

## **Appendix-5 Technical Notes**



**Appendix-5-1 Technical Notes (1)**



**Ministry of Transport and Communications  
Kyrgyz Republic**

**PREPARATORY SURVEY  
ON  
THE PROJECT FOR AVALANCHE PROTECTION  
ON  
BISHKEK – OSH ROAD  
IN THE KYRGYZ REPUBLIC**

**TECHNICAL NOTES**

**JULY 2014**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.**

Preparatory Survey on the Project for Avalanche  
Protection on Bishkek-Osh Road  
in the Kyrgyz Republic

**Technical Notes**


JICA Survey Team for the Preparatory Survey (the Survey Team) has confirmed the items described in the attached Technical Notes concluded by the representative of the Ministry of Transport and Communications, Kyrgyz Republic (MOTC) which is the responsible and implementing organization on the Project for Construction of the Avalanche Protection on Bishkek-Osh Road in the Kyrgyz Republic (the Project), with representatives of concerned Ministries as the witness. Based on the Technical Notes, the Survey Team plans to conduct the basic design for the Project including the project cost estimate through analysis of the site survey findings after obtaining the approval from Japan International Cooperation Agency (JICA).

The results of the analysis and basic design are planned to be presented and explained in December 2014.

Bishkek city, Kyrgyz Republic  
July 17, 2014



YUZO MIZOTA  
Chief Consultant  
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Kyrgyz Republic  
(Witness)



## 1. ROAD DESIGN

### 1.1 Design Standard

Reference shall be made to the following manuals and standard specifications for the basic design requirement of roads and bridges:

- Highway Design (SNiP KR 32-01:2004)
- Bridge and Culvert (SNiP 2.05.03-84: 2011)
- Construction in Seismic Area (SNiP KR, 20-02: 2009)

In addition to the above guidelines when other aspects of design are not covered or when a safer and more efficient requirement is indicated, the design shall refer to other standards including:

- AASHTO Policy on Geometric Design Highway and Streets, 2011
- AASHTO Guide for Design of Pavement Structure, 1993
- Road Design Ordinances, Japan, 2004
- Specifications for Highway Bridges, Japan Road Association, 2012
- Design Guideline for Culvert, Japan Road Association, 2010

### 1.2 Beginning Point and Ending Point of the Project

The Project road consists of snow shed and its access road as shown Appendix-1. Station numbers of the beginning and ending points are specified as below.

Beginning point of the Project: Sta. 0+000

Ending point of the Project: Sta. 1+003

Snow-shed section: Sta 0+360- Sta 0+810 (L=450m)

### 1.3 Criteria on Road Design

#### (1) Road Category

Based on the SNiP and traffic survey result which was conducted on March 2014, Road category is III.

#### (2) Design Speed

Design speed in mountainous terrain prescribed in SNiP is 50km/h as shown below. On the other hand, existing terrain condition can accommodate more relaxed design speed and many of section along Bishkek-Osh road including the Project site have been designed as 60km/h in design speed. In order to maintain current traffic flow and its safety, 60km/h of the design speed shall be applied for this project section.

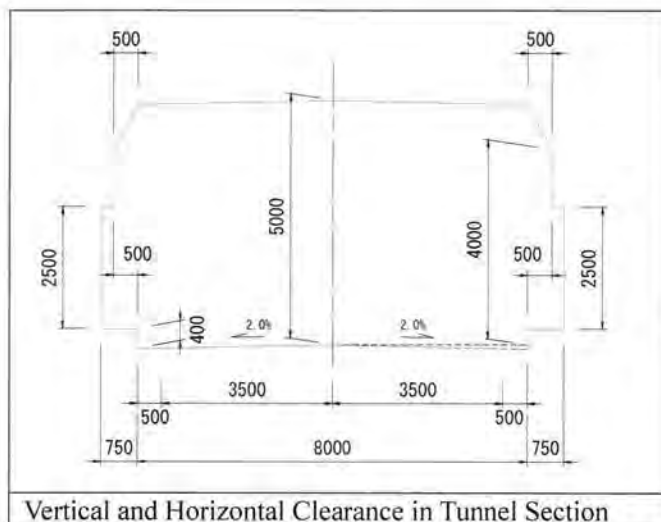
Road category	Design speed, km/h		
	Basic design speed	Admissible design speed in the difficult sections of terrain and in confined spaces	
		Stiff terrain	Mountainous terrain
IA	140	110	70
1B	120	100	60
II	120	100	60
III	100	80	50
IV	80	60	40
V	60	40	30

Source: Highway Design (SNiP KR 32-01:2004) Table 4.2.1 –Design Speed

### (3) Cross Section Element

Cross section elements are proposed as below comparing with Kyrgyz standard and other international standards. Typical Cross sections are shown in Appendix-2,

Item	Proposed	SNiP(Kg)	Asian Highway	AASHTO	Japanese Standard
Road Category	Category III	Category III	Class II (Steep)	Rural Arterial	Type 3 Class 4
Design Speed (km/h)	60	50~80	40	60	60
Vertical Clearance (m)	5.0	5.0	4.5	4.3~4.9	4.5
Width of Carriage Way (m)	3.5	3.5	3.5	3.6	2.75
Width of Shoulder (m)	0.5	0.5	2.0	0.6~2.4	0.75
Unpaved Un-paved Shoulder (m)	2.0	2.0			0.75
Cross fall of Paved Area (%)	2.0	2.0	2.0	1.5~2.0	1.5~2.0
Cross fall of Un-paved Area (%)	4.0	-	3.0~6.0	1.5~2.0	1.5~2.0
Maximum Super-elevation (%)	4.0	4.0		6.0	6.0





**(4) Geometric Criteria**

Geometric criteria is proposed as below based on comparison with Kyrgyz standard and other international standard under the condition of 60km/h in the design speed.

Item		Proposed	SNiP (Kg)	Asian Highway	AASHTO	Japanese Standard
Road Classification		Category III	Category III	Class II (Steep)	Rural Arterial	Type-3 Class-4
Minimum Horizontal Curve		<b>330 or more</b>	150m	115 m	125m 以上	150m
Minimum Curve Length		<b>100m</b>	-	N/A	180m	100m
Sight Distance	Stopping	<b>85m</b>	85m	50m	85m	75m
	Passing	<b>N/A</b>	170m	-	315m	-
Widening at Horizontal Curve*		<b>0.0m</b>	1.1m : R=325m 0.9m : R=425m	-	Disregarded	0.0
Minimum Length of Transition Curve		<b>100m</b>	100m	50m	50m	50m
Maximum Radius for Use of a Spiral Curve Transition		<b>2000m</b>	2000m	500m	213m	500m
Maximum Vertical Grade		<b>4 %</b>	7%	7%	6%	5%
Minimum Vertical Curve	Crest	<b>2500m</b>	2500m	-	1100m	1400m
	Sag	<b>1500m</b>	1500m	-	1800m	1000m
Minimum Vertical Curve Length	Crest	<b>300m</b>	300m	-	-	50m
	Sag	<b>100m</b>	100m	-	-	50m

SNiP (Kg): Highway Design (SNiP KR 32-01:2004)

AASHTO: A Policy on Geometric Design of Highways and Streets, 6th Edition (2011)

Asian Highway: Asian Highway Classification and Design Standards (ESCAP; 2001)

Japanese Standard: Japan Road Structure Ordinance (2012)

\*Widening at Horizontal Curve; Road design standard of Kyrgyz has shown that 0.9~1.1m widening would be required at horizontal curve with R=325~425m although no widening is required in other international standards. Simulation was made by "Traveling Track Generation Software" on the R=330m as shown in Appendix-3 to confirm exact width of carriage way to accommodate two semitrailer in R=330m. As the result, 3.5 m width of carriage way without widening was satisfied with above situation with safer clearance of 0.5m or more. Since the widening at tunnel section affects to increase in construction cost, the value of widening shall be determined based on practical requirement.

## **1.4 Pavement Design**

### (1) Road and Climatic Zone

Road and Climatic Zone of the project site is Class (III).

### (2) Type of Pavement

#### a) Snow-shed Section

Rigid type (concrete) pavement is applied in the tunnel section to minimize maintenance work during the operation since traffic control would be difficult in terms of road safety.

#### b) Connecting Road Section

Asphalt pavement would be recommended in terms of traffic safety and construction cost.

### (3) Frost heaving

Anti-frost heaving layer shall be provided in accordance with Highway Design (SNiP KR 32-01:2004).

### (4) Pavement Thickness

The thickness of pavement shall be analyzed based on Russian standard such as "ODN 218.046-01 Design of Non-rigid Pavement". Pavement design analysis based on AAHTO shall be supplementary examined to propose safer pavement structure.

## **1.5 Drainage Design**

### (1) Drainage System

Drainage system in the project site is proposed as shown Appendix-4. Outlet of the drainage shall be designed to accommodate the storm-water discharge from catchment area including road side slope. Existing drainage among road side slope shall be diverted to new drainage to be constructed along new embankment.

### (2) Design Discharge

Culvert for drainage shall be designed based on peak discharge estimated under the 2% provability in accordance with "7.7 Drainage Structure" in SNiP KR 32-01:2004. (Maximum recorded water level at the site will be deemed as equivalent to above discharge)

## **1.6 Road Facility**

### (1) Street Lighting

Following points have been requested by MOTC to be examined in Japan by JICA Study Team.

- Lightings in the Snow-shed section and outside of the snow-shed section are required for traffic safety.
- LED has been commonly used for the illuminant of street lighting in Kyrgyz.
- Lighting control system is required to modulate the brightness in accordance

with light condition of the outside.

- Emergency lighting is required in snow-shed section for traffic safety during power failure. Power generator for the emergency lighting can be procured by MOTC as needed.
- Low-voltage power distribution board will be covered by Japan's grant aid and Approx. 50 kVA in total of transformed electric power supply will be required for the street lighting at the Project Site to be provided by MOTC.

(2) Pull-off

Emergency Pull-off shall be designed at the both side of entrances of the snow shed to secure the space of U-turn for trailers in case the road is stacked by avalanche.

(3) Traffic Signboard

Procurement and installation of the traffic signboard shall be borne by MOTC as appropriate.

(4) Delineator

Delineator and safety visual guidance would be considered in Snow-shed section.

## 2. SNOW-SHED DESIGN

### 2.1 Type of the Structure

Concrete arch culvert type will be proposed. Pre-cast segment method and Cast in-situ method will be examined and compared in terms of construction cost and its period. Unconfined compressive strength of the concrete for arch culvert shall be 30 MPa or more.

### 2.2 Design Load

(1) Avalanche Load

Design Avalanche Load shall be estimated based on 42m in height from existing road surface. Unit weight of accumulated snow inclusive of debris is estimated 6 kN/m<sup>3</sup> (0.60 tf/m<sup>3</sup>) based on site test.

(2) Seismic Load

Construction in Seismic Area (SNiP KR, 20-02: 2009) shall be applied to estimate seismic load for the structure. Seismic Intensity of the project site is "9" in accordance with above code.(See Appendix-5)

## 3. CONSTRUCTION PLAN

### 3.1 Temporary Stock Yard

The temporary stock yard of 2ha (200mx100m) will be required in case precast segment type culvert

has been selected. Possible location of the construction yard, such as stock yard disposal site, asphalt plant and quarry to be secured by MOTC are shown in Appendix-6.

### 3.2 Quarry and Disposal Sites

Candidate site for Quarry and Disposal Sites to be utilized during the project implementation have been plotted on Appendix-6.

### 3.3 Asphalt Plant

Asphalt concrete can be procured from the asphalt plant of DEP 23 located in Toktogul during the implementation. The location is shown in Appendix-6.

### 3.4 Traffic Control

Temporary road shall be constructed during the construction to maintain existing traffic flow. One-lane traffic control with traffic signal and guard man will be accepted during the construction period in the stretch of 200m or less.

## 4. ENVIRONMENTAL AND SOCIAL CONSIDERATION

### 4.1 Implementation of EIA

MOTC has agreed on implementation and the procedures of the Environmental Impact Assessment (EIA) in accordance with draft implementation schedule as shown Appendix-7. EIA report shall be submitted under the responsibility of MOTC by the end of August 2014 and to be approved by the end of November 2014.

### 4.2 Resettlement and Compensation

Resettlement and compensation for following table shall be carried out under the responsibility of MOTC. The location map is shown in Appendix-8.

Location	Item	Quantity	Condition
BO Road 246km section	Apiary	2 (One each in Bishkek side and Toktogul side.)	<ul style="list-style-type: none"> <li>• One (1) apiary of Bishkek side is affected by connecting road.</li> <li>• One (1) apiary of Toktogul side is mobile type with dwelling.</li> <li>• Residents of the Bishkek side is six people.</li> <li>• The term of current lease contract of Bishkek side's is from 2010 to 2016. It will be extended to 2049 automatically after 2016.</li> <li>• The period of annual stay is from March to October.</li> <li>• These apiaries shall be relocated to alternative site under the responsibility of MOTC.</li> </ul>

	Cenotaph for avalanche victims	2 (1 location)	<ul style="list-style-type: none"> <li>• Cenotaph is located on new road alignment of the project.</li> <li>• The installation personnel may be identified in the lion (region government) office because the application for installation should have been submitted to the region government office.</li> <li>• If impossible to identify, relocation of cenotaph will be requested to the region government office.</li> </ul>
	Archa <sup>1</sup> (Trees protected by law)	3	<ul style="list-style-type: none"> <li>• Tree of archa which is designated as protected species are located on new road alignment of the project.</li> <li>• It is necessary to discuss for the compensation measures with SAEPF<sup>2</sup>, and to get permission for felling.</li> <li>• Compensation measures will be planting or compensation by money. The measures will be decided at the stage of detailed design.</li> <li>• MOTC will be sent the letter to SAEPF for the solution of the problem.</li> </ul>
Storehouse for road maintenance equipment of DEP	Apiary	10	<ul style="list-style-type: none"> <li>• This place will be utilized for concrete plant or the yard for temporary placement of soil generated by construction.</li> <li>• There are about 10 apiaries in the place.</li> <li>• The contract for land lease has renewed in last year. The contract period is more 10 years.</li> <li>• These apiaries shall be relocated to alternative site under the responsibility of MOTC.</li> </ul>
Toktogul city	Candidate site for quarry	1	<ul style="list-style-type: none"> <li>• MOTC shall be responsible for obtaining permission from related organizations to use the quarry.</li> </ul>

<sup>1</sup> Tree of Archa is protected to cut down by the law of Kyrgyz Republic.

<sup>2</sup> SAEPF : State Agency of Environment Protection Forestry

## 5. UTILITIE RELOCATION

Fiber optics cables which has been installed in project site by “Telecom” shall be relocated before construction of the Project would be started. It was agreed that relocation cost of the cable shall be borne by MOTC.

## **6. UNDERTAKINGS BY REPUBLIC OF KYRGYZ**

### **6.1 Major Tasks to be undertaken by Each Government**

The major tasks to be undertaken by each government have been confirmed in the Minutes of Discussions dated 1<sup>st</sup> April 2014 (Appendix -9).

### **6.2 Tax Exemption Related to Construction**

The Kyrgyz side shall issue exemption certificates for all concerned members working for the Project from Customs duties, internal taxes and other fiscal levies that may be imposed in Kyrgyz with respect to the supply of products and services, including the exemption certificate.

### **6.3 Land Acquisition and Resettlement**

The Kyrgyz sides shall secure the land required for the construction and proceed required actions for resettlement.

### **6.4 Permission for Construction Yards**

Kyrgyz side shall cooperate to obtain permissions on usage of temporary stock yard, disposal site, and quarry.

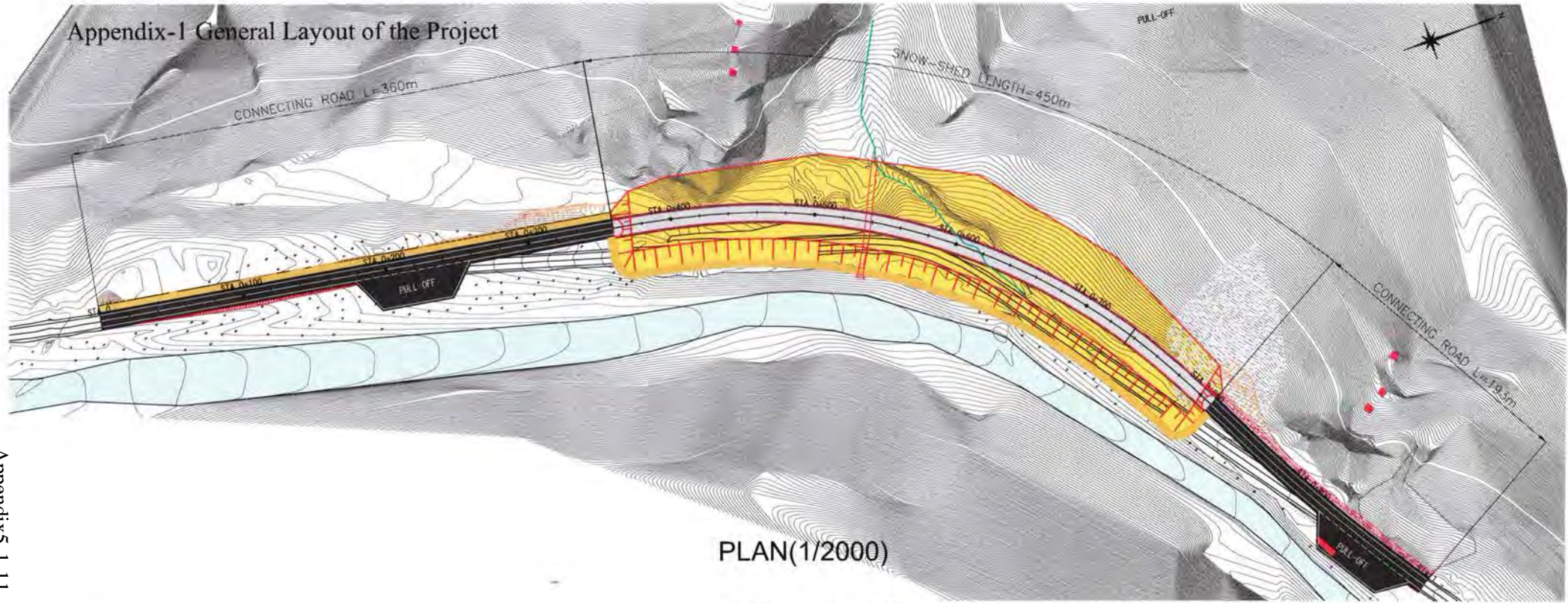
### **6.5 Relocation of Utilities**

Fiber optics cable affected to construction of the Project shall be relocated under the responsibility of MOTC.

### **6.6 Electric Power Supply**

Electric Power Supply at the Project Site shall be prepared by MOTC for street lighting and road operation purpose. Distribution panel to be installed at the project site for street lighting will be borne by Japan's Grant Aid.

