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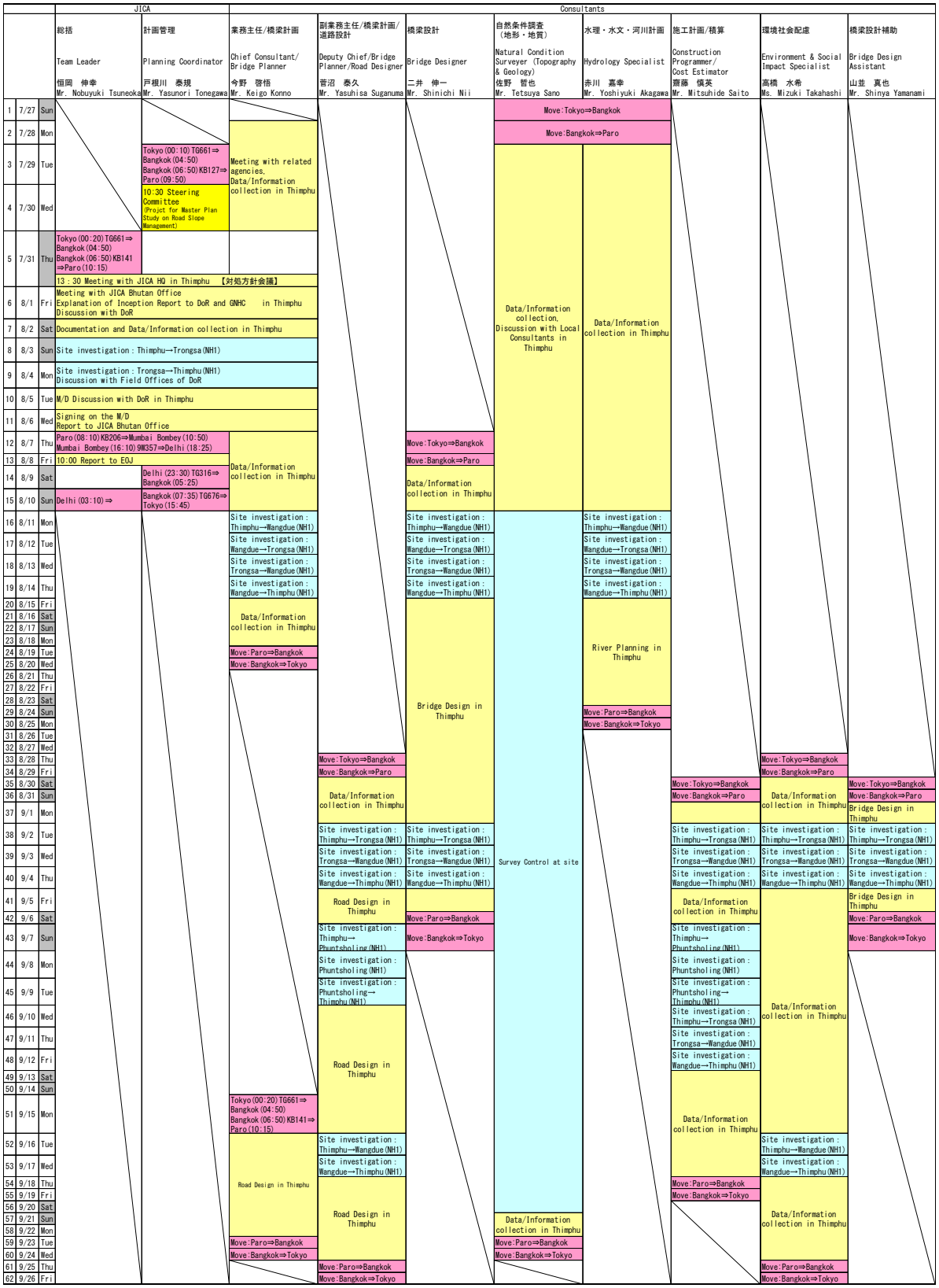
1. 調査団員・氏名

氏名	担当	所属
恒岡 伸幸	総括	JICA 国際協力専門員
戸根川 泰規	計画管理	JICA 社会基盤・平和構築部 運輸交通・情報通信ｸﾞﾙｰﾌﾟ
今野 啓悟	業務主任／橋梁計画	㈱ｵﾘｴﾝﾀﾙｺﾝｻﾙﾀﾝﾂｸﾞﾛｰﾊﾞﾙ
菅沼 泰久	副業務主任/橋梁計画/道路設計	㈱ｵﾘｴﾝﾀﾙｺﾝｻﾙﾀﾝﾂｸﾞﾛｰﾊﾞﾙ
二井 伸一	橋梁設計	㈱ｱﾝｼﾞｪﾛｾｯｸ
佐野 哲也	自然条件調査（地形・地質）	㈱ｵﾘｴﾝﾀﾙｺﾝｻﾙﾀﾝﾂｸﾞﾛｰﾊﾞﾙ
赤川 嘉幸	水理・水文・河川計画	㈱ｱﾝｼﾞｪﾛｾｯｸ
齋藤 慎英	施工計画・積算	㈱ｱﾝｼﾞｪﾛｾｯｸ
高橋 水希	環境社会配慮	㈱ｵﾘｴﾝﾀﾙｺﾝｻﾙﾀﾝﾂｸﾞﾛｰﾊﾞﾙ
山並 真也	橋梁設計補助	㈱ｱﾝｼﾞｪﾛｾｯｸ

2. 調査行程

(1) 第１次現地調査時



(2) 第 2 次現地調査（概略設計概要説明）

			JICA		Consultants		
			総括 Team Leader 恒岡　伸幸 Mr. Nobuyuki Tsuneoka	計画管理 Planning Coordinator 戸根川　泰規 Mr. Yasunori Tonegawa	業務主任/橋梁計画 Chief Consultant/ Bridge Planner 今野　啓悟 Mr. Keigo Konno	副業務主任/橋梁計画/道路設計 Deputy Chief/Bridge Planner/Road Designer 菅沼　泰久 Mr. Yasuhisa Suganuma	橋梁設計 Bridge Designer 二井　伸一 Mr. Shinichi Nii
1	1/13	Tue	Tokyo(00:20)TG661⇒Bangkok(05:20) Bangkok(07:20)KB121⇒Paro(09:20)				
			12:30 Meeting with JICA Bhutan Office 14:30 Explanation of Draft final Report to DoR and GNHC M/D Discussion with DoR and GNHC				
2	1/14	Wed	M/D Discussion with DoR and GNHC				
3	1/15	Thu	10:30 Signing on the M/D 15:30 Report to JICA Bhutan Office				
4	1/16	Fri	Paro(08:40)KB204⇒Delhi(11:40)		Site investigation：Thimphu→Trongsa(NH1) Discussion with Lobesa Field Office of DoR		
			PM Report to EOJ				
			Delhi(20:20)JL740⇒				
5	1/17	Sat	Tokyo(07:10)		Site investigation：Trongsa→Thimphu(NH1) Discussion with Trongsa Field Office of DoR		
6	1/18	Sun			Move:Paro⇒Bangkok	Project for a Master Plan Study of Road Slope Management in Bhutan	Move:Paro⇒Bangkok
7	1/19	Mon			Move:Bangkok⇒Tokyo		Move:Bangkok⇒Tokyo

3. 関係者（面会者）リスト

本調査のカウンターパートである DoR および本調査期間中に面会した関係者を以下に示す。

関係機関名	氏名	役職
公共事業・定住省道路局 (DOR,MoWHS)	Mr. Karma Galay	Director
	Mr. Kunzang Wangdi	Specialist, Planning Division
	Mr. M.N. Lamichaney	Specialist, Construction Division
	Mr. Jangchuk Yeshi	Chief Engineer, Design Division
	Mr. Karma Wangdi	Chief Engineer, Design Division
	Mr. Tshering Wangdi(A)	Chief Engineer, Construction Division
	Mr. Tshering Paljare	Chief Engineer, Planning Division
	Mr. Tshering Wangdi(B)	Chief Engineer, Maintenance Division
	Mr. Tougay Choedup	Chief Engineer, Head of Trongsa Regional Division
	Mr. G.M. Rai	Chief Engineer, Head of Lobeysa Regional Division
	Mr. Karma Tenzin	Executive Engineer, Design Division (Road)
	Mr. Delip Thapa	Executive Engineer, Geotechnical Section
	Ms. Choden	Assistant Engineer, Environmental Unit
	安藤増実氏	JICA シニアボランティア
経済省気象水文サービス局 (DHMS, MoEA)	Mr. PP Sharma	Executive Engineer, Hydrology Division
経済省地質鉱山局 (DGM, MoEA)	Mr. Dowchu Drukpa	Seismologist
ウォンディ県(Wangdue Phodrang Dzongkhag)	Mr. Dorji Wangdi	Enviromental Officer, Dzongkhag
	Mr. Kunzang	Chief Land Record Officer, Dzongkhag
トンサ県(Trongsa Dzongkhag)	Mr. Tshewang Rinzin	Dzongda
	Mr. Dorji Pelzang	Land Record Officer, Dzongkhag
JICA ブータン事務所(JICA Bhutan Office)	朝熊由美子氏	事務所長
	高野翔氏	副事務所長
	砂田雅則氏	企画調査員
	宮田智子氏	企画調査員

DOR: Department of Roads, MoWHS: Ministry of Works and Human Settlement,

DHMS Department of Hydro-met Service, MoEA: Ministry of Economic Affairs,

DGM: Department of Geology and Mining, MoEA: Ministry of Economic Affairs

4. 討議議事録(M/D)

(1) 第１次現地調査時

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON
PRIMARY NATIONAL HIGHWAY No. 1
IN
KINGDOM OF BHUTAN

In response to a request from the Royal government of the Kingdom of Bhutan (hereinafter referred to as "Bhutan"), Japan International Cooperation Agency (hereinafter referred to as "JICA") in consultation with the Government of Japan decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Reconstruction of Bridges on Primary National Highway No. 1 (hereinafter referred to as "the Project").

JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") to Bhutan, headed by Mr. Nobuyuki Tsuneoka, Senior Advisor of JICA, from July 31 to September 23, 2014.

The Team held discussions with officials concerned of the Royal Government of Bhutan and conducted a field survey in the Project area.

In the course of discussions and the field survey, both sides confirmed the main items described in the attached sheets. The Team will continue further studies and prepare the Preparatory Survey Report.

Thimphu August 6, 2014

Nobuyuki Tsuneoka
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Karma Galay
Director
Department of Roads
Ministry of Works & Human Settlement
Kingdom of Bhutan

Thinley Namgyel
Director
Gross National Happiness Commission
Kingdom of Bhutan

ATTACHMENT

1. Title of the Project
   Both sides confirmed that the title of the project shall be "the Project for Reconstruction of Bridges on Primary National Highway No. 1".

2. Objective of the Project
   Both sides confirmed that the objective of the Project is to reconstruct Chuzomsa zam, Nika chuzam and Zalamchu zam (previously nameed "Nagnichu zam") to ensure smooth and safe traffic on the bridges.

3. Project Site
   The sites of the Project are shown in Annex-1.

4. Objective of the Survey
   4-1. To understand the back ground and objective of the Project and examine its impacts and appropriateness.
   4-2. To identify the components, outline design and cost estimation of the Project based on the data and information collected from and the results of meetings with Bhutanese side.
   4-3. To study the issues of environmental and social considerations through the site survey.

5. Responsible and Implementing Organizations
   5-1. The responsible organization is the Department of Roads, Ministry of Works & Human Settlement (DoR).
   5-2. The organization chart of DoR is as shown in Annex-2.
   5-3. After completion, DoR will be responsible for maintenance and management of the bridges and the roads constructed by the Project.

6. Components of the Project
   6-1. The project includes the following components
      6-1-1. Construction of the new three bridges with two vehicle lanes,
      6-1-2. Construction of approach roads,
      6-1-3. Construction and removal of the temporary bridges if deemed necessary,
      6-1-4. Construction of scouring and erosion protection for the new bridges
   6-2. Technical matters
      6-2-1. The new bridges should be carefully planned with a consideration of earthquake resistance, high water level, load resistant capacity, slope disaster and approach roads linearity.
      6-2-2. DoR will demolish the existing bridges upon completion of the new three bridges if deemed necessary.

7. Japan's Grant Aid Scheme
   7-1. Bhutanese side understands the Japan's Grant Aid scheme explained by the Team, as described in Annex-3 and Annex-4.
   7-2. Bhutanese side will take the necessary measures, as described in Annex-5, to facilitate the smooth

implementation of the Project, as a condition for the Japan's Grant Aid to be implemented, according to the existing agreement between the Government of Japan and the Royal Government of Bhutan.

8. Environmental and Social Considerations

8-1. The Team explained the Project is categorized as "Category B" according to the JICA Guideline, since the Project is reconstructing the three bridges and approach roads, and its impact on the environmental may be expected.

8-2. Bhutanese side understands the Project needs to follow the JICA guideline. Therefore the initial environmental examination (IEE) shall be done through the survey.

8-3. In case of the Project Affected Persons (PAPs) within the Project sites, Bhutanese side agreed to secure the appropriate budget to be allocated for resettlement and compensation and secure the land before the implementation of the Project. In this regard an Abbreviated Resettlement Action Plan (Abbreviated RAP) will be prepared and approved by the responsible authorities beforehand and Bhutanese side will take necessary measures to PAPs according to an Abbreviated RAP in close communication with JICA.

9. Schedule of the Study

9-1. The Team will continue further studies in Bhutan until September 23, 2014.

9-2. JICA will prepare the draft Preparatory Survey Report and dispatch a mission team to explain its contents to Bhutanese side around January 2015. JICA will explain details of the Project including the final components and cost estimation to Bhutanese side.

9-3. When the contents of the draft Preparatory Survey Report are accepted in principle by the Royal Government of Bhutan, JICA will complete the final report and send it to the Royal Government of Bhutan around April 2015.

9-4. The above schedule is tentative and subject to change.

10. Proper Use

Bhutanese side shall secure enough budget and personnel necessary for operation and maintenance of the facilities implemented by the Project, including the periodical maintenance work after the completion of the Project.

11. Other Relevant Issues

11-1. Bhutanese side shall, at its own expense, provide the Team with the following items in cooperation with other organizations concerned

(1) security-related information as well as measures to ensure the safety of the survey team;
(2) information as well as support in obtaining medical service;
(3) data and information necessary for the Survey;
(4) counterpart personnel;
(5) credentials or identification cards if necessary;
(6) entry permits necessary for the survey team members to conduct field surveys;
(7) permission for the implementation of traffic survey;

(8) necessary arrangement for exemption of the taxes, duties, and any charges on equipment, machinery and other materials brought into Bhutan for the implementation of the Survey; and

(9) support in obtaining other privileges and benefits if necessary.

11-2. Bhutanese side agreed that the following undertakings should be taken by Bhutanese side at the Bhutanese expenses under the Project if implementation of the Project is approved by the Government of Japan;

(1) to provide tax exemption for construction materials and equipment for the Project.

1) The Bhutanese side agreed that customs duties, internal taxes and other fiscal levies which may be imposed in Bhutan are exempted under mutual agreement of Exchange of Note (E/N).

2) If any expenses stated above are caused by some reasons such as the delay of execution of tax exemption, the Bhutanese side shall pay for it.

(2) to secure the lots of land necessary for the implementation of the Project including land for site office, plant yards, material storing yard, motor pool, temporary construction yard and waste disposal site;

(3) to relocate existing utilities within the Project site;

(4) to relocate existing buildings and facilities if necessary;

(5) to arrange issuance of license, permission and other necessary procedures for the Project;

(6) to obtain the royalties/permission for taking raw materials such as stone/rock/filling materials from the quarry/river-bed/borrow pit; and

(7) to provide security measures for all concerned working for the Project.

12. Disclosure of Information

Both sides confirmed that the study results excluding the Project cost will be disclosed to the public after the completion of the Survey. All the study results including the Project cost will be disclosed to the public after all the verification of contracts for the Project by JICA are concluded.

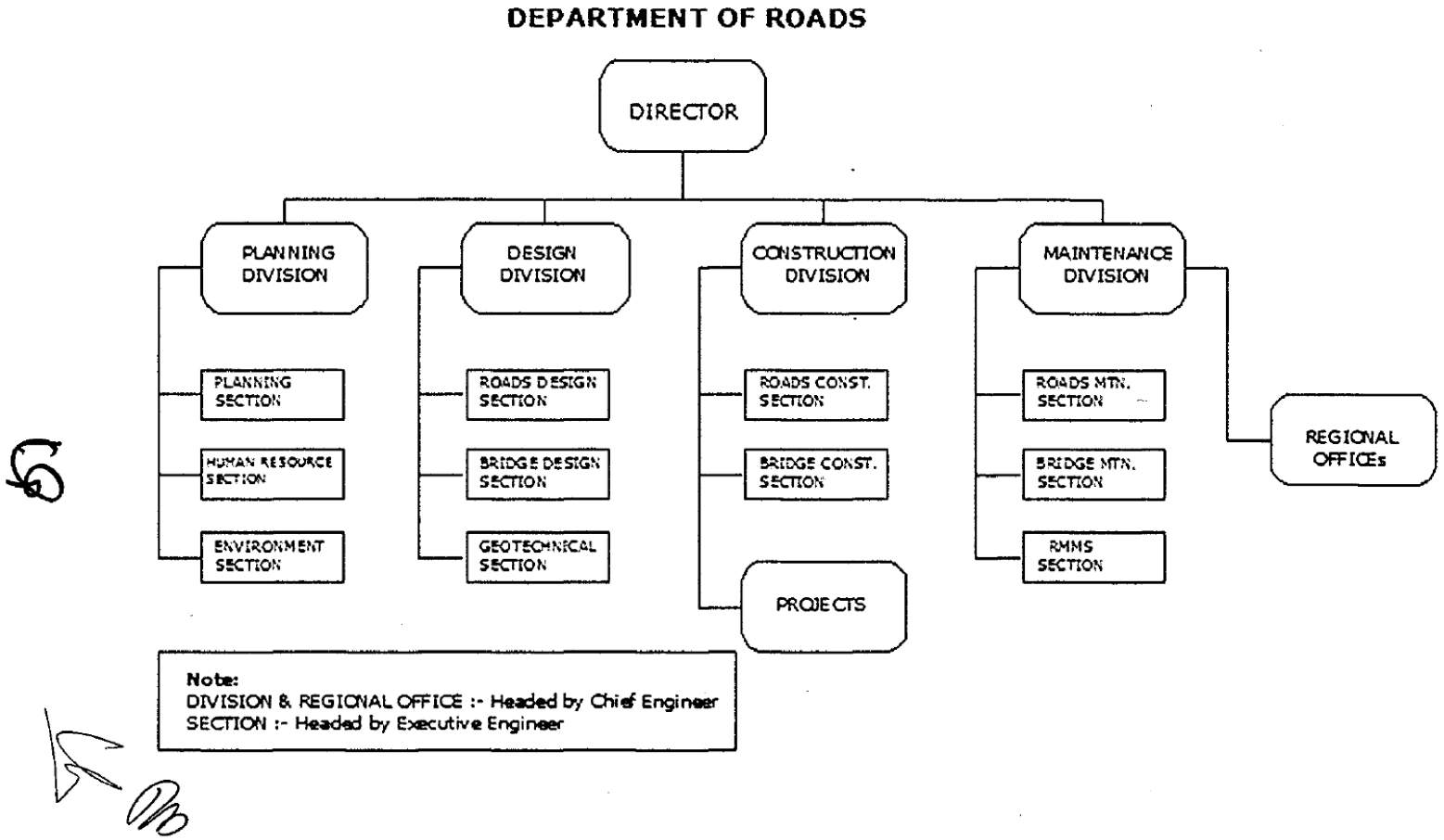
Annex-1: Project Sites
Annex-2: Organization Chart of DoR
Annex-3: Japan's Grant Aid Scheme
Annex-4: Flowchart of Japan's Grant Aid Procedure
Annex-5: Major Undertakings to be Taken by Each Government

Annex-1

Project Site

Annex-2

Organization Chart of DOR



Annex-3

Japan's Grant Aid Scheme

JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

- Preparatory Survey
  - The Survey conducted by JICA
- Appraisal &Approval
  - -Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
  - -The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
  - -Agreement concluded between JICA and a recipient country
- Implementation
  - -Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.

- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

Annex-3

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment

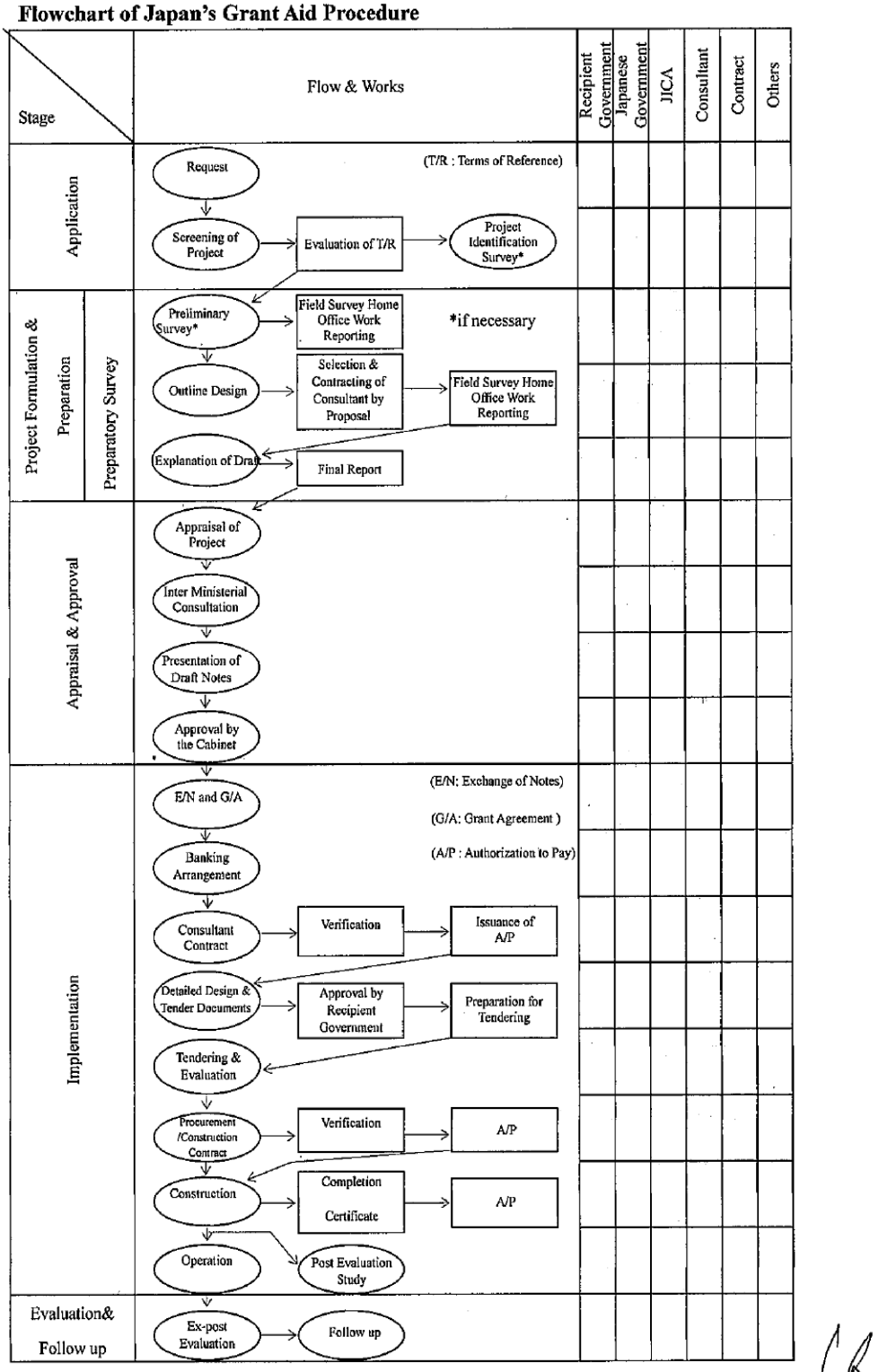
commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

Annex-4

Flowchart of Japan's Grant Aid Procedure



Annex-5

Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure lots of land necessary for the implementation of the Project and to clear the site		●
2	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products.		
	1) Marine (Air) transportation of the products from Japan to the recipient country	●	
	2) Internal transportation from the port of embarkation to the project site	(●)	(●)
3	To ensure that customs duties, internal taxes and other fiscal levies, which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted.		●
4	To accord Japanese physical persons and / or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the implementation of the Project.		●
5	To ensure that the Facilities be maintained and used properly and effectively for the implementation of the Project.		●
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project.		●
7	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		●
	1) Advising commission of A/P		●
	2) Payment commission		●
8	3) To give due environmental and social consideration in the implementation of the Project.		●

(B/A: Banking Arrangement, A/P: Authorization to Pay)

（2） Technical Notes（第１現地調査時）

TECHNICAL NOTES

JICA Preparatory Survey Team (hereinafter referred to as "the Team") on the Preparatory Survey (hereinafter referred to as "the Survey") on The Project for Reconstruction of Bridges on Primary National Highway No. 1 (hereinafter referred to as "the Project") and the Department of Roads in Ministry of Works and Human Settlement (hereinafter referred to as "DoR") which is the responsible and implementing organization for the Project has agreed upon the items described in the attached Technical Notes. Based on these Technical Notes, the Team will carry out the outline design for the Project including the project cost estimate through analysis of the field survey findings and discussions with concerned authorities in Japan.

The results of the analysis and the outline design will be presented and explained in January, 2015.

Thimphu, 22 September 2014

Mr. Karma Galay

Director,
Department of Roads,
Ministry of Works and Human Settlement,
Kingdom of Bhutan

Mr. Keigo Konno

Chief Consultant,
Preparatory Survey Team,
Japan International Cooperation Agency,
Japan

1. Application of Design Guideline

Reference shall be made to following manuals and specification for the outline design requirements of bridge and approach road.

1.1 Bridge Design

- Guidelines on use of Standard Work Items for Common Road Works: DoR

Sl. No	Road Classification	Carriage Width (m)	Loading Capacity	Footpath
1	Asian Highway (AH-48)	7.50	Single lane IRC 70R (wheeled) or Double lane IRC class A (whichever is critical)	Optional
2	Primary National Highway (PNH)	7.00	Single lane IRC 70R (wheeled) or Double lane IRC class A (whichever is critical)	Optional
3	Secondary National Highway (SNH)	5.50	IRC Class A (double lane)	Optional
4	Dzongkhag Road	3.50	IRC Class A (single lane)	Optional
5	Farm road	3.50	IRC Class A (single lane)	
6	Thromde road	Varies from 7.50 to 15.00	Single lane IRC 70R (wheeled) or Double lane IRC class A (whichever is critical)	Both side 1.50m wide

Note: Bridges shall be designed for IRC class 70R (wheeled) loading and at least 5.5m carriage width irrespective of the load classification, if the road has potential of catering traffic to planned or Hydro Power Plants or Projects.
However, the width of the temporary bridges (bailey bridges) for single lane is 3.27m wide with 24R loading commonly used in farm roads and double lane bailey bridge of 7.50m wide can be used in the PNH and SNH for temporary measures.

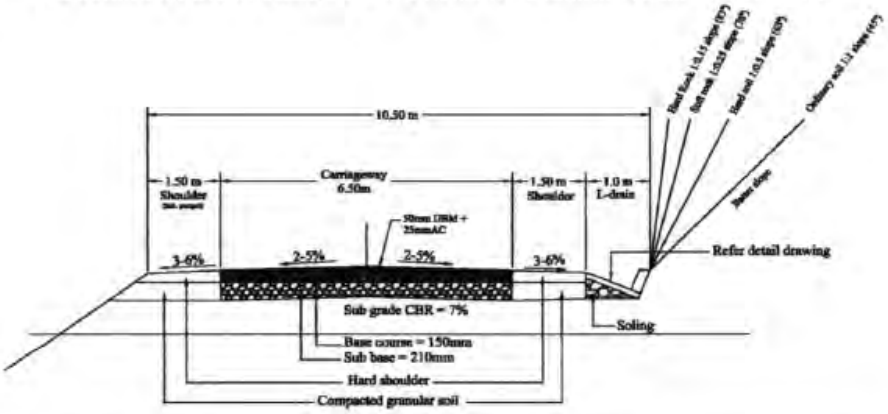
- Standard Specification and Code of Practice for Road Bridge: The Indian Road Congress (IRC)
- Specifications for Highway Bridges (Part I – V): Japan Road Association

The curb width and the handrail are applied to Japanese Standard.

1.2 Highway Design

(1) Geometric Design

- Guidelines on use of Standard Work Items for Common Road Works: DoR



- Guideline on Road Classification System and Delineation of Construction and Maintenance Responsibilities: DoR
- Road Structure Ordinance: Japan Road Association

(2) Pavement Design

- Pavement Design Manual: DoR

2. Bridge Structure Material

Followed to analysis a consideration of easy maintenance, concrete is preferred as the bridge material. However the bridge material shall be compared with concrete and steel.

- **Concrete**
  - ➢ Substructure : 21N/mm^2
  - ➢ Superstructure (Slab) : 24N/mm^2
    (Girder, beam) : 30N/mm^2
  - ➢ Reinforcing bar : Fe 500

3. Pavement Design Life

- Pavement Design Manual: DoR

4. Seismic Condition

Condition for earthquake resistance design of the objective bridges is applied to the Indian Standard of the Indian Road Congress (IRC). Seismic zone of India is shown in Figure 1. Bhutan is mainly located in zone V.

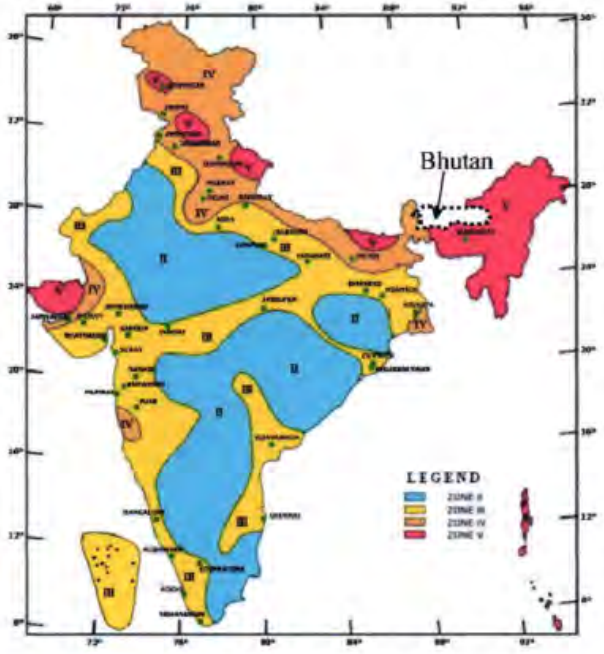


Figure 1　Seismic Zone of India

5. Ground Condition

Ground condition of the bearing stratum for the foundation and the substructure shall be planned and decided based on the result of laboratory test and boring.

6. River Condition

Based on the result of catchment area of each river for the objective bridges, discharge volume shall be calculated including the past records, rainfall density, riverbed gradient and so on. The high water level to plan the bridge length and elevation is directly related by the discharge volume.

