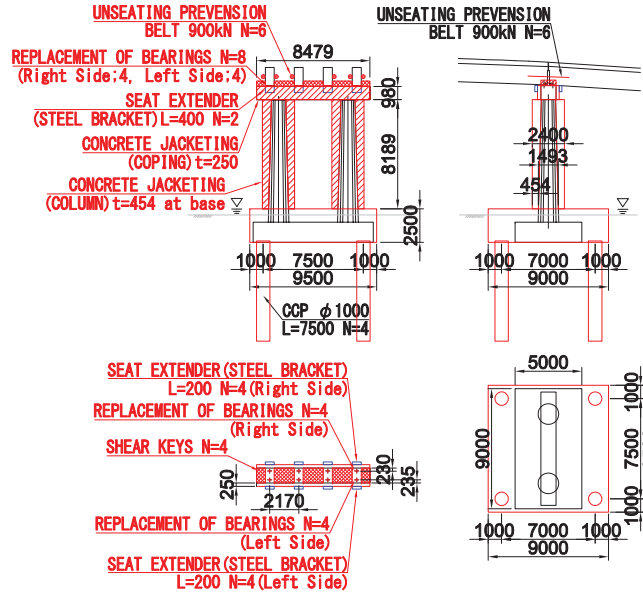
Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	LILO-AN BRIDGE	STRUCTURAL DRAWING (1)	(2-C3)

STRUCTURAL DRAWING OF LILO-AN BRIDGE (2)

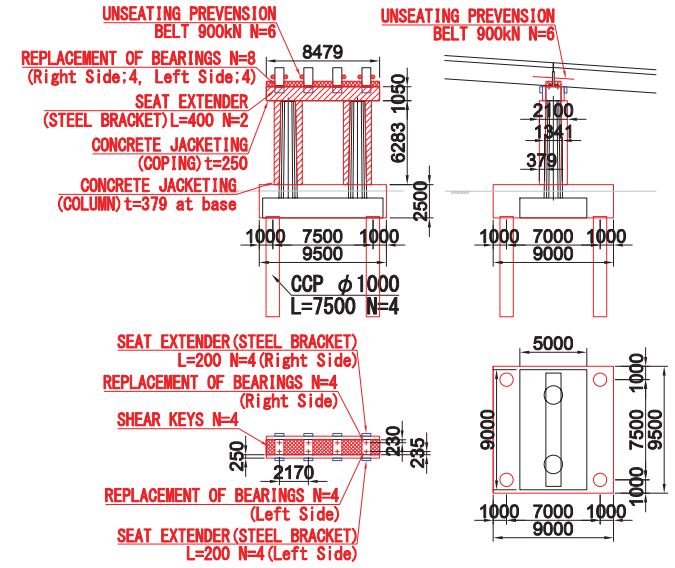
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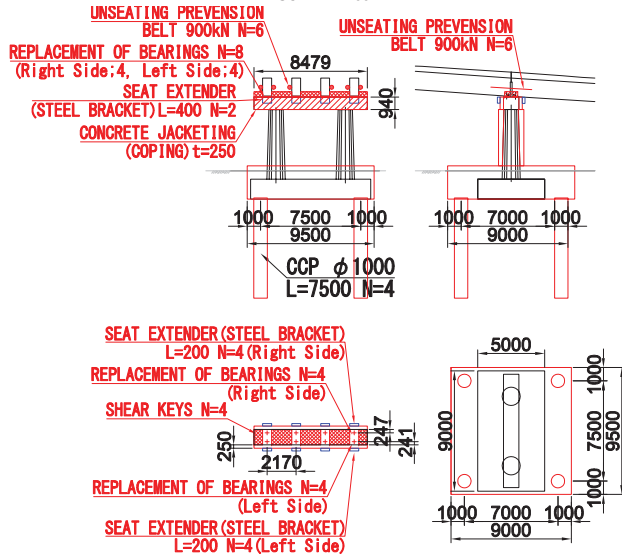
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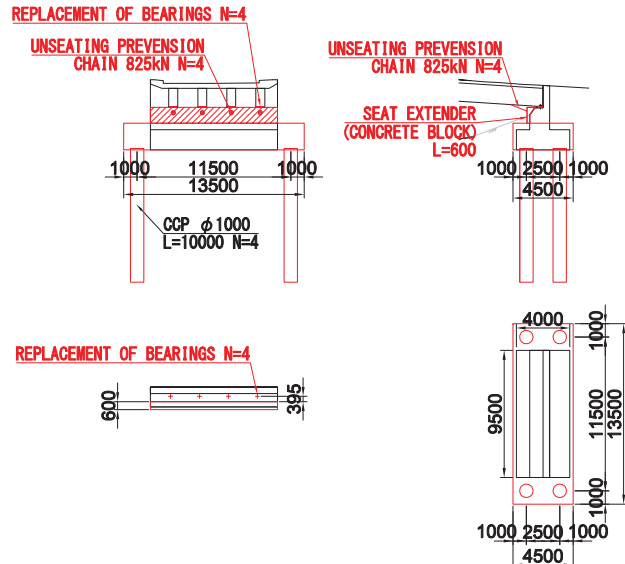
PIER - 5
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PIER - 6
SCALE 1:400



ABUTMENT - B
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Clients:	Consultants:	Project Title:	Bridge Name:	Sheet Contents:	SHT. NO.
Japan International Cooperation Agency DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REPUBLIC OF THE PHILIPPINES	CTI Engineering Co., Ltd. Chodai Co., Ltd. Nippon Koei	Project for Study on Improvement of Bridges Through Disaster Mitagating Measures for the Large Scale Earthquakes in the Republic of the Philippines	LILO-AN BRIDGE	STRUCTURAL DRAWING (2)	2-C4