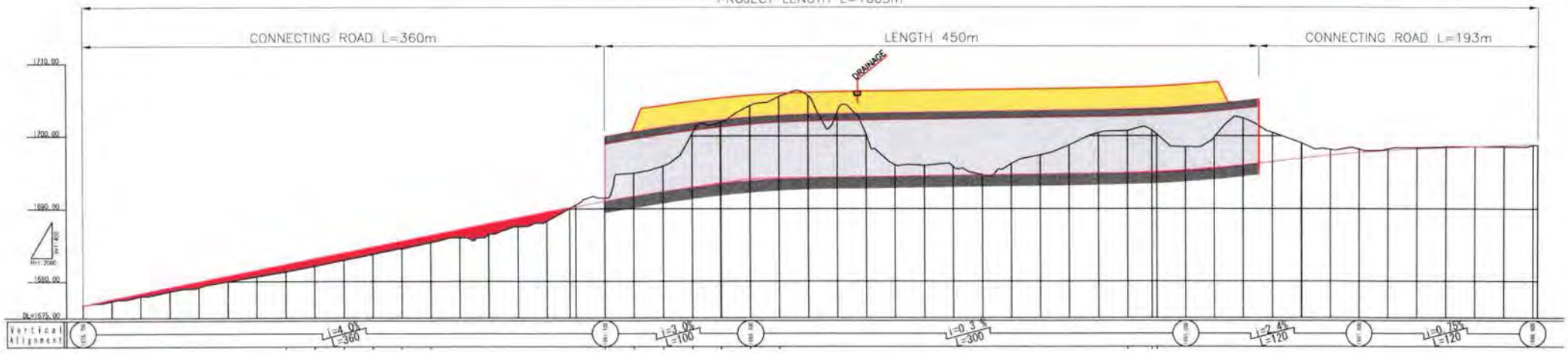
# Appendix-1 General Layout of the Project



PLAN(1/2000)

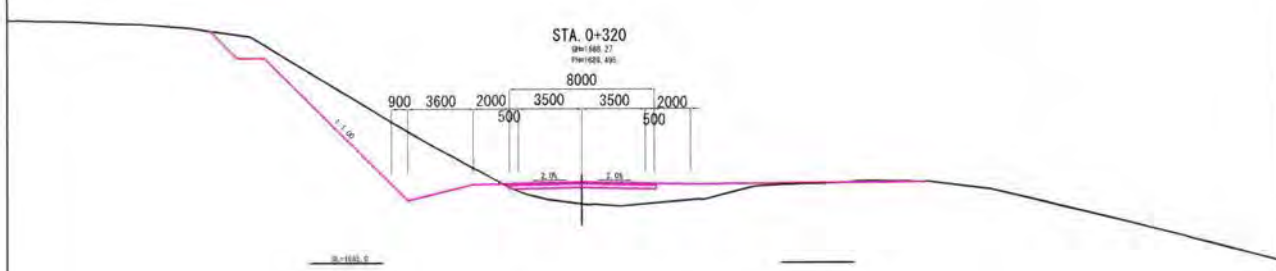
PROJECT LENGTH L=1003m

Appendix5-1-11

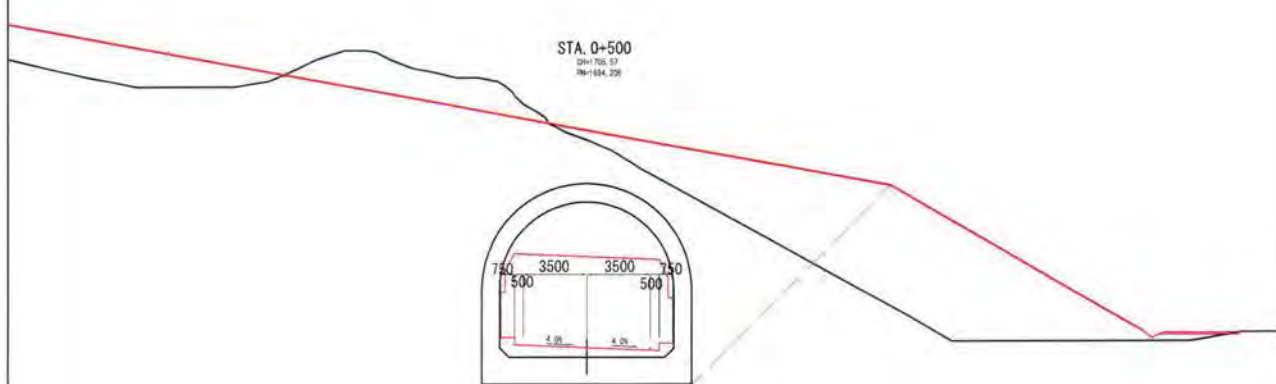


PROFILE

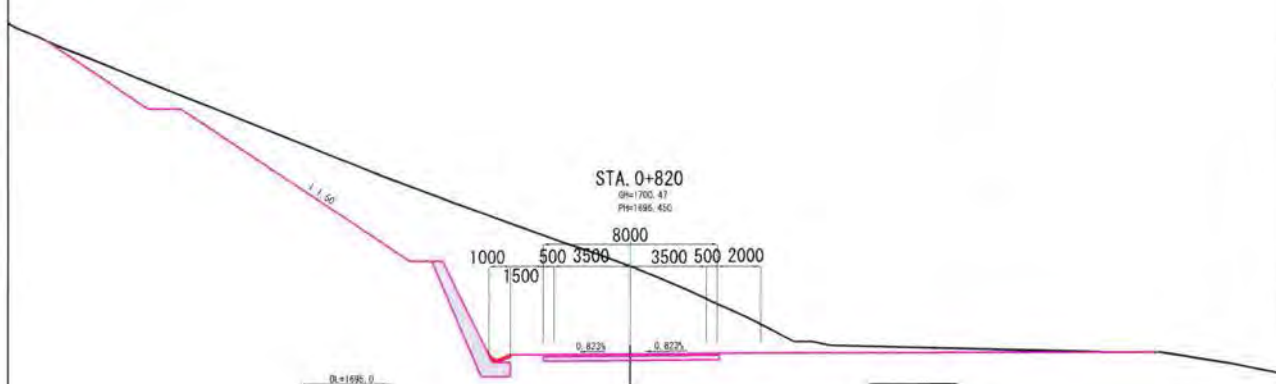
# Appendix-2 Typical Cross-sections



OPEN SECTION AT TOKUTOGUL SIDE



SNOW-SHED SECTION



OPEN SECTION AT BISHKEK SIDE

## TYPICAL CROSS-SECTIONS

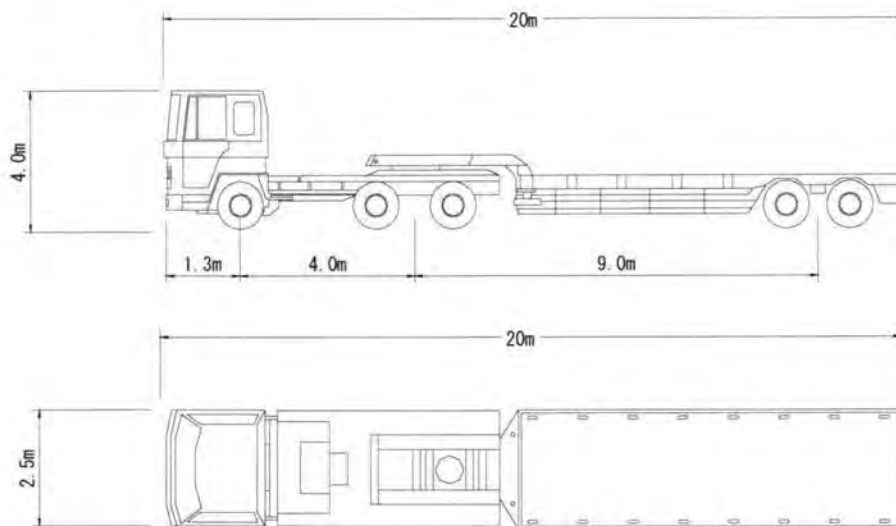


### Appendix-3 Examination of Road Width by "Traveling Track Generation Software"

#### 1. Input Data

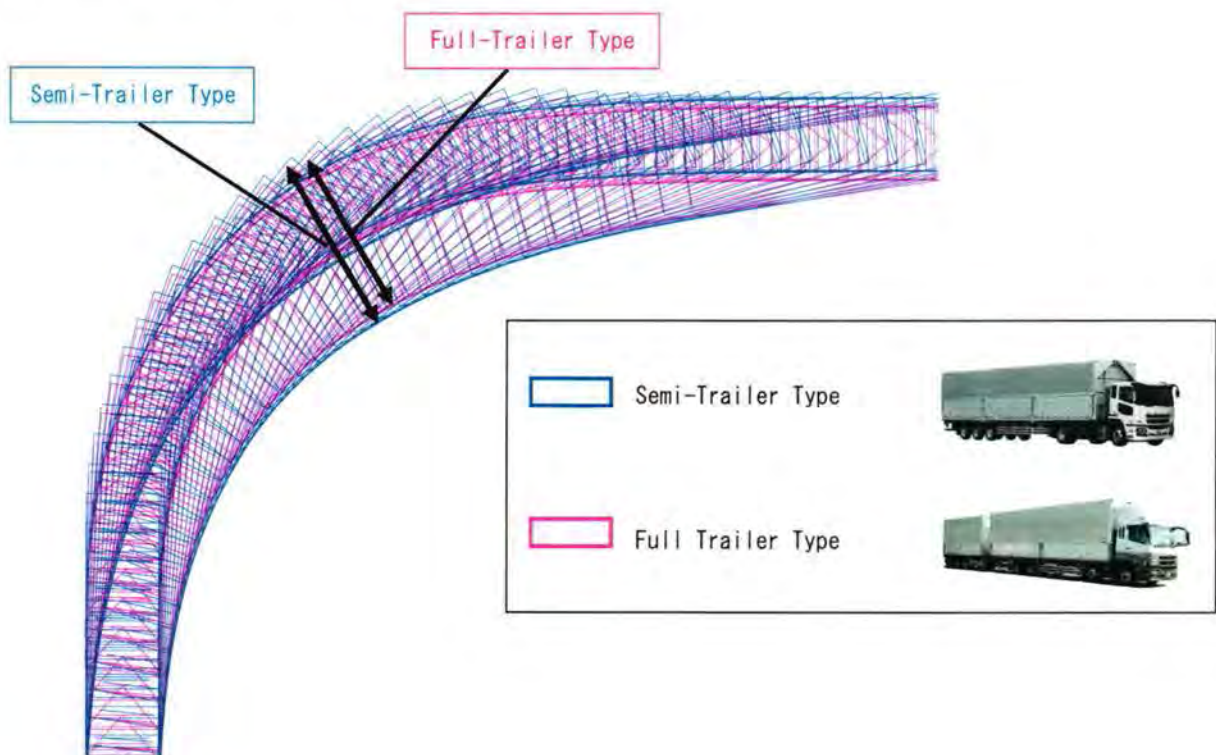
##### (1) Vehicle Dimension

SNiP: Length : 20m Width: 2.5m, Height: 4.0m



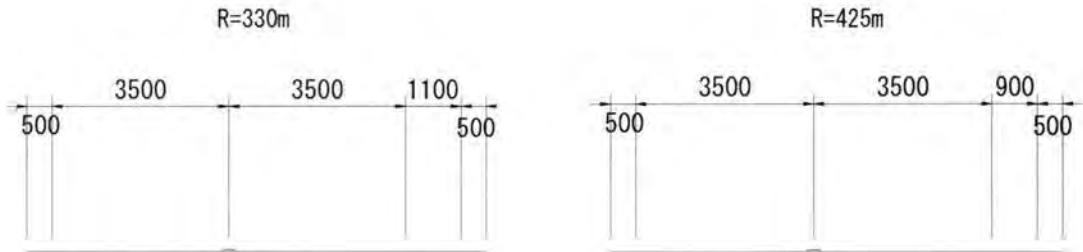
##### (2) Type of Vehicle

In comparison with Semi-Trailer Type and Full Trailer Type, the turning radius of Semi-trailer for 40ft container type is much smaller than Full Trailer Type. Therefore the summarization would be carried out based on the data of Semi-Trailer Type.



(3) Kyrgyz Regulation of Road Widening at Horizontal Curve

In accordance with SNiP KR 32-01:2004, 1.1m of road widening is required for R=330, and 0.9m of widening for R=425m as shown below.



2. Conclusion

Both of R=330m and R=425m can accommodate the Semi-Trailer in the same section with sufficient clearance (50cm or more). The Result of shows that the widening at this range of horizontal curve is not required as same conclusion of other international standard.

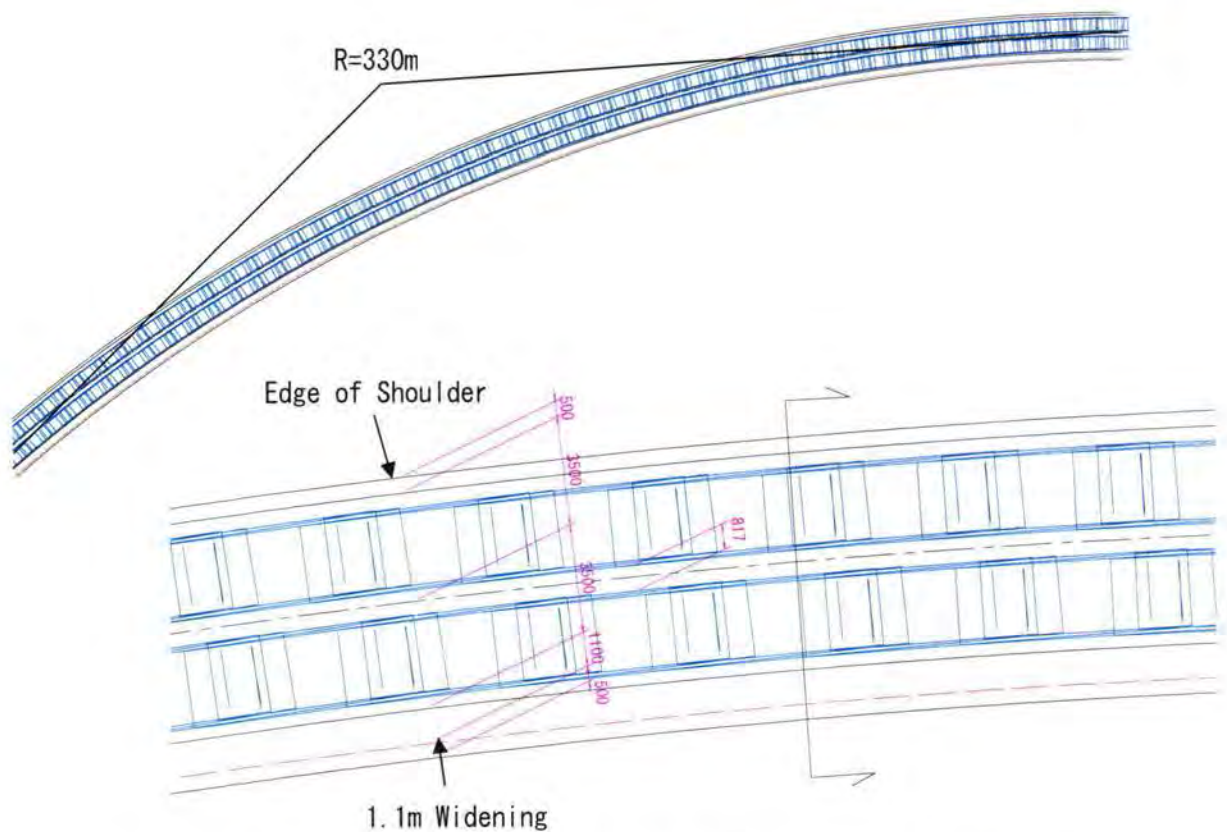


Figure Simulation result for R330m by "Traveling Track Generation Software"

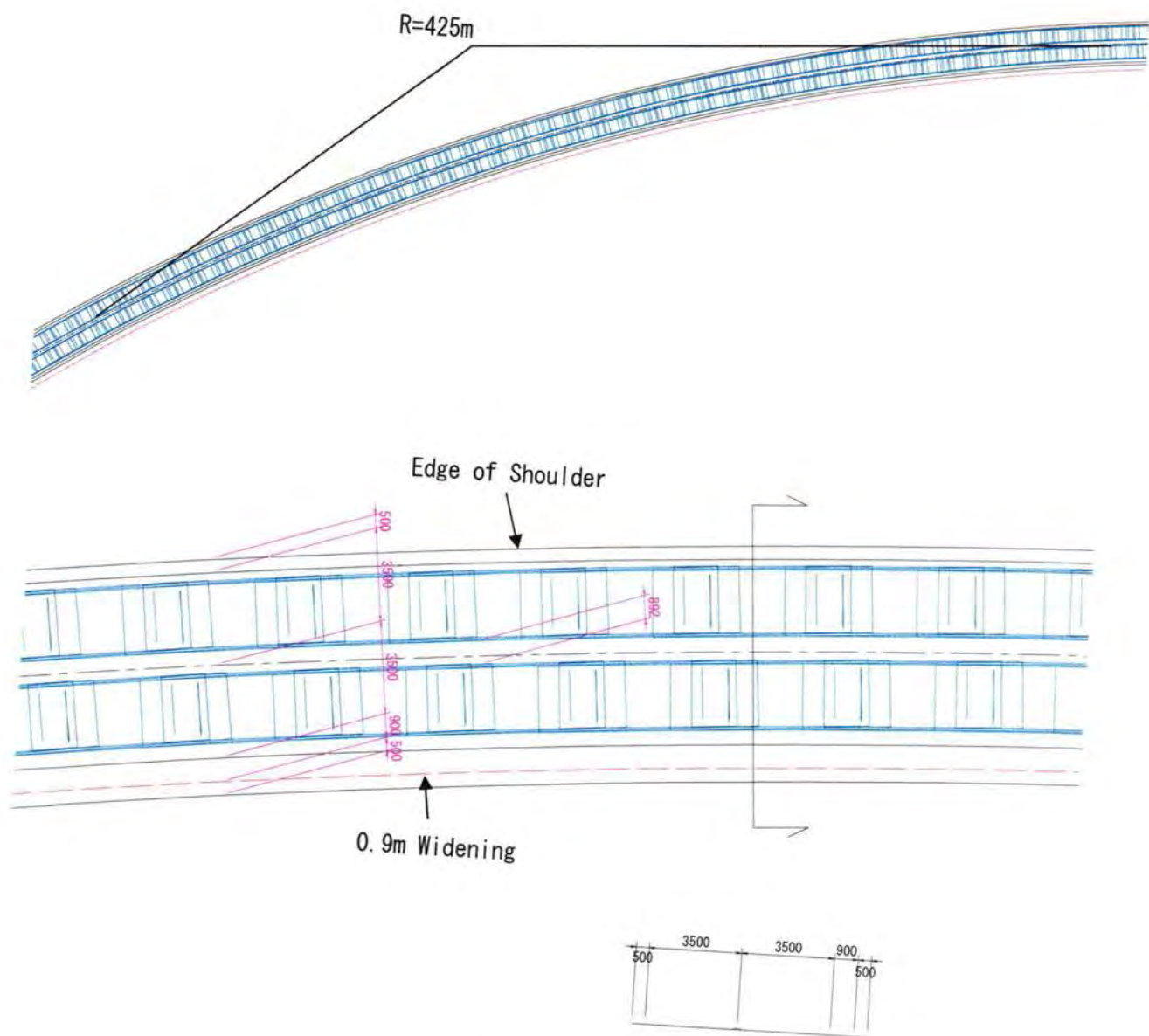
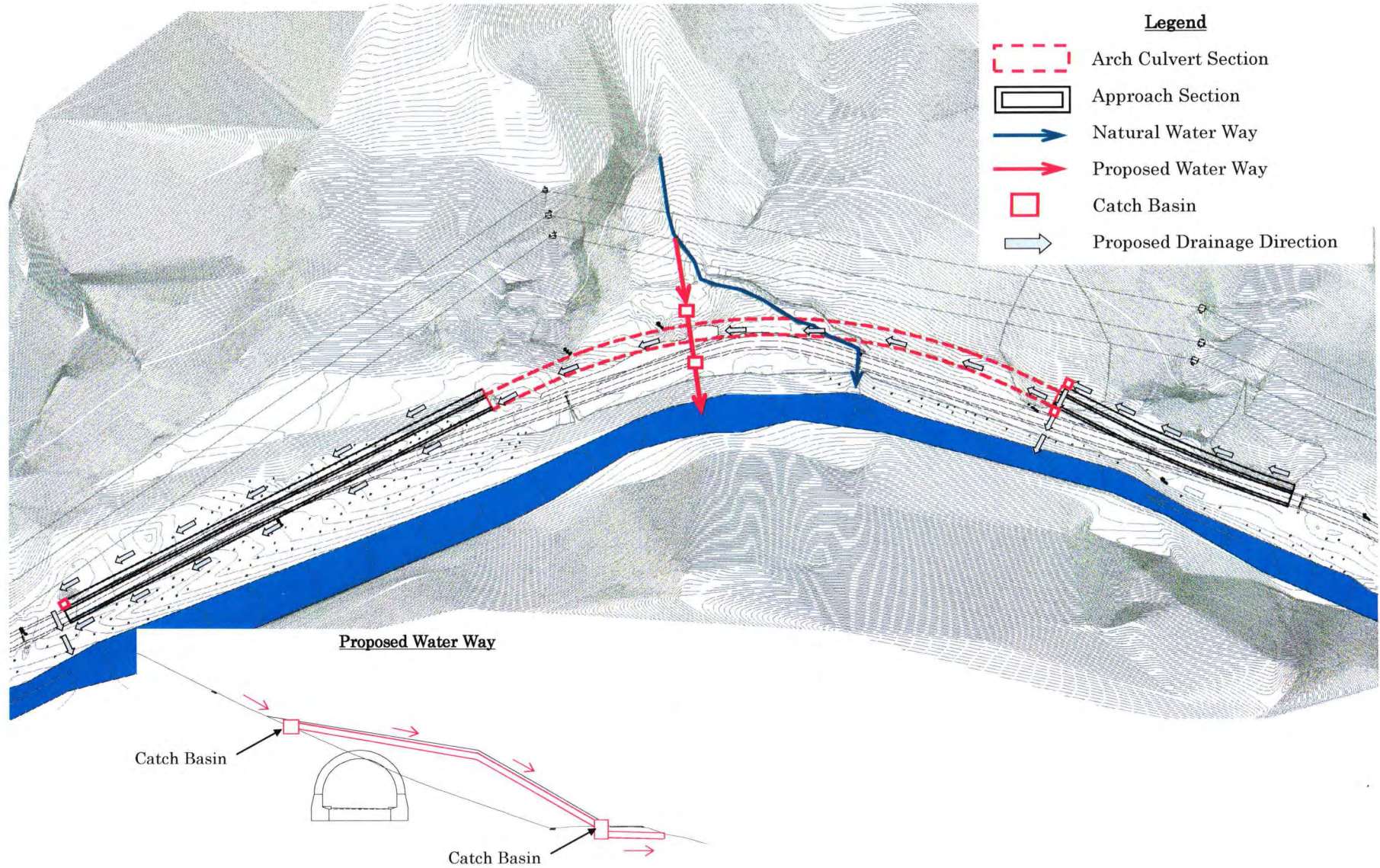


Figure-2 Simulation result for R425m by "Traveling Track Generation Software"

# Appendix-4 Proposed Drainage System

## Drainage System

Appendix5-1-16



Appendix-5 Seismic Zone

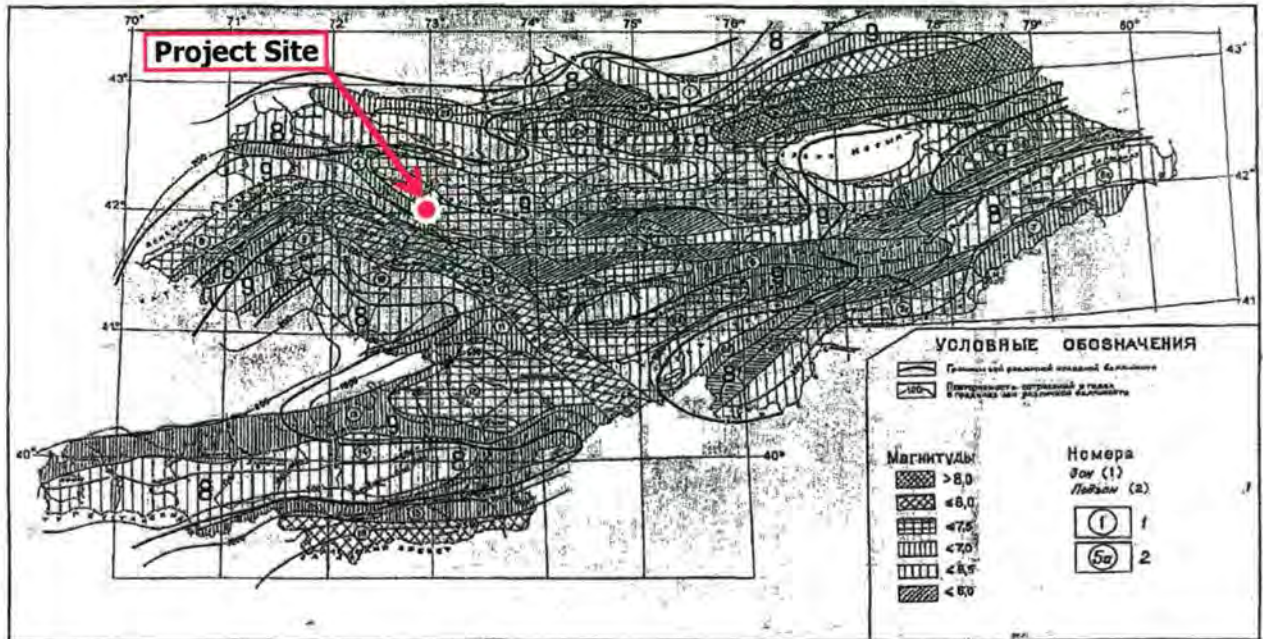
СНиП КР 20-02:2009

Приложение Б  
(обязательное)