Aforesaid river condition will be planned by using Japanese Standard.

7. Design Condition

The design condition including aforesaid conditions to be applied is shown in Table 1.

Table 1 Design Condition

Parameter	Unit	Design	Remarks
1. Bridge Design			
Live Load		IRC 70R or IRC class A	As per DoR Standard
Horizontal Seismic Coefficient		To be calculated	Based on IRC Standard
Design Speed	km/hr	20	As per Japanese Standard
Carriageway Width	m	7.0	As per DoR Standard
Standard Crossfall	%	2.0	As per DoR Standard
Maximum Superelevation	%	6.0	At curved section
Maximum Gradient	%	7.0	As per Bhutanese Standard
Affixed Articles		Add on the Bridge	As per DoR Standard
2. Road Design			
Design Speed	km/hr	20 (Approach road) 60 (Main road)	As per Japanese Standard As per DoR Standard
Carriageway Width	m	6.5	As per DoR Standard
Shoulder Width	m	1.5	As per DoR Standard
Standard Crossfall	%	2.0	As per DoR Standard
Maximum Superelevation	%	6.0	At curved section
Maximum Gradient	%	7.0	As per DoR Standard
Minimum Radius	m	15.0 (Approach road) 115.0 (Main road)	As per Japanese Standard As per DoR Standard
Widening Space	m	90≦radius of curve<160→0.25 60≦radius of curve<90→0.50 45≦radius of curve<60→0.75 32≦radius of curve<45→1.00 26≦radius of curve<32→1.25 21≦radius of curve<26→1.50 19≦radius of curve<21→1.75	As per Japanese Standard
Transition Length	m	20km/hr: 20 60km/hr: 50	As per Japanese Standard

8. Environmental Considerations

8.1 EIA Study Schedule

The Bhutanese side has confirmed the EIA study schedule as shown in Table 2.

Table 2 Tentative Schedule of EIA

Year/Month	2014						2015			
Work Item	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Consensus Meeting with DOR and NEC		■								
Recconnaissance			■							
Stakeholder Meeting on Scoping Stage (PAP Level)				■						
Scoping				■						
EIA Study (simple survey and literature survey on IEE)				■	■					
preparation of EIA report					■					
EIA approval Process						■	■	■	■	
Approval of Environmental Permission									■	

8.2 Policy Framework and Authorization for ARAP

The Bhutanese side has confirmed the abbreviated resettlement action plan (ARAP) schedule as shown in Table 3.

Table 3 Tentative Schedule of ARAP

Year/Month	2014						2015			
Work Item	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Consensus Meeting with Relevant Parties		■								
Preperation of ARAP Framework and Authorization			■							
Socialization for ARAP, Census, Inventory of Loss Assets, Socio-ecoomic survey, Replacement cost survey				■	■					
Preparatin of ARAP report and authorization by implementation agency					■	■	■	■	■	

9. Traffic Survey Results and Analysis

Traffic surveys (traffic volume survey, OD survey and axle load survey) were carried out at the point of Wangdue and Trongsa. The result of traffic surveys and their analysis shall be reflected to design of the objective bridges.

10. Requests from DoR to the Team

DoR requested the Team to plan footpaths (width 1.0 m x 2) on Chuzomsa Bridge and Nikachu Bridge because of too much old of the existing both bridges. The Team answered that JICA would asset the appropriateness of the request through the Survey and would report the findings to the Government of Japan. Implementation and components of the Project will be decided by the Government of Japan.

(3) 第 2 次現地調査（概略設計概要説明）時

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
FOR
THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON
PRIMARY NATIONAL HIGHWAY No. 1
IN
BHUTAN

(Explanation of Draft Outline Design Report)

On the basis of the preparatory survey in Bhutan from July to September, 2014 and following technical examination in Japan, Japan International Cooperation Agency (hereinafter referred to as "JICA") prepared a Draft Outline Design Report (hereinafter referred to as "the Report") on the Project for Reconstruction of Bridges on Primary National Highway No. 1 (hereinafter referred to as "the Project").

The Preparatory Survey Team, headed by Mr. Nobuyuki Tsuneoka, Senior Advisor of JICA, explained to and consulted with the Department of Roads, Ministry of Works & Human Settlement (hereinafter referred to as "DoR") and the concerned officials of the Royal Government of Bhutan (hereinafter referred to as "RGOB") on the contents of the Report.

As a result of discussions, both sides confirmed the main items described in the attached sheets.

Thimphu, January 15, 2015

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Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Karma Galay
Director
Department of Roads
Ministry of Works & Human Settlement
Bhutan

Rinchen Wangdi
Chief Programme Coordinator
Gross National Happiness Commission
Bhutan

ATTACHMENT

1. Components of the Draft Outline Design Report

1.1. Bhutanese side agreed and accepted in principle the contents of the Report explained by the Team. As a result of the Survey the Team examined and found out the best solutions therefore the main components of the Project consist of following three construction works.

a) Reconstruction of Chuzomsa zam, Nikachu zam and Zalamchu zam (hereinafter referred to as "the Bridges")
b) Construction of the access roads for the Bridges
c) Construction of revetment works for Chuzomsa zam and Nikachu zam

2. Cost Estimation for the Project

2.1. Japanese side explained to Bhutanese side the estimate of the Project Cost described in Annex-1; while, the final Project Cost described in the Exchange of Note (hereinafter referred to as "E/N") would be appraised by the Government of Japan (hereinafter referred to as "GOJ").

2.2. Both sides further confirmed that the Project Cost in Annex-1, and details of the construction works in the Report should never be duplicated and/or disclosed to any third parties until all the contracts for the Project are concluded.

2.3. The Team explained and Bhutanese side agreed that the cost for land acquisition is also subject to change but in principle it will be compensated at full replacement cost according to the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines").

3. Undertaking by Bhutanese Side

3.1. Bhutanese side promised to undertake the Major Undertakings to be taken by DoR for the Project listed in Annex-2 at full responsibility and its own expenses based on the contents of the Report.

3.2. Bhutanese side confirmed that the customs duties, internal taxes and other fiscal levies, imposed in Bhutan with respect to the purchase of the products and the services shall be exempted in accordance with the regulations of E/N between both governments.
For the sake of this smooth tax exemption procedures, the Team recommended DoR / Gross National Happiness Commission (hereinafter referred to as "GNHC") that DoR / GNHC would begin necessary preparations of the application of tax exemption mentioned above and consultation with Department of Revenue and Customs (hereinafter referred to as "DRC") and relevant organizations, if any, based on the past E/N contents as soon as possible.

3.3. Bhutanese side agreed to execute the undertakings listed in Annex-2 in time, duly understanding the possibilities of the suspension / termination of this Grant Aid assistance if there will be violations on the undertakings.

3.4. Bhutanese side agreed to make their best efforts to secure necessary budget for their scope of work in time and to report its progress to JICA Bhutan office (hereinafter referred to as "JICA office") in order to ensure the budgeting. If the budget cannot be secured in time and/or appropriately, there is a possibility that the Project might be suspended / terminated.

3.5. Bhutanese side agreed that DoR will report to JICA office the progress of their undertakings by Bhutanese side until all the works to be done. Reports to JICA office shall be submitted monthly with actual progress bar chart in Annex-2. Other than the monthly report, DoR shall reply if requested by JICA. Bhutanese side also agreed to provide JICA with the progress of National Cadastral Re-survey Program which may affect the land acquisition of the Project.

3.6. Bhutanese side agreed to demolish the existing Zalamchu zam as soon as possible after the completion of the Project. And also demolish the existing Chuzomsa zam and Nikachu zam at an appropriate time. Before the demolition, Chuzomsa zam and Nikachu zam can be used for local pedestrian and light traffic for a certain period with proper maintenance.

4. Operation and Maintenance of the Facilities

4.1. Bhutanese side will secure enough staff and budgets necessary for operation and maintenance of the facilities constructed by the Project. The annual operation and maintenance costs are estimated and shown in the table below. Refer to the Report for further details.

Term	Object	Location subject to inspection, Frequency	Maintenance Description	Unit	Unit cost (Nu)	Workload	Maintenance Cost (Nu)
Inspection	Bridge	Once/week	Routine inspection	Lump sum	-	-	20,000
		Once/2 years	Periodic inspection	Lump sum	-	-	10,000
		In case of emergency	Special Inspection	Lump sum	-	-	10,000
	Road	Once/week	Routine inspection	Lump sum	-	-	10,000
		Once/2 years	Periodic inspection	Lump sum	-	-	5,000
		In case of emergency	Special Inspection	Lump sum	-	-	5,000
	①Subtotal						60,000
Annual	Bridge	Drainage	Cleaning of catch basin and drainage pipe	No.	100	15	1,500
		Expansion joint	Cleaning, repair of rubber portion	No.	500	6	3,000
		Bridge surface	Small-scale repair	m²	220	130	28,600
		Bearing	Cleaning	No.	100	6	600
	Road	Road surface	Repair of pavement	No.	620	30	18,600
		Ditch	Removal of soil	m	50	855	42,750
	②Subtotal						95,050
5 years	Bridge	Handrail	Repair	m	1,000	9	9,000
		River bank	Inspection and repair of gabion	m	1,800	200	360,000

	Road	Marking	Repainting	m	30	600	18,000
	③Subtotal						387,000
	④Average amount of each year (③/5year)						77,400
10 years	Road	Road surface	Repaving	㎡	1,000	4,033,000	4,033,000
	⑤Subtotal						4,033,000
	⑥Average amount of each year (⑤/10year)						403,300
20 years	Bridge	Bridge surface	Repaving	㎡	1,000	1,300,000	1,300,000
		Deck slab	Installation of waterproof sheet at deck slab	㎡	1,300	1,690,000	1,690,000
		Expansion joint	Replacement	m	35,000	60	2,100,000
	⑦Subtotal						5,090,000
	⑧Average amount of each year (⑦/20year)						254,500
Total amount for each year (①+②+④+⑥+⑧)							890,250

4.2. The Team stressed the following three points, and Bhutanese side agreed;

(1) Although the project includes some facilities to ensure traffic safety such as sign posts and guardrail, frequency of accidents might not be reduced due mainly to increased traffic volume. Therefore continuous traffic safety awareness activities by relevant organizations are required.

(2) Passing the bridges by overloaded vehicles would cause significant damage to the bridge structure which may lead to shorter lifespan.

(3) Proper asset management mainly for bridges will impact greatly to maintenance cost and lifespan.

5. Environment and Social Considerations

5.1. Both sides confirmed that information on environmental and social considerations including major impacts and relevant mitigation measures is summarized in the Environmental Checklist attached as Annex-3. DoR confirmed that they will inform JICA of any major changes, which may affect environmental and social considerations, by revising the Checklist in a timely manner.

5.2. Both sides confirmed continuous environmental monitoring will be conducted by DoR in accordance with the Environmental Checklist and Monitoring Form attached as Annex-3 and Annex-4.

5.3. DoR confirmed that the results of environmental monitoring will be provided to JICA by filling in Environmental Monitoring Form attached as Annex-4 on a quarterly basis until the completion of the Project, provided that there is no outstanding issue regarding the environmental and social considerations during implementation of the Project.
In case JICA finds that there is necessity for improvement in a situation with respect to environmental and social considerations after the agreed monitoring period, JICA can request to extend the period of monitoring and reporting until JICA confirms the issues have been properly addressed.

5.4. Bhutanese side agreed JICA's disclosure of provided monitoring results in the Environmental Monitoring Form attached as Annex-4 on JICA's website.

6. Implementation Schedule

Both sides confirmed Implementation Schedule of the Project attached as Annex-5. The schedule is assuming that construction will be started in January, 2016 with rainy seasons and winter seasons considered. Both sides understood that the delay of starting may cause further delay of completion.

7. Validity of the Previous Minutes of Discussions

Both sides confirmed that all the agreements in the Minutes of Discussions of the preceding Preparatory Survey signed on August 6, 2014 continue to be valid unless information is updated by the draft Preparatory Survey Report.

8. Japan's Grant Aid Scheme

8.1. Bhutanese side fully understood and reconfirmed the scheme of the Japan's Grant Aid and the necessary measures to be undertaken by Bhutanese side, which was explained by the Japanese side and agreed as the Minutes of Discussion signed on August 6, 2014.

9. Schedule of the Study

9.1. JICA will complete the Final Report of the Preparatory Survey both in Japanese and English, in accordance with the confirmed items and send it to Bhutanese side around May, 2015.

9.2. The above schedule is tentative and subject to change.

10. Disclosure of Information

10.1. Bhutanese side agreed to JICA's disclosure of the study results excluding the Project cost after completion of the Preparatory Survey, and all the study results including the Project cost after all the contracts for the Project are concluded.

11. Misconduct

If JICA receives information concerning suspected corrupt or fraudulent practices, the Government shall take necessary measures in accordance with the Procurement Guidelines in the competition for, or in execution of, the contract funded by the Grant:

(1) to provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or public organizations of Bhutan;
(2) not to treat unfairly or unfavorably the physical persons and juridical persons, that provide the information.

Annex-1: Project Cost Estimation
Annex-2: Undertakings to be taken by the Royal Government Bhutan
Annex-3: Environmental Checklist
Annex-4: Environmental Monitoring Form
Annex-5: Implementation Schedule

Annex-1: Project Cost Estimation

CONFIDENTIAL

(1) Cost Borne by the Government of Japan

Components		Cost Estimation (Million Yen)
Building Construction	Construction of Chuzomsa zam (including approach road and revetment)	
	Construction of Nikachu zam (including approach road and revetment)	
	Construction of Zalamchu zam (including approach road and revetment)	
Detailed Design and Procurement Supervision		
Total		

(2) Cost Borne by the Royal Government of Bhutan

Items	Cost Estimation (Ngultrum)
Payment of bank commission	1,613,000
Land acquisition / land rent for temporary yards	73,000
Removal of the existing bridge (Zalamchu zam)※	1,000,000
Total	2,686,000

※The demolition of Chuzomsa zam and Nikachu zam by DoR is not included

(3) Conditions of Cost Estimation

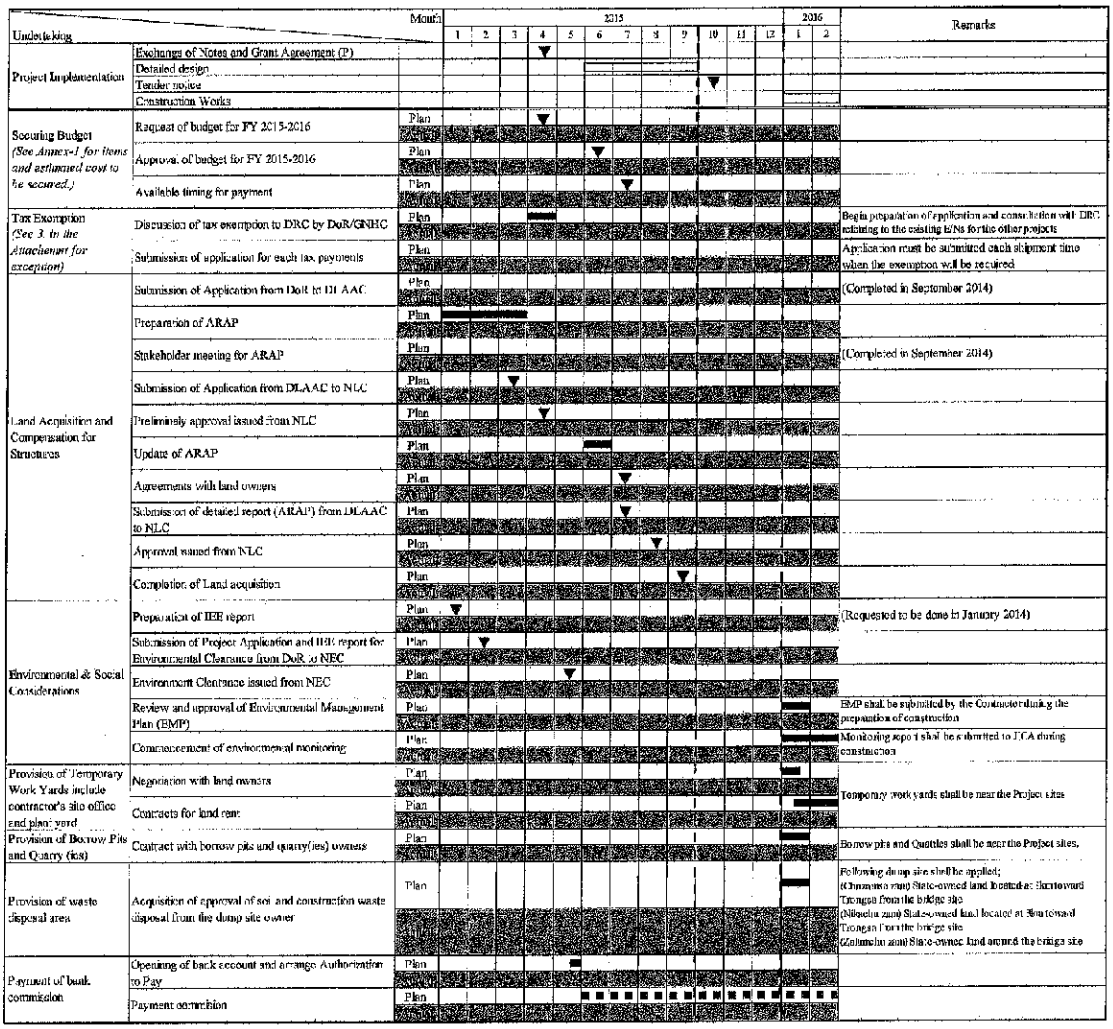
- Estimated timing: July 2014
- Exchange rates: USD1.00 = 103.25 JPY
  BTN 1.00 = 1.86 JPY
- Others: The project is implemented in accordance with the system of Japan's Grant Aid. The above cost estimation is not final, and GOJ is responsible for finalizing the ceiling amount of the Grant Aid assistance of the Project.

Annex-2: Undertakings to be taken by the Royal Government of Bhutan

(1) Undertakings of which progress required to be shared with and to be reported to JICA in a timely manner

Bhutanese side is required to implement following items described below and report to JICA Bhutan office monthly and the times when the items marked " ▼" is done, as well as at the beginning and end points of the bar charts. Furthermore, DoR is also required to report to JICA on an ad hoc basis in response to JICA's inquiries.

Note : (P) means provisional



(2) Other Undertakings necessary for smooth implementation of the Project

Items
To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products.
To accord Japanese physical persons and / or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the implementation of the Project.
To ensure that the Facilities be maintained and used properly and effectively for the implementation of the Project.
To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project even other than the cost shown in Annex-I if necessary.
To support ensuring security for the personnel assigned to the Project and ensuring security at the Project sites, e.g. security information sharing, coodination with police, etc.
To demolish the existing Zalamchu zam as soon as possible after the completion of the Project.
To demolish the existing Chuzomsu zam and Nikochu zam at an appropriate time.
To cooperate in solving potential troubles with the local people or any third party in connection with the execution of the Project with close consultation with JICA.

Annex-3: Environmental Checklist

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been in conditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) Y	(a) Under preparation of draft IEE and will be submitted to NEC in Feb, 2015 and approved in May, 2015 (b) ditto ↑ (c) The conditions are not expected as of January, 2015 (d) Forest Clearance has been obtained from DFPS, MoAF and Dzongkhag Administrative approval has been issued from concerned Dzongkhag as of December, 2014
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) Local stakeholder meetings was held based on JICA Guidelines and Bhutan's EIA Procedure. The project outline, tentative schedule was disclosed and exchange opinions with participants has been done. (The first stakeholder meeting has been held in September 2014) (b) The opinions and comments will be reflected to the engineering design and environmental management plan.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Several alternative plans were examined in this project including from the environmental and social considerations point of view.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken? (b) If air quality already exceed country's standards near the route, is there a possibility that the project will make air pollution worse?	(a) N (b) N	(a) The predicted air quality does not expected to exceed Bhutan's standard level because the expected traffic volume is around 300~400 a day. (b) The predicted air quality does not expected to exceed Bhutan's standard level.
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that the project will contaminate water sources, such as well water?	(a) N (b) N	(a) Although turbid water is caused and discharged from the construction area, general and appropriate mitigation measures minimize the adverse impacts. These mitigation measures are planned on the environmental management plan. (b) There are no water sources affected by project.
	(3) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards? (b) Do low frequency sound from the vehicle and train traffic comply with the country's standards?	(a) Y (b) Y	(a) The predicted noise does not expected to exceed Bhutan's standard level because the expected traffic volume is around 300~400 a day. (b) There are no structure which cause low frequency sound.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) There are not any protected areas designated by Bhutan's laws or international treaties and conventions.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of bridges and access roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered?	(a) N (b) N (c) N (d) N (e) N	(a) The project site does not encompass primeval forests, tropical rain forests, ecologically valuable habitats. (b) The project site does not encompass the protected habitats of endangered species designated by the Bhutan's laws or international treaties and conventions. (c) The project activities does not give significant impacts on the ecosystem. (d) Since the project area is developed, thus any negative impacts are not expected and any protection measures are not taken. (General measures will be prepared appropriately) (e) Adverse impacts to the ecosystems are not expected since this project is replacement of existing bridges.
	(3) Hydrology	(a) Is there a possibility that hycrologic changes due to the installation of structures will adversely affect surface water and groundwater flows?	(a) N	(a) There are not any construction activity that cause hydrologic change.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a) N (b) N (c) Y	(a) There are no soft ground area. In the cutting land section on the route, land protection measures are prepared. (b) ditto ↑ (c) The mitigation measures for soil erosion and run off such as silt fence are planned in earth work section.

4 Social Environment	(1) Resettlement / Land acquisition	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) Y (b) Y (c) Y (d) Y (e) Y (f) Y (g) Y (h) Y (i) Y (j) Y	(a) Involuntary resettlement is not caused, but land acquisition of small area is expected. (b) The adequate explanation on compensation are given to affected persons of land acquisition (The explanation has been made in Sep. 2014) (c) Resettlement plan (ARAP) is made based on ARAP survey. (d) Compensation will be paid prior to land acquisition. (e) Compensation policies are prepared in ARAP. (f) The adverse impact is not expected but ARAP pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line if necessary. (g) The applicable laws, regulations and guidelines have been explained to PAPs and formulated basic consensus. The final affected area and affected persons will be identified in detailed design stage and agreed with affected persons prior to implementation of construction. (h)The organizational framework established to properly implement resettlement will be set up, and its capacity and budget will be secured on the ARAP in the detailed design stage. (i) An onitoring plan about the impacts of resettlement before and during construction. (j) If necessary, the grievance redress mechanism in Bhutan will be used.
	(2) Living and Livelihood	(a) Where bridges and access roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are acequate measures considered for preventing these impacts? (b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)? (e) Is there any possibility that project will impede the movement of inhabitants? (f) Is there any possibility that bridges will cause a sun shading and radio interference?	(a) N (b) N (c) N (d) Y (e) Y (f) N	(a) This project does not affect the existing means of transportation and the associated workers. Appropriate mitigation measures will be proposed and carried out on ARAP for the affected persons by land acquisition. (b) There are not possibility that the project will adversely affect the living conditions of inhabitants other than the affected inhabitants. (c) There are no impacts expected in occurence of diseases, including communicable diseases, such as HIV will be introduced due to immigration of workers associated with the project. However adequate mitigation measures such as health check and education will be conducted based on environmental management plan, if necessary. (d) The project may give adverse impact to existing connected-road since traffic restriction is required, thus adequate mitigation measures will be prepared. Additionally traffic safety will be secured by the mitigation measures during construction. The driving space after construction of the bypass will be controlled by local police and setting up sign boards along the road. (e) ditto ↑ (f) There are not any planned bridges cause adverse impacts such as sun shading and radio interferences.
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There are not any possibilities that the project will adversely affect the heritage.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) There are not any possibilities that the project will adversely affect the local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N (b) N	(a) There are not any designated ethnic minorities and indigenous peoples in the rights-of-way. (b) ditto ↑
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) Y (c) Y (d) Y	(a) Construction will be carried out in compliance with labor law in Bhutan. (b) Adequate safety consideration will be taken. (c)(d) Based on Bhutan's labor law, safety education and educatin for consideration to residence will be given to workers.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) N (c) Y	(a) Adequate measures considered to reduce impacts during construction will be prepared based on environmental management plan. (b) Adverse impacts on ecosystem are not predicted. (c) Land acquisition is caused, thus adequate mitigation measures are prepared on ARAP.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) Y (d) Y	(a) The proponent will prepare monitoring program for the environmental items based on approved IEE and it will be implemented. (b) The monitoring items, methods and frequencies included in the monitoring program will be prepared based on JICA Guidelines and Bhutan's EIA procedures. (c) The proponent will establish an adequate monitoring framework based on JICA Guidelines and Bhutan's EIA procedures. (d) Regulatory requirements pertaining to the monitoring report system will be identified, such as the format and frequency of reports from the proponent to the regulatory authorities based on JICA Guidelines and Bhutan's EIA procedures.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways and Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). (b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) N (b) N	(a) Large scale deforestation is not expected. (b) There are not any construction plan for the Power Transmission and Distribution Lines.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) It is not likely to give impacts to transboundary or global issues.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.
In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

Annex -4: Environmental Monitoring Form

Environmental Monitoring Form

·If environmental reviews indicate the need of monitoring by JICA, JICA undertakes monitoring for necessary items that are decided by environmental reviews. JICA undertakes monitoring based on regular reports including measured data submitted by the project proponent. When necessary, the project proponent should refer to the following monitoring form for submitting reports.

·When monitoring plans including monitoring items, frequencies and methods are decided, project phase or project life cycle (such as construction phase and operation phase) should be considered.

1. Pollution Countermeasures

- Air Quality (Traffic /Ambient Air Quality)

Item	Unit	Measured Value (Mean) Along road/Residential area	Measured Value (Max.)	Country's Standards	Referred International Standards (Japanese standard)	Remarks (Measurement Point, Frequency, Method, etc.)
TSP	$\mu g/m^3$			200 (24 Hour Average)	SPM (0.1mg/m3)	– On the boundary of approach road and residence (1 point ×3 bridges) – 2 times a year during construction – Air sampler High volume sampler
NO2	$\mu g/m^3$			80 (24 Hour Average)	0.04-0.06(ppm)	
SO2	$\mu g/m^3$			80 (24 Hour Average)	0.04(ppm)	
CO	$\mu g/m^3$			2000 (8 Hour Average)	10(ppm)	
PM10	$\mu g/m^3$			100 (24 Hour Average)	SPM(0.1mg/m3)	

- Water Quality (Water Quality in the river)

	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards (Japanese Standards/ D category river)	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-			6-9	6.5-8.5	– Downstream portions of affected water bodies (1 point ×3 bridges) – Once a month during construction – Grab sampling
DO	mg/l			-	2	
TSS	mg/l			-	SS 100	
BOD	mg/l			50	8	
Total Coliform	1,000 MPN/100ml			10,000	-	
EC	µS/cm			2000	-	

- Noise / Vibration

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards (Japanese Standard)	Remarks (Measurement Point, Frequency, Method, etc.)
Noise level	dB(A)			For Industrial areas Day(0600-2200): 75 dB(A) Night(2200-0600) : 65 dB(A) * Value for industrial area is applied since the monitoring is planned only for temporary period of construction	Specified Construction noise 85 dB(A) (Maximum value of 90% range)	– On the boundary of construction yard and residence (1 point ×3 bridges) – 2 times a year during construction – Digital sound level meter

- Waste

Monitoring Item	Monitoring Results during Report Period
Type, quantity and disposal sites of construction waste	

2. Social Environment and others

- Resettlement (Land acquisition)

Monitoring Item	Monitoring Results during Report Period
Proper compensation, consultation, agreement with the affected people and confirmation of payment in compensation.	