Карта сейсмического районирования территории Кыргызской Республики

М 1:1 000 000

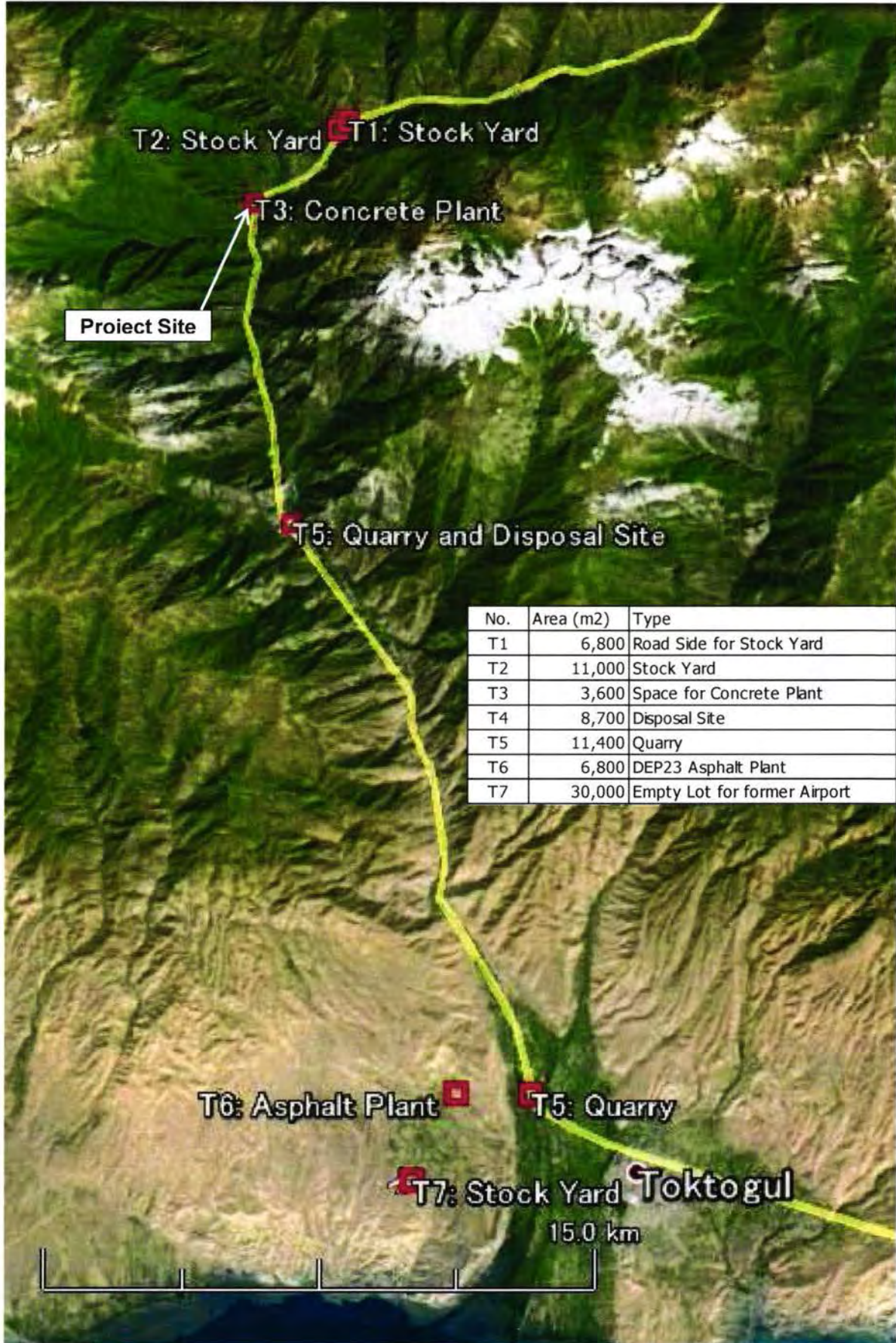
2011 год



88

(В редакции Изменения № 1 утв. Приказом Госстройрегионпрзвития от 02.04.2012 г. № 27)

Appendix-6 Location Map of Construction Yards



**Appendix-7 Draft Implementation Plan of EIA, Resettlement and Compensation**

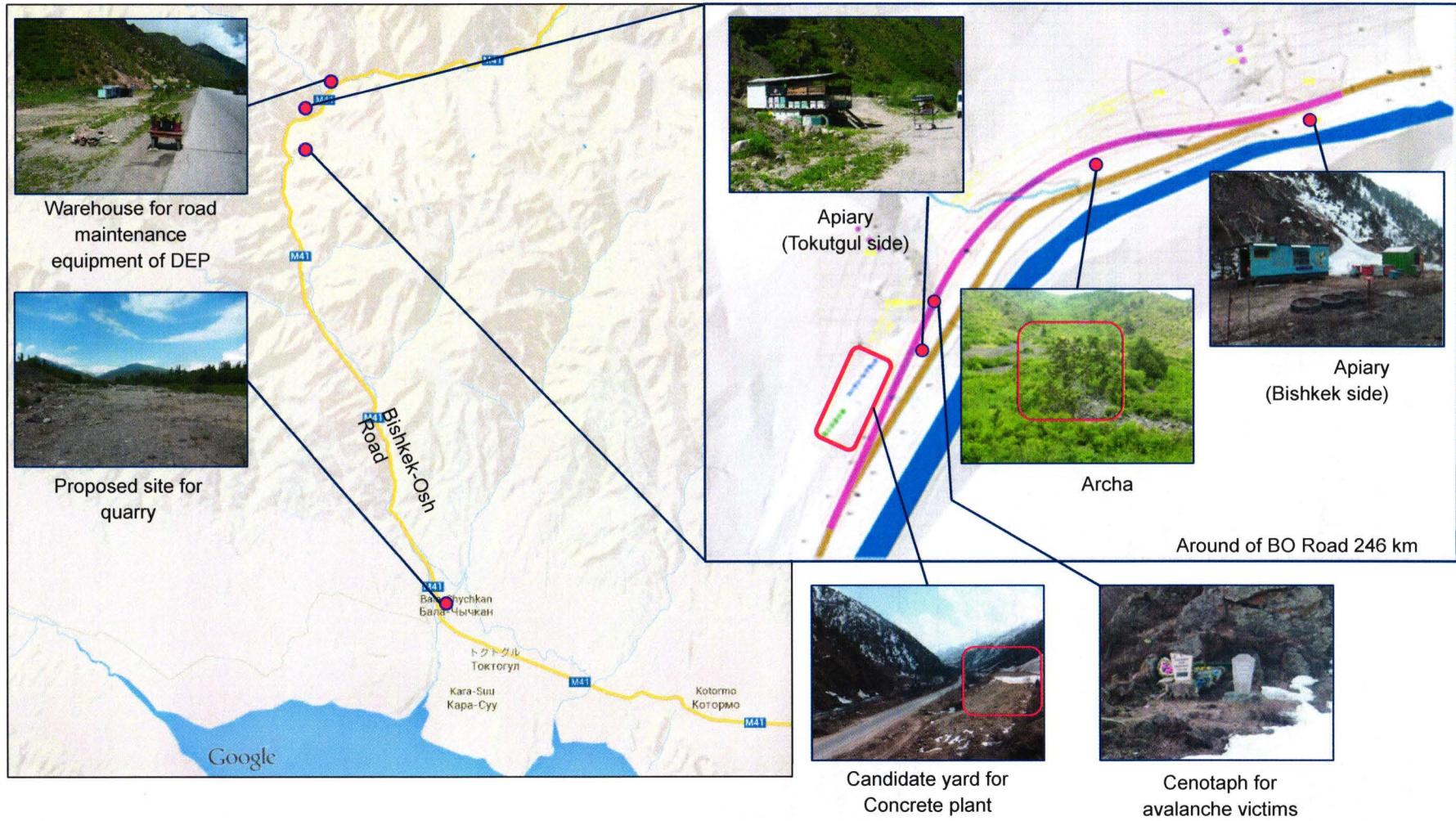
	2014						2015												
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Environmental Impact Assessment (EIA) to be conducted by MOTC	█																		
1) Permission of quarry site use	█																		
2) Permission of land use for worksite office, plant facilities, equipment yard, etc...	█																		
3) Planning of movement for the monuments, apiaries, etc.	█																		
4) Estimation of compensation cost for tree cutting	█																		
5) Estimation of property for residents affected by the Project	█																		
6) Estimation of whole compensation costs	█																		
7) Completion of EIA report	█																		
2 Public meeting with local governments and local residents (Toktogul rayon)	▲	(Public Meeting on July 2)					▲												
3 Submission of EIA from MOTC to SAEPF 1)			▲																
4 Examination of EIA report by SAEPF for approval			█																
5 Cutoff Date										▲									
6 Provision of compensation budget by MOTC			█																
7 Resettlement and Compensation											█								
8 Commandment of construction works																			▲

Note:

1) SAEPF: State Agency on Environment Protection and Forestry

Appendix-8 Location Map of Resettlement and Compensation

Appendix5-1-20





Appendix-9 Major Undertakings to be taken by Each Government

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 customs clearance of the products and to assist internal transportation of the products in the recipient country.		
	1) Marine (Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at ports of disembarkation		●
	3) 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)



## **Appendix-5-2 Technical Notes (2)**



**KYRGYZ REPUBLIC  
MINISTRY OF TRANSPORT AND COMMUNICATIONS**

**PREPARATORY SURVEY  
ON  
THE PROJECT FOR AVALANCHE PROTECTION  
ON  
BISHKEK – OSH ROAD  
IN THE KYRGYZ REPUBLIC**

**TECHNICAL NOTES (2)**

**SEPTEMBER 2014**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.**

**Preparatory Survey on the Project  
for Avalanche Protection of Bishkek-Osh Road  
in the Kyrgyz Republic**

**TECHNICAL NOTES**

The JICA Survey Team for the Preparatory Survey on the Project for Avalanche Protection on Bishkek-Osh Road in the Kyrgyz Republic (the Project) had confirmed the items described in the attached Technical Notes prearranged by a representative of the Ministry of Transport and Communications, Kyrgyz Republic (MOTC), which is the organization responsible for implementing the Project, with the representatives of the concerned ministries as witnesses. Based on the Technical Notes, the Survey Team plans to conduct the Basic Design of the Project, including project cost estimation, through the analysis of site survey findings after obtaining approval of the Japan International Cooperation Agency (JICA).

The results of analysis and the basic design are planned to be presented and discussed with JICA and MOTC in December 2014.

Bishkek City, Kyrgyz Republic  
September 16, 2014



**YUZO MIZOTA**  
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Deputy Minister  
Ministry of Transport and Communications  
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Director, IPIG  
Ministry of Transport and Communications  
Kyrgyz Republic

## UNDERTAKING OF THE MINISTRY OF TRANSPORT AND COMMUNICATIONS

The work items to be undertaken by the Ministry of Transport and Communications (MOTC) are the following:

- Electric power supply for the Project
- Emergency power generator for the Project
- Relocation of communication cables before the start of the Project
- Land acquisition before the start of the Project
- Management and control of diversion road during winter
- Social Environmental Considerations

The required cost for some specific work items are summarized in the table below, together with the schedule of budgeting and implementation of the works. The total expenditures is estimated at around 22 million som, which is equivalent to around 420 thousand USD. Cost is subject to the basic design

Work Item	Cost Som (USD)	E/N	Period for Budgeting by MOTC	Period for Implementation
Electric Power Supply	20,000,000	March 2015	April 2015 to December 2017	April 2018 to June 2018
	(385,000)			
Emergency Generator	1,040,000	ditto	ditto	ditto
	(20,000)			
Relocation of Communication Cable	780,000	ditto	April 2015 to August 2015	September 2015 to October 2015
	(15,000)			
Compensation of Archa	35,000	ditto	ditto	ditto
	(700)			
Total	21,855,000			
	(420,700)			

Exchange rate: 1 USD = 52 Som

E/N: Exchange of Note between the Government of Kyrgyz Republic and the Government of Japan

### 1. Electric Power Supply for the Project

MOTC shall provide electric power supply for the lighting system of the snow-shed. Power supply shall be completed by the end of June 2018, because the test operation of electrical equipment is required from July to October 2018. The estimated cost is 20 million som, based on the current year prices. 15 kVA (220 - 240 V) power supply shall be provided by MOTC to the incoming panel which will be installed by the Contractor.

### 2. Emergency power generator for the Project

MOTC shall provide the emergency power generator by the end of June 2018, because the test operation of the emergency power generator is required in the later stage of construction work, from July 2018. The estimated cost is 20 thousand USD, based on the current year prices. Generator capacity shall be 60 to 65 kW.

### **3. Relocation of Communication Cable**

Kyrgyz Telecom had installed a communication cable at the Project Site in June 2014. This communication cable shall be relocated by MOTC before the start of the Project. The cost of relocation is estimated at 780,000 som, based on the current year prices.

### **4. Land Acquisition Before the Start of the Project**

Required sites for the Project and/or project works, such as temporary stockyard, concrete plant, asphalt plant, quarry site, disposal area and contractor's camp, shall be secured by MOTC before the start of the Project.

#### **4.1 Temporary Stockyard**

Excavated materials consisting of rock and soil shall be removed from the project site, and most of them shall be utilized for the Project. These excavated materials, which contain small amounts of waste materials such as debris of concrete, asphalt, wood and other materials, are therefore required to be stored in a temporary stockyard during the construction period of around three (3) years.

The assumed volume of excavated materials before the detailed design phase is 98,000 m<sup>3</sup>, including the waste materials of 1,000 m<sup>3</sup>. Most of the excavated materials shall be utilized for the embankment and as filling materials at the project site, while around 10,000 m<sup>3</sup> of rock and soil shall be utilized as filling materials for the quarry site after taking the gravel materials. Around 18,000 m<sup>3</sup> are required for the embankment of around 5.5 m in height. The waste materials of 1,000 m<sup>3</sup> shall be dumped at the disposal area.

The temporary stockyard for excavated materials shall be secured by MOTC at the following location: Highland area beside the Equipment Yard of DEP No. 23 (DRP) located at Km 242 of Bishkek–Osh Road.

#### **4.2 Concrete Plant Site**

Land for the concrete plant shall be secured by MOTC at Km 246 of Bishkek–Osh Road.



Concrete Plant Site



### 4.3 Asphalt Plant Site

A new asphalt plant for the Project shall be installed within the territory of the existing asphalt plant under DEP No. 23 responsibility located at Km 3 of Toktogul–Besh Tash Road. The general view of the asphalt plant is shown below.



General View of the Asphalt Plant for the Project

### 4.4 Quarry Site

There are two (2) possible quarry sites: Quarry Site No. 1, which is located in the compound of the existing asphalt plant in Toktogul City and managed by MOTC, and Quarry Site No. 2, which was confirmed by the State Agency of Geology and Mineral Sources during the EIA report preparation. After the Exchange of Notes (E/N) between the Government of Kyrgyz Republic and the Government of Japan which is supposed to be concluded on March 2015, MOTC is expected to obtain all the necessary licenses for Quarry Site No. 2 from the State Agency of Geology and Mineral Sources. Contractor/consultant have a responsibility to prepare the required documents from regional administration of SAEPF and local authority before starting construction works. MOTC has a responsibility to obtain the license for quarry operation from the State Agency of Geology and Mineral Sources after collecting the required documents.

- Quarry Site No. 1 is situated next to the existing Asphalt Plant. It is equipped with a crushing machine for crushed stone production.

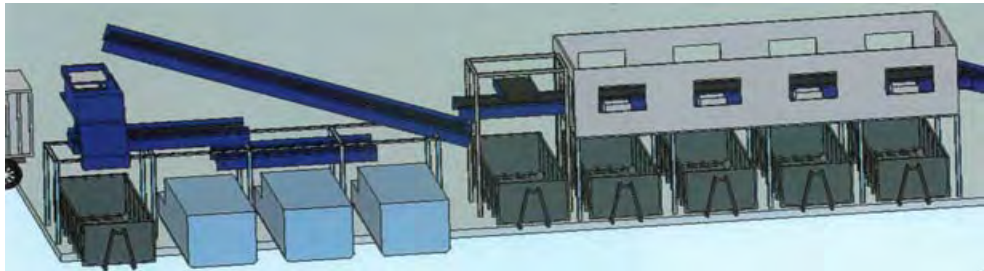


Quarry Site No. 1

- Quarry Site No. 2 is the Kayrak Quarry with an area of more than 10ha. The current quarry can provide the necessary amount of gravel materials (22,000 m<sup>3</sup>) for the Project. Due to its close location to the residential area, the quarry is to be equipped only with a sifting machine.



Quarry Site No. 2



Sample of Sifting Machine for Installation

#### 4.5 Disposal Area

Land within the territory of the concrete plant situated near the Project site at Km 246 of Bishkek-Osh Road shall be utilized as the disposal area for waste materials after the completion of construction works. The volume of waste materials to be dumped at the disposal area is estimated at approximately 1,000 m<sup>3</sup>. Contractor/consultant need to agree and get conclusion on the disposal area from regional administration of SAEPPF.

#### 4.6 Contractor's Camp

At least 3,000 m<sup>2</sup> of land is required for the Contractor's camp. The area shall be provided with water supply facilities. There are two lots proposed and possible for the Contractor's camp as follows:

Camp No. 1



## Camp No. 2



No.	Address	Available Area	Owner
Camp No. 1	Jalalabad State, Toktogul Rayon, Toktogul City, Promyshlennaya 47	5,000m <sup>2</sup>	DEP No. 23
Camp No. 2	Jalalabad State, Toktogul Rayon, Toktogul City, M. Ashyraliev 1	6,000m <sup>2</sup>	DEP No. 23

### 5. Management and control of diversion road during winter

A “No-Construction Schedule” due to snow and subzero temperature at the project site during the winter season from November to April shall be submitted in writing by the Japanese Contractor to MOTC, together with the endorsement of the Japanese Consultant, for approval. The responsibility for maintenance works at the project site during the “No-Construction” period shall be shared between MOTC, the Japanese Consultant and the Japanese Contractor, as follows:

- (1) DEP No. 23 of MOTC shall be responsible for the management and control of the diversion road during the no-construction period.
- (2) The Consultant and the Contractor shall set up and maintain the following organizational structure during the no-construction period:
  - (a) Consultant: One (1) Japanese supervisor and one (1) interpreter (from Russian to Japanese or English, vice versa).
  - (b) Contractor: One (1) Japanese construction manager and one (1) interpreter (from Russian to Japanese or English, vice versa).
- (3) The Consultant and the Contractor shall conduct the following emergency measures at the project site:
  - (a) Site patrol and inspection of structures and facilities
  - (b) Reporting to JICA and MOTC to catch up with the original construction schedule.

## **6. Environmental Consideration**

### **6.1 Compensation for Cutting of Trees**

MOTC takes a responsibility of correspondence with regional administration of SAEPF and local authority on the compensation for tree cutting as shown below. With regard to the method of compensation for the 5 “archa” trees cut by newly planting 25 seedlings of “archa” as described in the Environmental Impact Assessment (EIA) Report, it is necessary for MOTC to prepare the planting program by 2014, with the agreement of SAEPF, which shows the procedure of planting and the adequate planting site near Km 246 of Bishkek–Osh Road or its vicinity. The most preferable period for “archa” tree planting is March–April or October–November. As soon as the Exchange of Notes (E/N) between the Government of Kyrgyz Republic and the Government of Japan is concluded in March 2015, MOTC shall prepare the budget for planting in April 2015 (approx. 35 000 som or 700 USD), and MOTC shall conduct the planting in April 2015 or in the period of October to November 2015. The planting condition should be monitored by MOTC and SAEPF in or after April 2016. In case that the planting is not adequate, planting should be conducted again to maintain adequate planting.

According to Government Decree No. 374, dated May 21, 2004, regarding “The Implementation of Investment Projects for Construction, Rehabilitation and Reconstruction of Roads in Kyrgyz Republic,” the Ministry of Transport and Communications of Kyrgyz Republic and contractors involved in investment projects for construction, rehabilitation and reconstruction of roads in Kyrgyz Republic under the provision of signed and ratified agreements shall be exempt from the payment of compensation of damage due to the cutting of trees and bushes in areas covered by the right-of-way of project road sections.