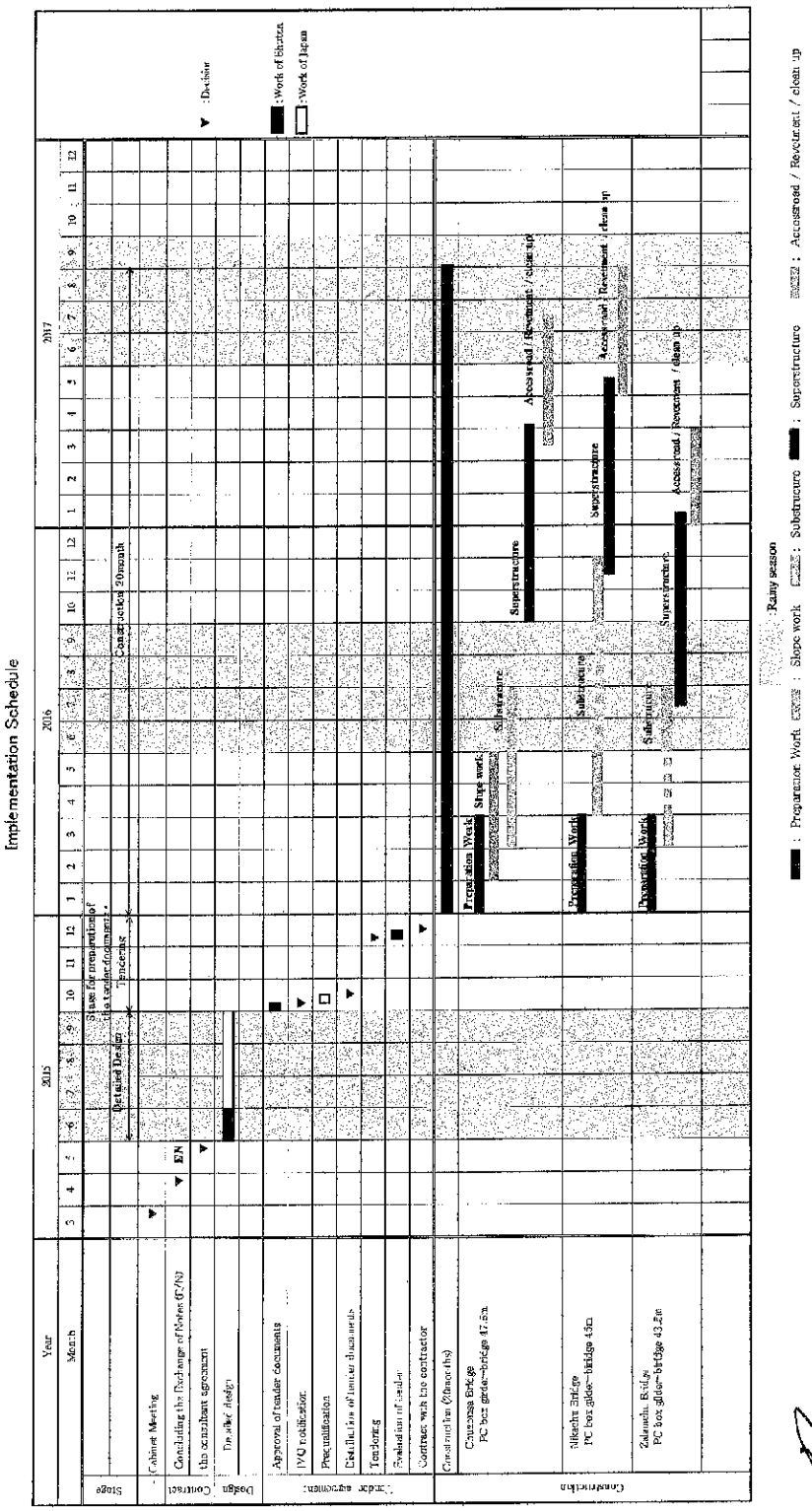
- Existing social infrastructures and services

Monitoring Item	Monitoring Results during Report Period
Securing pass road and transit time of pass road at construction site	

- Accident

Monitoring Item	Monitoring Results during Report Period
Number and details of accident	

Annex -5: Implementation Schedule



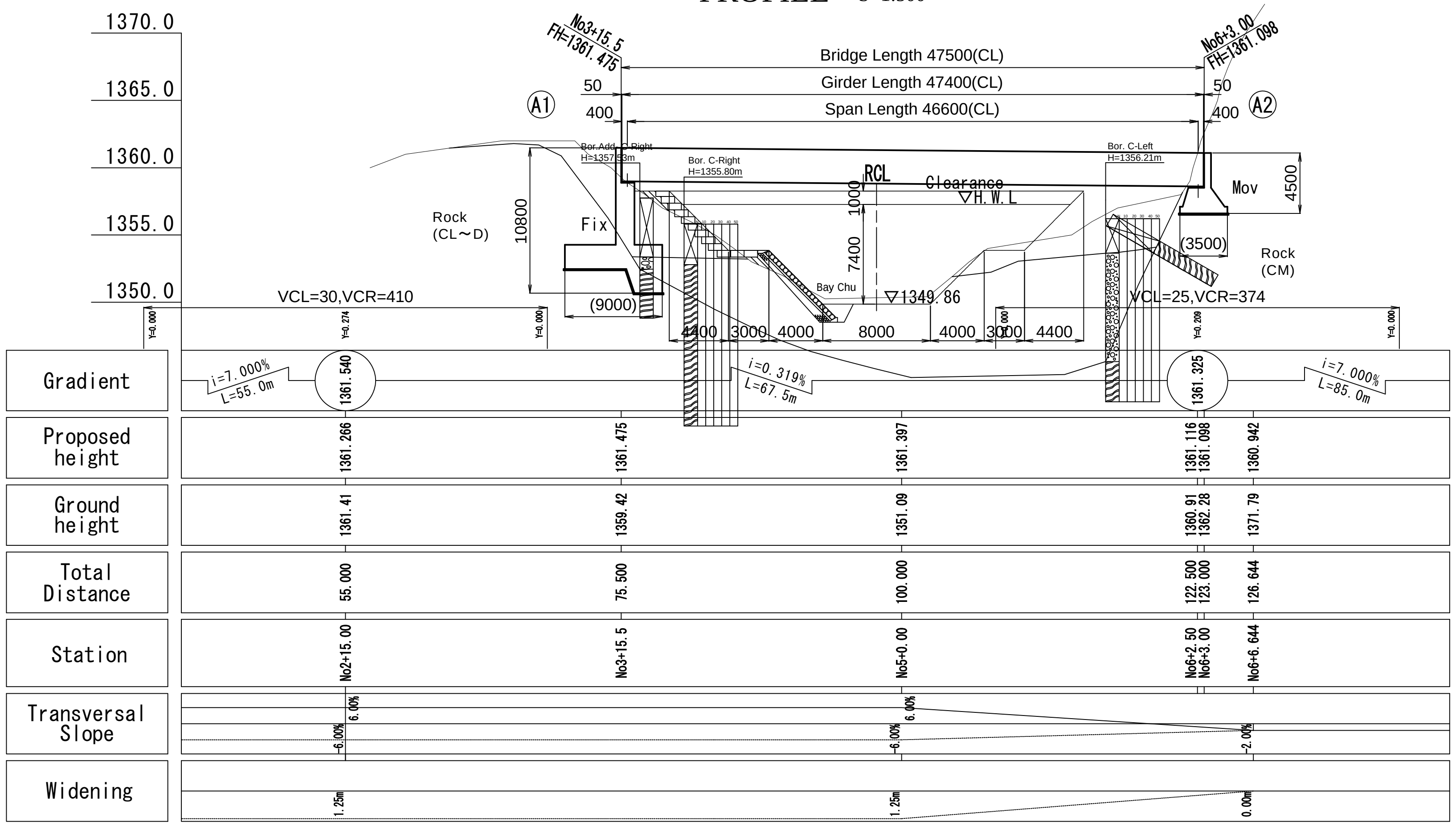
5. 概略設計図

No.	図面名称
1. 橋梁一般図	
1	橋梁一般図（チュゾムサ橋）
2	橋梁一般図（ニカチュ橋）
3	橋梁一般図（ザラムチュ橋）
2. 道路図面	
(1)チュゾムサ橋	
C-1	平面図
C-2	縦断図
C-3	標準断面図
C-4	横断図（1）
C-5	横断図（2）
C-6	横断図（3）
C-7	横断図（4）
C-8	横断図（5）
C-9	横断図（6）
C-10	道路構造物構造図
(2)ニカチュ橋	
N-1	平面図
N-2	縦断図、標準断面図
N-3	横断図（1）
N-4	横断図（2）
N-5	横断図（3）
N-6	横断図（4）
N-7	道路構造物構造図
(3)ザラムチュ橋	
Z-1	平面図
Z-2	縦断図、標準断面図
Z-3	横断図（1）
Z-4	横断図（2）
Z-5	横断図（3）
Z-6	横断図（4）
Z-7	横断図（5）
Z-8	道路構造物構造図

1．橋梁一般図

GENERAL DRAWING (Chuzomsa Bridge)

PROFILE S=1:500



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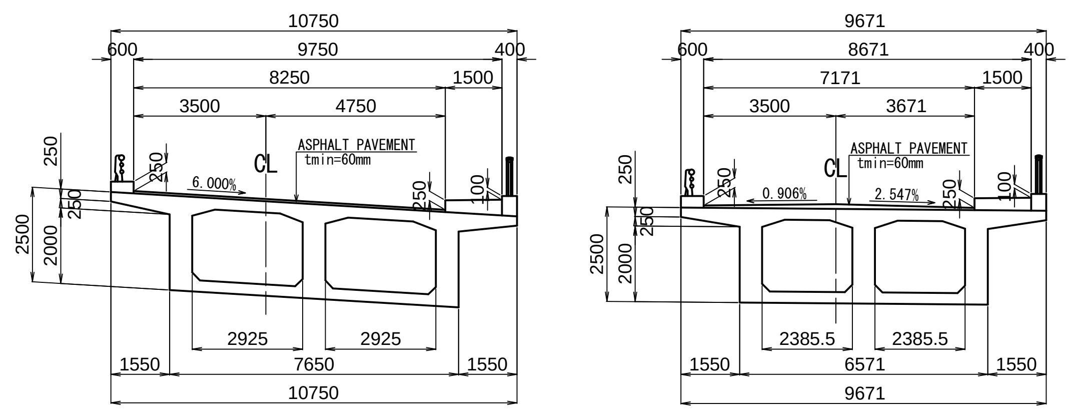

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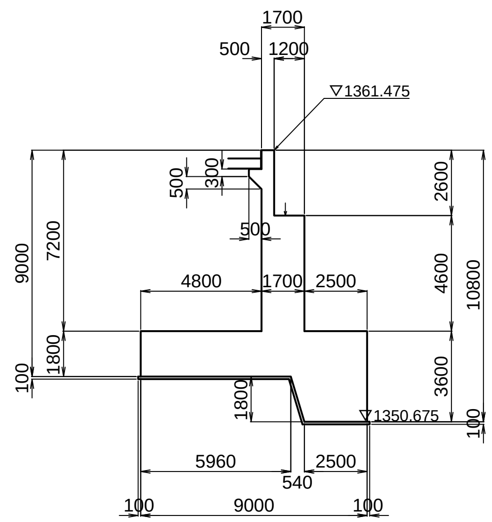

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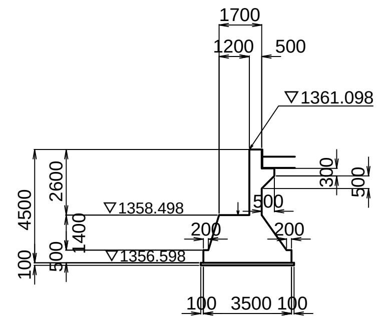
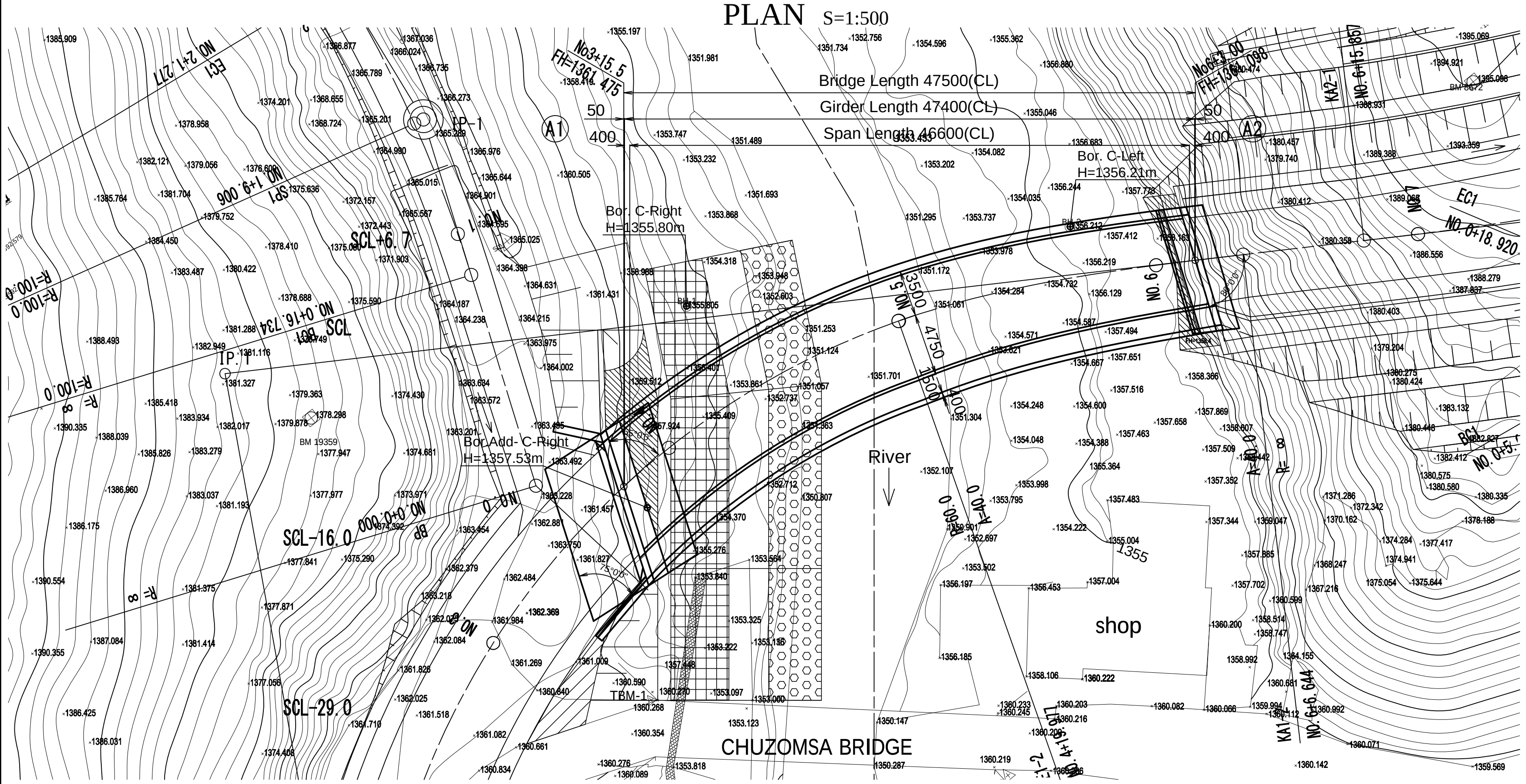
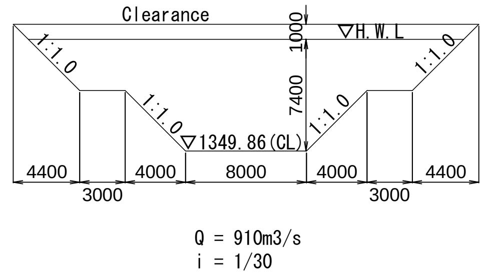


PLAN S=1:500



RIVER CROSS SECTION S=1:500



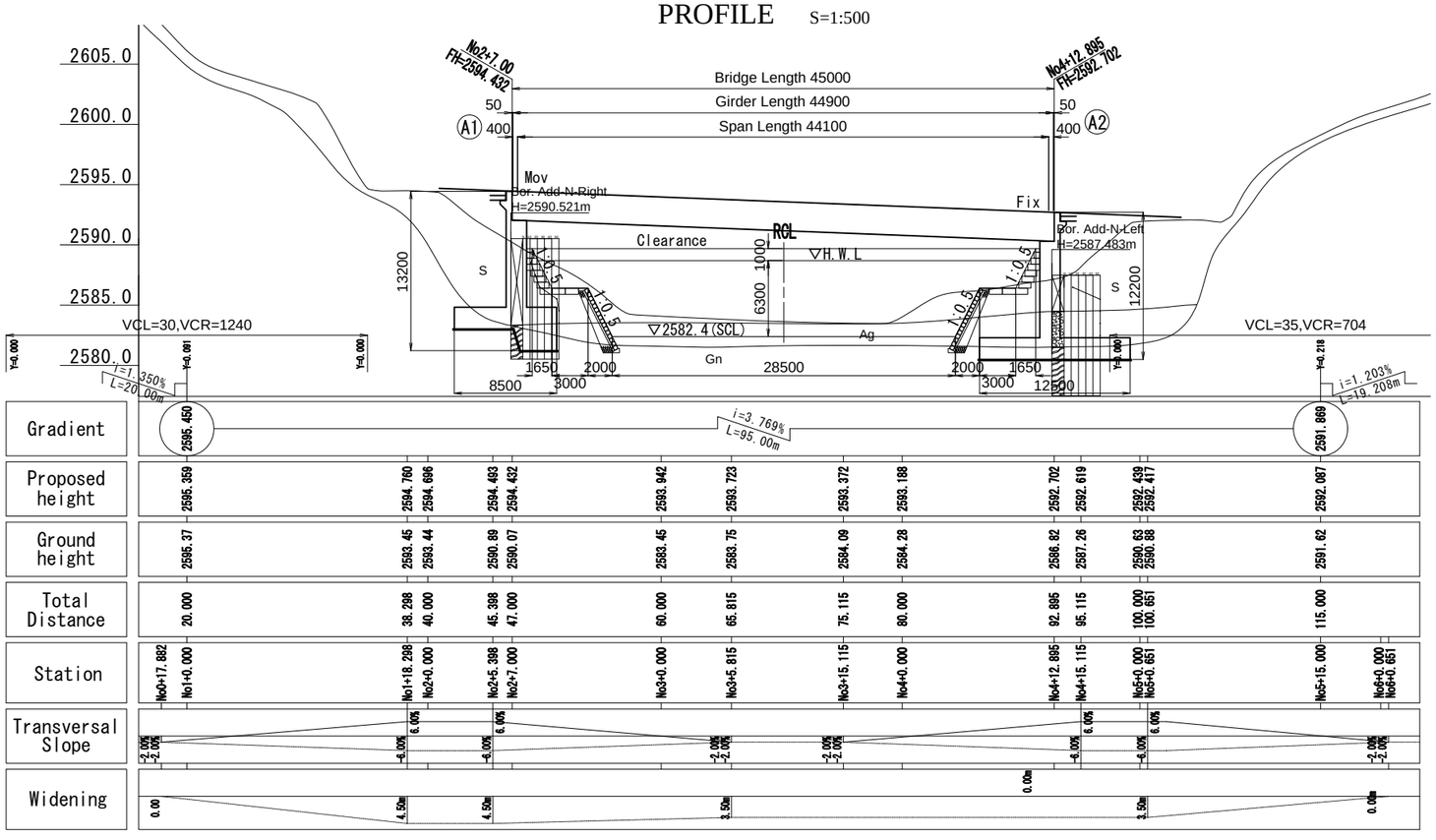
Design condition

Bridge Length			47.500m
Span Length			46.600m
Road Width			8.666m～9.750m
Live Load			Single lane IRC 70R(wheeled) or Double lane IRC Class A
Design Seismic Scale			KH=0.22 KV=0.00
Super structure	Form		PC Box-Shape Girder
	Material strength	Concrete	σck=30 N/mm^2
		ReinforcigBar	SD345 Equivalent
		Tendon	12S12.7mm
Sub structure	Form	Structure	Inverted T-Type Abutment
		Foundation	Spread Foundation
	Material strength	Concrete	σck=21 N/mm^2
		ReinforcigBar	SD345 Equivalent

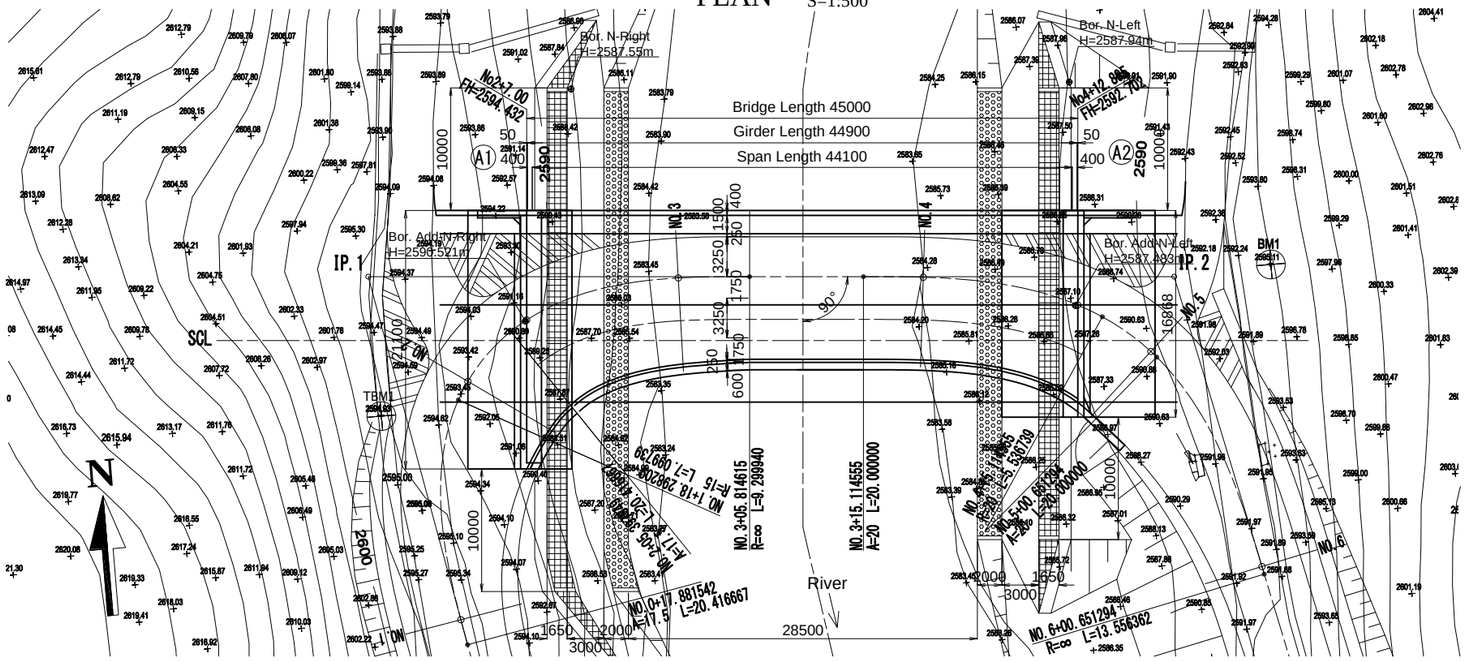
Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF Oriental Consultants Co., Ltd. AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGE ON PRIMARY NATIONAL HIGHWAY No.1	DRAWING TITLE: GENERAL DRAWING (Chuzomsa Bridge)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : 1

GENERAL DRAWING (Nikachu Bridge)

PROFILE S=1:500

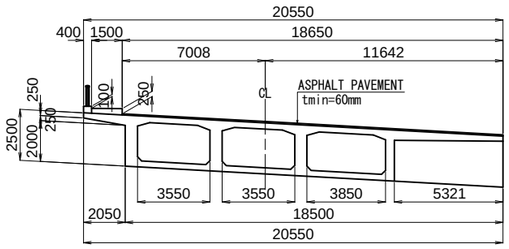


PLAN S=1:500

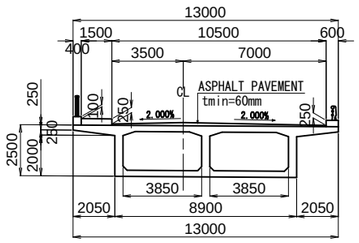


CROSS SECTION S=1:300

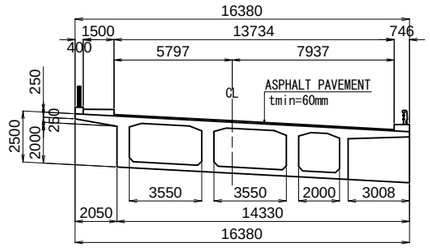
A1 side



Center



A2 side



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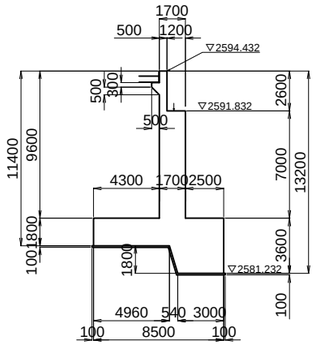

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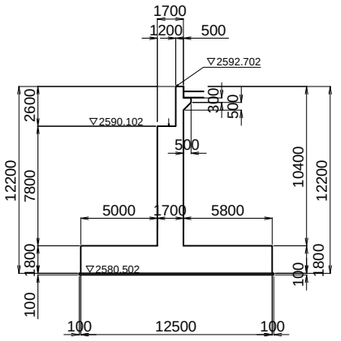
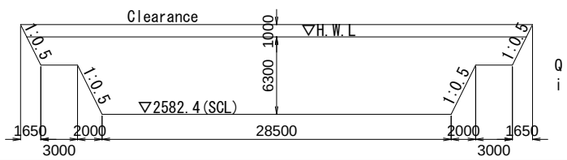


Design condition

Bridge Length			45.000m
Span Length			44.100m
Road Width			20.550m～16.380m
Live Load			Single lane IRC 70R(wheeled) or Double lane IRC Class A
Design Seismic Scale			KH=0.22 KV=0.00
Super structure	Form		PC Box-Shape Girder
	Material strength	Concrete	σck=30 N/mm^2
		ReinforcigBar	SD345 Equivalent
		Tendon	12S12.7mm
Sub structure	Form	Structure	Inverted T-Type Abutment
		Foundation	Spread Foundation
	Material strength	Concrete	σck=21 N/mm^2
		ReinforcigBar	SD345 Equivalent

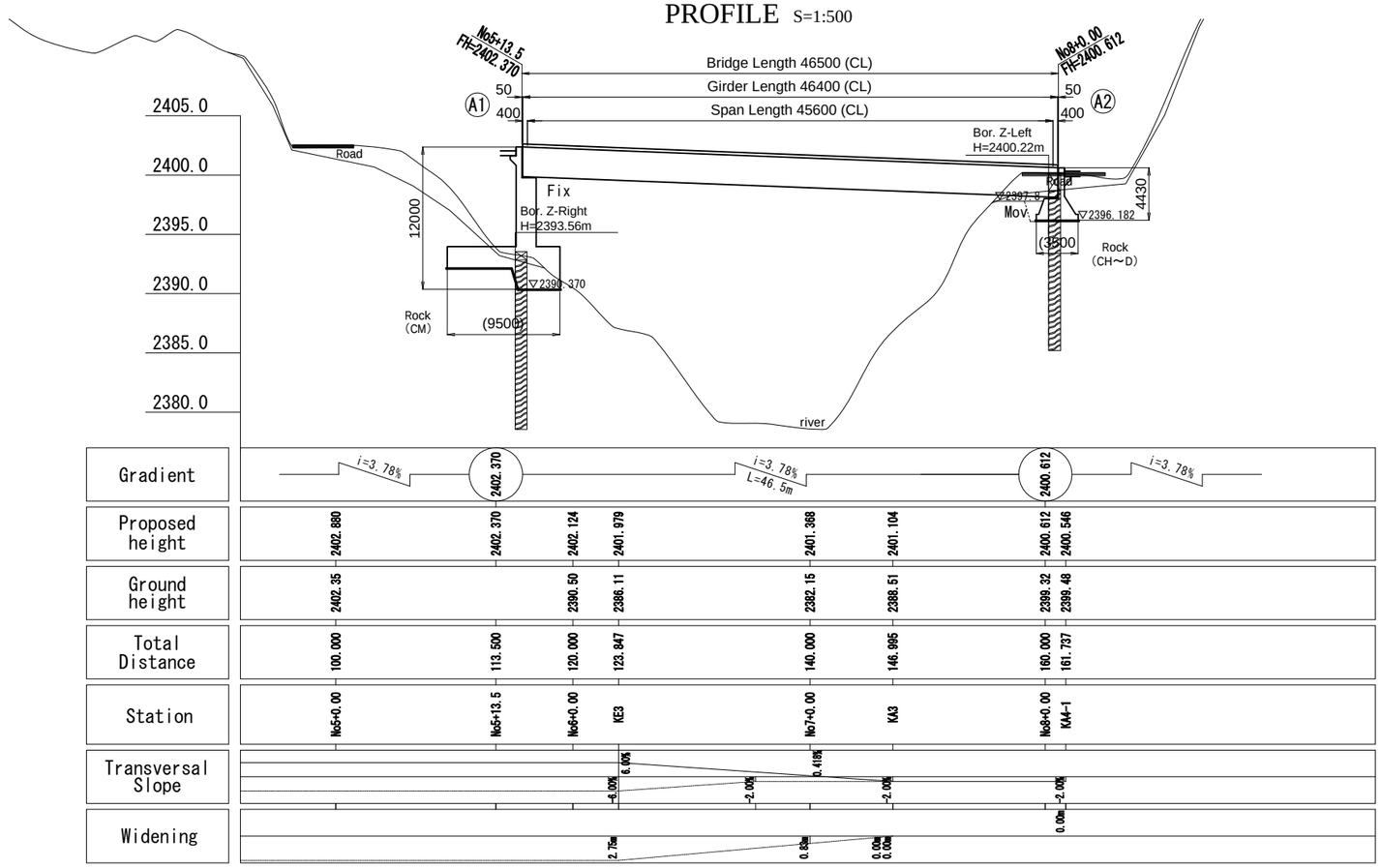
RIVER CROSS SECTION S=1:500



Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF Oriental Consultants Co., Ltd. AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGE ON PRIMARY NATIONAL HIGHWAY No.1	DRAWING TITLE: GENERAL DRAWING (Nikachu Bridge)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : 2

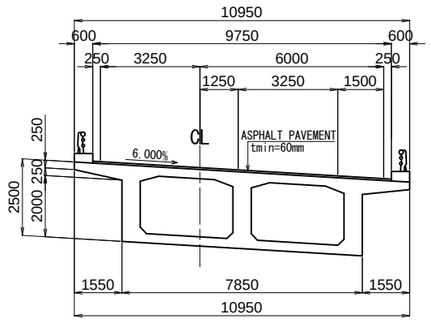
GENERAL DRAWING (Zalamchu Bridge)