According to the law regarding “the prohibition of cutting, transportation, utilization, purchasing and selling of particular valuable wood species (walnut and “archa” trees)” in Kyrgyz Republic,” archa is one of valuable species. MOTC needs to decide the issue of compensation with SAEPF, if it would be paid or not. If archa tree cutting compensation would be decided by payment, then a certain amount of payment would be made. Through Government Decree No. 450 dated August 5, 2013, the rules on the issuance of permits for the cutting of particular valuable wood species (walnut and archa trees) were established. The rules are to be followed during the construction or explosive work implementation, such as the installation of cables, pipelines, transportation and other communication lines, geological survey or commercial exploitation of terrain when there is no possibility to keep the current condition of the landscape, or loss of forestry production (including denied benefit). Following the Instructions of Authorization Procedures described in Statement No. 458 of the Government of Kyrgyz Republic, dated August 13, 2013, “Confirmation of procedures for forestry land standard price determination, in case of land utilization for purposes not related to the forest management,” the authorization procedure should be as follows:

- (1) MOTC submits a request letter to SAEPF, which is the administrative office for trees in the project area.
- (2) The central office of SAEPF submits a letter to the Jalal-Abad Regional Department for evaluation of the amount of compensation.

- (3) Staff members of MOTC and Jalal-Abad Regional Department jointly visit the project site and discuss specific features of the archa trees within the site.
- (4) Based on the survey results, the extent of archa trees to be cut is evaluated. Likewise, the number of new archa trees to be planted as compensation is calculated. Usually, 15-year old archa trees (about 1 meter in height) are planted to compensate for cut trees. Average price is 800 som to 1,000 som per tree. If 25 newly planted archa trees are obligated as compensation for cutting 5 archa trees, the total expense for the purchase of 25 archa trees will be 25,000 som. Planting works to be implemented by the staff of Lesohotustroistvo (the agency responsible for forest management) is estimated to cost about 10,000 som. Overall amount of compensation to be paid is estimated at 35,000 som.

## 6.2 Apiary Relocation

There are two (2) apiaries at Km 246 of Bishkek–Osh Road: one is portable and the other one is stationary. The Toktogul Rayon (District) Administration Office had approved that the Jany-Djol Village Administration Office will allocate alternative lots to apiary owners, without any indemnity payment, after discussing this matter with MOTC. Apiary relocation shall begin before construction works. MOTC together with Toktogul District Administration Office should inform apiary owner about construction works and necessity of apiary relocation before starting construction works during the period of 2014-2015.



Stationary and Portable Apiaries near the Project Site

MOTC plans to designate a person to be responsible for the relocation of apiaries. As soon as the E/N is concluded in March 2015, MOTC shall also conduct the monitoring of apiary relocation and shall appoint a person to be responsible for the relocation from April 2015. The relocation of apiaries has to be completed by November of 2015.

## 6.3 Relocation of Avalanche Victim Monuments

MOTC conducted public hearings in Toktogul City on the 2nd of June 2014, where the issue of monument relocation was discussed with the Toktogul State Administration Office, and approved. According to the information provided by the Toktogul Administration, these monuments were installed illegally. Thus, relocation or demounting of these monuments is possible without indemnity payment. However, due to ethical and moral standards, MOTC shall reinstall the monuments after the construction work is completed.



Avalanche Victim Monuments

#### **6.4 Final Statement on EIA Report from SAEPF**

MOTC plans to submit the Final EIA Report to SAEPF in the beginning of September 2014. The EIA's approval is expected to be received in October 2014.

#### **6.5 Appointment for the Investigation of Grievances**

MOTC issues an order of establishing a group for grievance investigation. As soon as the E/N is concluded in March 2015, MOTC shall also conduct grievance investigation and shall appoint persons to be responsible for the investigation of grievances during the Project.

#### **6.6 Public Announcement on the Monitoring Results**

MOTC shall publicly announce the environmental monitoring results in a certain manner. The website or notice board of MOTC may be utilized for the information dissemination to the public.

## Appendix-6 概略設計図面





**GOVERNMENT OF KYRGYZ REPUBLIC  
MINISTRY OF TRANSPORT AND COMMUNICATION**



**PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD**

**DRAWINGS**

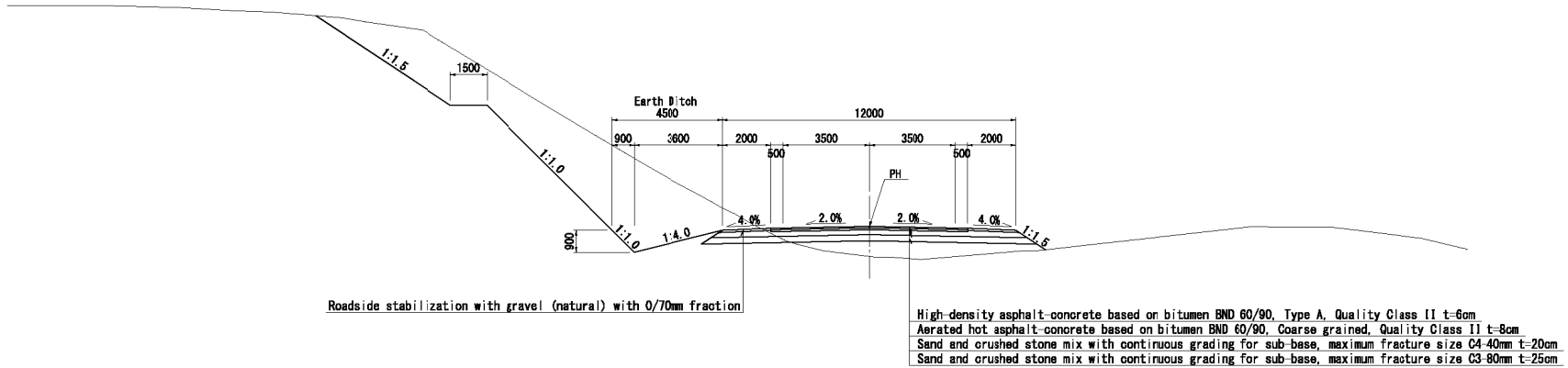
**DECEMBER 2014**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.**

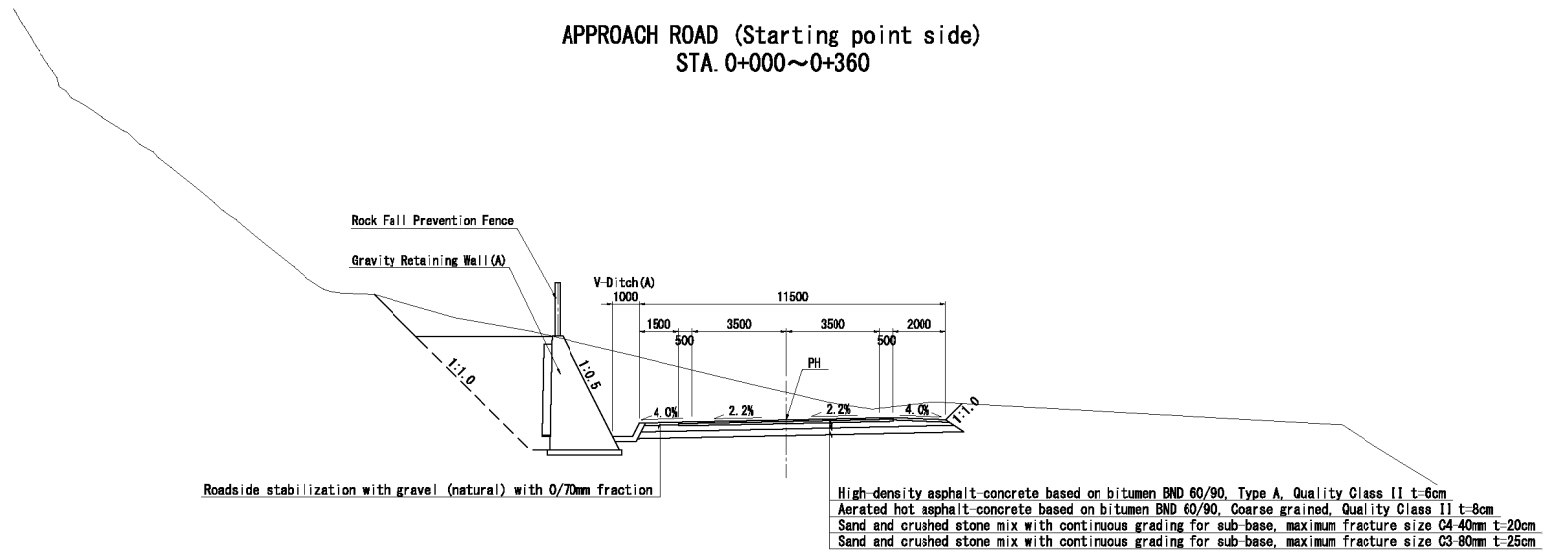
PREPARATORY SURVEY OF THE PROJECT FOR AVALANCHE PROTECTION ON BISHKEK-OSH ROAD

**DRAWING LIST**

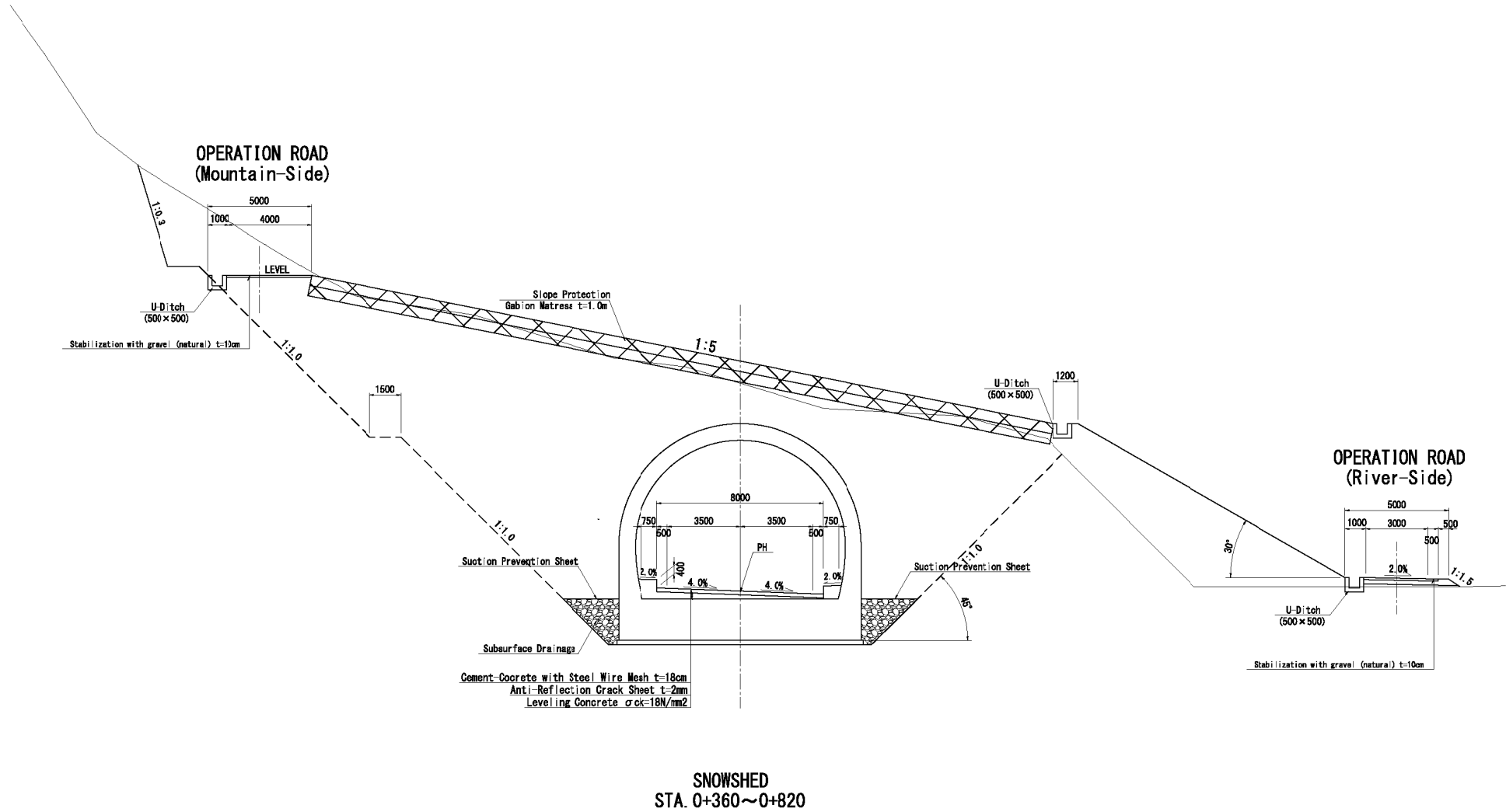
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1.	TYPICAL CROSS SECTION	TP - 01 ~ 02	2
2.	GENERAL DRAWING	GD - 01 ~ 02	2
3.	FACILITY PLAN	FP - 01 ~ 03	3
4.	DETAIL OF DRAINAGE STRUCTURE	DS - 01 ~ 11	11
5.	DETAIL OF ANCILLARY STRUCTURE	DA - 01 ~ 02	2
6.	DETAIL OF CONCRETE PAVEMENT	DC - 01	1
7.	GENERAL LAYOUT OF ARCH CULVERT	GL - 01	1
8.	DETAIL OF ARCH CULVERT	AC - 01 ~ 03	3
9.	LAYOUT OF LIGHTING IN ARCH CULVERT	LL - 01	1
10.	WIRING SYSTEM OF LIGHTING	WS - 01	1
11.	INSTALLATION OF LAMP AND WIRING	IL - 01	1
12.	DISTRIBUTION BOARD	DB - 01	1
13.	LEAD-IN POLE AND SWITCH BOX	LP - 01	1
14.	EXTERIOR LIGHT	EL - 01	1
	TOTAL		31



**APPROACH ROAD (Starting point side)**  
STA. 0+000~0+360



**APPROACH ROAD (Ending point side)**  
STA. 0+820~1+009.57



MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

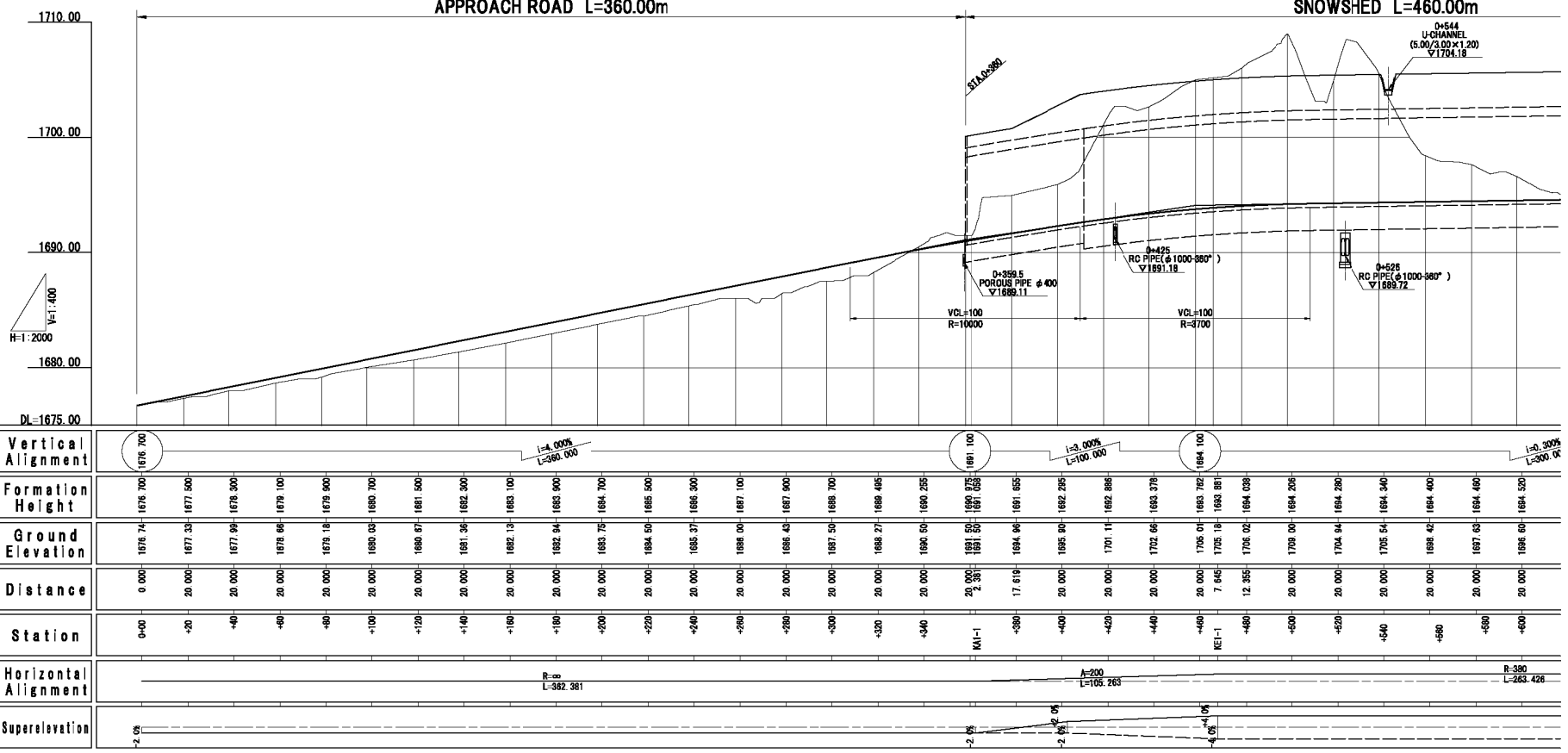
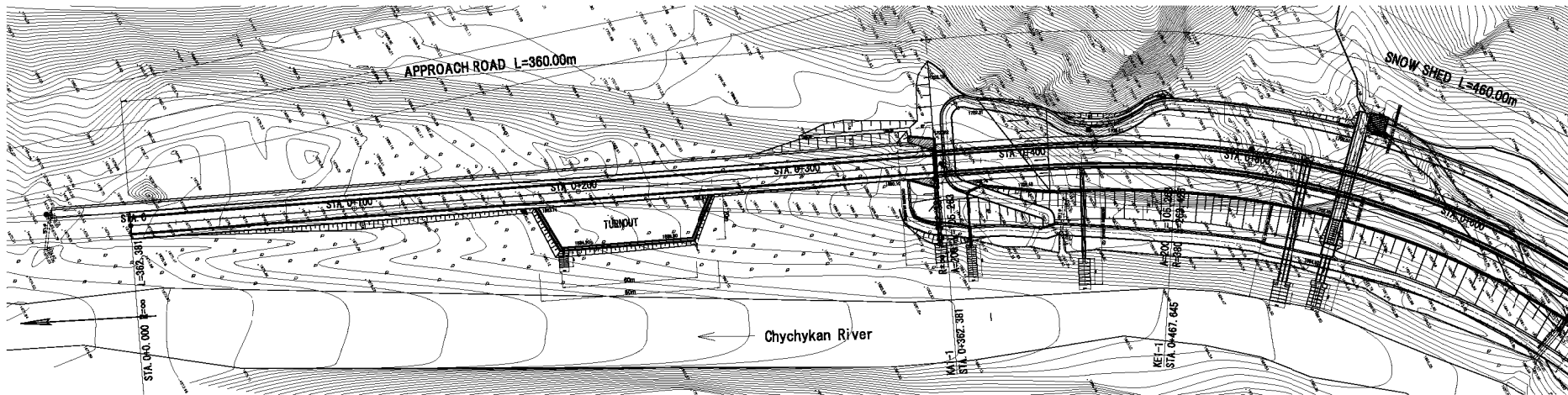
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:

TYPICAL CROSS SECTION  
OF SNOWSHED

SCALE	SHEET NO.
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DATE	



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Ground Elevation	1676.74	1677.33	1677.99	1678.66	1679.16	1679.90	1680.05	1680.70	1680.87	1681.50	1681.36	1682.30	1682.94	1683.75	1684.70	1684.50	1685.50	1686.37	1686.30	1687.00
Distance	0.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000
Station	0+00	+20	+40	+60	+80	+100	+120	+140	+160	+180	+200	+220	+240	+260	+280	+300	+320	+340	MI-1 2+381	4+00
Horizontal Alignment																				
Superelevation																				