PROFILE S=1:500

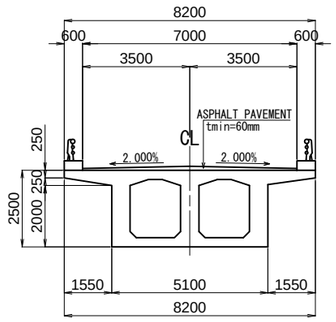


CROSS SECTION S=1:200

A1 side

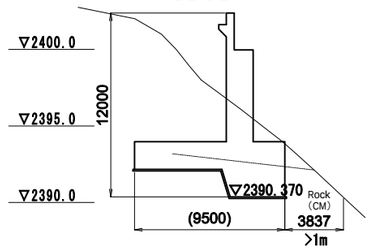


A2 side

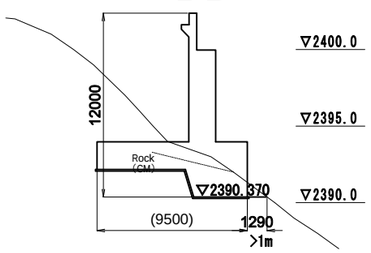


A1 ABUTMENT S=1:400

A-A

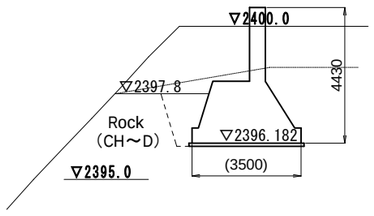


B-B

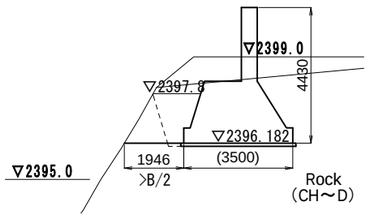


A2 ABUTMENT S=1:200

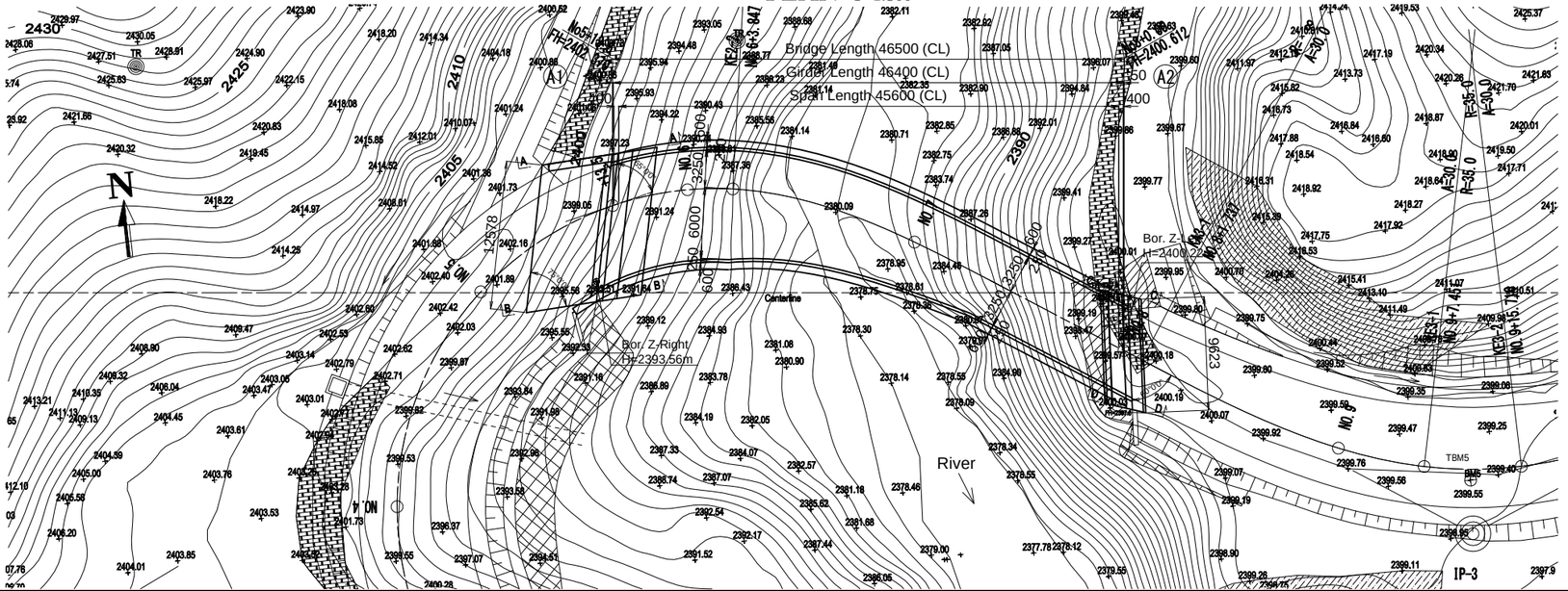
C-C



D-D



PLAN S=1:500



Design condition

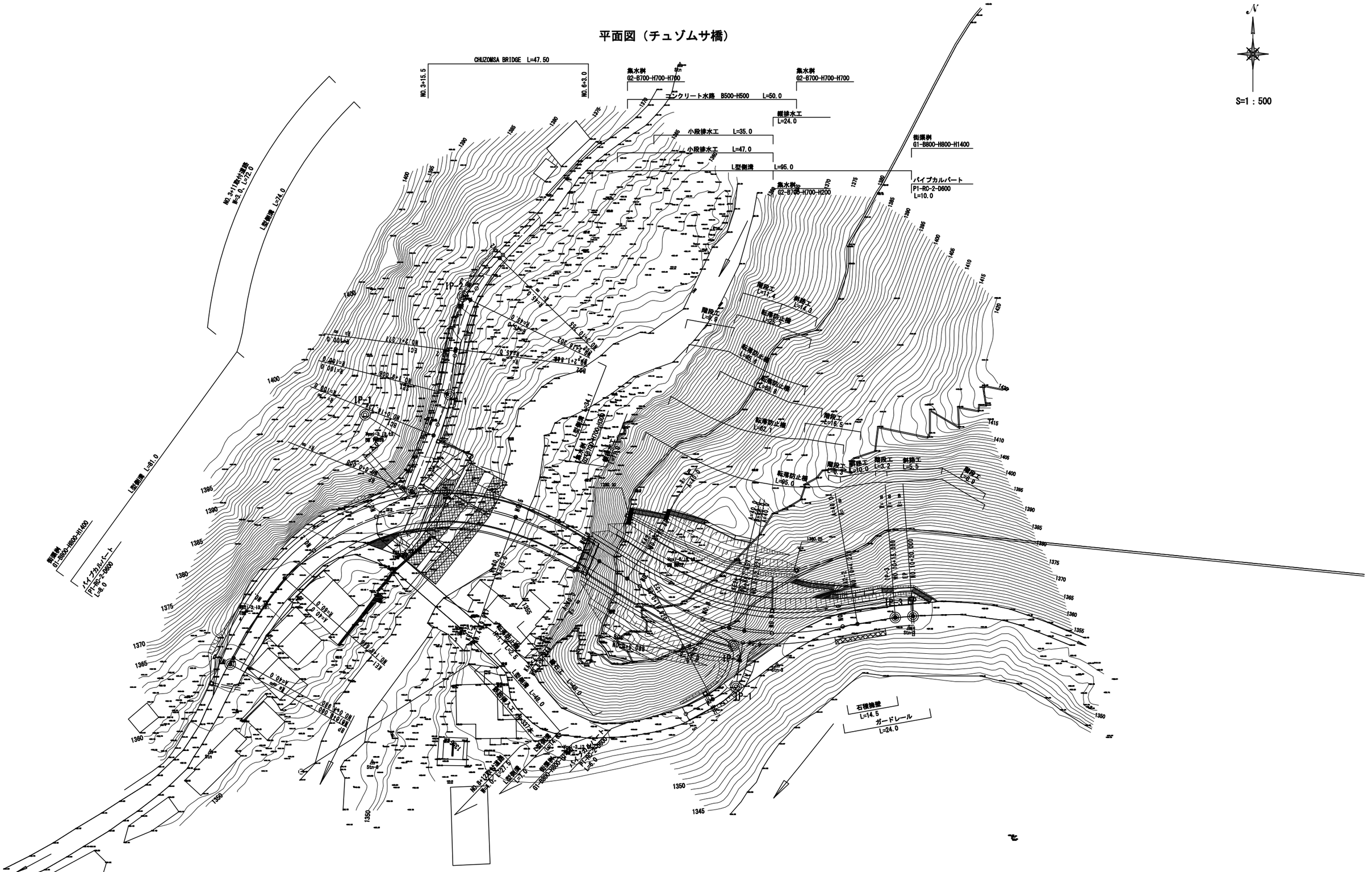
Bridge Length			46.500m
Span Length			45.600m
Road Width			7.000m～9.750m
Live Load			Single lane IRC 70R(wheeled) or Double lane IRC Class A
Design Seismic Scale			KH=0.22 KV=0.00
Super structure	Form		PC Box-Shape Girder
	Material strength	Concrete	σck=30 N/mm^2
		ReinforcigBar	SD345 Equivalent
		Tendon	12S12.7mm
Sub structure	Form	Structure	Inverted T-Type Abutment
		Foundation	Spread Foundation
	Material strength	Concrete	σck=21 N/mm^2
		ReinforcigBar	SD345 Equivalent

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF Oriental Consultants Co., Ltd. AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGE ON PRIMARY NATIONAL HIGHWAY No.1	DRAWING TITLE: GENERAL DRAWING (Zalamchu Bridge)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : 3

2. 道路図面

(1)　チュゾムサ橋

平面図（チュゾムサ橋）

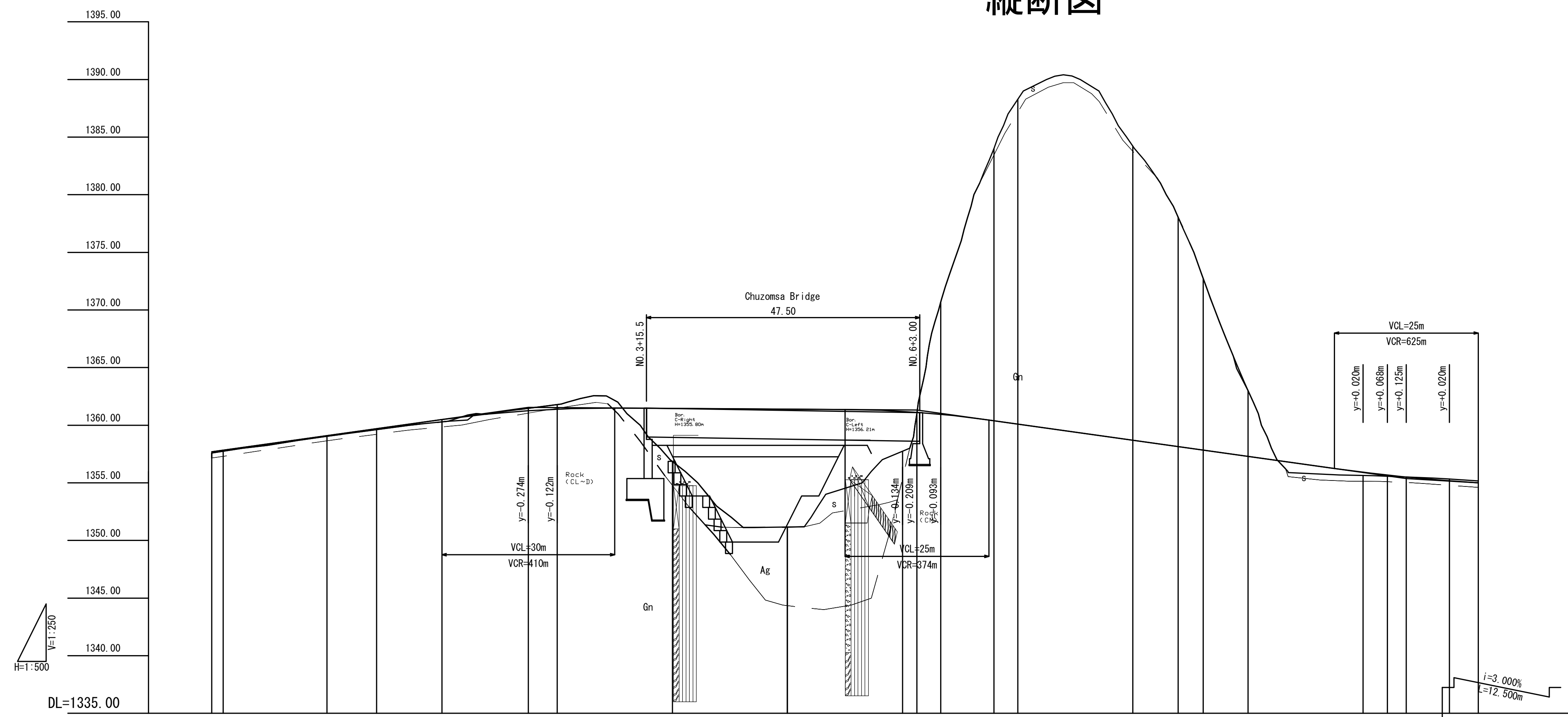


N

S=1：500

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: PLAN(CHUZOMSA BRIDGE) (CHUZOMSA BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : C-1

縦断図



勾配: 1357.690 — i=7.000% L=55.000m — 1361.540 — i=0.319% L=67.500m — 1361.325 — i=7.000% L=85.000m — 1355.375 — 1355.000

測点	計画高	地盤高	切土	盛土	追加距離	単距離
NO.0	1357.690	1357.60		0.09	0.000	0.000
KA1-1	1357.829	1357.75		0.08	1.980	1.980
NO.1	1359.090	1359.04		0.05	20.000	18.020
KE1-1	1359.695	1359.62		0.08	28.646	8.646
NO.2	1360.490	1360.29		0.20	40.000	11.354
+15.000	1361.266	1361.47	0.20		55.000	15.000
NO.3	1361.402	1361.79	0.39		60.000	5.000
NO.4	1361.460	1356.85		4.61	80.000	20.000
KE1-2	1361.397	1351.16		10.24	99.977	19.977
NO.5	1361.397	1351.16		10.24	100.000	0.023
NO.6	1361.199	1357.74		3.46	120.000	20.000
+ 2.500	1361.116	1361.01		0.11	122.500	2.500
KA1-2	1360.942	1370.71	9.77		126.644	4.144
KA2-1	1360.390	1383.99	23.60		135.857	9.213
NO.7	1360.100	1388.28	28.18		140.000	4.143
NO.8	1358.700	1384.21	25.51		160.000	20.000
KE2-1	1358.150	1378.06	19.91		167.857	7.857
KE2-2	1357.845	1372.72	14.88		172.221	4.364
NO.9	1357.300	1362.99	5.69		180.000	7.779
NO.10	1355.920	1355.64		0.28	200.000	20.000
KA2-2	1355.673	1355.57		0.10	204.221	4.221
+ 7.500	1355.500	1355.51	0.01		207.500	3.279
IP-3	1355.170	1355.33	0.16		215.000	7.500
EP	1355.000	1355.16	0.16		220.000	5.000

曲率図:
R=∞ L=1.980
A=40.000 L1=26.667
R=60.000 LC=71.331
IP.1 IA=93° 34′ 51″ TL=77.708 CL=124.664 SL=28.354
A=40.000 L2=26.667
R=∞ L=9.213
A=40.000 L1=32.000
IP.2 IA=41° 40′ 12″ TL=35.297 CL=68.364 SL=4.408
R=50.000 LC=4.364
A=40.000 L2=32.000
R=∞ L=10.779
IP.3
R=∞ L=5.000

片勾配: -2.00% -2.00% -2.00% -2.00% -3.41% 3.41% -6.00% 6.00% -6.00% -5.99% 6.00% 5.99% -2.00% -0.01% -0.76% -2.00% -2.00% -0.96% -2.00% -4.04% 4.04% -6.00% 6.00% -6.00% 6.00% -4.06% 4.06% -2.00% -0.94% -2.00% -2.00% -2.00%

拡幅 (2車線合計): 0.000m 0.000m 0.000m 0.000m 0.422m 0.625m 0.625m 0.625m 0.625m 0.624m 0.156m 0.097m 0.000m 0.000m 0.000m 0.000m 0.097m 0.566m 0.750m 0.750m 0.750m 0.568m 0.099m 0.000m 0.000m 0.000m

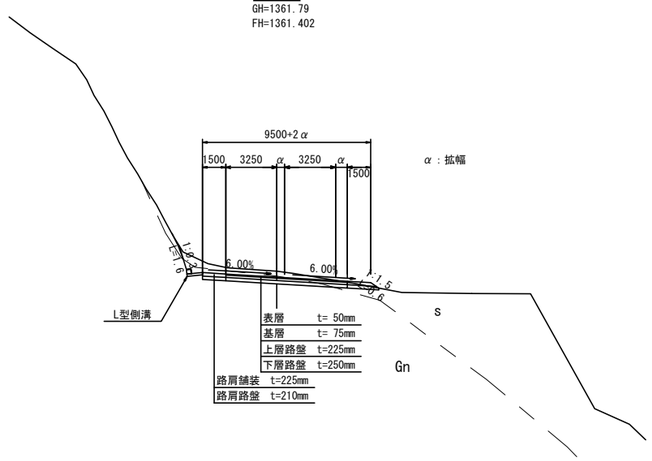
Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: PROFILE (CHUZOMSA BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : C-2

標準断面図

S=1:200

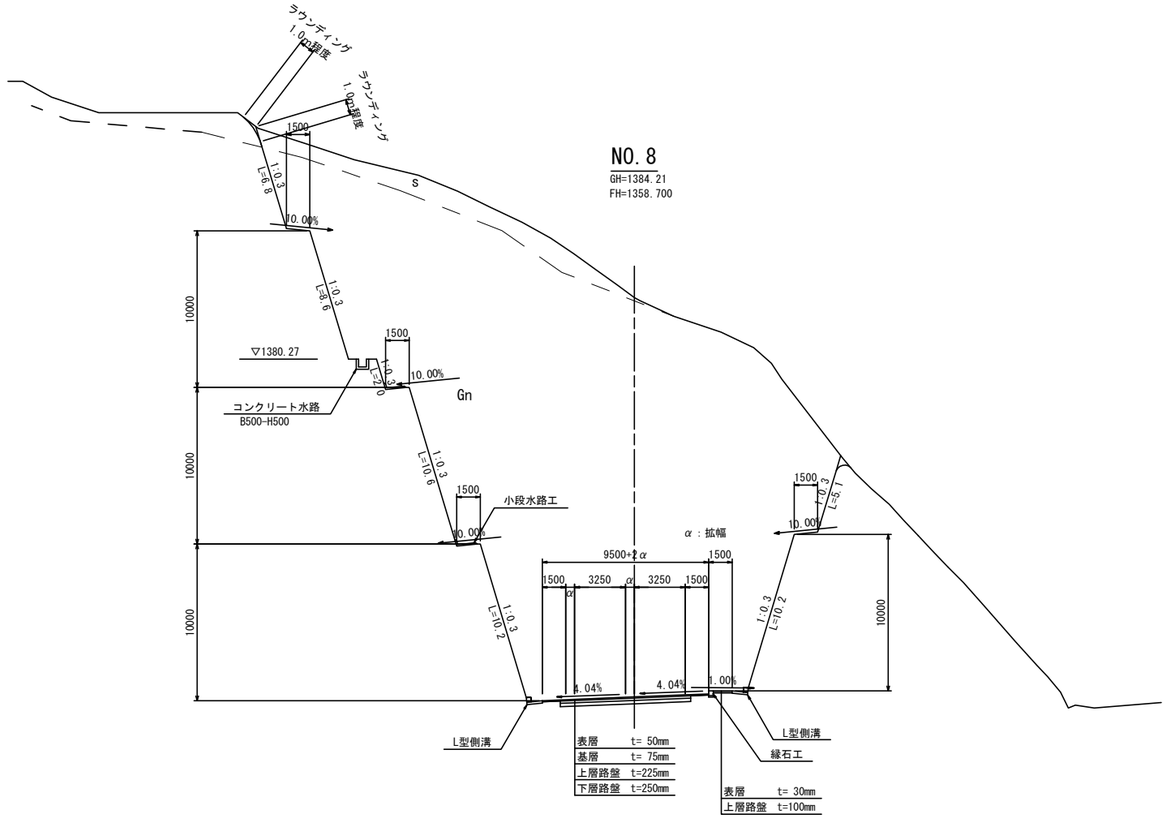
NO.3

GH=1361.79
FH=1361.402



NO.8

GH=1384.21
FH=1358.700

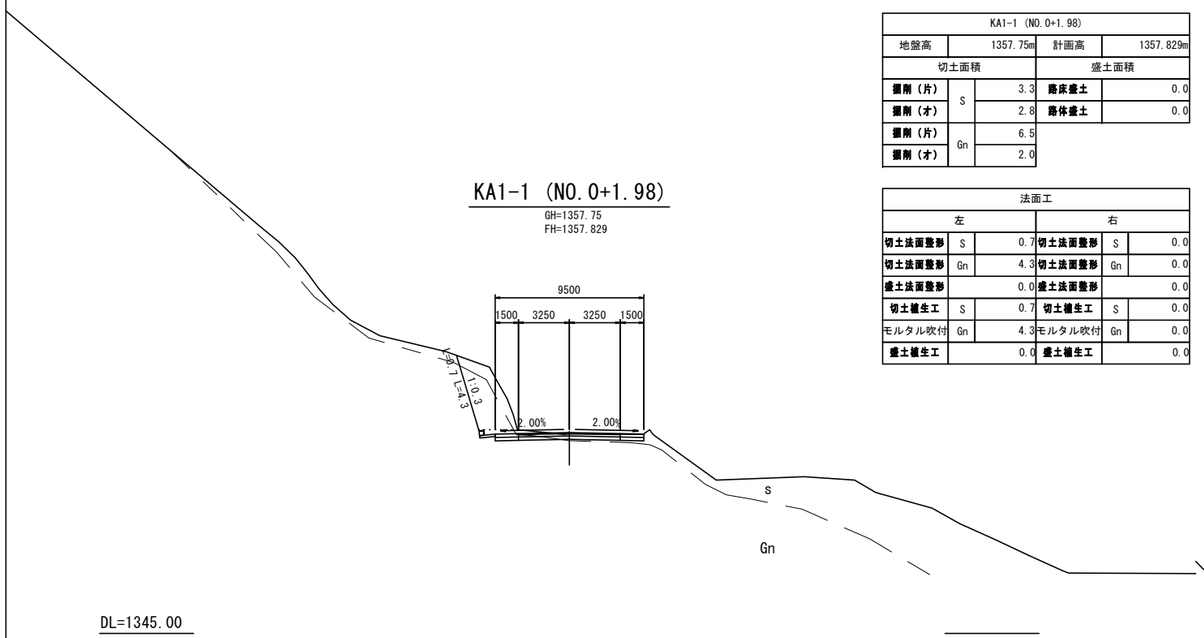


Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: TYPICAL CROSS SECTION (CHUZOMSA BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : C-3

横断図（１）

KA1-1 (NO.0+1.98)

GH=1357.75
FH=1357.829

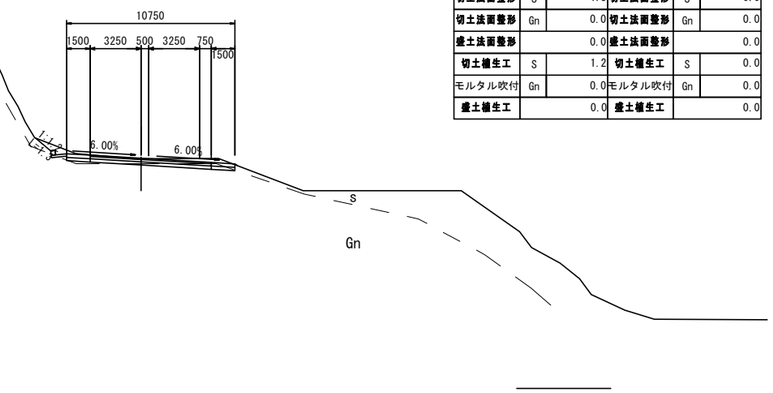


KA1-1 (NO.0+1.98)				
地盤高		1357.75m	計画高	1357.829m
切土面積			盛土面積	
掘削（片）	S	3.3	路床盛土	0.0
掘削（オ）		2.8	路体盛土	0.0
掘削（片）	Gn	6.5		
掘削（オ）		2.0		

法面工					
左			右		
切土法面整形	S	0.7	切土法面整形	S	0.0
切土法面整形	Gn	4.3	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	0.7	切土植生工	S	0.0
モルタル吹付	Gn	4.3	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

KE1-1 (NO.1+8.646)

GH=1359.62
FH=1359.695

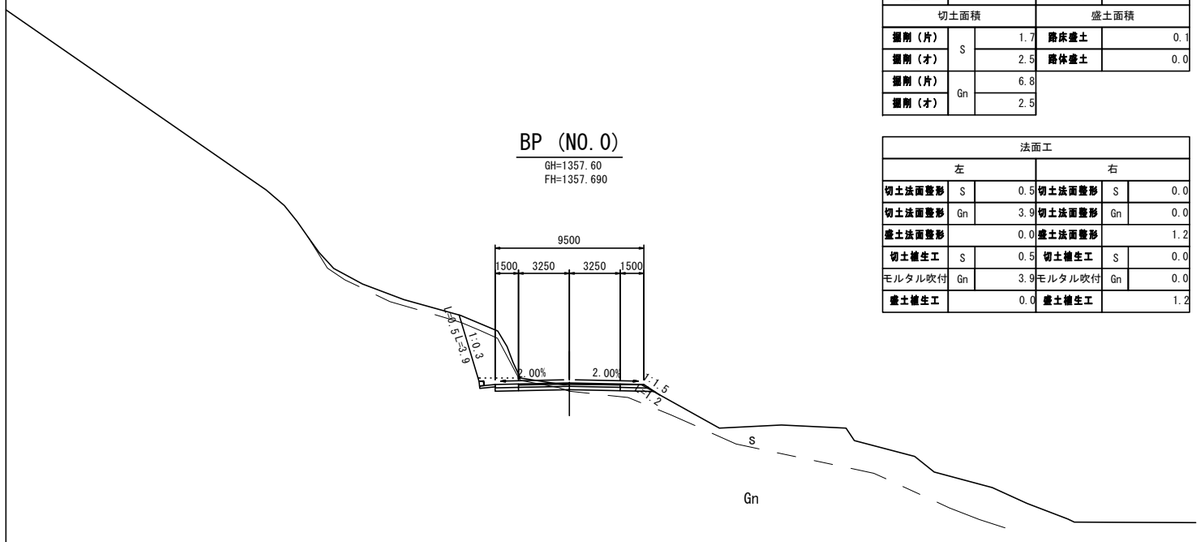


KE1-1 (NO.1+8.646)				
地盤高		1359.62m	計画高	1359.695m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		4.8	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		1.5		

法面工					
左			右		
切土法面整形	S	1.3	切土法面整形	S	0.0
切土法面整形	Gn	0.0	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.2	切土植生工	S	0.0
モルタル吹付	Gn	0.0	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

BP (NO.0)

GH=1357.60
FH=1357.690

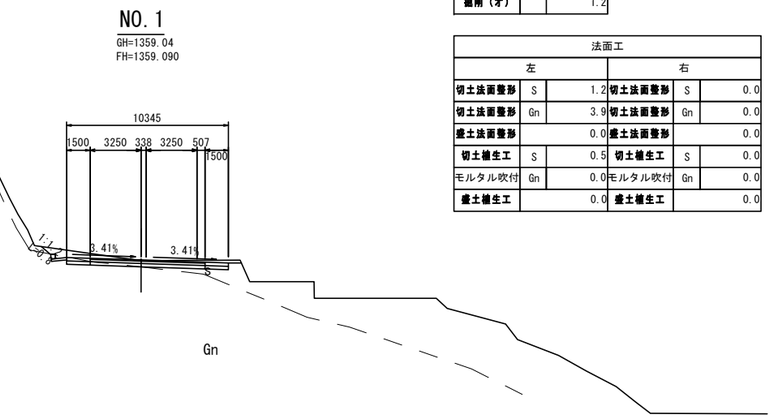


BP (NO.0)				
地盤高		1357.60m	計画高	1357.690m
切土面積			盛土面積	
掘削（片）	S	1.7	路床盛土	0.1
掘削（オ）		2.5	路体盛土	0.0
掘削（片）	Gn	6.8		
掘削（オ）		2.5		

法面工					
左			右		
切土法面整形	S	0.5	切土法面整形	S	0.0
切土法面整形	Gn	3.9	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		1.2
切土植生工	S	0.5	切土植生工	S	0.0
モルタル吹付	Gn	3.9	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		1.2

NO.1

GH=1359.04
FH=1359.090



NO.1				
地盤高		1359.04m	計画高	1359.090m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		5.7	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		1.2		

法面工					
左			右		
切土法面整形	S	1.2	切土法面整形	S	0.0
切土法面整形	Gn	3.9	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	0.5	切土植生工	S	0.0
モルタル吹付	Gn	0.0	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

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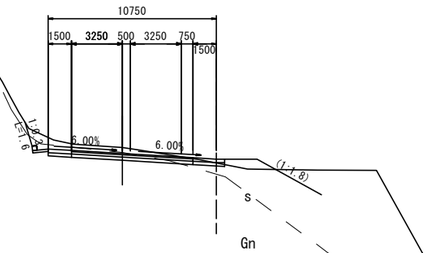
横断図（２）

NO.3

GH=1361.79
FH=1361.402



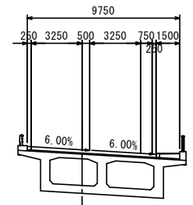
NO.3			
地盤高	1361.79m	計画高	1361.402m
切土面積		盛土面積	
掘削（片）	8.7	路床盛土	0.1
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.6
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.6

DL=1345.00

KE1-2 (NO.4+19.977)

GH=1351.16
FH=1361.397



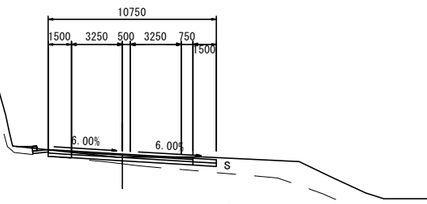
KE1-2 (NO.4+19.977)			
地盤高	1351.16m	計画高	1361.397m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

DL=1350.00

NO.2

GH=1360.29
FH=1360.490



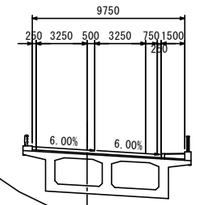
NO.2			
地盤高	1360.29m	計画高	1360.490m
切土面積		盛土面積	
掘削（片）	3.8	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.1
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.1
盛土植生工	0.0	盛土植生工	0.0

DL=1345.00

NO.4

GH=1356.85
FH=1361.460



NO.4			
地盤高	1356.85m	計画高	1361.460m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

DL=1350.00

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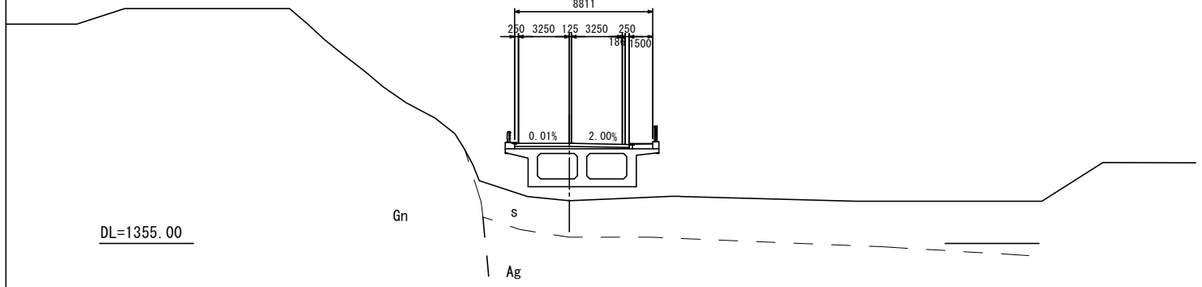
横断図（３）

NO.6			
地盤高	1357.74m	計画高	1361.199m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

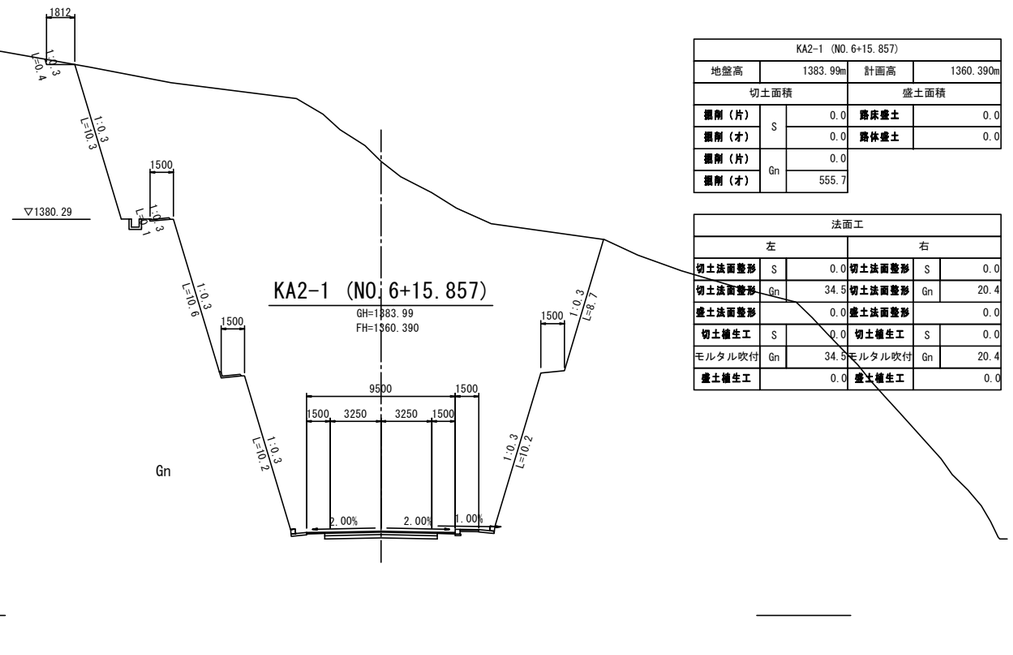
NO.6
GH=1357.74
FH=1361.199



KA2-1 (NO.6+15.857)					
地盤高		1383.99m	計画高		1360.390m
切土面積			盛土面積		
掘削（片）	S	0.0	路床盛土		0.0
掘削（オ）	S	0.0	路体盛土		0.0
掘削（片）	Gn	0.0			
掘削（オ）	Gn	555.7			

法面工					
左			右		
切土法面整形	S	0.0	切土法面整形	S	0.0
切土法面整形	Gn	34.5	切土法面整形	Gn	20.4
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	0.0	切土植生工	S	0.0
モルタル吹付	Gn	34.5	モルタル吹付	Gn	20.4
盛土植生工		0.0	盛土植生工		0.0

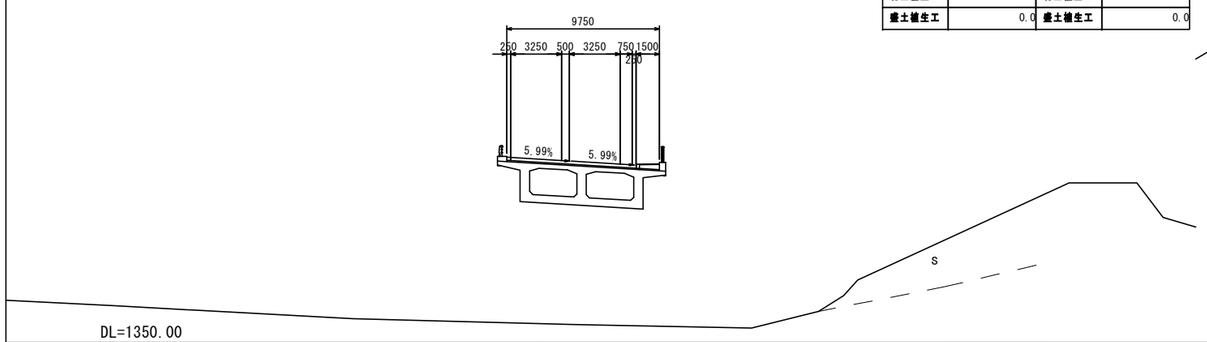
KA2-1 (NO.6+15.857)
GH=1383.99
FH=1360.390



NO.5			
地盤高	1351.16m	計画高	1361.397m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

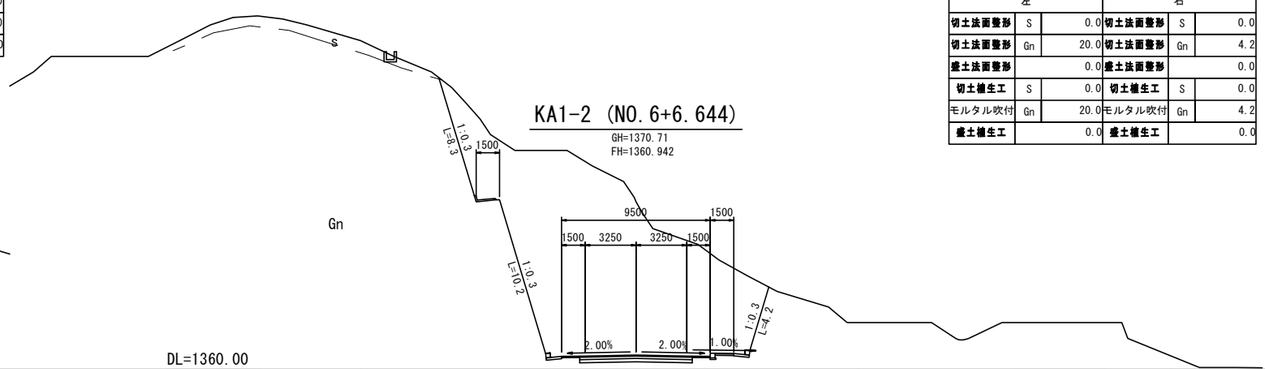
NO.5
GH=1351.16
FH=1361.397



KA1-2 (NO.6+6.644)					
地盤高		1370.71m	計画高		1360.942m
切土面積			盛土面積		
掘削（片）	S	0.0	路床盛土		0.0
掘削（オ）	S	0.0	路体盛土		0.0
掘削（片）	Gn	0.0			
掘削（オ）	Gn	165.4			

法面工					
左			右		
切土法面整形	S	0.0	切土法面整形	S	0.0
切土法面整形	Gn	20.0	切土法面整形	Gn	4.2
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	0.0	切土植生工	S	0.0
モルタル吹付	Gn	20.0	モルタル吹付	Gn	4.2
盛土植生工		0.0	盛土植生工		0.0

KA1-2 (NO.6+6.644)
GH=1370.71
FH=1360.942



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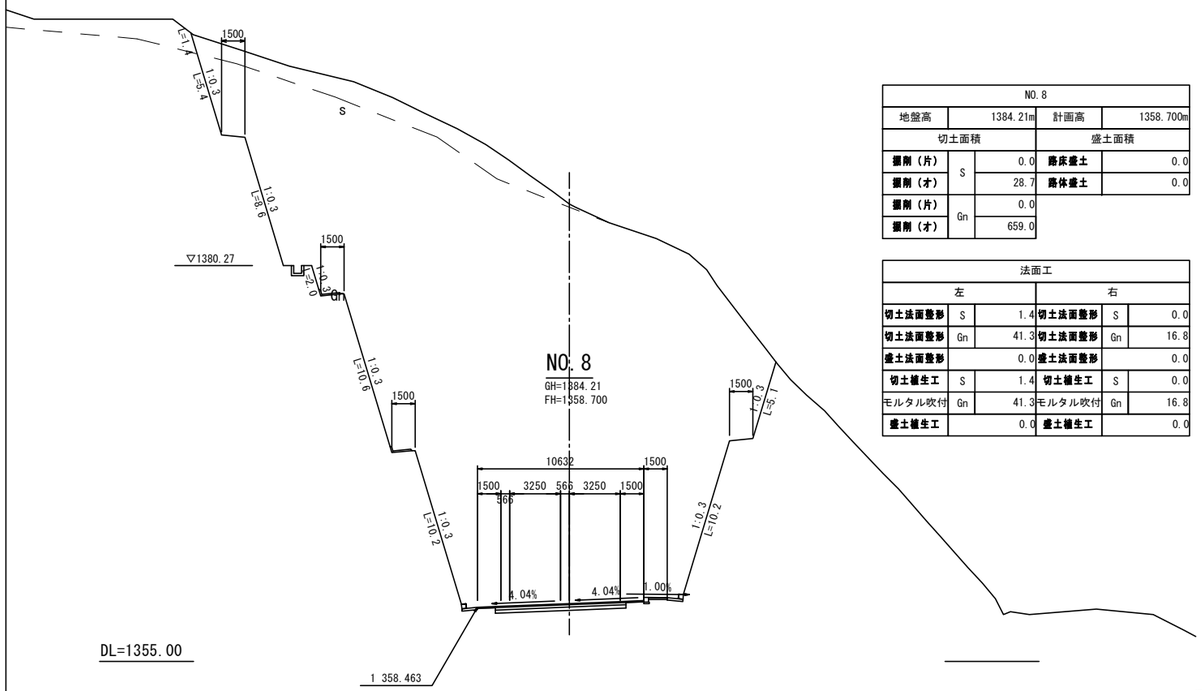
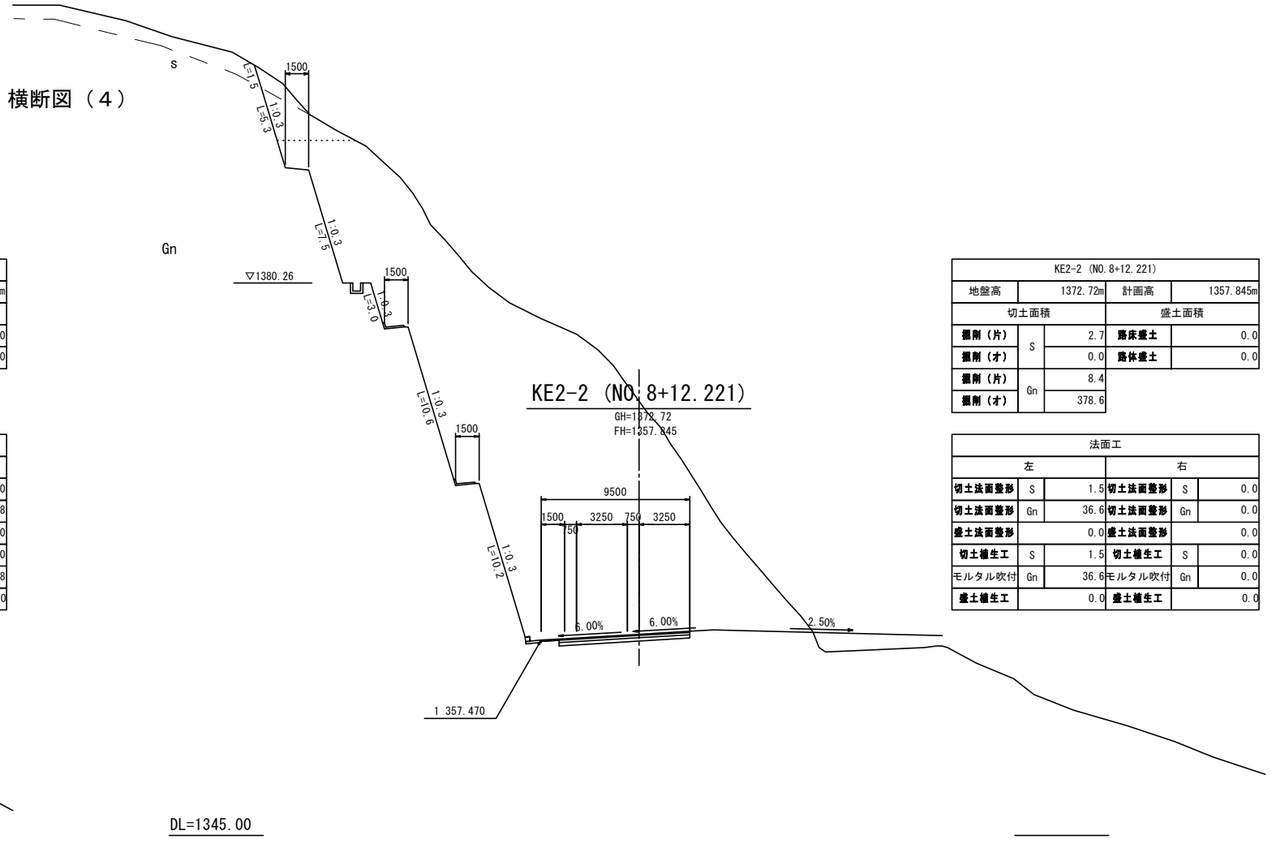
横断図（４）



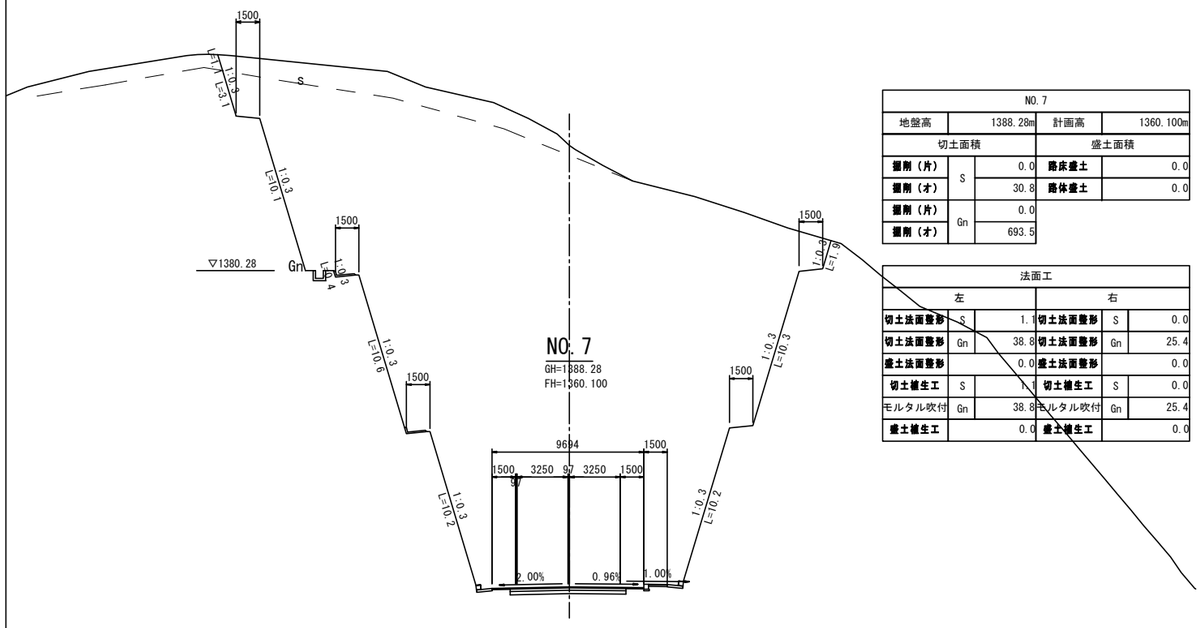
NO.8				
地盤高		1384.21m	計画高	1358.700m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		28.7	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		659.0		

法面工				
左			右	
切土法面整形	S	1.4	切土法面整形	S	0.0
切土法面整形	Gn	41.3	切土法面整形	Gn	16.8
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.4	切土植生工	S	0.0
モルタル吹付	Gn	41.3	モルタル吹付	Gn	16.8
盛土植生工		0.0	盛土植生工		0.0



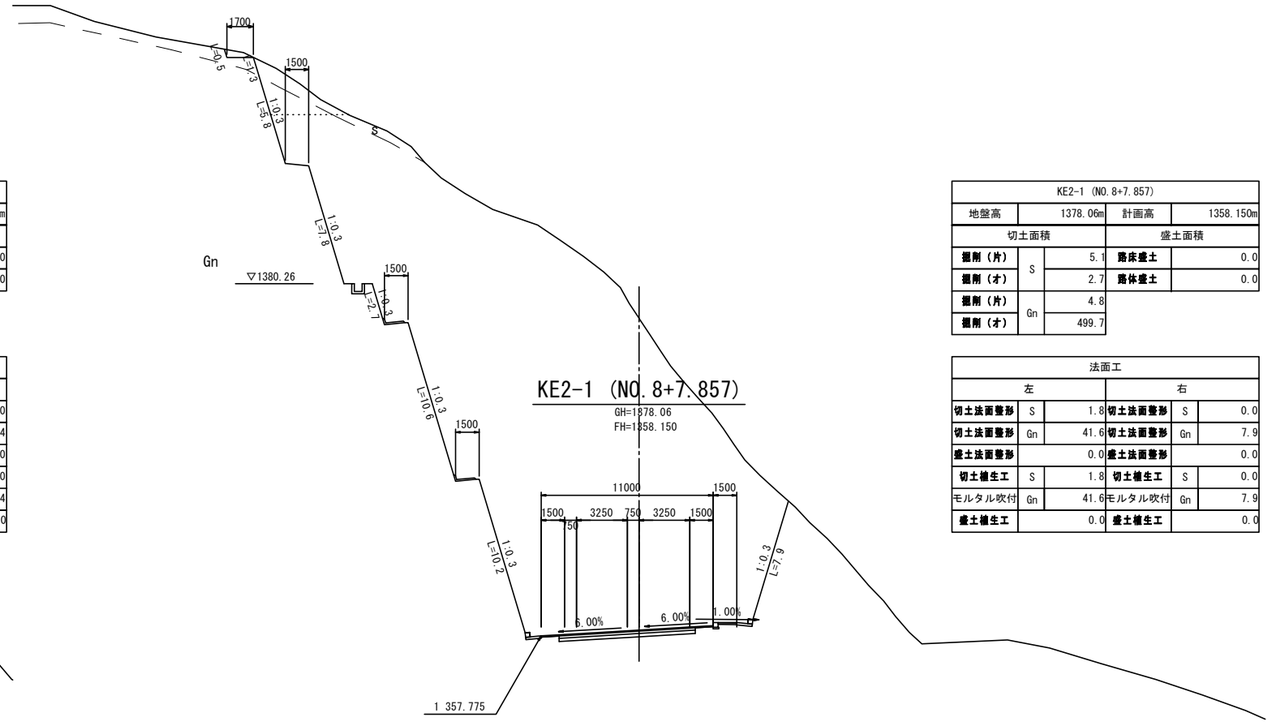
KE2-2 (NO.8+12.221)				
地盤高		1372.72m	計画高	1357.845m
切土面積			盛土面積	
掘削（片）	S	2.7	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	8.4		
掘削（オ）		378.6		

法面工				
左			右	
切土法面整形	S	1.5	切土法面整形	S	0.0
切土法面整形	Gn	36.6	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.5	切土植生工	S	0.0
モルタル吹付	Gn	36.6	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0



NO.7				
地盤高		1388.28m	計画高	1360.100m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		30.8	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		693.5		

法面工				
左			右	
切土法面整形	S	1.1	切土法面整形	S	0.0
切土法面整形	Gn	38.8	切土法面整形	Gn	25.4
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.1	切土植生工	S	0.0
モルタル吹付	Gn	38.8	モルタル吹付	Gn	25.4
盛土植生工		0.0	盛土植生工		0.0



KE2-1 (NO.8+7.857)				
地盤高		1378.06m	計画高	1358.150m
切土面積			盛土面積	
掘削（片）	S	5.1	路床盛土	0.0
掘削（オ）		2.7	路体盛土	0.0
掘削（片）	Gn	4.8		
掘削（オ）		499.7		

法面工				
左			右	
切土法面整形	S	1.8	切土法面整形	S	0.0
切土法面整形	Gn	41.6	切土法面整形	Gn	7.9
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.8	切土植生工	S	0.0
モルタル吹付	Gn	41.6	モルタル吹付	Gn	7.9
盛土植生工		0.0	盛土植生工		0.0

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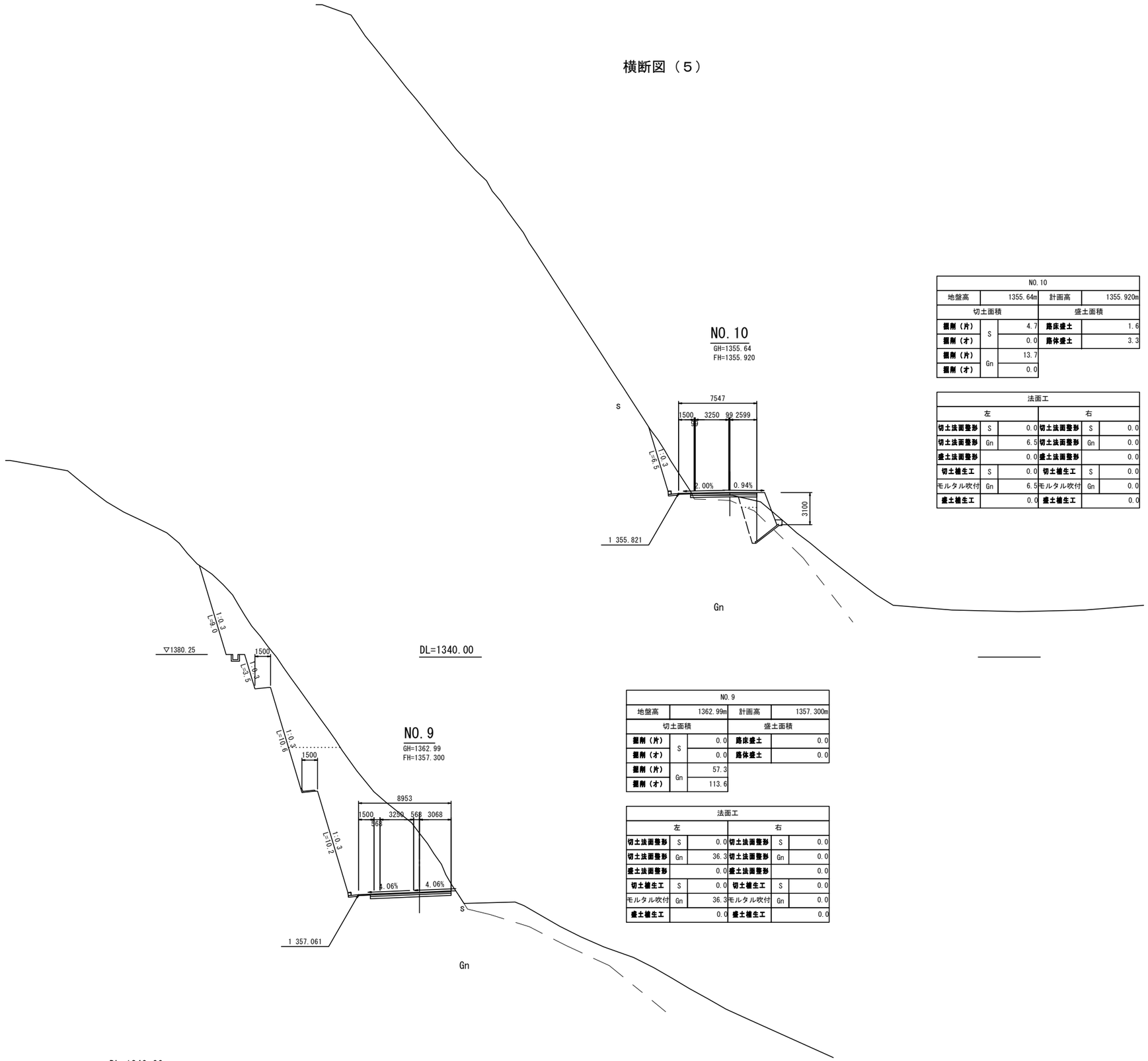
横断図（５）



NO.10				
地盤高	1355.64m		計画高	1355.920m
切土面積			盛土面積	
掘削（片）	S	4.7	路床盛土	1.6
掘削（オ）		0.0	路体盛土	3.3
掘削（片）	Gn	13.7		
掘削（オ）		0.0		

法面工					
左			右		
切土法面整形	S	0.0	切土法面整形	S	0.0
切土法面整形	Gn	6.5	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	0.0	切土植生工	S	0.0
モルタル吹付	Gn	6.5	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

NO.9				
地盤高	1362.99m		計画高	1357.300m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	57.3		
掘削（オ）		113.6		

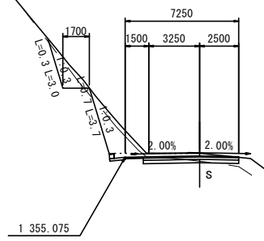
法面工					
左			右		
切土法面整形	S	0.0	切土法面整形	S	0.0
切土法面整形	Gn	36.3	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	0.0	切土植生工	S	0.0
モルタル吹付	Gn	36.3	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(5) (CHUZOMSA BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : C-8

横断図（６）

IP-3 (NO.10+15)

GH=1355.33
FH=1355.170



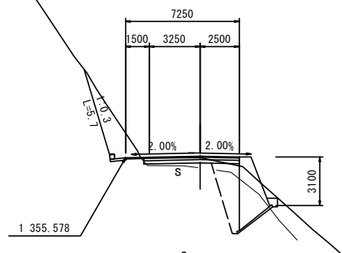
IP-3 (NO.10+15)				
地盤高	1355.33m		計画高	1355.170m
切土面積			盛土面積	
掘削（片）	S	2.0	路床盛土	0.0
掘削（オ）		2.5	路体盛土	0.0
掘削（片）	Gn	5.4		
掘削（オ）		1.9		

法面工					
左			右		
切土法面整形	S	1.0	切土法面整形	S	0.0
切土法面整形	Gn	6.7	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.0	切土植生工	S	0.0
モルタル吹付	Gn	6.7	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

DL=1340.00

KA2-2 (NO.10+4.221)

GH=1355.57
FH=1355.673



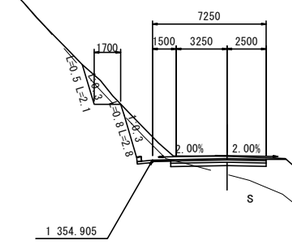
KA2-2 (NO.10+4.221)				
地盤高	1355.57m		計画高	1355.673m
切土面積			盛土面積	
掘削（片）	S	3.1	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	15.0		
掘削（オ）		0.0		

法面工					
左			右		
切土法面整形	S	0.0	切土法面整形	S	0.0
切土法面整形	Gn	5.7	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	0.0	切土植生工	S	0.0
モルタル吹付	Gn	5.7	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

DL=1340.00

EP (NO.11)

GH=1355.16
FH=1355.000



EP (NO.11)				
地盤高	1355.16m		計画高	1355.000m
切土面積			盛土面積	
掘削（片）	S	1.1	路床盛土	0.0
掘削（オ）		5.1	路体盛土	0.0
掘削（片）	Gn	1.2		
掘削（オ）		3.3		

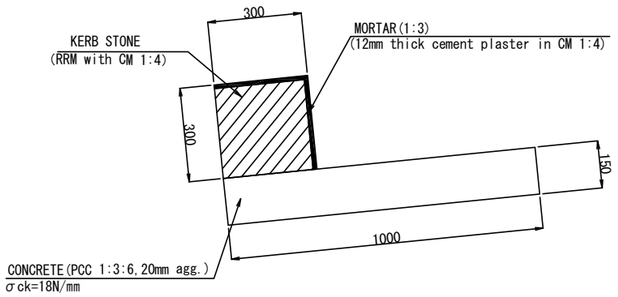
法面工					
左			右		
切土法面整形	S	1.3	切土法面整形	S	0.0
切土法面整形	Gn	4.9	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.3	切土植生工	S	0.0
モルタル吹付	Gn	4.9	モルタル吹付	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

DL=1325.00

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(6) (CHUZOMSA BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : C-9

道路構造物構造図

L-DRAIN S=1:20



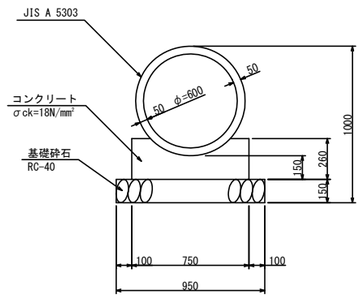
QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
KERB STONE	RRM with CM 1:4	m	10.00
CONCRETE	σck=18N/mm 2	m3	1.50
FORM		m2	3.00
MORTAR	1:3	m3	0.07

パイプカルバート S=1:20

(P1-RC-2-D600)



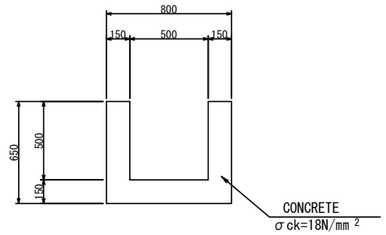
数量表

10m当り

種　別	規格・寸法	単位	数　量
管本数	RC2種 D600	本	4.1
コンクリート	σck=18N/mm2	m3	1.563
型枠		m2	5.200
基礎砕石	RC-40　t=15cm	m2	9.500

コンクリート水路 S=1:20

(500×500)



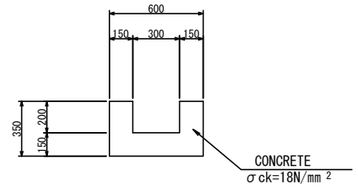
QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	2.70
FORM		m2	26.00

縦排水工 S=1:20

(300×200)

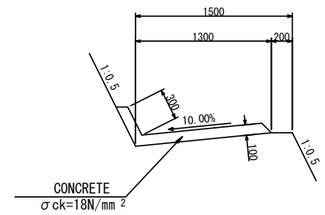


QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	1.50
FORM		m2	14.00

小段排水工 S=1:30



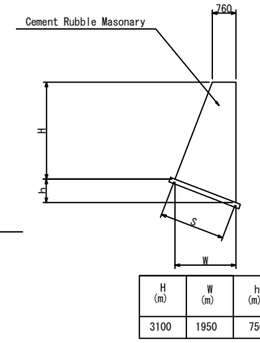
QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	1.59
目地材	t=10mm	m2	0.16

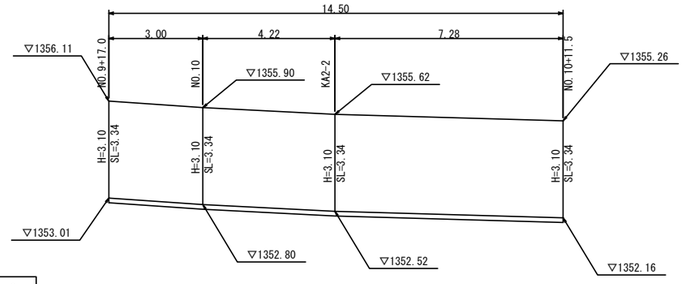
RETAINING WALL S=1:100

SECTION



H (m)	W (m)	h (m)	S (m)
3100	1950	750	2090

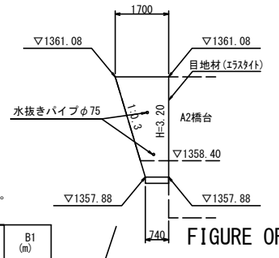
DEPLOYMENT



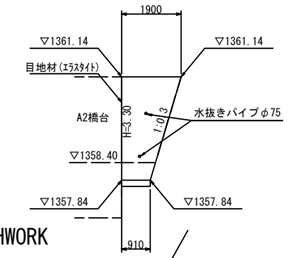
CONCRETE RETAINING WALL S=1:100

DEPLOYMENT

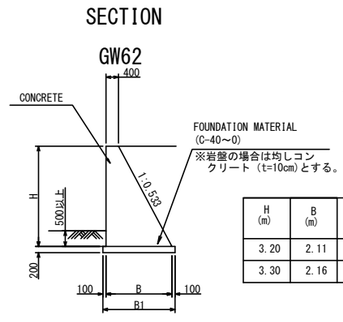
(NO.6+2.7　LEFT)



(NO.6+4.4　RIGHT)



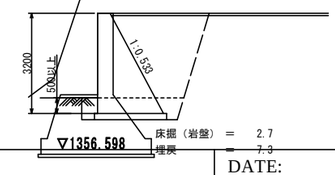
SECTION



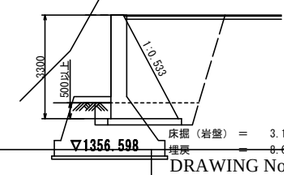
H (m)	B (m)	B1 (m)
3.20	2.11	2.31
3.30	2.16	2.36

FIGURE OF EARTHWORK

(NO.6+2.7　LEFT)

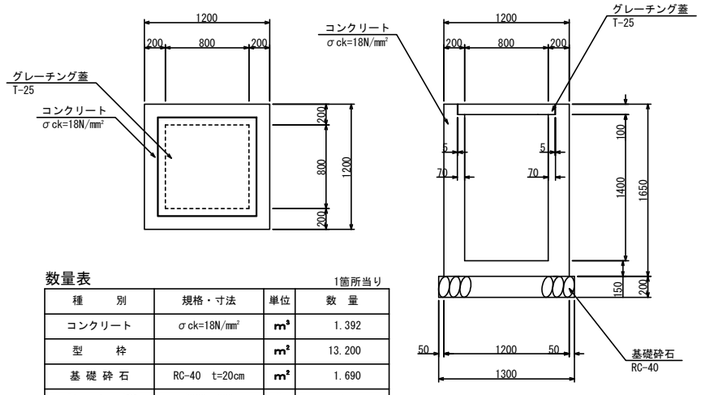


(NO.6+4.4　RIGHT)



CATCH BASIN TYPE-A S=1:30

(800×800×1400)