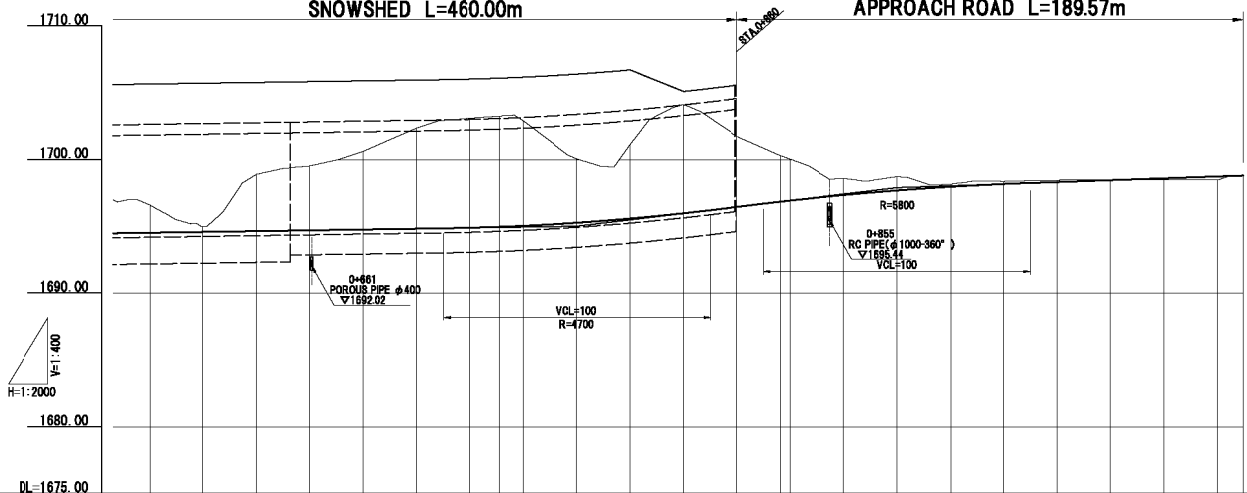
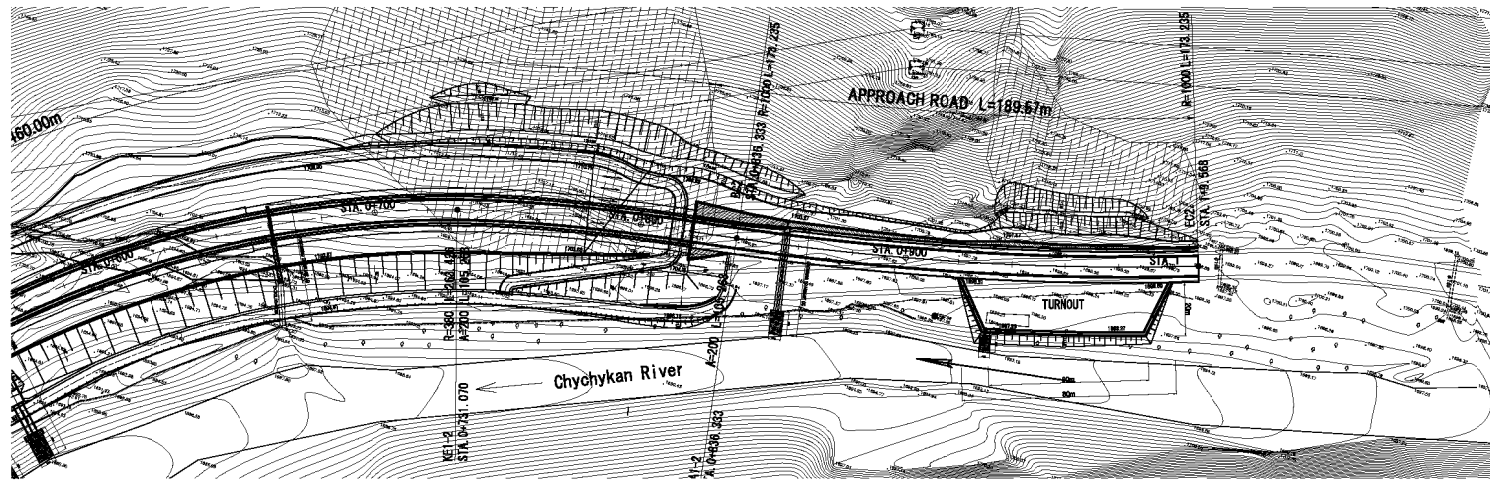
MINISTRY OF TRANSPORT AND COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:  
GENERAL DRAWING (1/2)

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DATE		GD-01



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Ground Elevation	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00	1695.00
Distance	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000
Station	-600	-620	-640	-660	-680	-700	-720	-740	-760	-780	-800	-820	-840	-860	-880	-900	-920	-940	-960	-980
Horizontal Alignment	$R = 380$ $L = 263.426$																			
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MINISTRY OF TRANSPORT AND COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

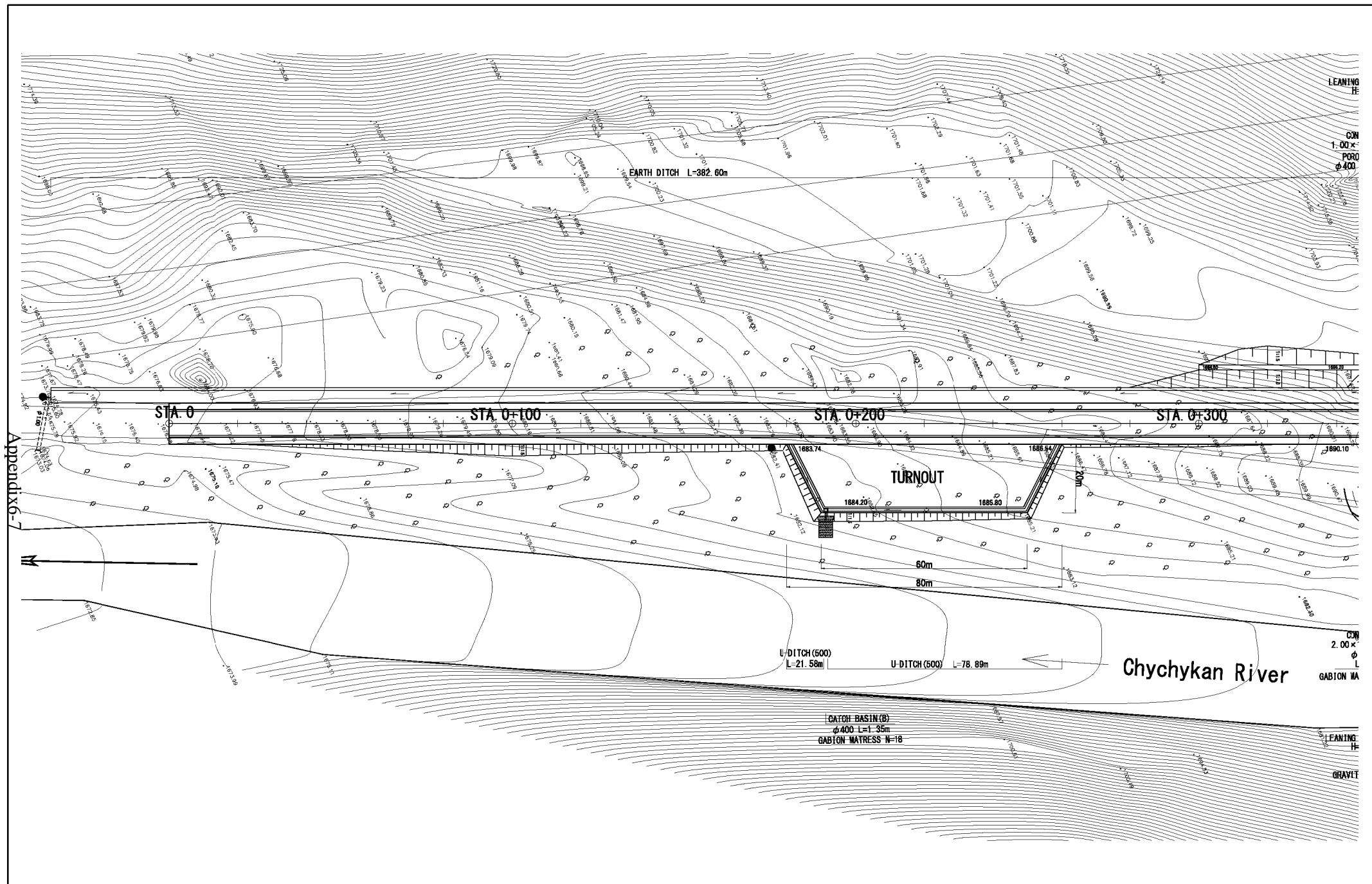
PREPARATORY SURVEY OF THE PROJECT FOR AVALANCHE PROTECTION ON BISHKEK-OSH ROAD IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
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TITLE:

GENERAL DRAWING (2/2)

SCALE	SHEET NO.
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Appendix 6-7

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

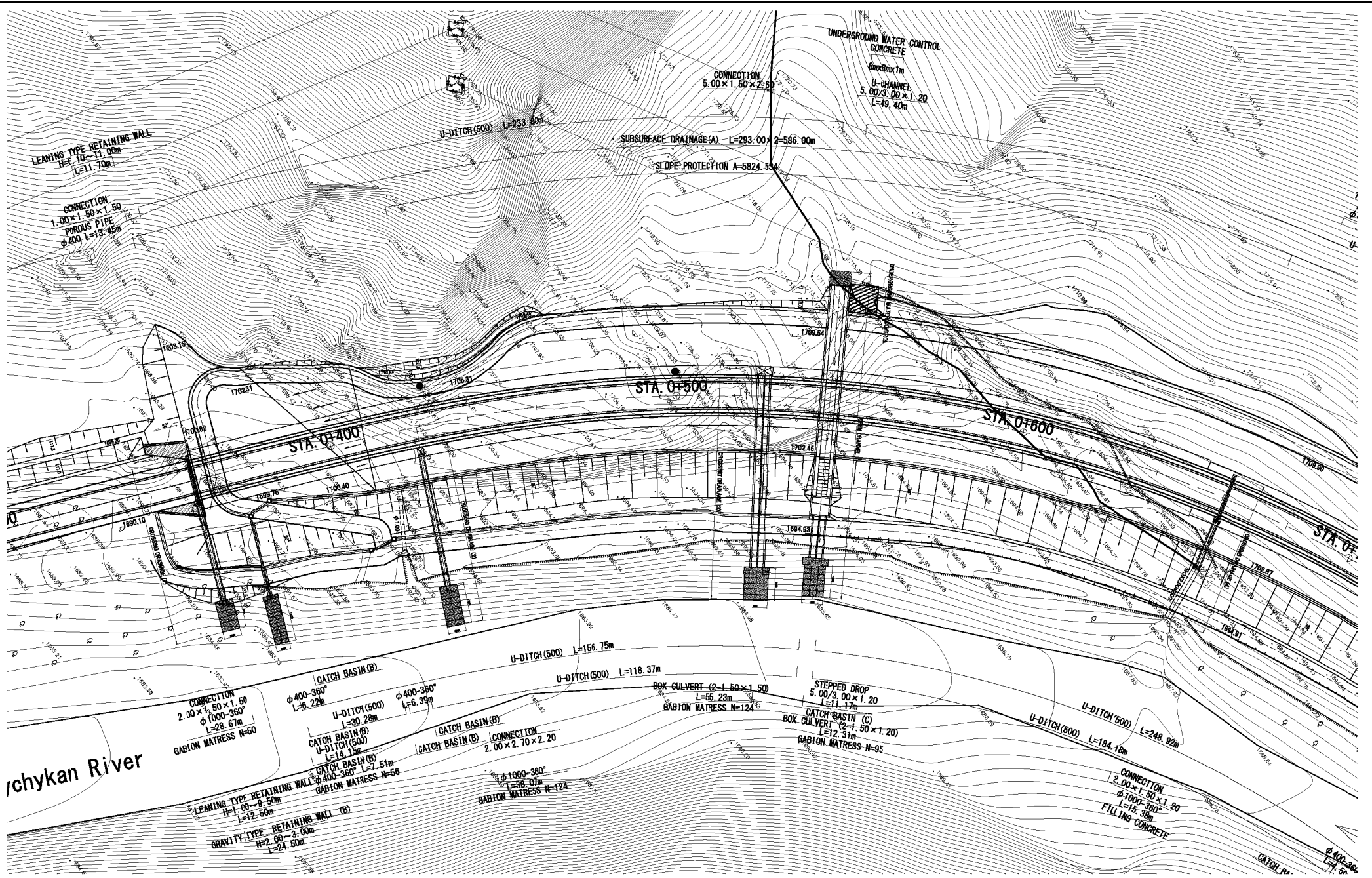
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AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

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CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

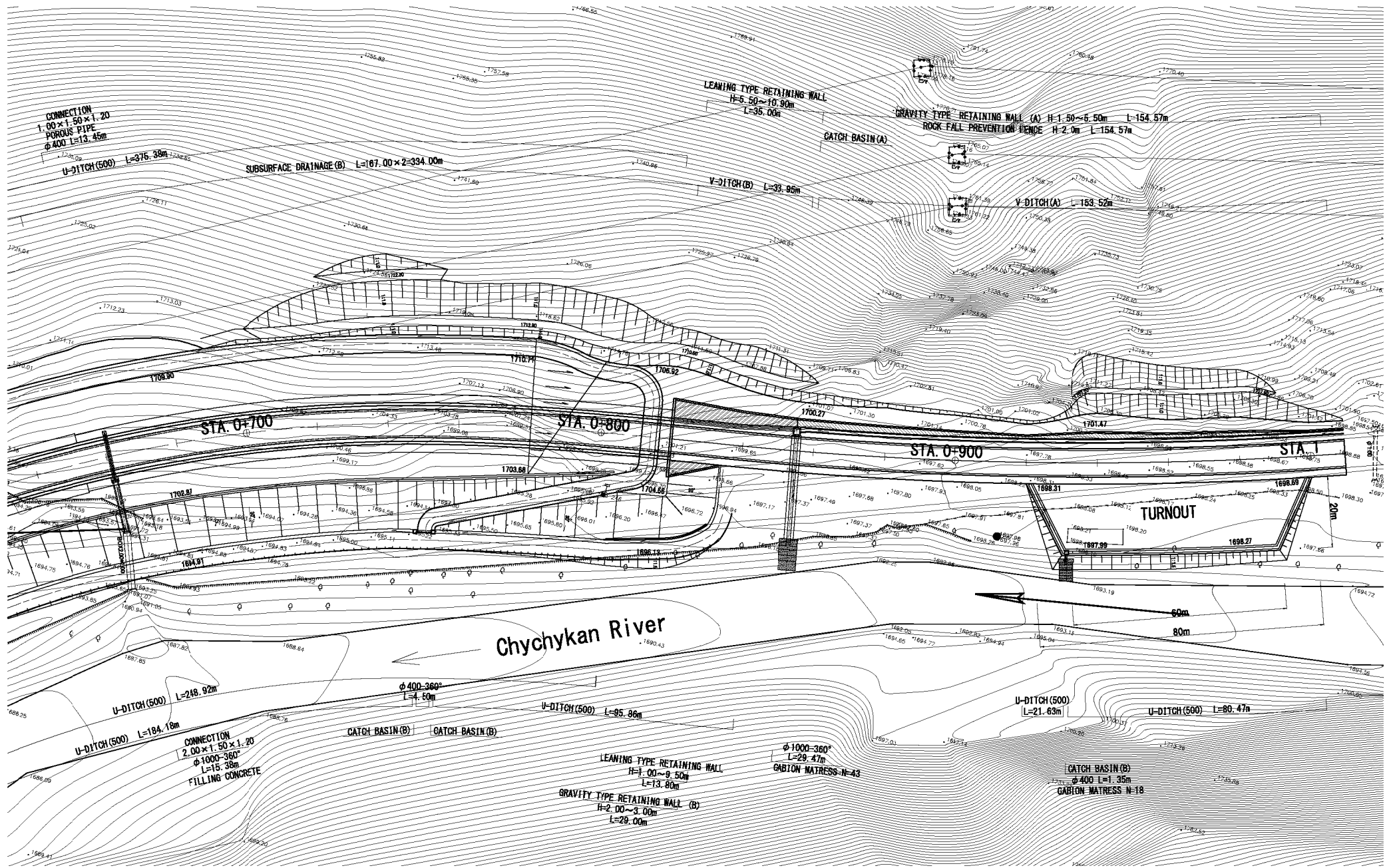
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MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

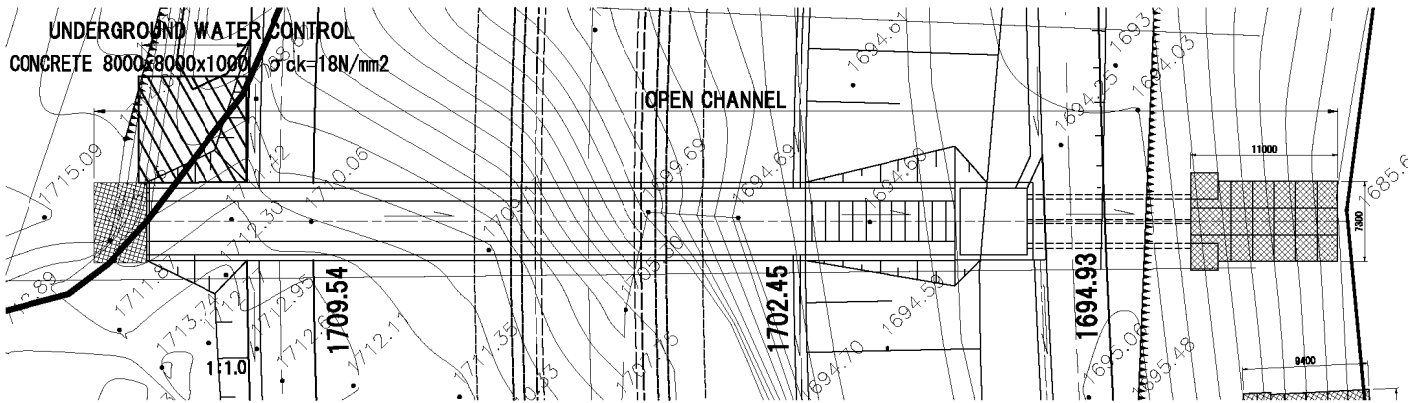
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IN KYRGYZ REPUBLIC

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KOKUSAI KOGYO CO., LTD.

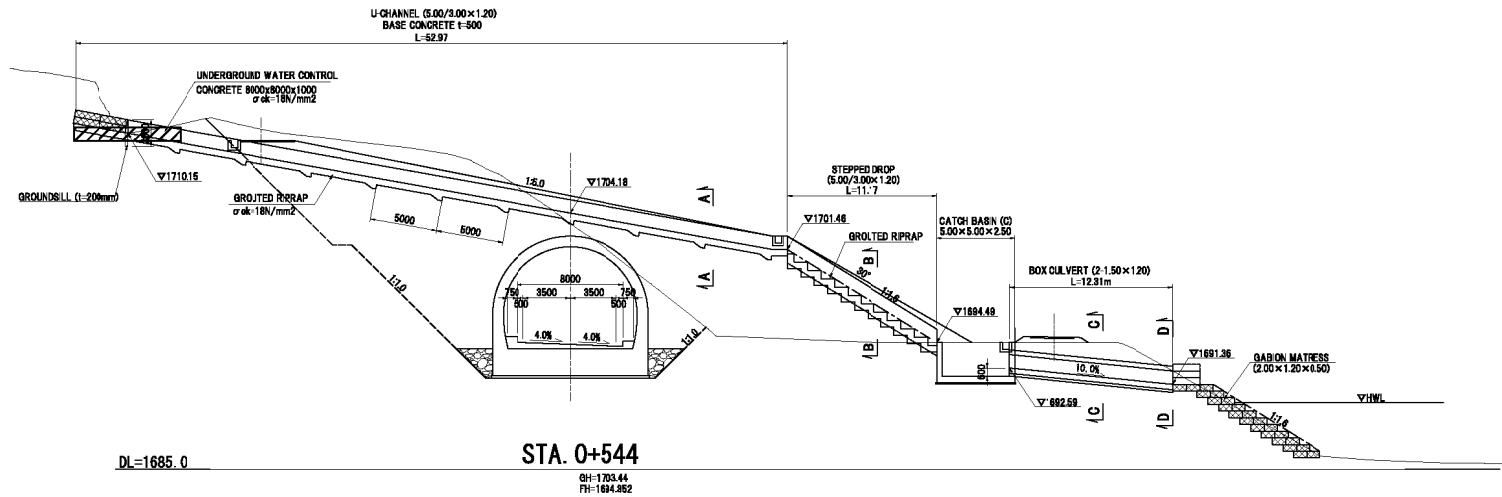
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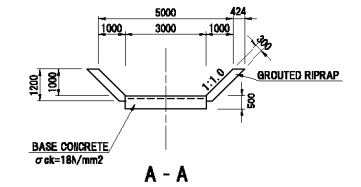
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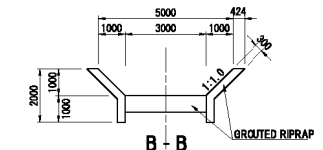
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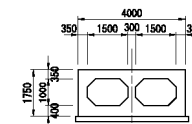
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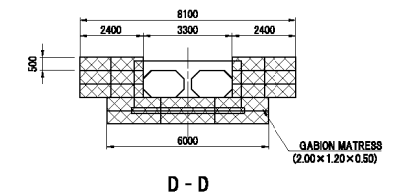
A - A



B - B



C - C



D - D

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Appendix 6-10

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

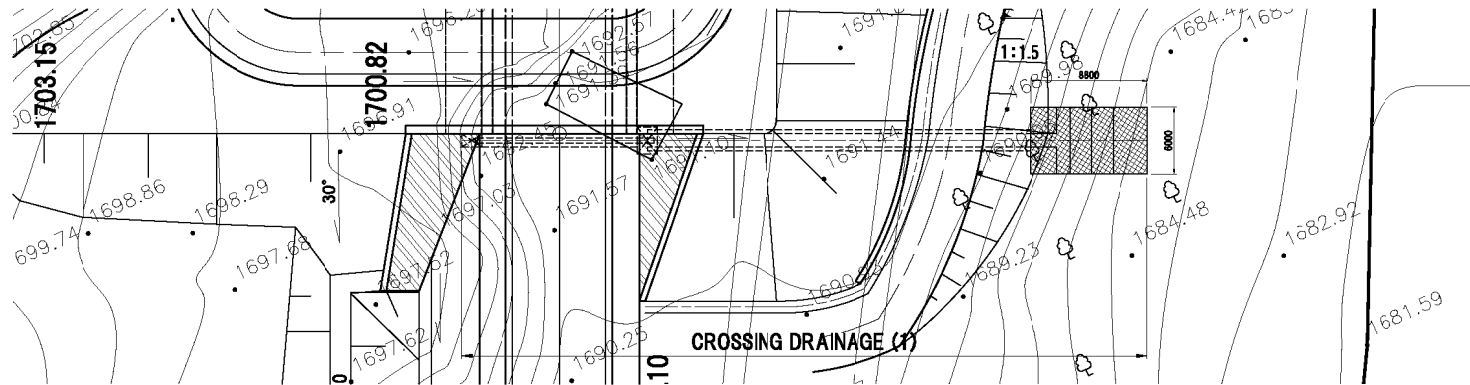
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