数量表

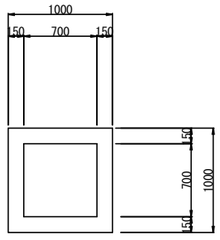
1箇所当り

種　別	規格・寸法	単位	数　量
コンクリート	σck=18N/mm2	m3	1.392
型　枠		m2	13.200
基礎砕石	RC-40　t=20cm	m2	1.690
グレーチング蓋	B800-L800	枚	1

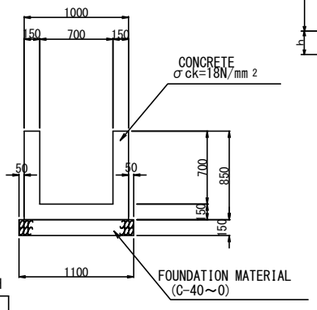
CATCH BASIN TYPE-B S=1:20

(700×700×700)

PLAN



PROFILE

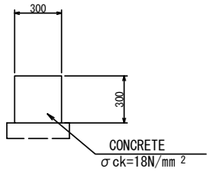


QUANTITY

PER EACH

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	0.51
FORM		m2	5.78
FOUNDATION BASE MATERIAL	C-40～0	m2	1.21

縁石工 S=1:20



QUANTITY

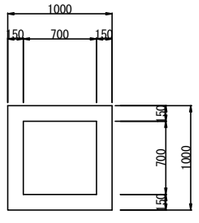
PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	0.90
FORM		m2	6.00

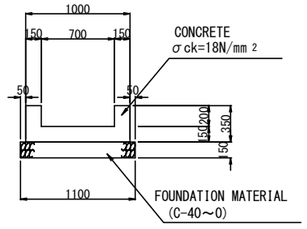
CATCH BASIN TYPE-C S=1:30

(700×700×200)

PLAN



PROFILE



QUANTITY

PER EACH

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	0.25
FORM		m2	2.38
FOUNDATION BASE MATERIAL	C-40～0	m2	1.21

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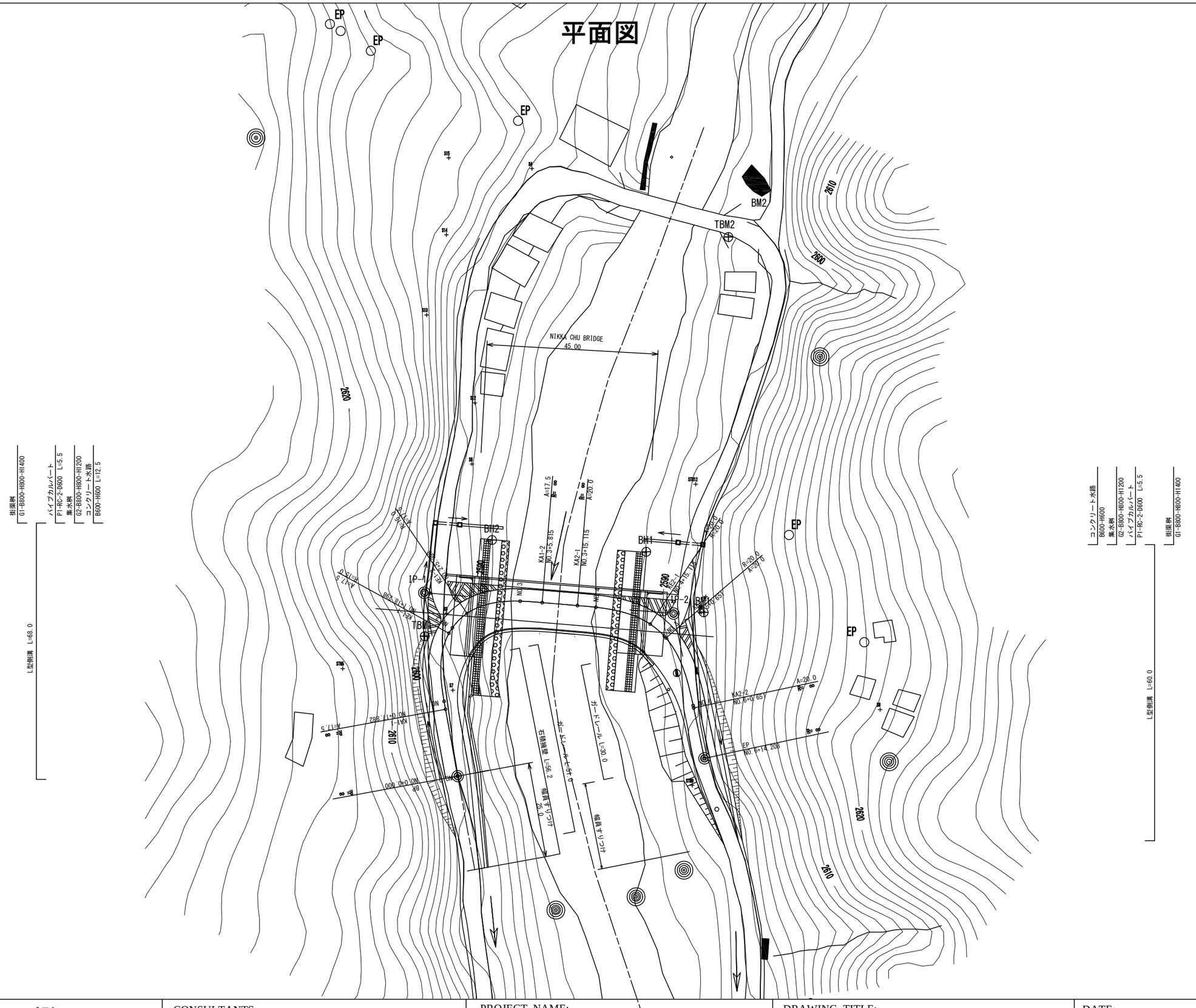
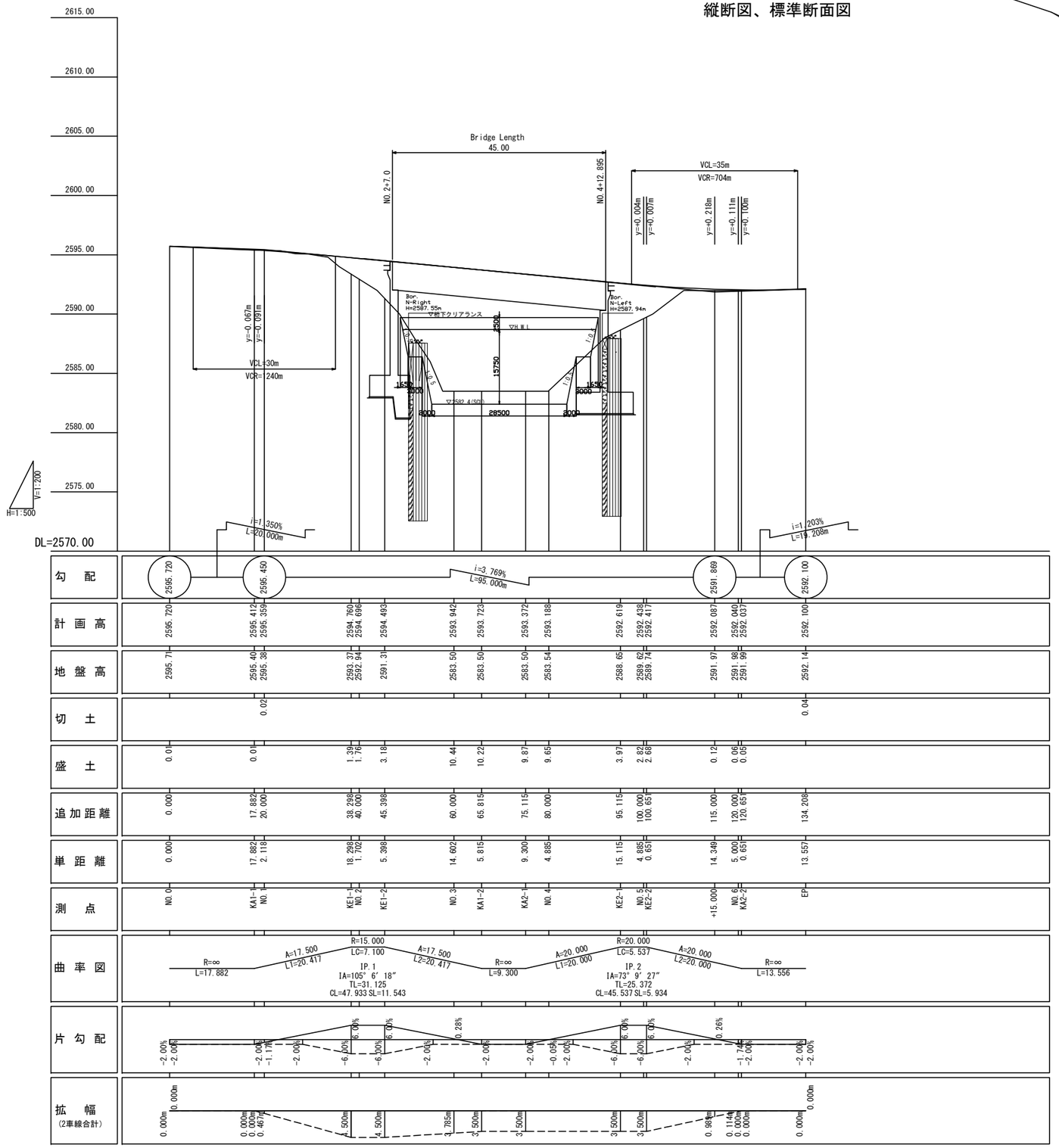
(2)　ニカチュ橋

平面図

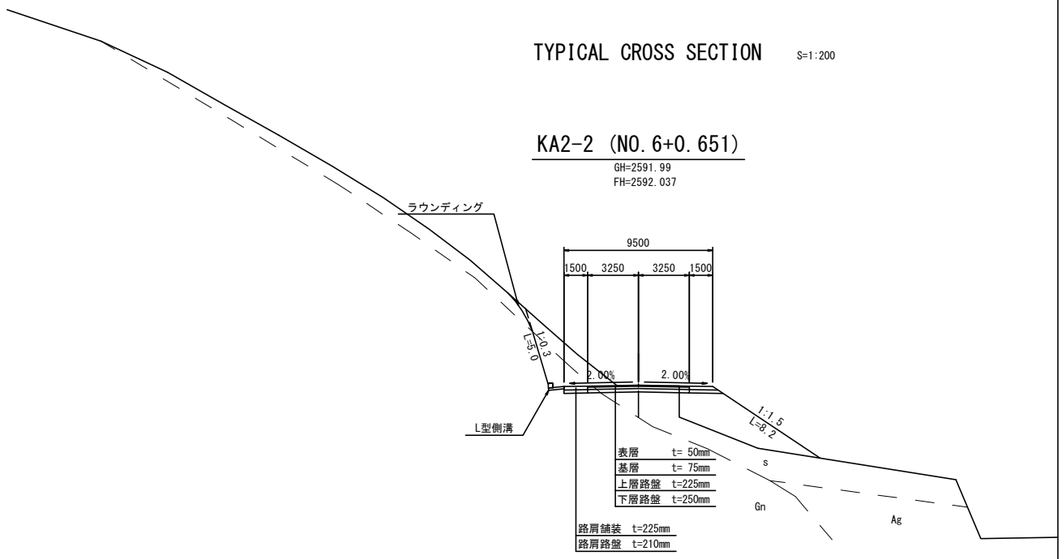


Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: PLAN (NIKACHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : N-1

縦断図、標準断面図



TYPICAL CROSS SECTION S=1:200

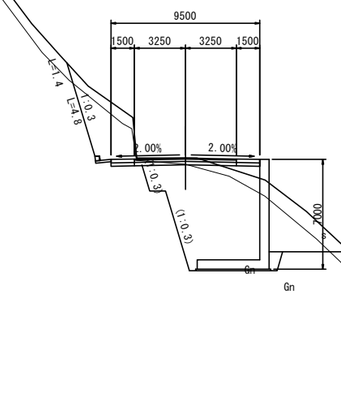


Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: PROFILE AND TYPICAL CROSS SECTION (NIKACHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : N-2

横断図（１）

KA1-1 (NO.0+17.882)

GH=2595.40
FH=2595.412



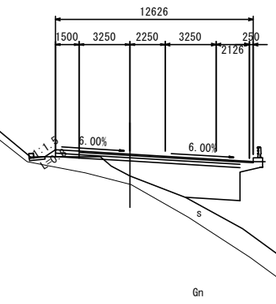
KA1-1 (NO.0+17.882)				
地盤高	2595.40m		計画高	2595.412m
切土面積			盛土面積	
掘削（片）	S	4.7	路床盛土	1.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	10.7		
掘削（オ）		0.0		

法面工					
左			右		
切土法面整形	S	1.4	切土法面整形	S	0.0
切土法面整形	Gn	4.8	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.4	切土植生工	S	0.0
切土モルタル吹付工	Gn	4.8	切土モルタル吹付工	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

DL=2580.00

KE1-1 (NO.1+18.298)

GH=2593.37
FH=2594.760



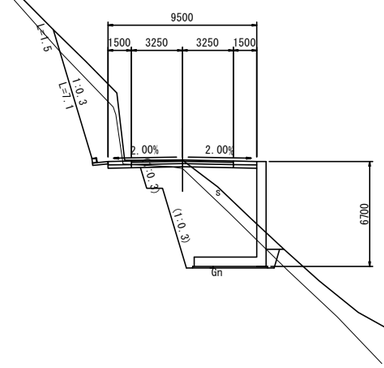
KE1-1 (NO.1+18.298)				
地盤高	2593.37m		計画高	2594.760m
切土面積			盛土面積	
掘削（片）	S	0.4	路床盛土	0.2
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工					
左			右		
切土法面整形	S	0.0	切土法面整形	S	0.0
切土法面整形	Gn	0.0	切土法面整形	Gn	0.0
盛土法面整形		0.8	盛土法面整形		0.0
切土植生工	S	0.0	切土植生工	S	0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn	0.0
盛土植生工		0.8	盛土植生工		0.0

DL=2580.00

BP (NO.0)

GH=2595.71
FH=2595.720



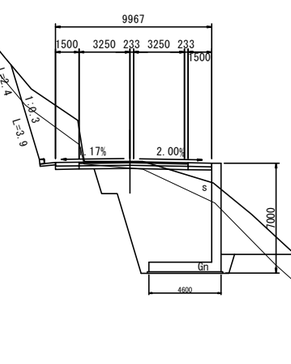
BP (NO.0)				
地盤高	2595.71m		計画高	2595.720m
切土面積			盛土面積	
掘削（片）	S	6.3	路床盛土	5.7
掘削（オ）		0.0	路体盛土	1.3
掘削（片）	Gn	12.7		
掘削（オ）		0.0		

法面工					
左			右		
切土法面整形	S	1.5	切土法面整形	S	0.0
切土法面整形	Gn	7.1	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	1.5	切土植生工	S	0.0
切土モルタル吹付工	Gn	7.	切土モルタル吹付工	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

DL=2580.00

NO.1

GH=2595.38
FH=2595.359



NO.1				
地盤高	2595.38m		計画高	2595.359m
切土面積			盛土面積	
掘削（片）	S	7.5	路床盛土	1.1
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	8.4		
掘削（オ）		0.0		

法面工					
左			右		
切土法面整形	S	2.4	切土法面整形	S	0.0
切土法面整形	Gn	3.9	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		0.0
切土植生工	S	2.4	切土植生工	S	0.0
切土モルタル吹付工	Gn	3.9	切土モルタル吹付工	Gn	0.0
盛土植生工		0.0	盛土植生工		0.0

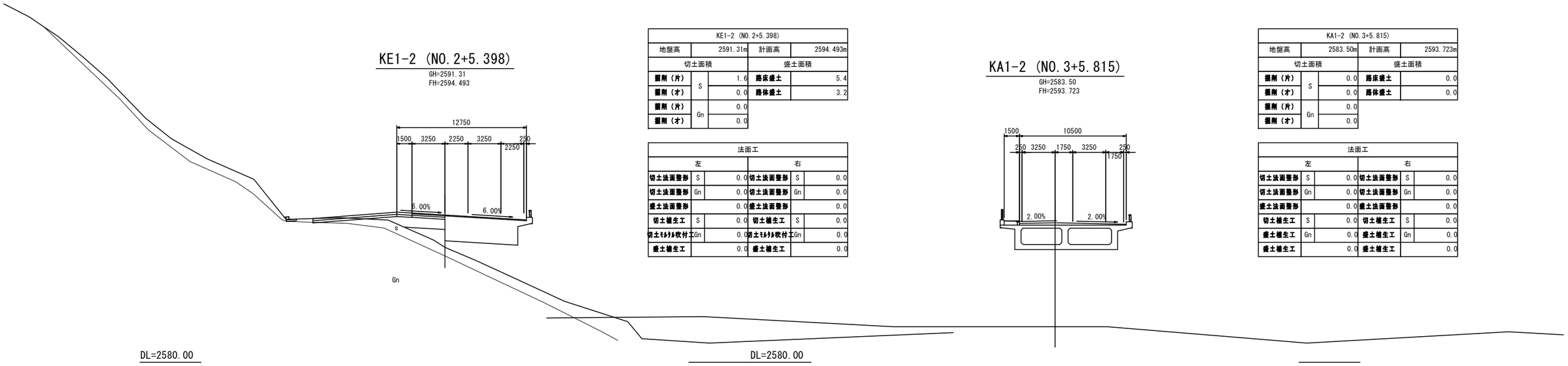
DL=2580.00

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(1) (NIKACHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : N-3

横断図（２）

KE1-2 (NO.2+5.398)

GH=2591.31
FH=2594.493



KE1-2 (NO.2+5.398)				
地盤高		2591.31m	計画高	2594.493m
切土面積			盛土面積	
掘削（片）	S	1.6	路床盛土	5.4
掘削（オ）		0.0	路体盛土	3.2
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn 0.0
盛土植生工		0.0	盛土植生工	0.0

KA1-2 (NO.3+5.815)

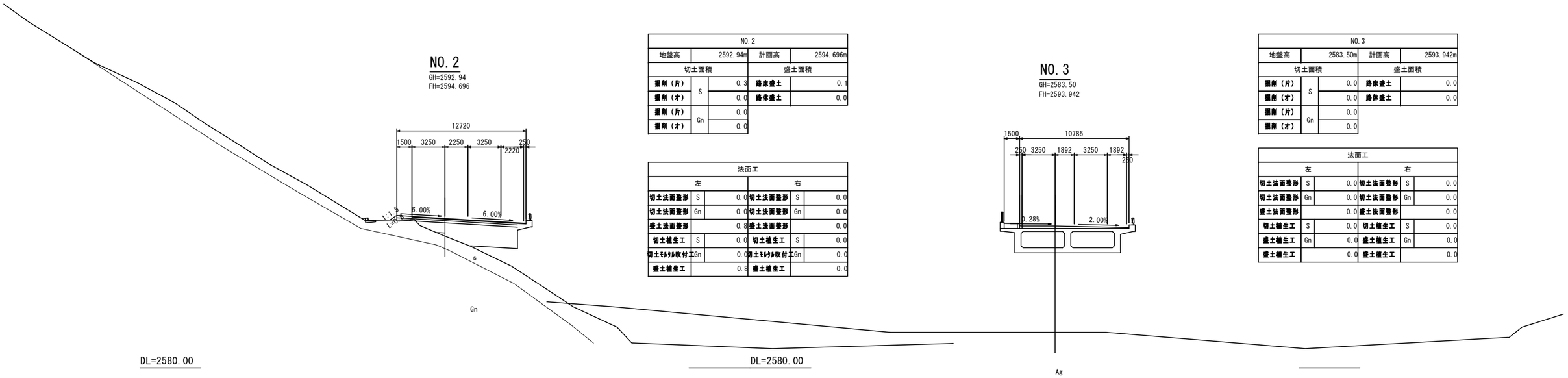
GH=2583.50
FH=2593.723

KA1-2 (NO.3+5.815)				
地盤高		2583.50m	計画高	2593.723m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
盛土植生工	Gn	0.0	盛土植生工	Gn 0.0
盛土植生工		0.0	盛土植生工	0.0

NO.2

GH=2592.94
FH=2594.696



NO.2				
地盤高		2592.94m	計画高	2594.696m
切土面積			盛土面積	
掘削（片）	S	0.3	路床盛土	0.1
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.8	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn 0.0
盛土植生工		0.8	盛土植生工	0.0

NO.3

GH=2583.50
FH=2593.942

NO.3				
地盤高		2583.50m	計画高	2593.942m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

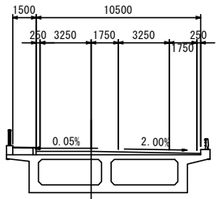
法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
盛土植生工	Gn	0.0	盛土植生工	Gn 0.0
盛土植生工		0.0	盛土植生工	0.0

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(2) (NIKACHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : N-4

横断図（３）

NO.4

GH=2583.55
FH=2593.188

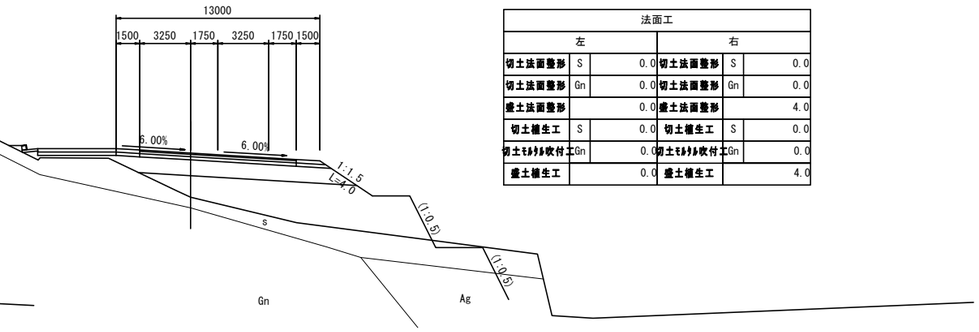


NO.4				
地盤高	2583.55m		計画高	2593.188m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn 0.0
盛土植生工		0.0	盛土植生工	0.0

NO.5

GH=2589.62
FH=2592.438

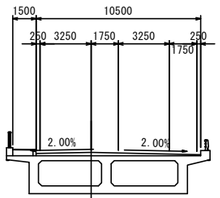


NO.5				
地盤高	2589.62m		計画高	2592.438m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	15.3
掘削（オ）		0.0	路体盛土	36.7
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	4.0
切土植生工	S	0.0	切土植生工	S 0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn 0.0
盛土植生工		0.0	盛土植生工	4.0

KA2-1 (NO.3+15.115)

GH=2583.50
FH=2593.372



KA2-1 (NO.3+15.115)				
地盤高	2583.50m		計画高	2593.372m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn 0.0
盛土植生工		0.0	盛土植生工	0.0

KE2-1 (NO.4+15.115)

GH=2588.65
FH=2592.619

KE2-1 (NO.4+15.115)				
地盤高	2588.65m		計画高	2592.619m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	0.0
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn 0.0
盛土植生工		0.0	盛土植生工	0.0

DL=2580.00　　DL=2580.00　　DL=2580.00

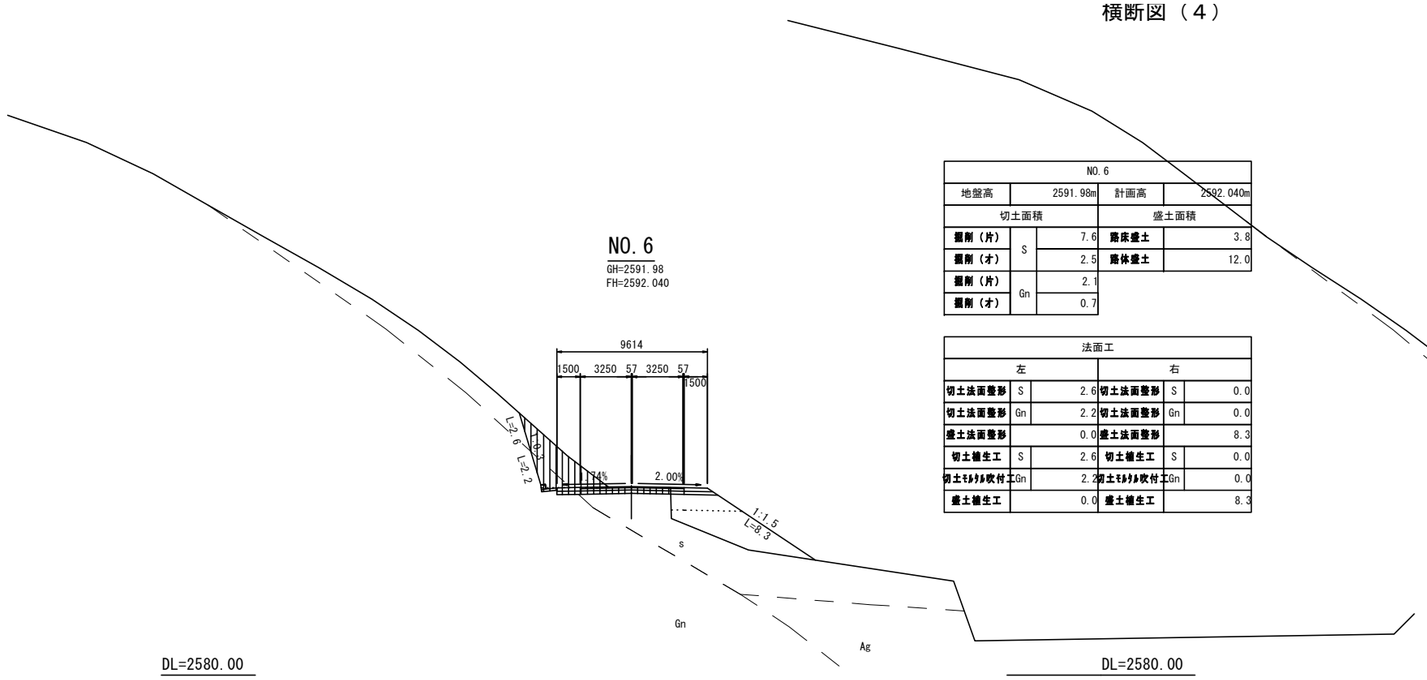
Ag　　Ag

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(3) (NIKACHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : N-5

横断図（４）

NO.6

GH=2591.98
FH=2592.040

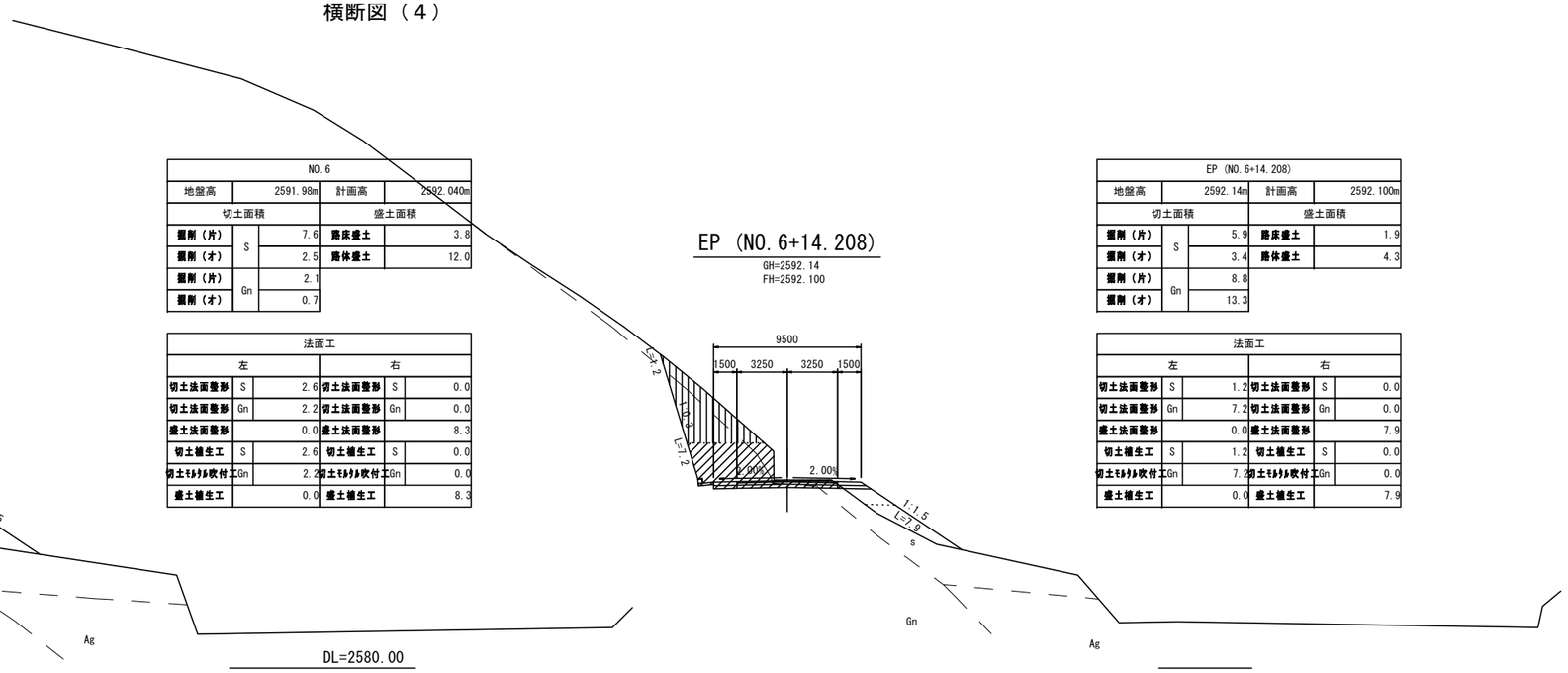


NO.6					
地盤高	2591.98m		計画高	2592.040m	
切土面積			盛土面積		
掘削（片）	S	7.6	路床盛土	3.8	
掘削（オ）		2.5	路体盛土	12.0	
掘削（片）	Gn	2.1			
掘削（オ）		0.7			

法面工					
左			右		
切土法面整形	S	2.6	切土法面整形	S	0.0
切土法面整形	Gn	2.2	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		8.3
切土植生工	S	2.6	切土植生工	S	0.0
切土モルタル吹付工	Gn	2.2	切土モルタル吹付工	Gn	0.0
盛土植生工		0.0	盛土植生工		8.3

EP (NO.6+14.208)