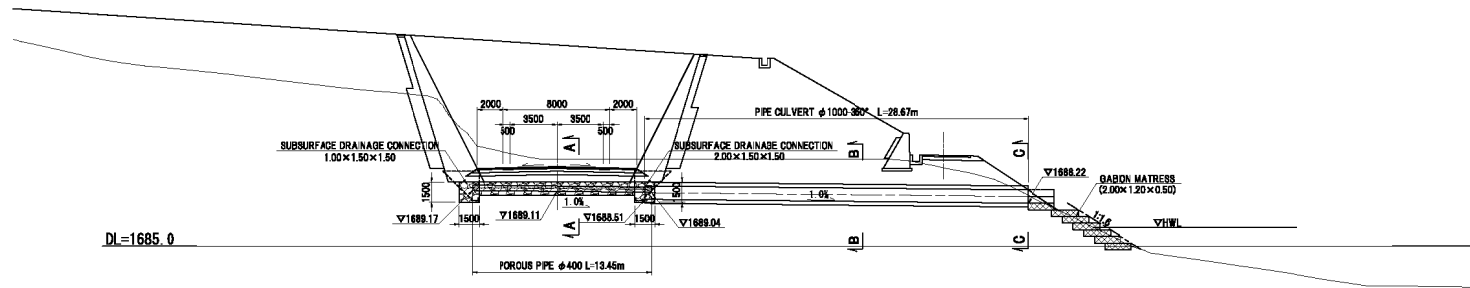
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AS SHOWN	DS-01
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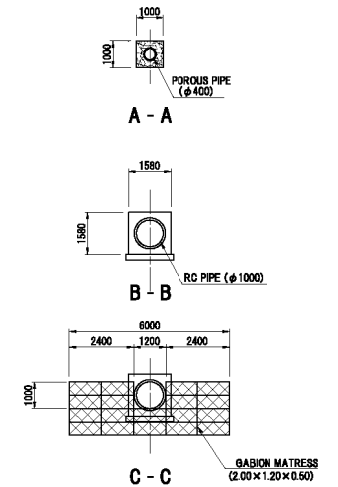
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NOTE: SCREEN SHALL BE INSTALLED ON SUBSURFACE DRAINAGE CONNECTION



CROSS SECTION S=1:200

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

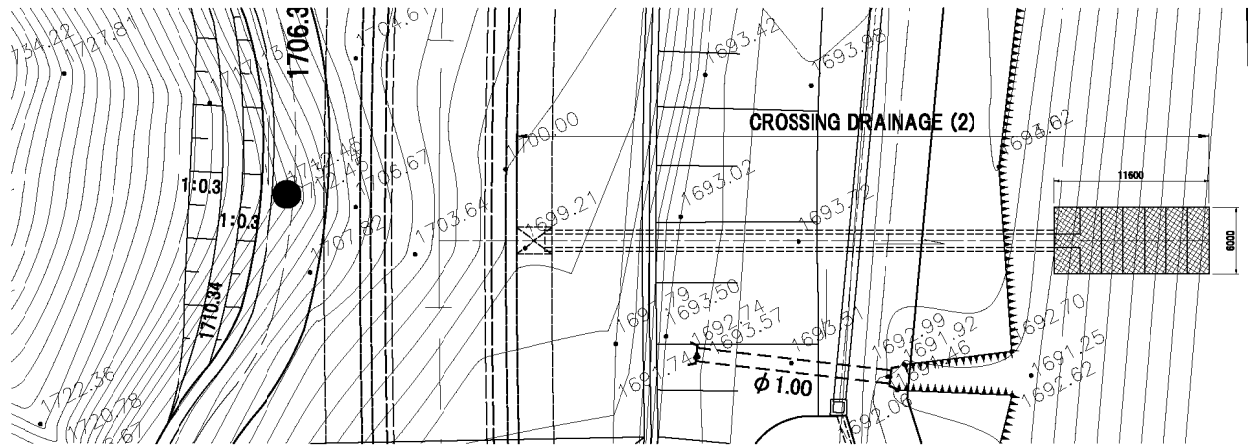
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AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

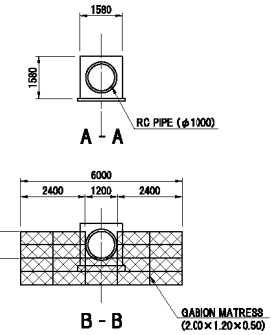
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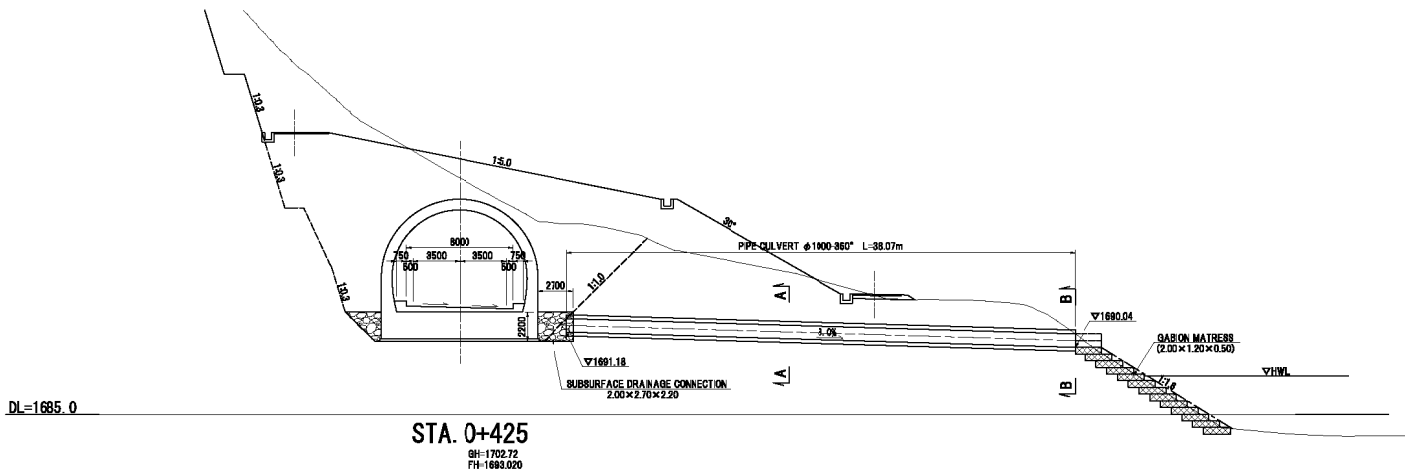
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SECTION S=1:400

NOTE: SCREEN SHALL BE INSTALLED ON SUBSURFACE DRAINAGE CONNECTION

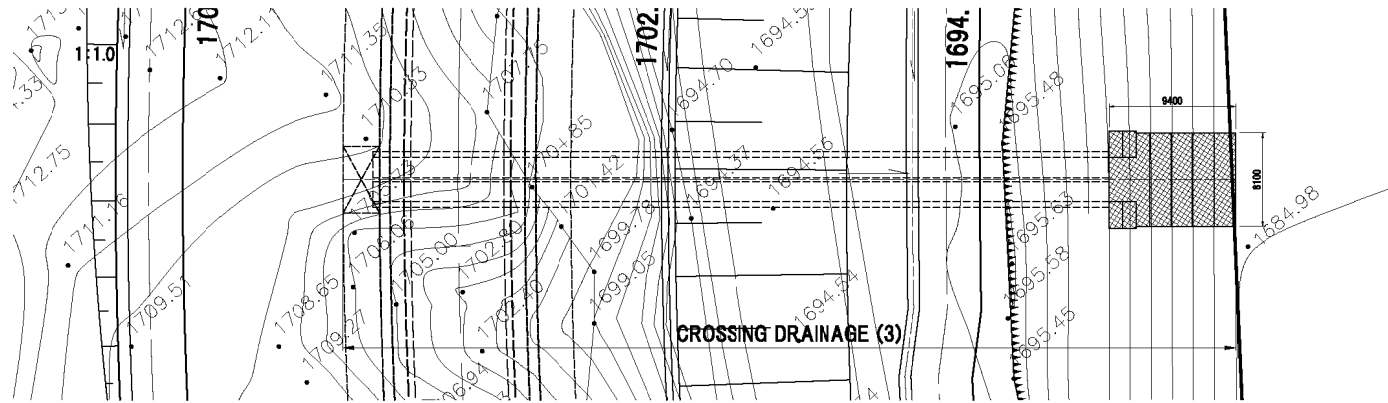
MINISTRY OF TRANSPORT AND COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

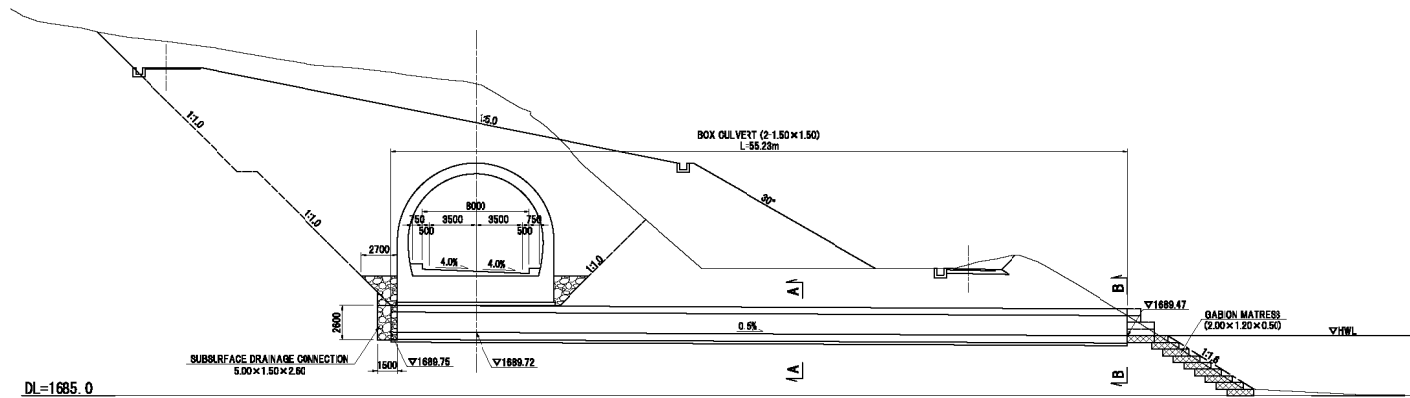
JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:  
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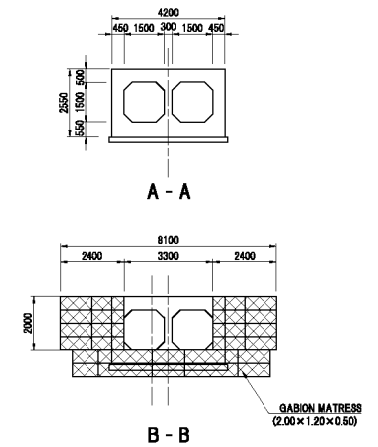


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SECTION S=1:400

NOTE: SCREEN SHALL BE INSTALLED ON SUBSURFACE DRAINAGE CONNECTION



CROSS SECTION S=1:200

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

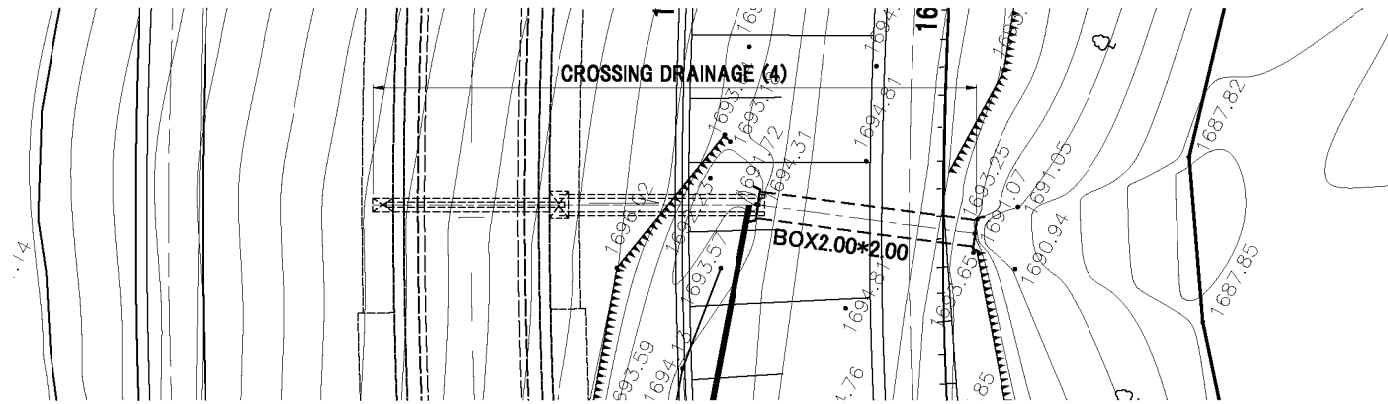
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

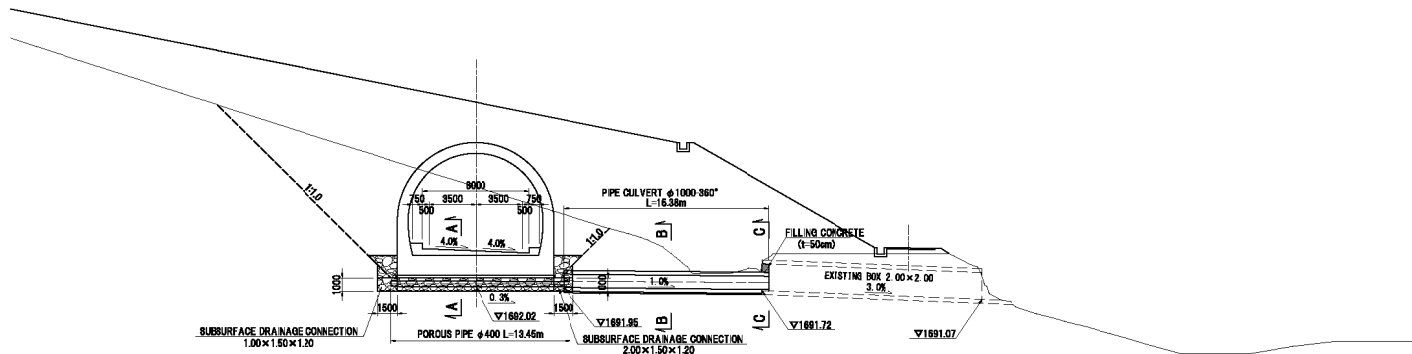
TITLE:

DETAIL OF DRAINAGE STRUCTURE (4/11)  
CROSSING DRAINAGE (STA.0+525)

SCALE	SHEET NO.
AS SHOWN	DS-04
DATE	



PLAN S=1:400

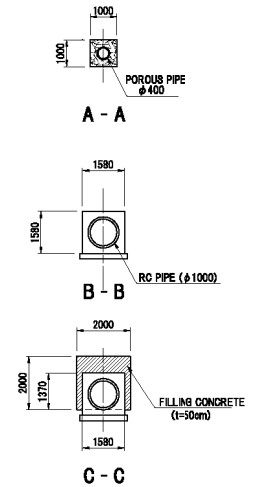


DL=1685.0

STA. 0+661

NOTE: SCREEN SHALL BE INSTALLED ON SUBSURFACE DRAINAGE CONNECTION

SECTION S=1:400



CROSS SECTION S=1:200

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

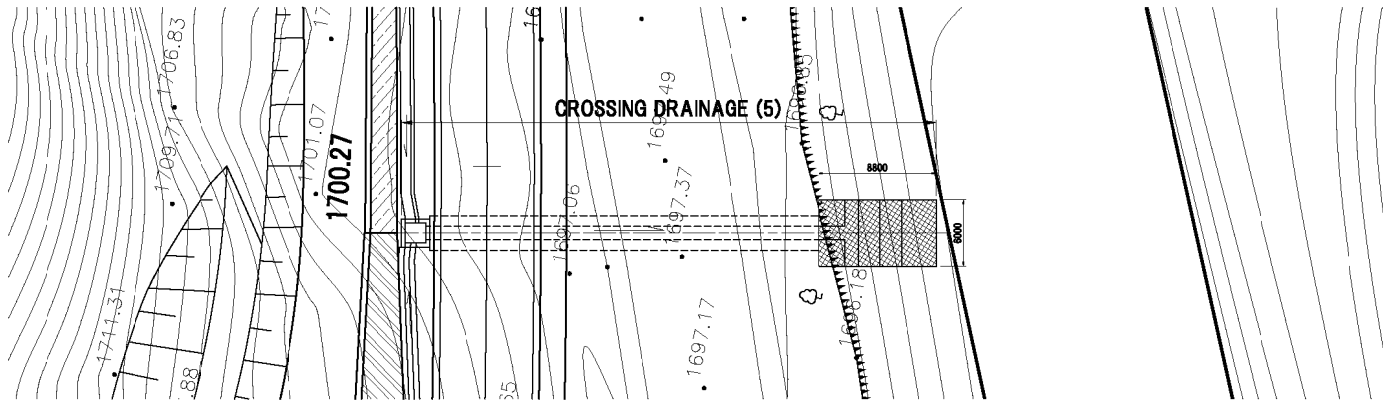
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

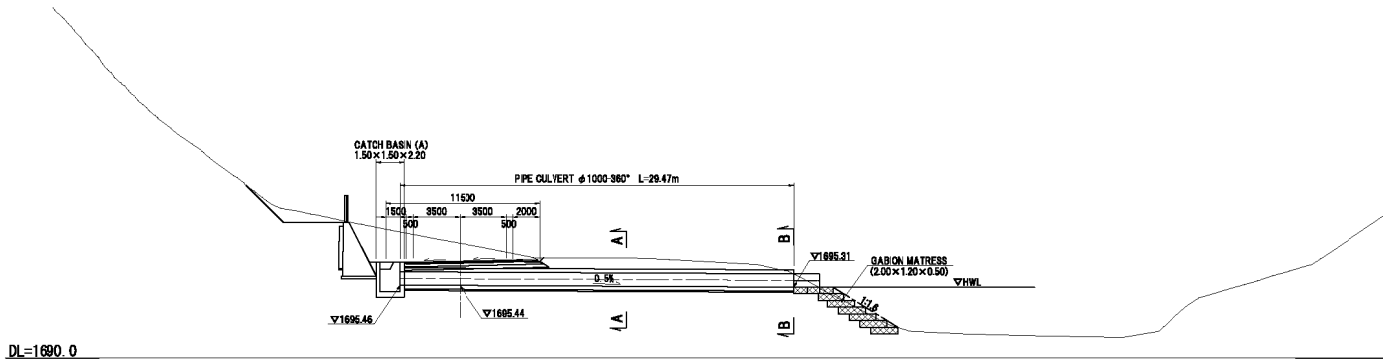
TITLE:

DETAIL OF DRAINAGE STRUCTURE (5/11)  
CROSSING DRAINAGE (STA.0+661)

SCALE	SHEET NO.
AS SHOWN	DS-05
DATE	

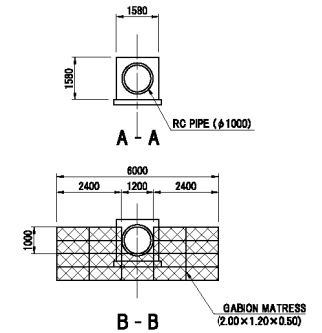


PLAN S=1:400



SECTION S=1:400

DL=1690.0  
SH=1698.00  
FH=1697.241



CROSS SECTION S=1:200

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

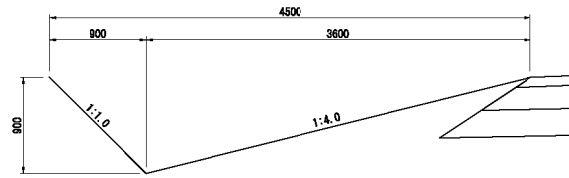
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

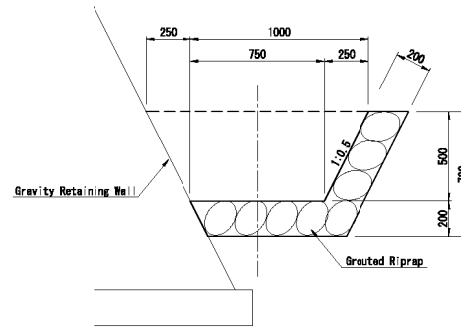
TITLE:

DETAIL OF DRAINAGE STRUCTURE (6/11)  
CROSSING DRAINAGE (STA.0+855)

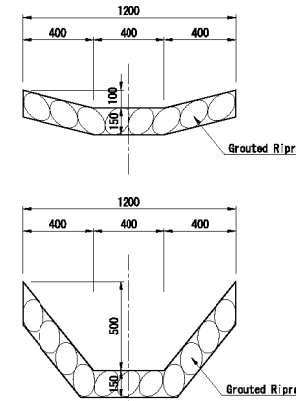
SCALE	SHEET NO.
AS SHOWN	DS-06
DATE	



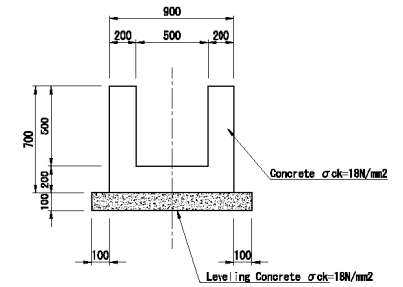
**EARTH DITCH S=1:50**



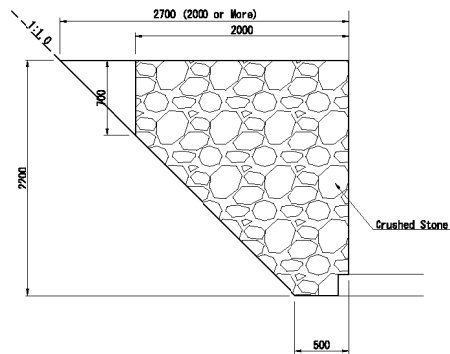
**V-DITCH (A) S=1:30  
(1000/750 × 500)**