GH=2592.14
FH=2592.100

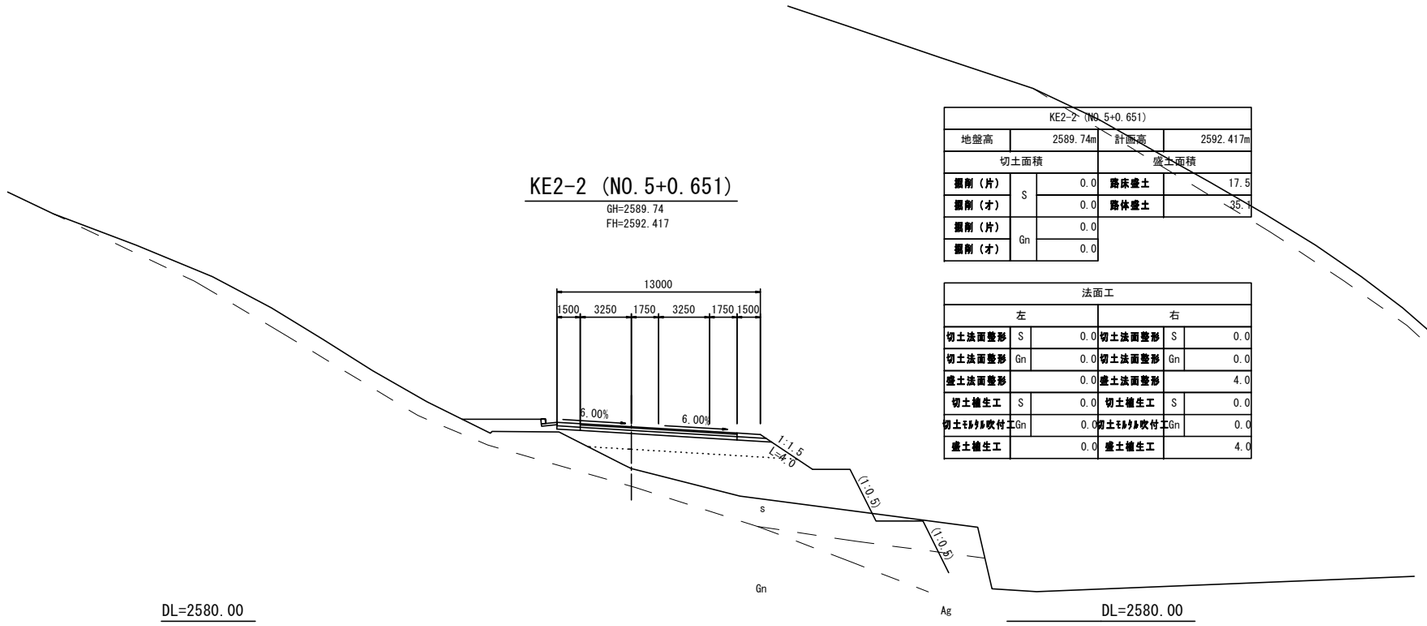


EP (NO.6+14.208)					
地盤高	2592.14m		計画高	2592.100m	
切土面積			盛土面積		
掘削（片）	S	5.9	路床盛土	1.9	
掘削（オ）		3.4	路体盛土	4.3	
掘削（片）	Gn	8.8			
掘削（オ）		13.3			

法面工					
左			右		
切土法面整形	S	1.2	切土法面整形	S	0.0
切土法面整形	Gn	7.2	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		7.9
切土植生工	S	1.2	切土植生工	S	0.0
切土モルタル吹付工	Gn	7.2	切土モルタル吹付工	Gn	0.0
盛土植生工		0.0	盛土植生工		7.9

KE2-2 (NO.5+0.651)

GH=2589.74
FH=2592.417

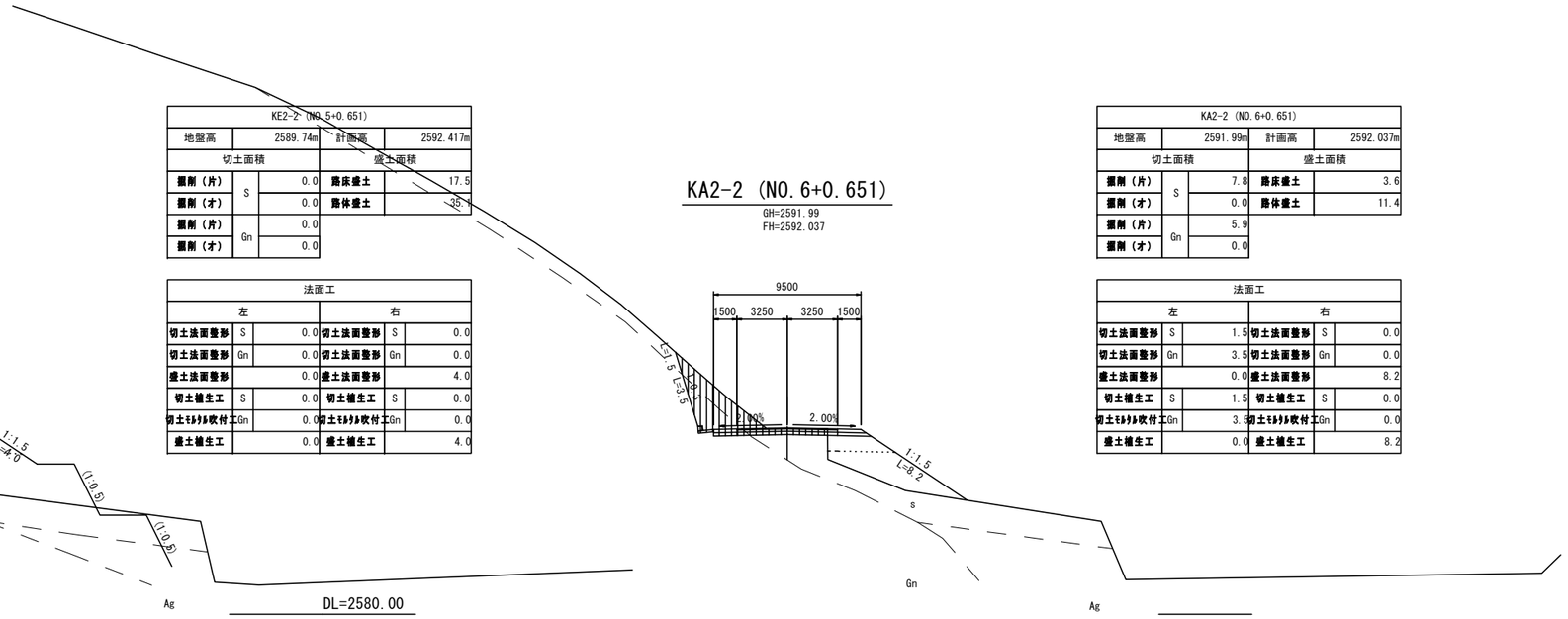


KE2-2 (NO.5+0.651)					
地盤高	2589.74m		計画高	2592.417m	
切土面積			盛土面積		
掘削（片）	S	0.0	路床盛土	17.5	
掘削（オ）		0.0	路体盛土	25.1	
掘削（片）	Gn	0.0			
掘削（オ）		0.0			

法面工					
左			右		
切土法面整形	S	0.0	切土法面整形	S	0.0
切土法面整形	Gn	0.0	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		4.0
切土植生工	S	0.0	切土植生工	S	0.0
切土モルタル吹付工	Gn	0.0	切土モルタル吹付工	Gn	0.0
盛土植生工		0.0	盛土植生工		4.0

KA2-2 (NO.6+0.651)

GH=2591.99
FH=2592.037



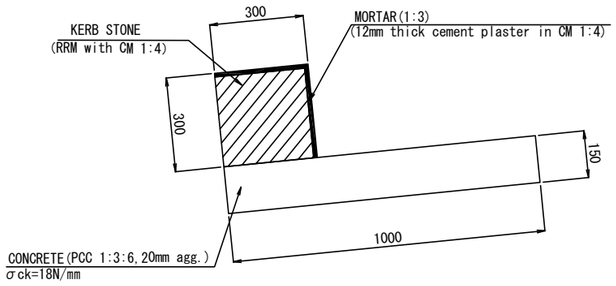
KA2-2 (NO.6+0.651)					
地盤高	2591.99m		計画高	2592.037m	
切土面積			盛土面積		
掘削（片）	S	7.8	路床盛土	3.6	
掘削（オ）		0.0	路体盛土	11.4	
掘削（片）	Gn	5.9			
掘削（オ）		0.0			

法面工					
左			右		
切土法面整形	S	1.5	切土法面整形	S	0.0
切土法面整形	Gn	3.5	切土法面整形	Gn	0.0
盛土法面整形		0.0	盛土法面整形		8.2
切土植生工	S	1.5	切土植生工	S	0.0
切土モルタル吹付工	Gn	3.5	切土モルタル吹付工	Gn	0.0
盛土植生工		0.0	盛土植生工		8.2

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(4) (NIKACHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : N-6

道路構造物構造図

L-DRAIN S=1:20



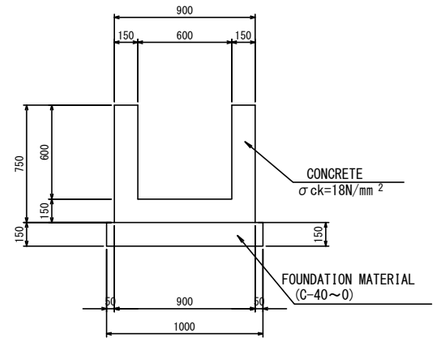
QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
KERB STONE	RRM with CM 1:4	m	10.00
CONCRETE	σck=18N/mm 2	m3	1.50
FORM		m2	3.00
MORTAR	1:3	m3	0.07

コンクリート水路 S=1:20

(600×600)



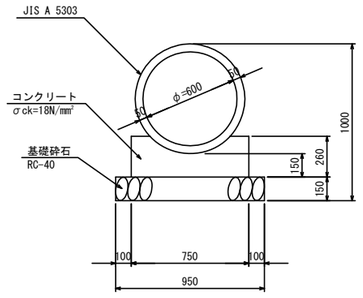
QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	3.15
FORM		m2	30.00
FOUNDATION BASE MATERIAL	C-40～0	m2	10.00

パイプカルバート S=1:20

(P1-RC-2-D600)



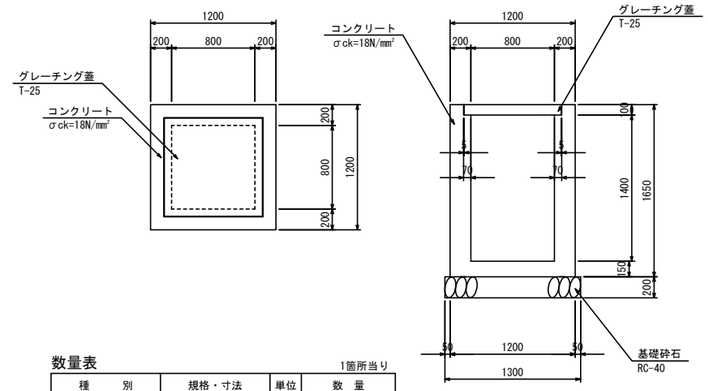
数量表

10m当り

種別	規格・寸法	単位	数量
管本数	RC2種 D600	本	4.1
コンクリート	σck=18N/mm2	m3	1.563
型枠		m2	5.200
基礎砕石	RC-40 t=15cm	m2	9.500

CATCH BASIN TYPE-A S=1:30

(800×800×1400)



数量表

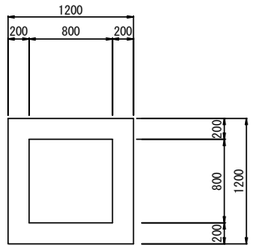
1箇所当り

種別	規格・寸法	単位	数量
コンクリート	σck=18N/mm2	m3	1.392
型枠		m2	13.200
基礎砕石	RC-40 t=20cm	m3	1.690
グレーチング蓋	B800-L800	枚	1

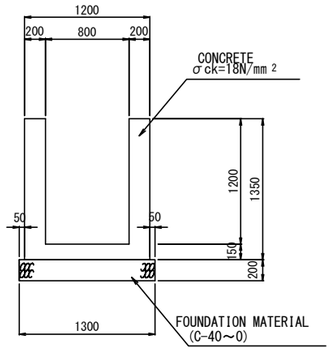
CATCH BASIN TYPE-B S=1:30

(800×800×1200)

PLAN



PROFILE



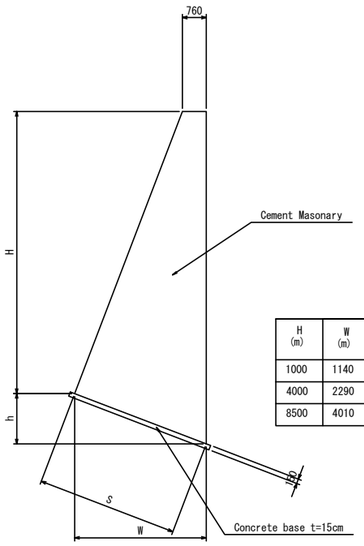
QUANTITY

PER EACH

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm 2	m3	1.18
FORM		m2	10.80
FOUNDATION BASE MATERIAL	C-40～0	m2	1.69

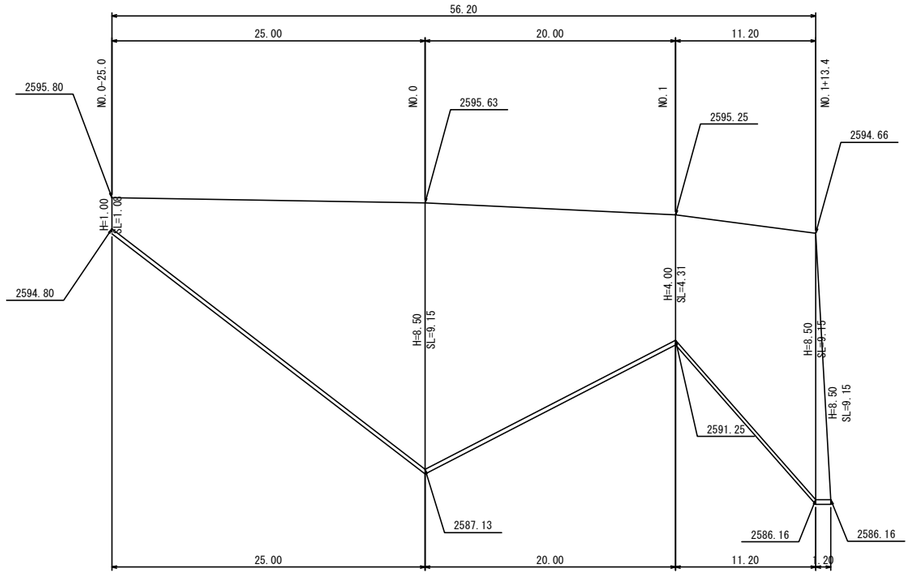
RETAINING WALL

SECTION S=1:100



H (m)	W (m)	h (m)	S (m)
1000	1140	440	1230
4000	2290	880	2450
8500	4010	1540	4300

DEPLOYMENT SH=1:250 SV=1:100



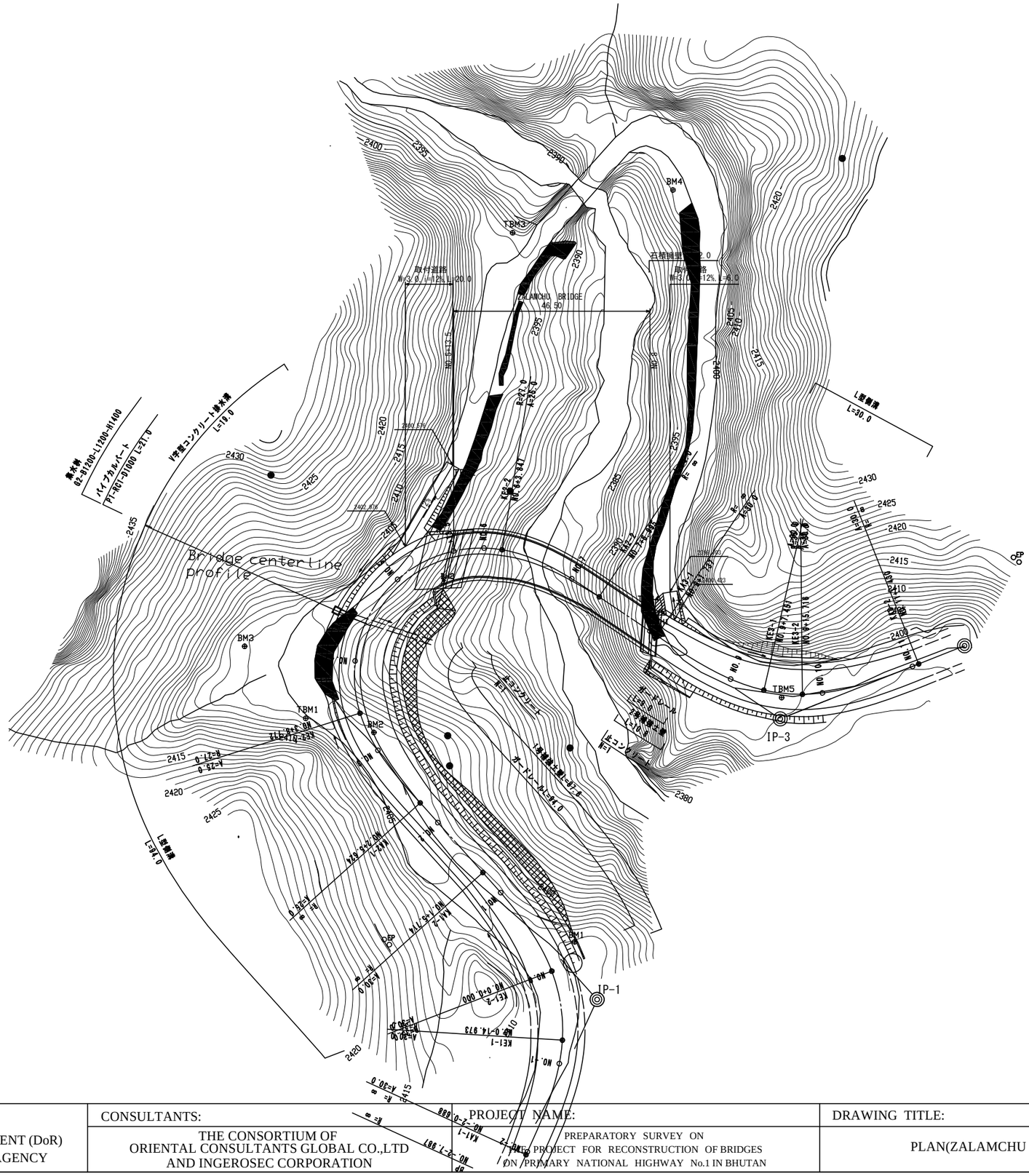
Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: ROAD STRUCTURE (NIKACHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : N-7

(3)　ザラムチュ橋

平面図

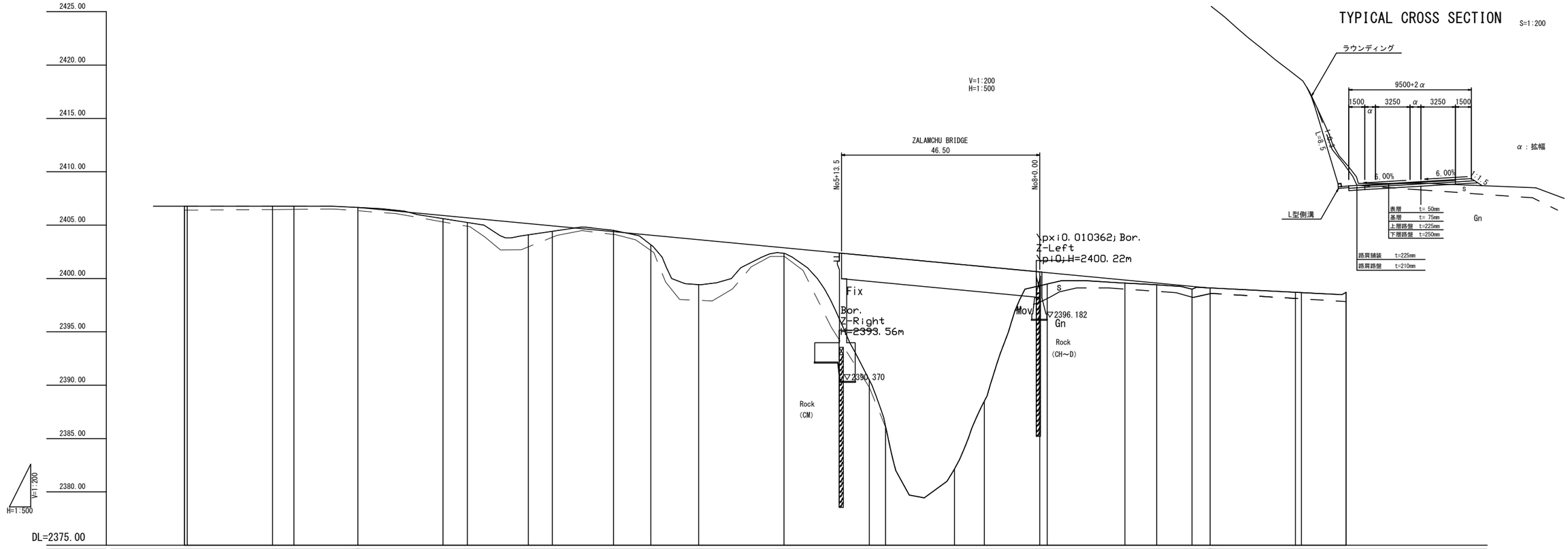
N

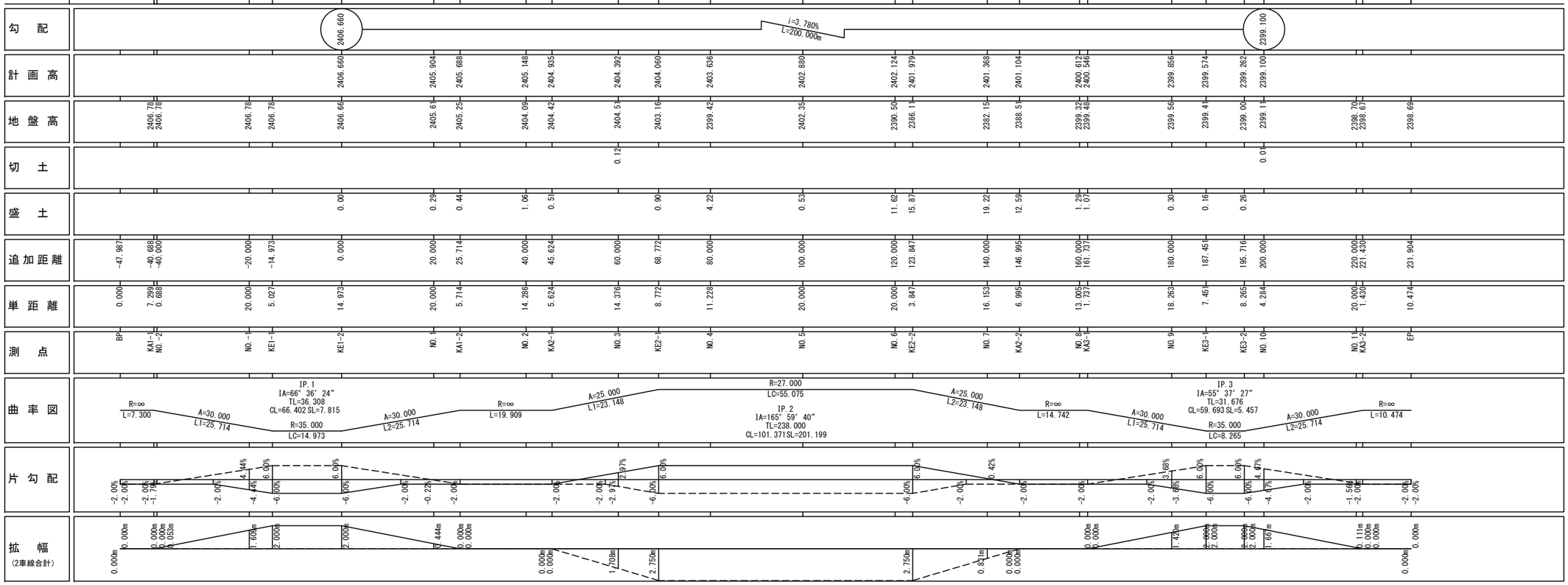
S=1 : 500



Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: THE PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: PLAN(ZALAMCHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : Z-1

縦断図、標準断面図



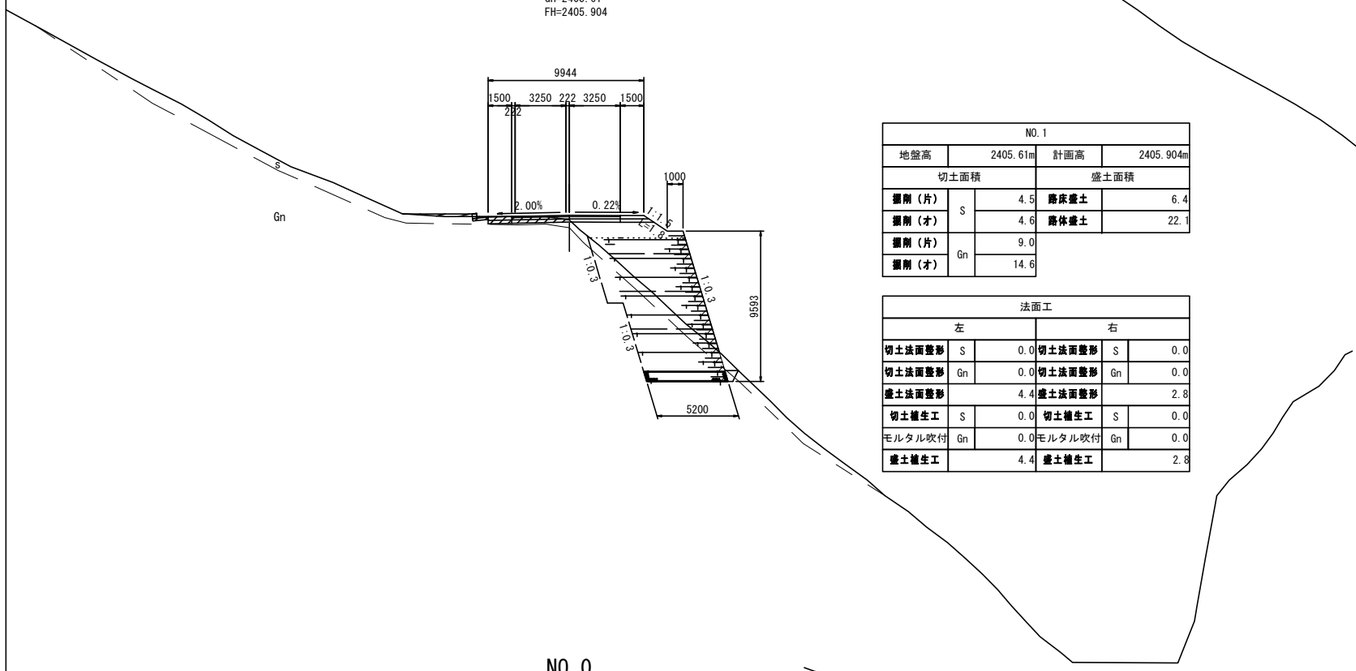


Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: PROFILE AND TYPICAL CROSS SECTION (ZALAMCHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : Z-2

横断図（1）

NO.1

GH=2405.61
FH=2405.904

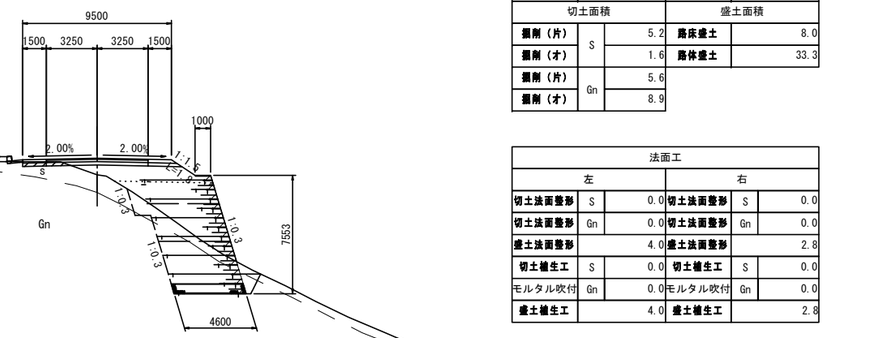


NO.1				
地盤高	2405.61m		計画高	2405.904m
切土面積			盛土面積	
掘削（片）	S	4.5	路床盛土	6.4
掘削（オ）		4.6	路体盛土	22.1
掘削（片）	Gn	9.0		
掘削（オ）		14.6		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		4.4	盛土法面整形	2.8
切土植生工	S	0.0	切土植生工	S 0.0
モルタル吹付	Gn	0.0	モルタル吹付	Gn 0.0
盛土植生工		4.4	盛土植生工	2.8

NO.2

GH=2404.09
FH=2405.148



NO.2				
地盤高	2404.09m		計画高	2405.148m
切土面積			盛土面積	
掘削（片）	S	5.2	路床盛土	8.0
掘削（オ）		1.6	路体盛土	33.3
掘削（片）	Gn	5.6		
掘削（オ）		8.9		

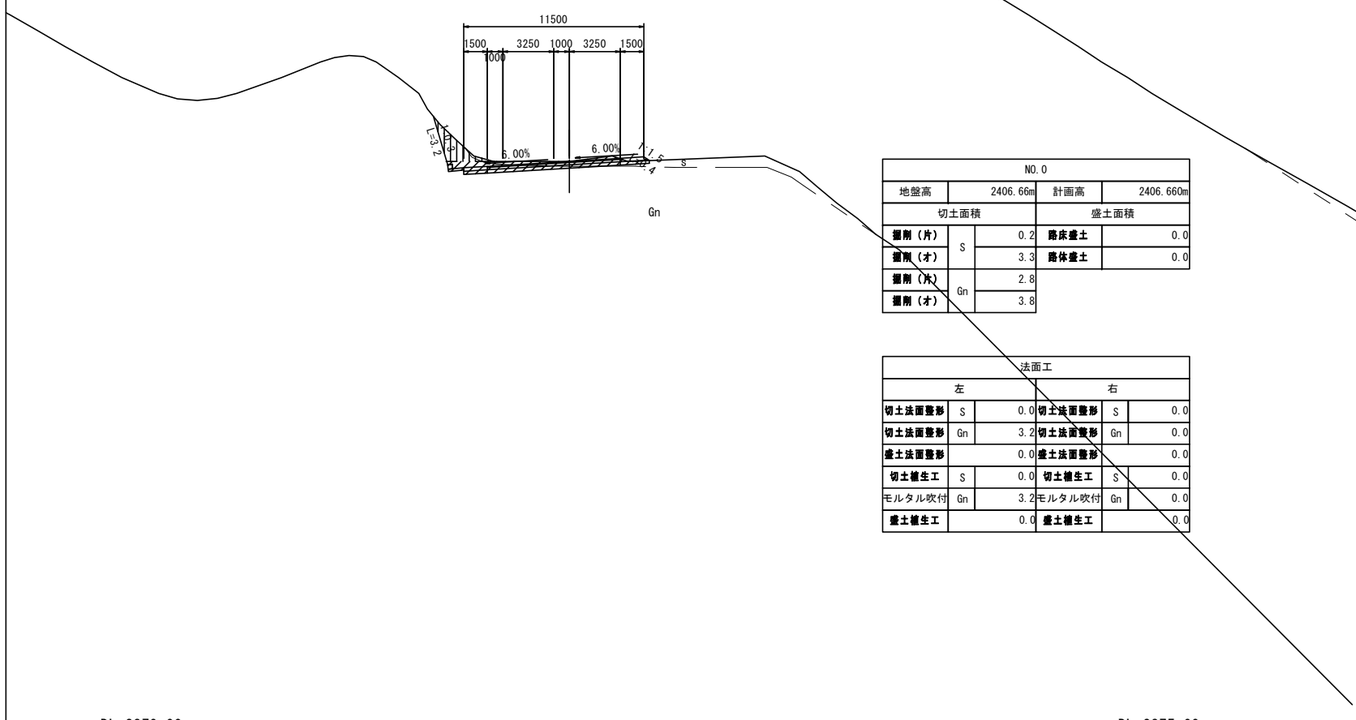
法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		4.0	盛土法面整形	2.8
切土植生工	S	0.0	切土植生工	S 0.0
モルタル吹付	Gn	0.0	モルタル吹付	Gn 0.0
盛土植生工		4.0	盛土植生工	2.8

DL=2375.00

DL=2375.00

NO.0

GH=2406.66
FH=2406.660

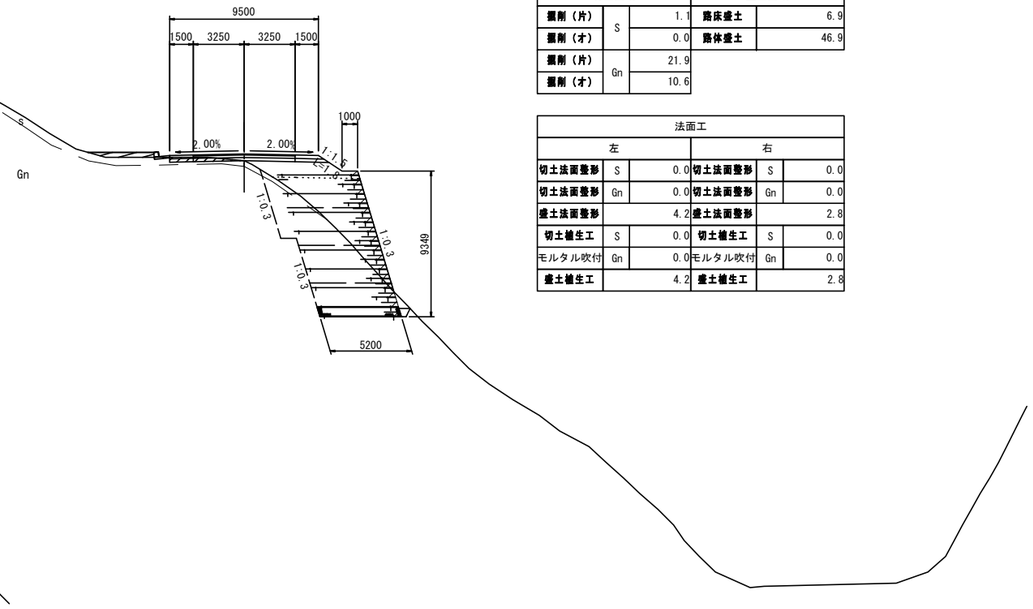


NO.0				
地盤高	2406.66m		計画高	2406.660m
切土面積			盛土面積	
掘削（片）	S	0.2	路床盛土	0.0
掘削（オ）		3.3	路体盛土	0.0
掘削（片）	Gn	2.8		
掘削（オ）		3.8		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	3.2	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	0.0
切土植生工	S	0.0	切土植生工	S 0.0
モルタル吹付	Gn	3.2	モルタル吹付	Gn 0.0
盛土植生工		0.0	盛土植生工	0.0

KA1-2 (NO.1+5.714)

GH=2405.25
FH=2405.688



KA1-2 (NO.1+5.714)				
地盤高	2405.25m		計画高	2405.688m
切土面積			盛土面積	
掘削（片）	S	1.1	路床盛土	6.9
掘削（オ）		0.0	路体盛土	46.9
掘削（片）	Gn	21.9		
掘削（オ）		10.6		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	0.0	切土法面整形	Gn 0.0
盛土法面整形		4.2	盛土法面整形	2.8
切土植生工	S	0.0	切土植生工	S 0.0
モルタル吹付	Gn	0.0	モルタル吹付	Gn 0.0
盛土植生工		4.2	盛土植生工	2.8

DL=2370.00

DL=2375.00

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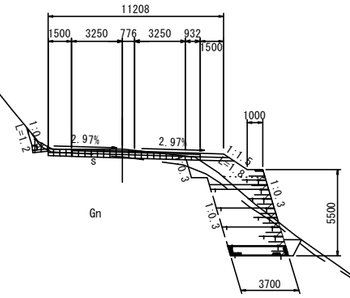
横断図（２）

NO.3

GH=2404.51
FH=2404.392

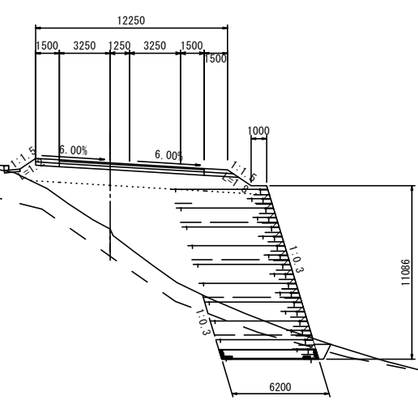


NO.3				
地盤高	2404.51m		計画高	2404.392m
切土面積			盛土面積	
掘削（片）	S	6.5	路床盛土	4.1
掘削（オ）		0.0	路体盛土	17.3
掘削（片）	Gn	15.9		
掘削（オ）		0.0		

法面工			
左		右	
切土法面整形	1.2	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	2.8
切土植生工	1.2	切土植生工	0.0
盛土植生工	0.0	盛土植生工	2.8

NO.4

GH=2399.42
FH=2403.636



NO.4				
地盤高	2399.42m		計画高	2403.636m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	21.1
掘削（オ）		6.2	路体盛土	93.0
掘削（片）	Gn	0.0		
掘削（オ）		11.0		

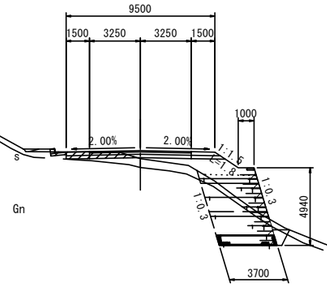
法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	3.2	盛土法面整形	2.8
切土植生工	0.0	切土植生工	0.0
盛土植生工	3.2	盛土植生工	2.8

DL=2375.00

DL=2375.00

KA2-1 (NO.2+5.624)

GH=2404.42
FH=2404.935

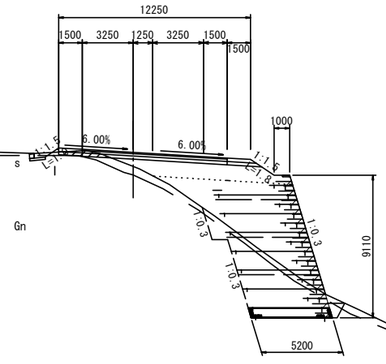


KA2-1 (NO.2+5.624)				
地盤高	2404.42m		計画高	2404.935m
切土面積			盛土面積	
掘削（片）	S	2.1	路床盛土	4.4
掘削（オ）		0.0	路体盛土	15.1
掘削（片）	Gn	10.8		
掘削（オ）		0.0		

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	1.7	盛土法面整形	6.2
切土植生工	0.0	切土植生工	0.0
盛土植生工	1.7	盛土植生工	2.8

KE2-1 (NO.3+8.772)

GH=2403.16
FH=2404.060



KE2-1 (NO.3+8.772)				
地盤高	2403.16m		計画高	2404.060m
切土面積			盛土面積	
掘削（片）	S	1.3	路床盛土	10.7
掘削（オ）		3.3	路体盛土	48.6
掘削（片）	Gn	0.0		
掘削（オ）		18.6		

法面工			
左		右	
切土法面整形	0.5	切土法面整形	0.0
盛土法面整形	0.5	盛土法面整形	2.8
切土植生工	0.5	切土植生工	0.0
盛土植生工	0.5	盛土植生工	2.8

DL=2375.00

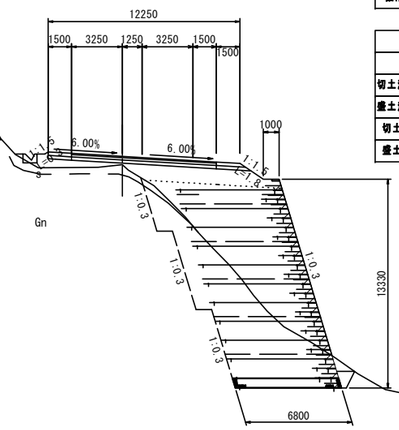
DL=2375.00

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(2) (ZALAM CHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : Z-4

横断図（３）

NO.5

GH=2402.35
FH=2402.880



NO.5				
地盤高	2402.35m		計画高	2402.880m
切土面積			盛土面積	
掘削（片）	S	0.8	路床盛土	11.4
掘削（オ）	S	3.3	路体盛土	96.1
掘削（片）	Gn	26.2		
掘削（オ）	Gn	23.3		

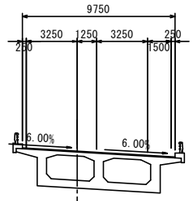
法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	1.3	盛土法面整形	2.8
切土植生工	0.0	切土植生工	0.0
盛土植生工	1.3	盛土植生工	2.8

DL=2385.00

DL=2380.00

KE2-2 (NO.6+3.847)

GH=2386.11
FH=2401.979



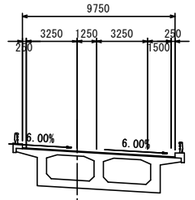
KE2-2 (NO.6+3.847)			
地盤高	2386.11m	計画高	2401.979m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

Gn

NO.6

GH=2390.50
FH=2402.124



NO.6			
地盤高	2390.50m	計画高	2402.124m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

s

Gn

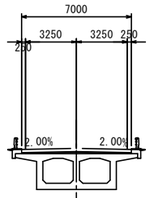
DL=2380.00

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(3) (ZALAM CHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : Z-5

横断図（４）

KA2-2 (NO.7+6.995)

GH=2388.51
FH=2401.104

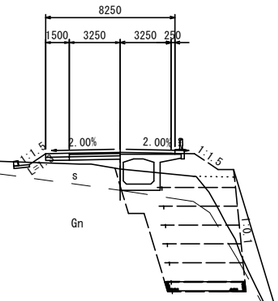


KA2-2 (NO.7+6.995)			
地盤高	2388.51m	計画高	2401.104m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

KA3-1 (NO.8+1.737)

GH=2399.48
FH=2400.546



KA3-1 (NO.8+1.737)				
地盤高		2399.48m	計画高	2400.546m
切土面積			盛土面積	
掘削（片）	S	0.0	路床盛土	8.5
掘削（オ）		10.9	路体盛土	41.8
掘削（片）	Gn	0.0		
掘削（オ）		29.5		

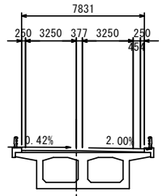
法面工			
左		右	
切土法面整形	0.3	切土法面整形	0.0
盛土法面整形	1.0	盛土法面整形	2.8
切土植生工	0.3	切土植生工	0.0
盛土植生工	1.0	盛土植生工	2.8

DL=2375.00

DL=2375.00

NO.7

GH=2382.15
FH=2401.368

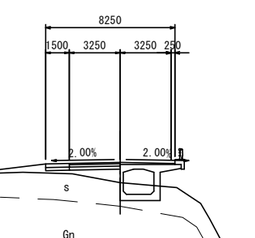


NO.7			
地盤高	2382.15m	計画高	2401.368m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	0.0
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	0.0	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	0.0	盛土植生工	0.0

NO.8

GH=2399.32
FH=2400.612



NO.8			
地盤高	2399.32m	計画高	2400.612m
切土面積		盛土面積	
掘削（片）	0.0	路床盛土	3.3
掘削（オ）	0.0	路体盛土	0.0

法面工			
左		右	
切土法面整形	0.0	切土法面整形	0.0
盛土法面整形	5.5	盛土法面整形	0.0
切土植生工	0.0	切土植生工	0.0
盛土植生工	5.5	盛土植生工	0.0

DL=2375.00

DL=2375.00

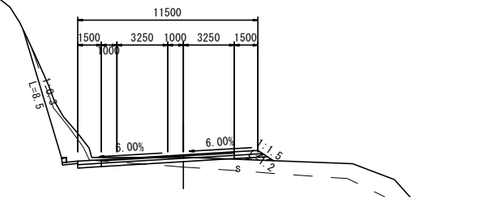
Gn

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(4) (ZALAMCHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : Z-6

横断図（５）

KE3-1 (NO.9+7.451)

GH=2399.41
FH=2399.574



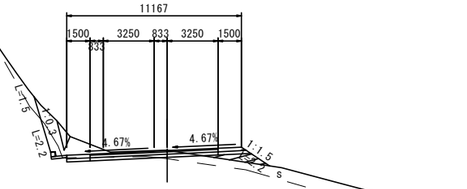
KE3-1 (NO.9+7.451)				
地盤高	2399.41m		計画高	2399.574m
切土面積			盛土面積	
掘削（片）	S	10.4	路床盛土	0.3
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	8.6	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	1.2
切土植生工	S	0.0	切土植生工	S 0.0
モルタル吹付	Gn	8.6	モルタル吹付	Gn 0.0
盛土植生工		0.0	盛土植生工	1.2

DL=2380.00

NO.10

GH=2399.11
FH=2399.100



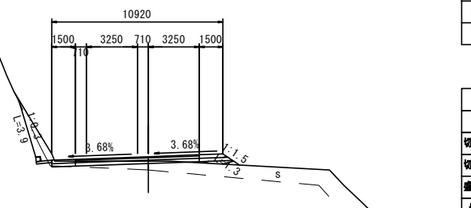
NO.10				
地盤高	2399.11m		計画高	2399.100m
切土面積			盛土面積	
掘削（片）	S	8.3	路床盛土	1.3
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	1.5	切土法面整形	S 0.0
切土法面整形	Gn	2.2	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	2.2
切土植生工	S	1.5	切土植生工	S 0.0
モルタル吹付	Gn	2.2	モルタル吹付	Gn 0.0
盛土植生工		0.0	盛土植生工	2.2

DL=2385.00

NO.9

GH=2399.56
FH=2399.856



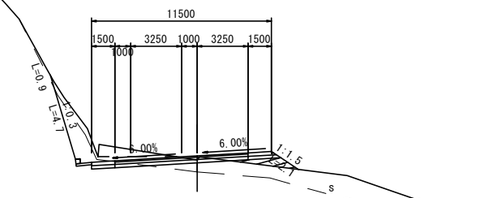
NO.9				
地盤高	2399.56m		計画高	2399.856m
切土面積			盛土面積	
掘削（片）	S	4.3	路床盛土	0.5
掘削（オ）		0.0	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

法面工				
左			右	
切土法面整形	S	0.0	切土法面整形	S 0.0
切土法面整形	Gn	3.9	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	1.3
切土植生工	S	0.0	切土植生工	S 0.0
モルタル吹付	Gn	3.9	モルタル吹付	Gn 0.0
盛土植生工		0.0	盛土植生工	1.3

DL=2380.00

KE3-2 (NO.9+15.716)

GH=2399.00
FH=2399.262



KE3-2 (NO.9+15.716)				
地盤高	2399.00m		計画高	2399.262m
切土面積			盛土面積	
掘削（片）	S	2.0	路床盛土	1.3
掘削（オ）		9.4	路体盛土	0.0
掘削（片）	Gn	0.0		
掘削（オ）		0.0		

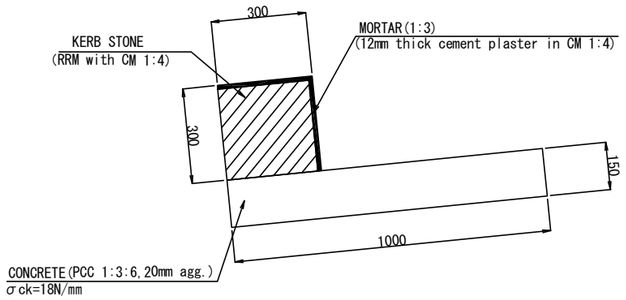
法面工				
左			右	
切土法面整形	S	0.9	切土法面整形	S 0.0
切土法面整形	Gn	4.7	切土法面整形	Gn 0.0
盛土法面整形		0.0	盛土法面整形	2.1
切土植生工	S	0.9	切土植生工	S 0.0
モルタル吹付	Gn	4.7	モルタル吹付	Gn 0.0
盛土植生工		0.0	盛土植生工	2.1

DL=2380.00

Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: CROSS SECTION(5) (ZALAMCHU BRIDGE)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : Z-7

道路構造物構造図

L-DRAIN S=1:10

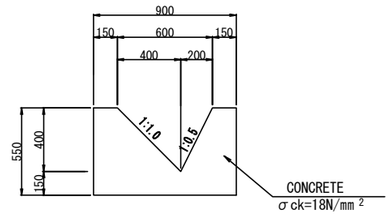


QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
KERB STONE	RRM with CM 1:4	m	10.00
CONCRETE	σck=18N/mm²	m³	1.50
FORM		m²	3.00
MORTAR	1:3	m³	0.07

V-SHAPED CONCRETE DITCH S=1:20



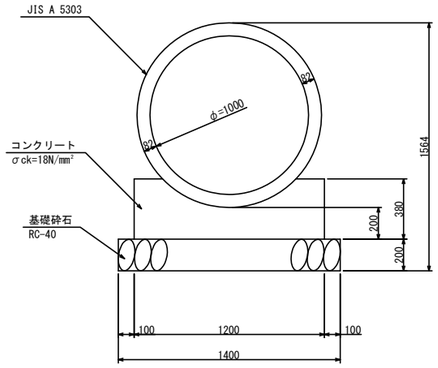
QUANTITY

PER 10m

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm²	m³	3.75
FORM		m²	11.00

パイプカルバート S=1:20

(P1-RC-1-D1000)



数量表

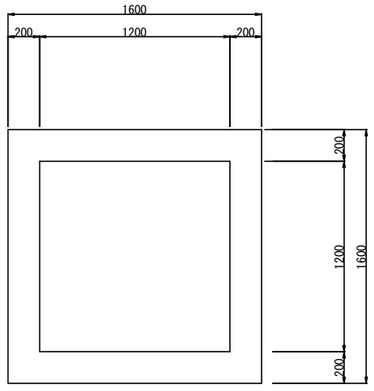
10m当り

種　別	規格・寸法	単位	数　量
管本数	RC1種 D1000	本	4.1
コンクリート	σck=18N/mm²	m³	3.514
型枠		m²	7.600
基礎砕石	RC-40　t=20cm	m²	14.000

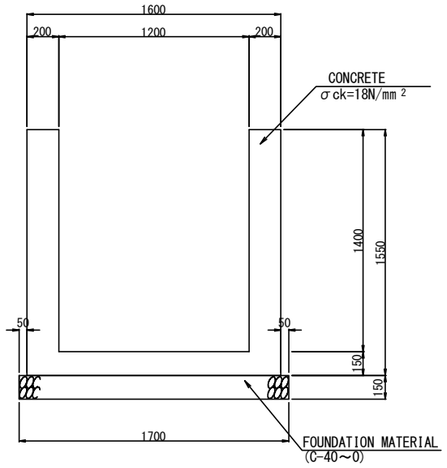
CATCH BASIN TYPE-A S=1:20

(1000×1000×1400)

PLAN



PROFILE



QUANTITY

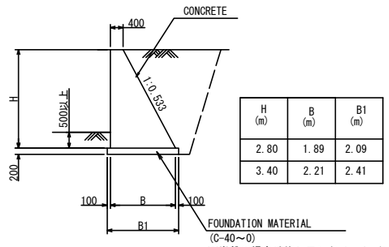
PER EACH

ITEM	STANDARD・DIMENSION	UNIT	QUANTITY
CONCRETE	σck=18N/mm²	m³	1.95
FORM		m²	11.94
FOUNDATION BASE MATERIAL	C-40～0	m²	2.89

CONCRETE RETAINING WALL S=1:100

(NO.8　LEFT)

SECTION
GW62

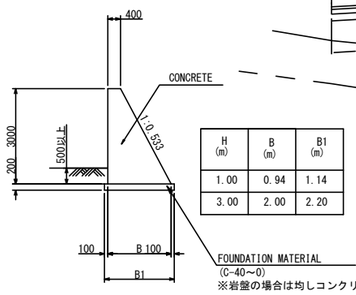


H (m)	B (m)	B1 (m)
2.80	1.89	2.09
3.40	2.21	2.41

※岩盤の場合は均しコンクリート（t=10cm)とする。

(NO.8　RIGHT)

SECTION
GW35

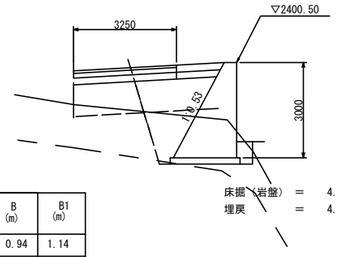


H (m)	B (m)	B1 (m)
1.00	0.94	1.14
3.00	2.00	2.20

※岩盤の場合は均しコンクリート（t=10cm)とする。

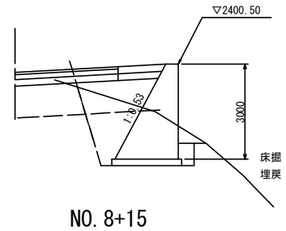
FIGURE OF EARTHWORK

NO.8+3



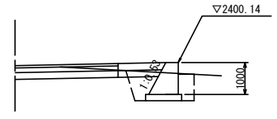
床掘（岩盤）＝　4.3
埋戻　＝　4.2

NO.8+10



床掘（岩盤）＝　5.9
埋戻　＝　4.2

NO.8+15



床掘（岩盤）＝　1.8
埋戻　＝　0.9

DEPLOYMENT

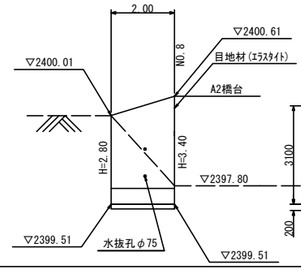
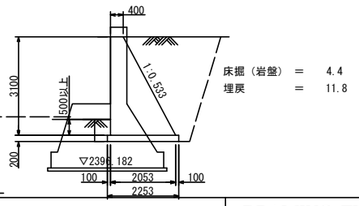
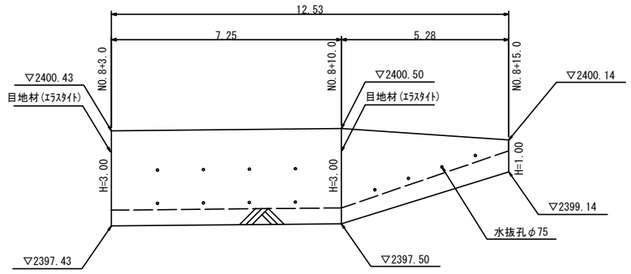


FIGURE OF EARTHWORK



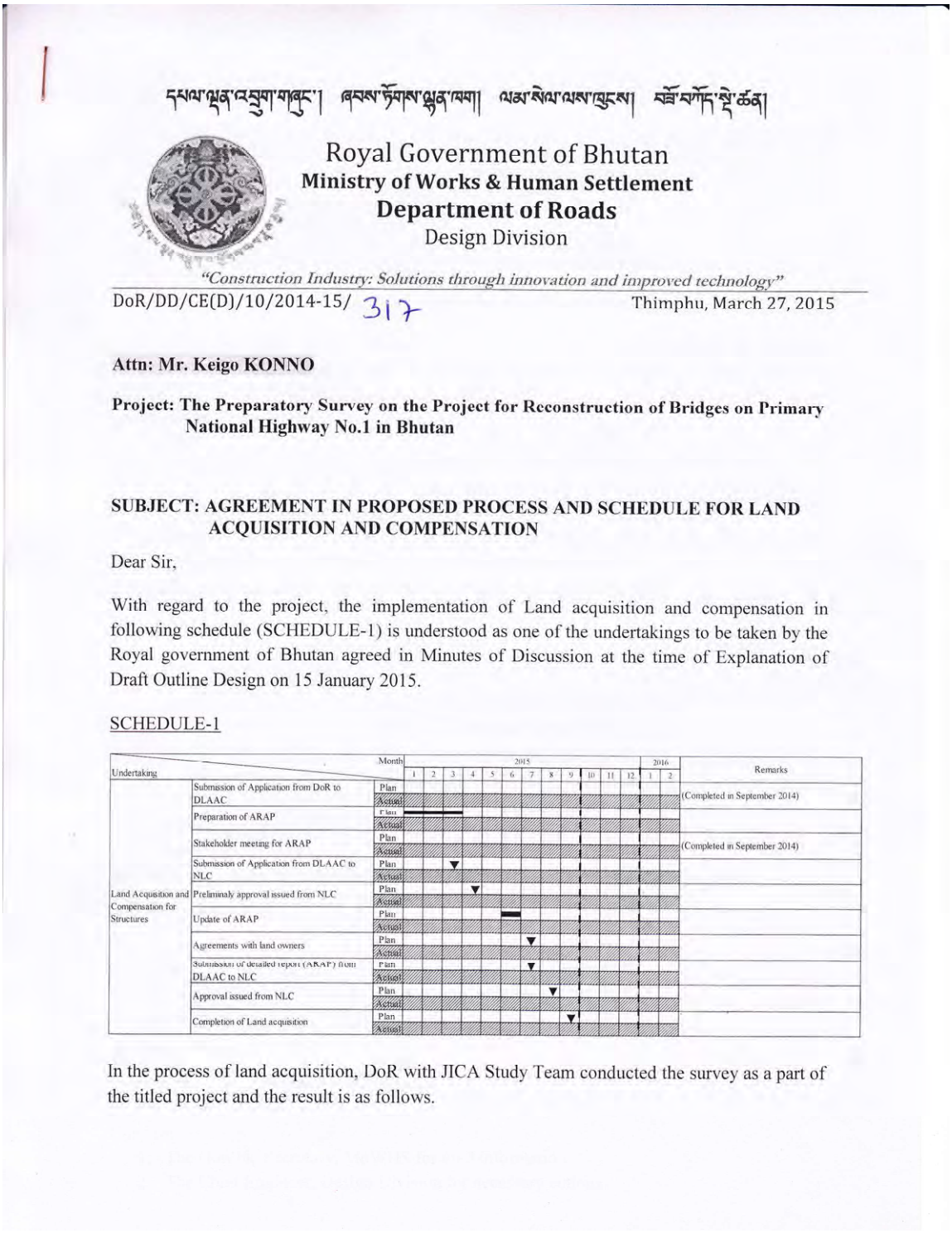
床掘（岩盤）＝　4.4
埋戻　＝　11.8



Royal Government of Bhutan MINISTRY OF WORKS and HUMAN SETTLEMENT (DoR) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: THE CONSORTIUM OF ORIENTAL CONSULTANTS GLOBAL CO.,LTD AND INGEROSEC CORPORATION	PROJECT NAME: PREPARATORY SURVEY ON THE PROJECT FOR RECONSTRUCTION OF BRIDGES ON PRIMARY NATIONAL HIGHWAY No.1 IN BHUTAN	DRAWING TITLE: Road Structure (Zalamchu Bridge)	DATE: PREPARED BY: CHECKED BY:	DRAWING No.: Z-8

6. その他資料・情報

(1) 用地取得についての DoR からのレター



དཔལ་ལྡན་འབྲུག་གཞུང་། ཞབས་ཏོག་ལྷན་ཐག། ལམ་སེལ་ལས་ཁུངས། བཟོ་བགོད་སྡེ་ཚན།

Royal Government of Bhutan
Ministry of Works & Human Settlement
Department of Roads
Design Division

"Construction Industry: Solutions through innovation and improved technology"

DoR/DD/CE(D)/10/2014-15/ 317 Thimphu, March 27, 2015

Attn: Mr. Keigo KONNO

Project: The Preparatory Survey on the Project for Reconstruction of Bridges on Primary National Highway No.1 in Bhutan

SUBJECT: AGREEMENT IN PROPOSED PROCESS AND SCHEDULE FOR LAND ACQUISITION AND COMPENSATION

Dear Sir,

With regard to the project, the implementation of Land acquisition and compensation in following schedule (SCHEDULE-1) is understood as one of the undertakings to be taken by the Royal government of Bhutan agreed in Minutes of Discussion at the time of Explanation of Draft Outline Design on 15 January 2015.

SCHEDULE-1

Undertaking		Month	2015 1	2	3	4	5	6	7	8	9	10	11	12	2016 1	2	Remarks
Land Acquisition and Compensation for Structures	Submission of Application from DoR to DLAAC	Plan															
		Actual															(Completed in September 2014)
	Preparation of ARAP	Plan															
		Actual															
	Stakeholder meeting for ARAP	Plan															
		Actual															(Completed in September 2014)
	Submission of Application from DLAAC to NLC	Plan			▼												
		Actual															
	Preliminaly approval issued from NLC	Plan				▼											
		Actual															
	Update of ARAP	Plan						▬									
		Actual															
	Agreements with land owners	Plan							▼								
		Actual															
	Submission of detailed report (ARAP) from DLAAC to NLC	Plan							▼								
		Actual															
	Approval issued from NLC	Plan								▼							
		Actual															
	Completion of Land acquisition	Plan									▼						
		Actual															

In the process of land acquisition, DoR with JICA Study Team conducted the survey as a part of the titled project and the result is as follows.

The result of the ARAP survey

Item	Chuzomsa Bridge
Total PAHs and PAPs	9 PAPs (Project Affected Persons) in 1 PAHs (Project Affected Households)
Residential PAHs (PAPs) to be Relocated	None
Land Acquired (decimal)	6 decimals (243m^2) for Dry Land
Crops and Trees	Trees:18
Note	Name of the Household Head: Ms. Aum Kelzang

However, as per Land Act of Bhutan 2007, the preparation of ARAP cannot be processed currently since the PAH mentioned above is under process of obtaining official document (Thram) that establish the legitimacy of ownership to the land. And it is expected to take several months to obtain the Thram.

Therefore, in order to complete land acquisition prior to project implementation in time, DoR proposes and agrees to follow the policy and schedule below (SCHEDULE-2) if Thram is not obtained by June 2015. According to the regulation of Bhutan, person without Thram is not subjected to the payment of compensation. However, the PAH mentioned above shall be treated as a title-holder (in line JICA guideline) and be subject to compensation only for this project considering the fact that the family has been living in the area for a while.

SCHEDULE-2

Undertaking		Month	2015 1	2	3	4	5	6	7	8	9	10	11	12	2016 1	2	Remarks
Land Acquisition and Compensation for Structures	Submission of Application from DoR to DLAAC	Plan															(Completed in September 2014)
		Actual															
	Preparation of ARAP	Plan															
		Actual															(Completed in September 2014)
	Stakeholder meeting for ARAP	Plan															
		Actual															
	Update of ARAP	Plan															
		Actual															
	Agreements with land owners	Plan															
		Actual															
	Completion of Land acquisition (Payment of compensation)	Plan															
		Actual															

Your understanding and kind cooperation on this matter would be highly appreciated.

Yours faithfully,

Jangchuk Yeshi
Offtg. Director
Department of Road, MOWHS

Copy to:
1. The Hon'ble Secretary, MoWHS for kind information
2. The Chief Engineer, Design Division for necessary actions