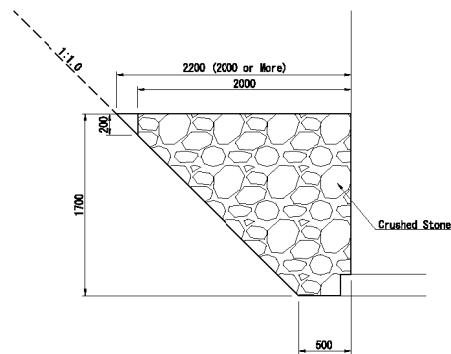
**V-DITCH (B) S=1:30  
(1200/400 × 100~500)**



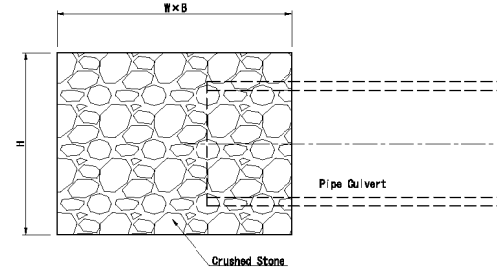
**U-DITCH (500 × 500) S=1:30**



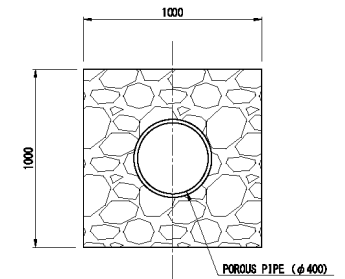
**SUBSURFACE DRAINAGE S=1:50  
(2700/500 × 2200)**



**SUBSURFACE DRAINAGE S=1:50  
(2200/500 × 1700)**

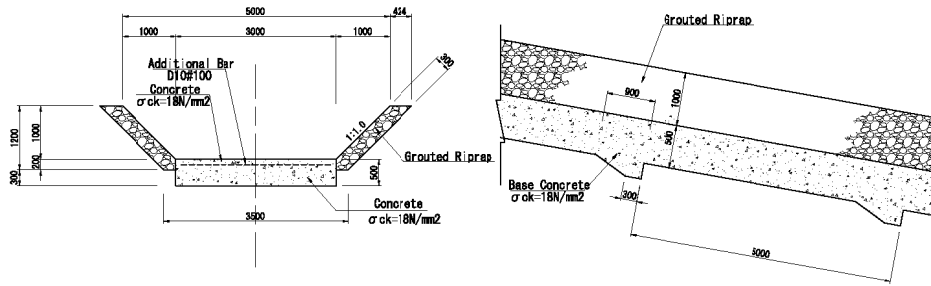


**SUBSURFACE DRAINAGE CONNECTION S=1:50**

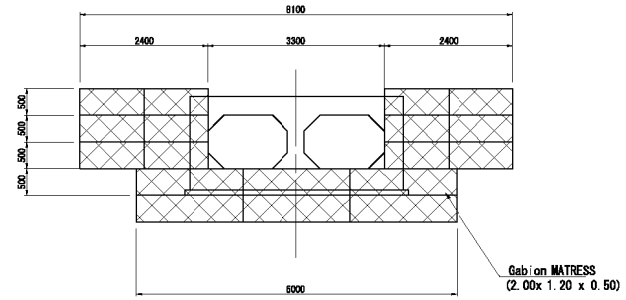


**SUBSURFACE DRAINAGE S=1:30**

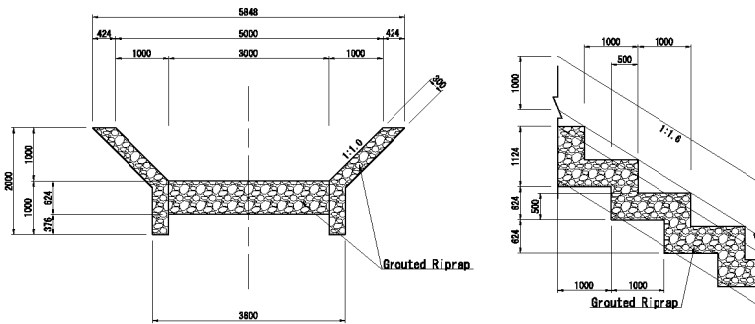




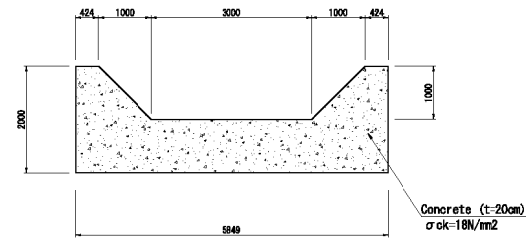
U-CHANNEL (5.00/3.00 × 1.00) S=1:100



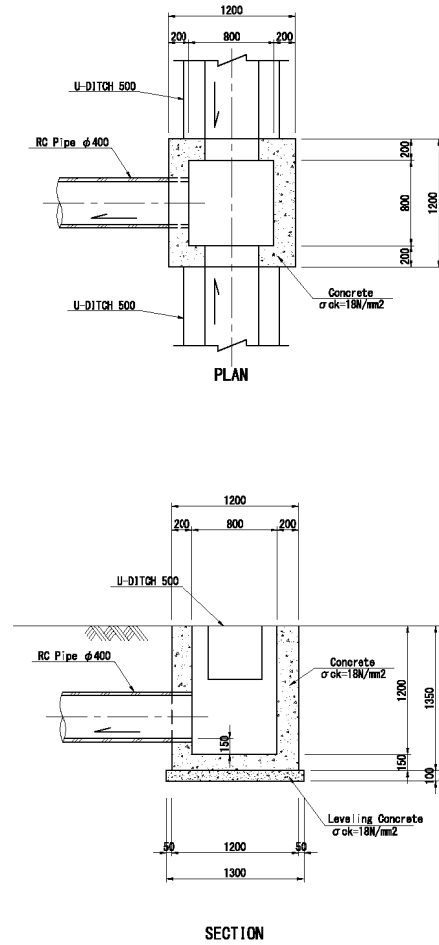
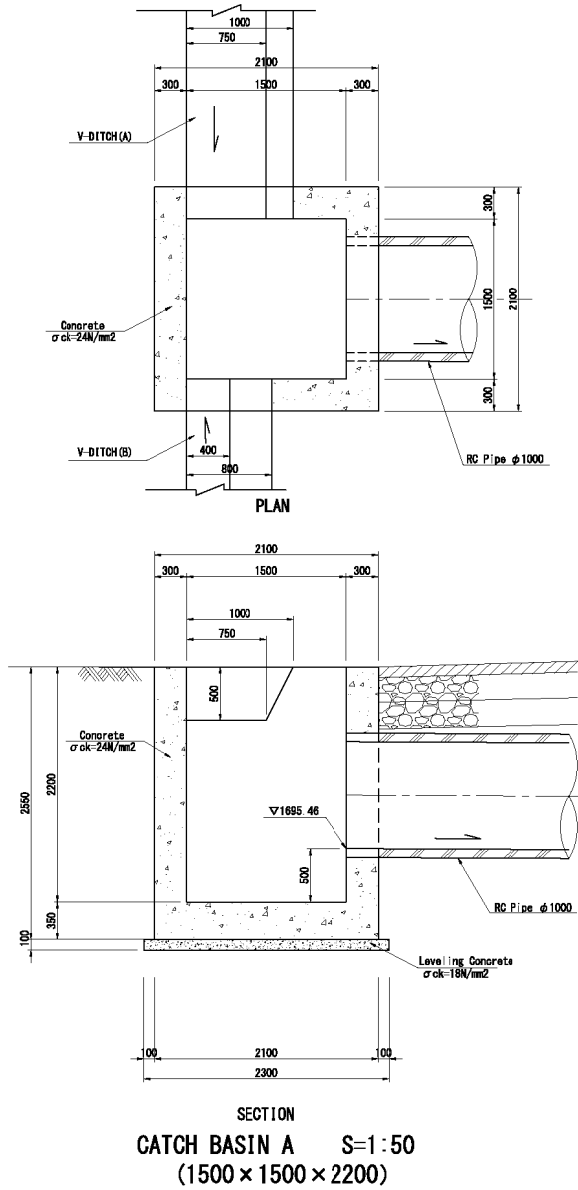
GABION MATRESS (2.00x 1.20 x 0.50) S=1:100



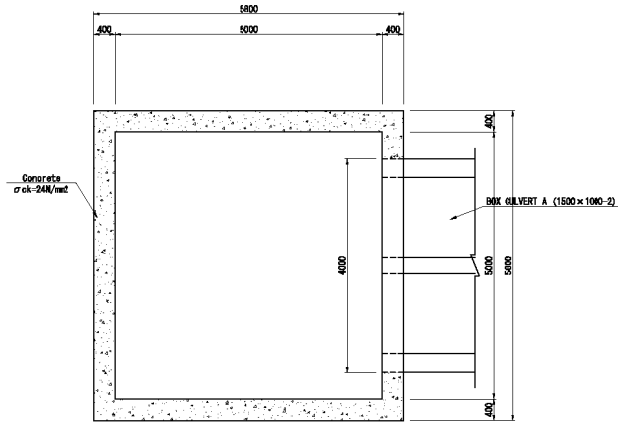
STEPPED DROP (5.00/3.00 × 1.00) S=1:100



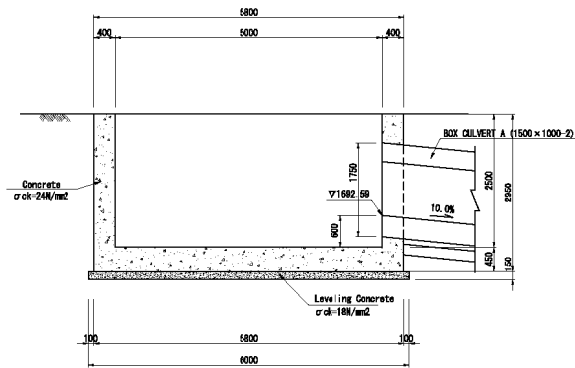
GROUNDSILL



MINISTRY OF TRANSPORT AND COMMUNICATION GOVERNMENT OF KYRGYZ REPUBLIC	PREPARATORY SURVEY OF THE PROJECT FOR AVALANCHE PROTECTION ON BISHKEK-OSH ROAD IN KYRGYZ REPUBLIC	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD. KOKUSAI KOGYO CO., LTD.	TITLE:  DETAIL OF DRAINAGE STRUCTURE (9/11) CATCH BASIN	SCALE	SHEET NO.
				S=1:50	DS-9
				DATE	

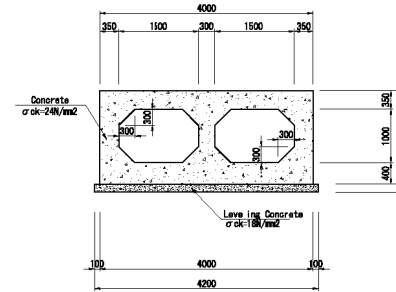


PLAN

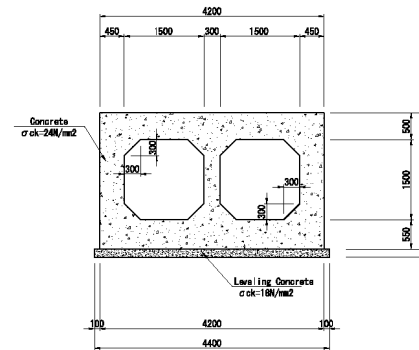


SECTION

**CATCH BASIN C S=1:100**  
(5000 × 5000 × 2500)



**BOX CULVERT A S=1:100**  
(1500 × 1000-2)



**BOX CULVERT B S=1:100**  
(1500 × 1500-2)

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

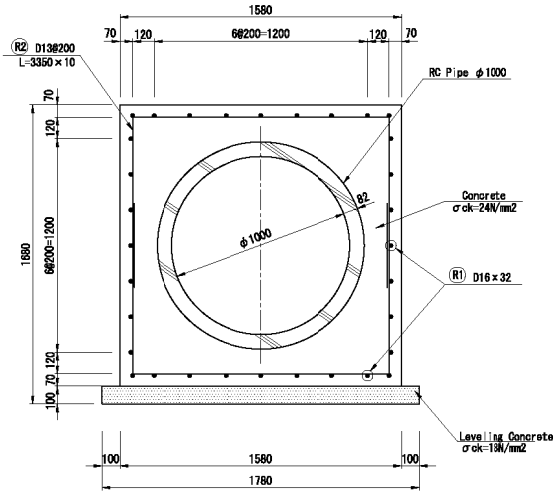
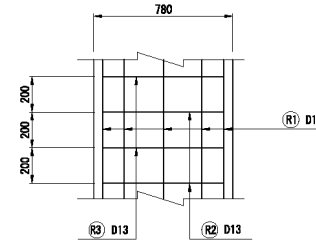
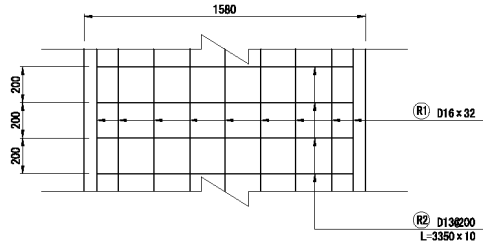
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

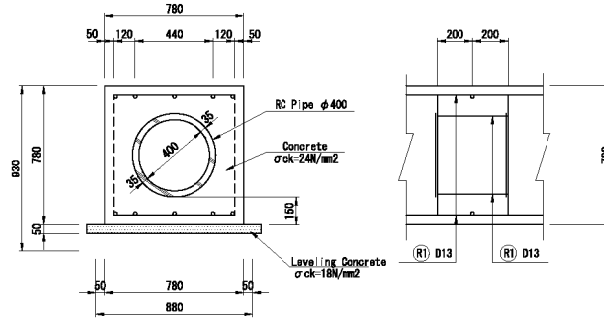
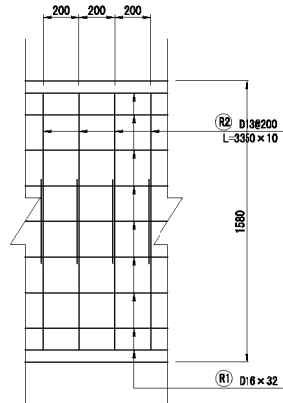
TITLE:

DETAIL OF DRAINAGE STRUCTURE (10/11)  
CATCH BASIN (C)  
BOX CULVERT

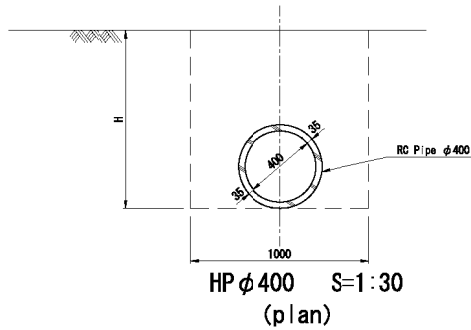
SCALE	SHEET NO.
S=1:100	DS-10
DATE	



**HP  $\phi$  1000 S=1:30  
(360° Base Concrete)**

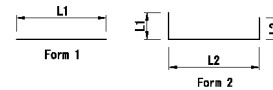


**HP  $\phi$  400 S=1:30  
(360° Base Concrete)**



**HP  $\phi$  400 S=1:30  
(plan)**

**Reinforcing Bars Processing Table**

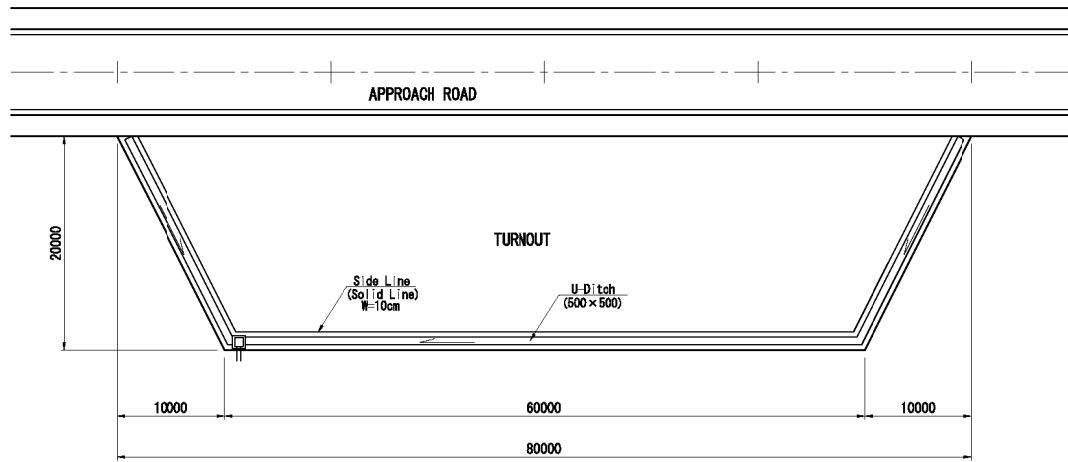


**Reinforcement Bar List (HP  $\phi$  1000)**

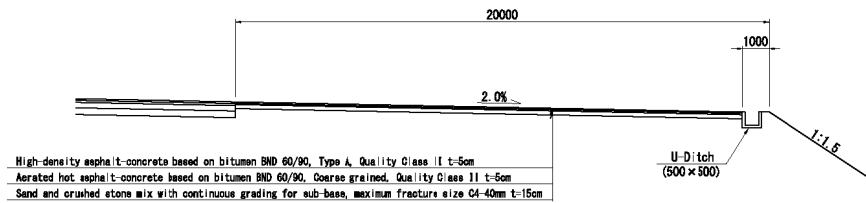
Mark	Form	Size	No.	Length (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Weight/m (kg/m)	Unit Weight (kg)	Weight (kg)	Remarks	
R1	1	D16	32	1,000	1,000			1.580	1.580	49.920		
R2	2	D13	10	3,350	955	1,440	955	0.995	3.333	33.330		
									Total	D16	49.920	
										D13	33.330	

**Reinforcement Bar List (HP  $\phi$  400)**

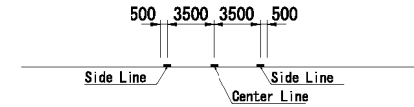
Mark	Form	Size	No.	Length (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Weight/m (kg/m)	Unit Weight (kg)	Weight (kg)	Remarks	
R1	1	D13	10	1,000	1,000			0.995	0.995	9.950		
R2	2	D13	5	1,750	555	640	555	0.995	1.741	8.705		
R3	1	D13	5	640	640			0.995	0.637	3.185		
									Total	D13	21.840	



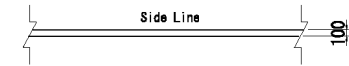
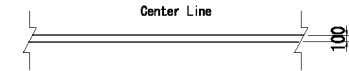
TURNOUT S=1:250



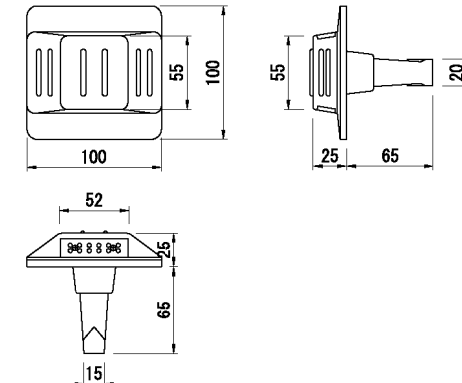
CROSS SECTION S=1:200



PAVEMENT MARKING LAYOUT S=1:200



PAVEMENT MARKING S=1:50



NOTE: REFLECTING ROAD STUD SHALL BE INSTALLED AT 10 METER INTERVAL.

REFLECTING ROAD STUD S=1:2

MINISTRY OF TRANSPORT AND  
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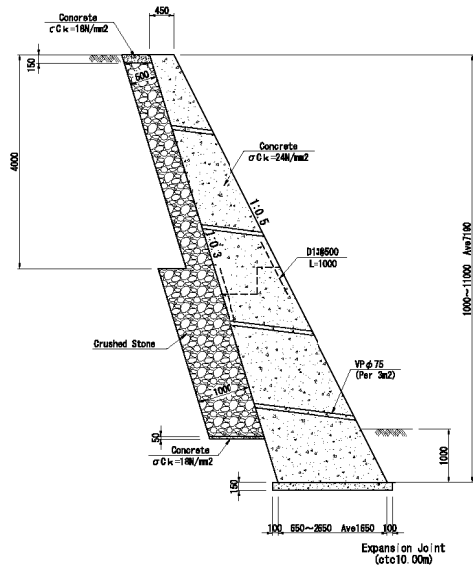
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

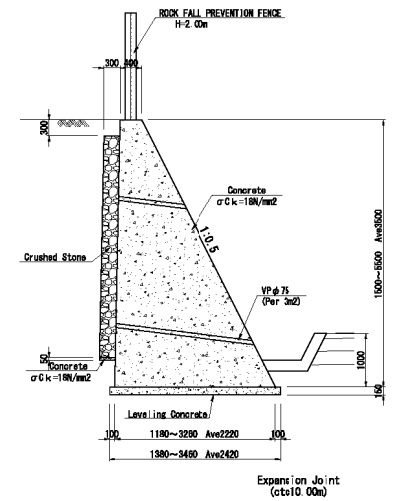
TITLE:

DETAIL OF DRAINAGE STRUCTURE (1/2)  
TURNOUT  
PAVEMENT MARKING  
REFLECTING ROAD STUD

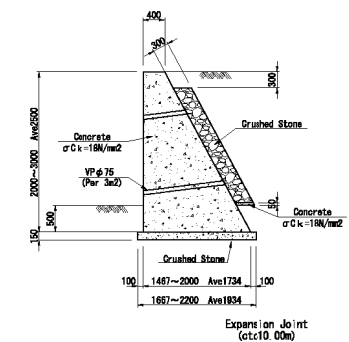
SCALE	SHEET NO.
AS SHOWN	DA-01
DATE	



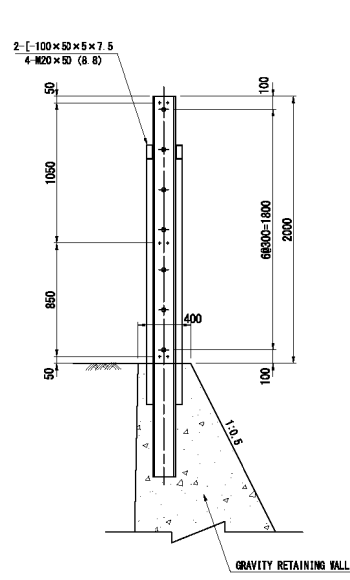
LEANING TYPE RETAINING WALL S=1:100



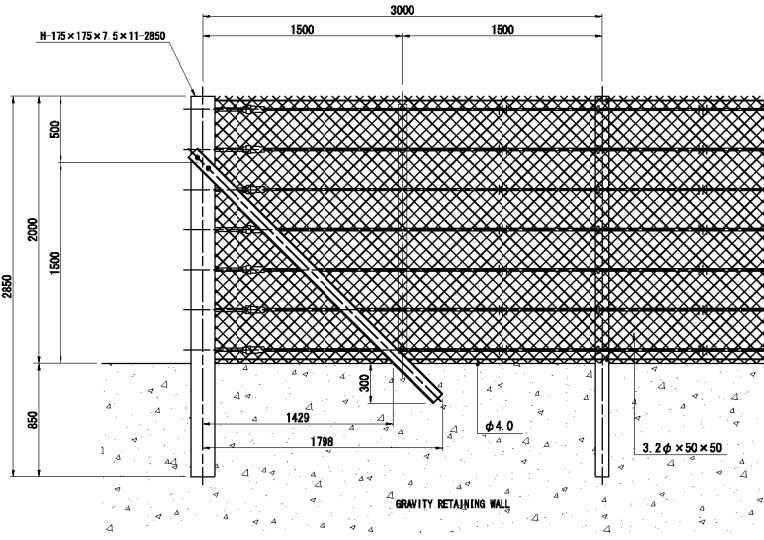
GRAVITY TYPE RETAINING WALL S=1:100  
A (H=1.50~5.50)



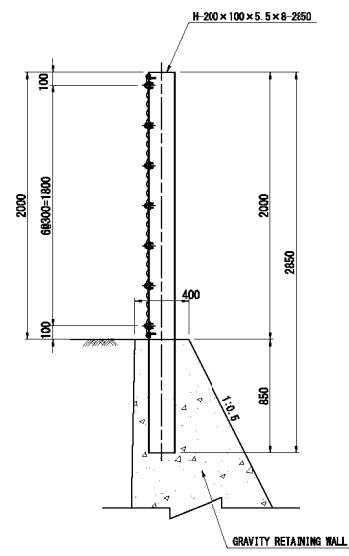
GRAVITY TYPE RETAINING WALL S=1:100  
B (H=2.00~3.00)



TYPICAL POST



FRONT VIEW  
ROCK FALL PREVENTION FENCE S=1:40



TYPICAL POST

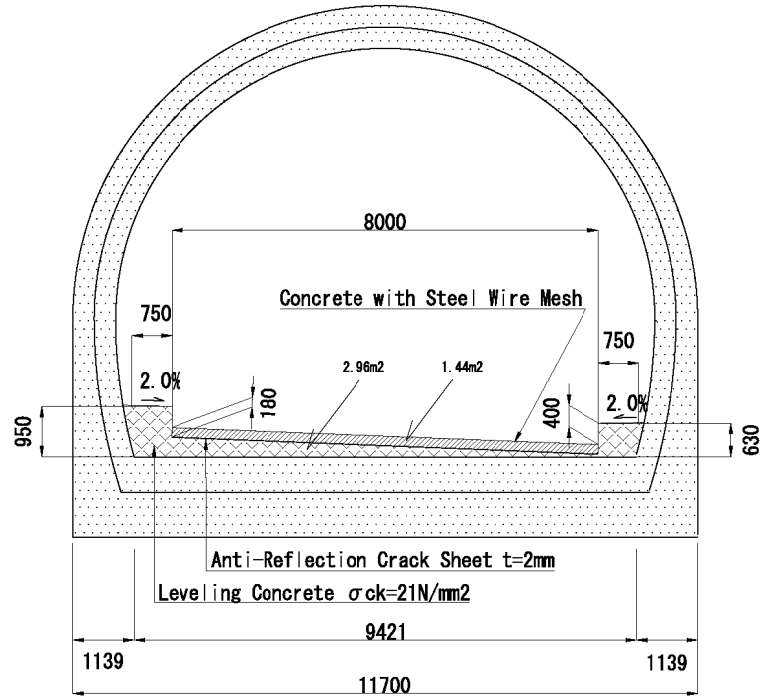
MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

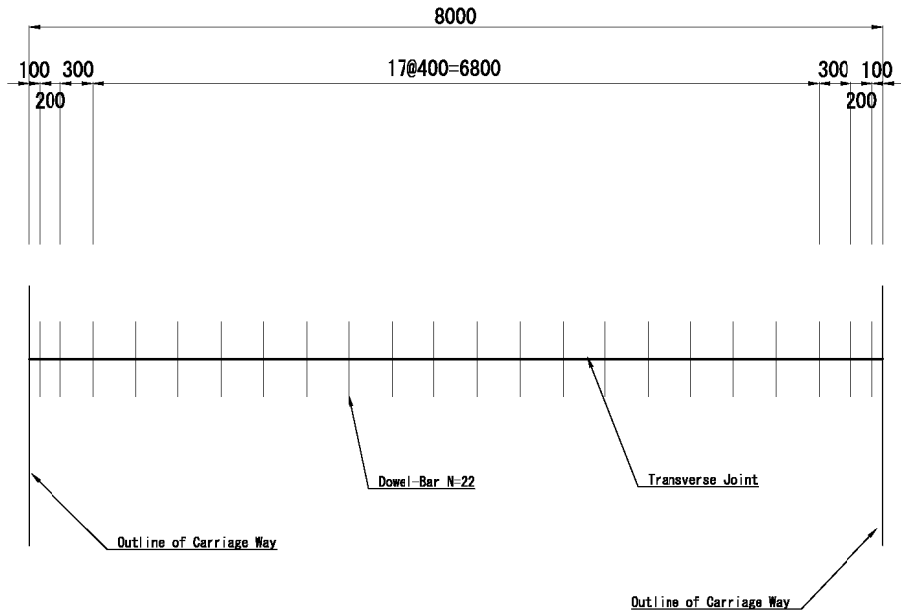
JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:  
DETAIL OF DRAINAGE STRUCTURE (2/2)  
SUPPORTED TYPE RETAINING WALL  
GRAVITY TYPE RETAINING WALL  
ROCK FALL PREVENTION FENCE

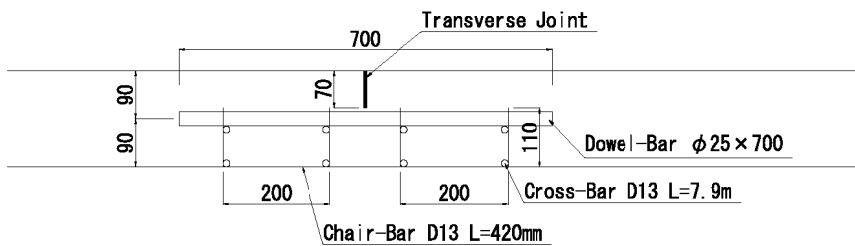
SCALE	SHEET NO.
AS SHOWN	DA-02
DATE	



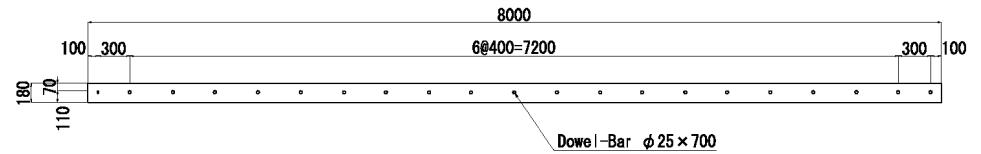
CROSS SECTION S=1:100



DOWEL-BAR LAYOUT (1) S=1:50



JOINT DETAIL S=1:10



DOWEL-BAR LAYOUT (2) S=1:50

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IN KYRGYZ REPUBLIC

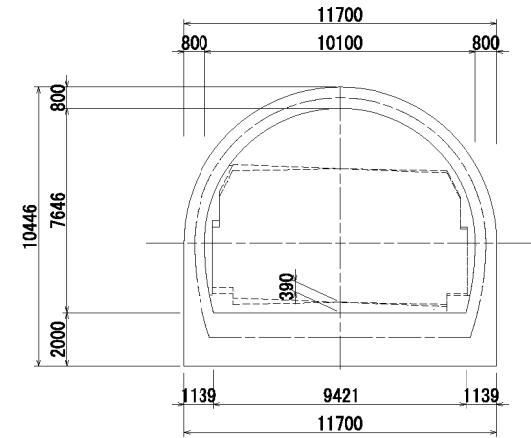
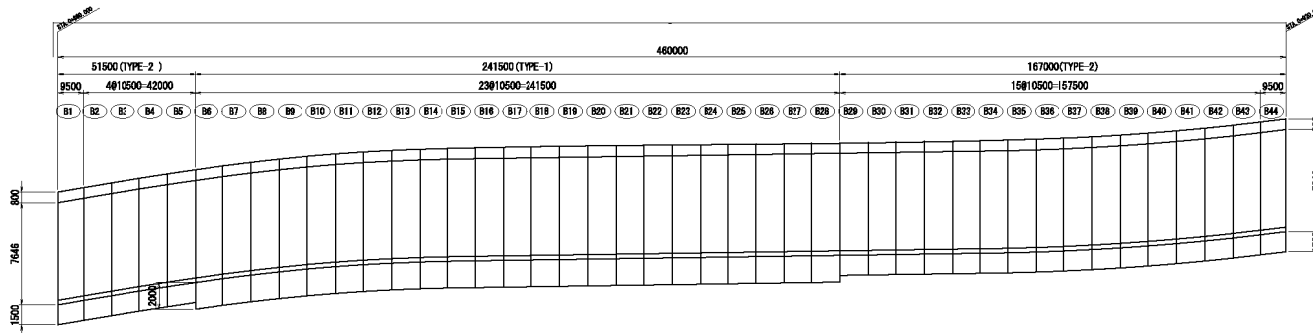
JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:

DETAIL OF CONCRETE PAVEMENT

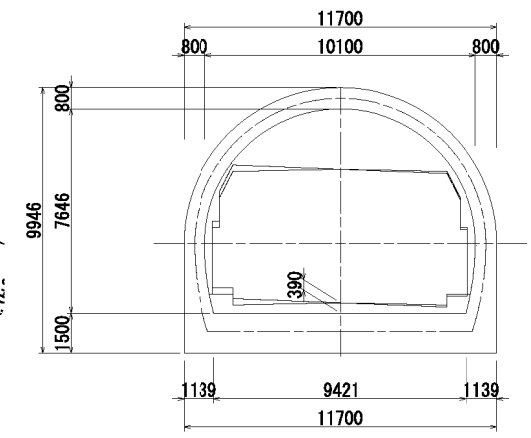
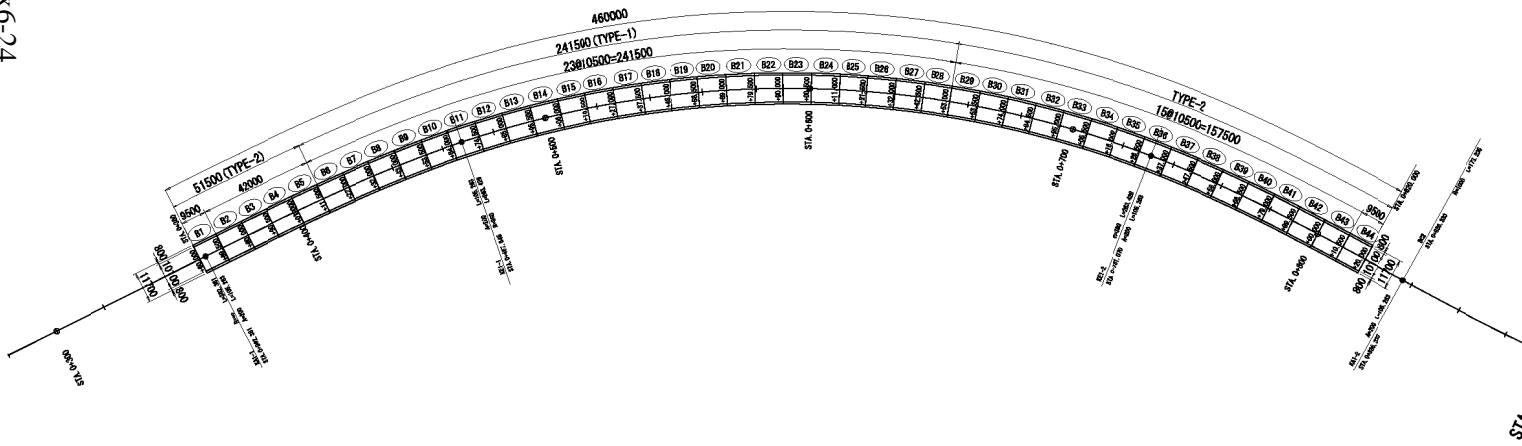
SCALE	SHEET NO.
AS SHOWN	DC-01
DATE	

PROFILE



TYPE-1

PLAN



TYPE-2

Appendix 6-24

MINISTRY OF TRANSPORT AND COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

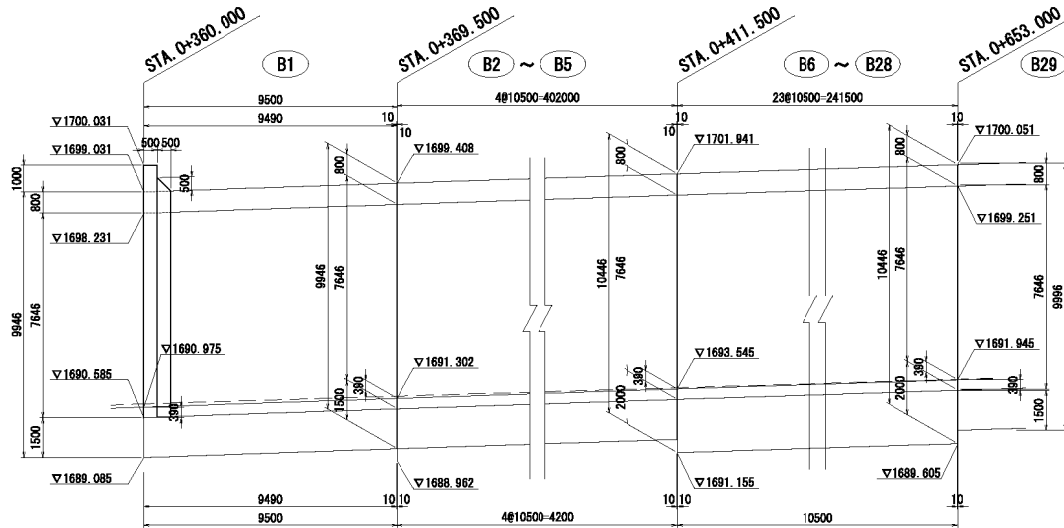
JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:  
GENERAL LAYOUT OF ARCH CULVERT

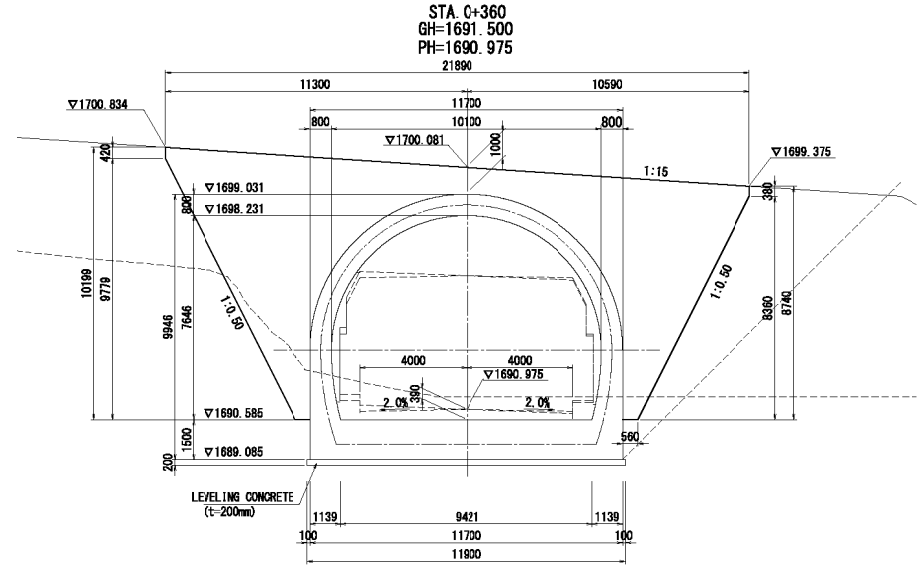
SCALE	SHEET NO.
S=1:1000	G.-01
DATE	



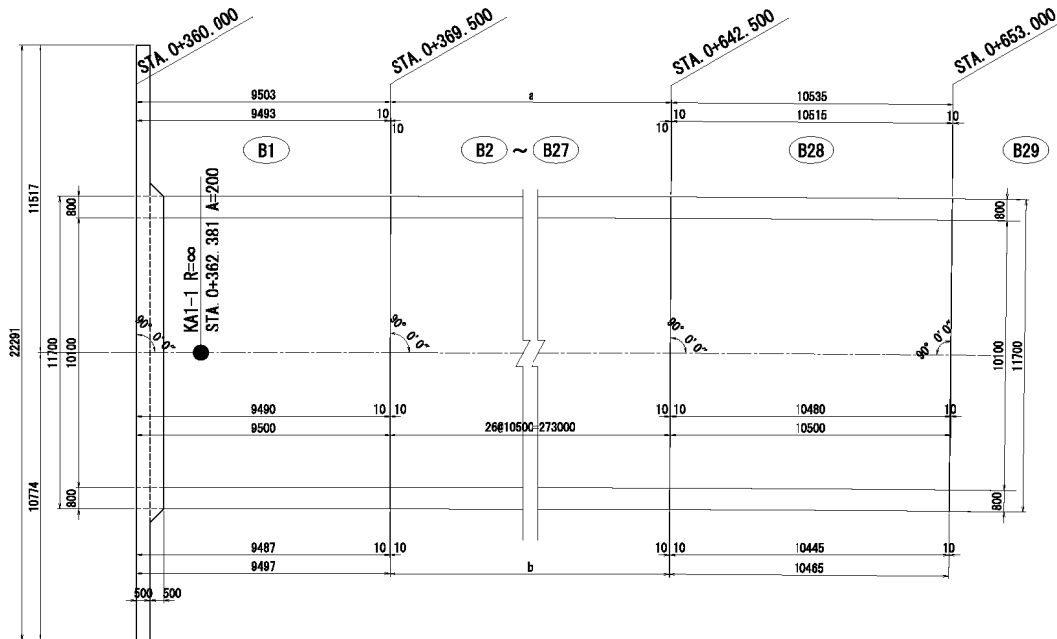
**PROFILE**



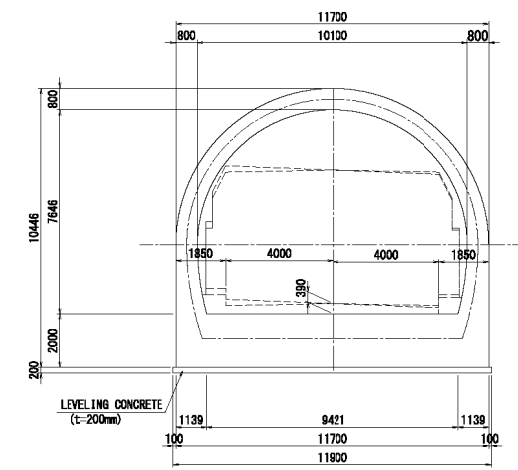
**CROSS SECTION**



**PLAN**



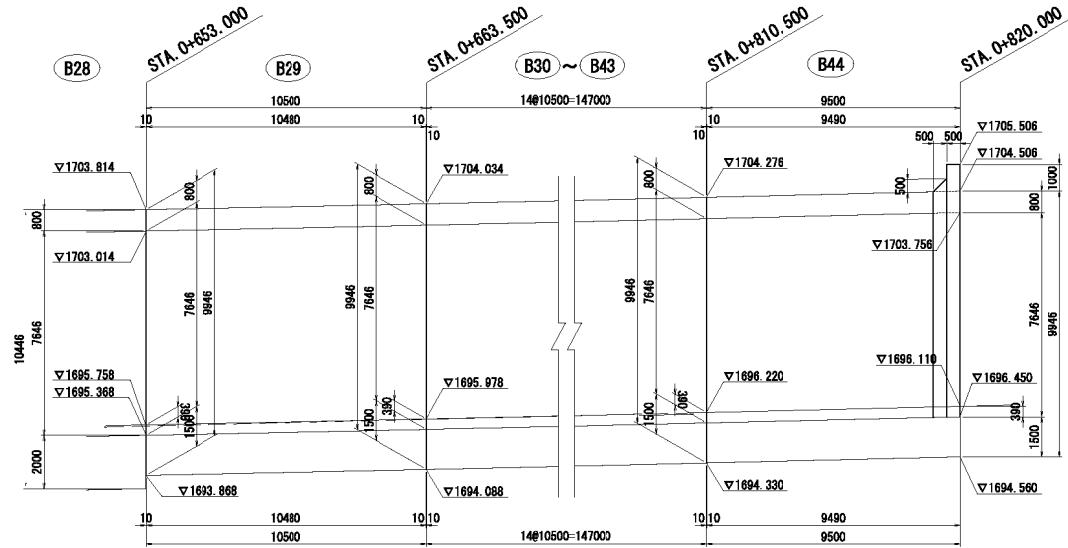
**TYPICAL CROSS SECTION**  
STA. 0+411.5~0+653



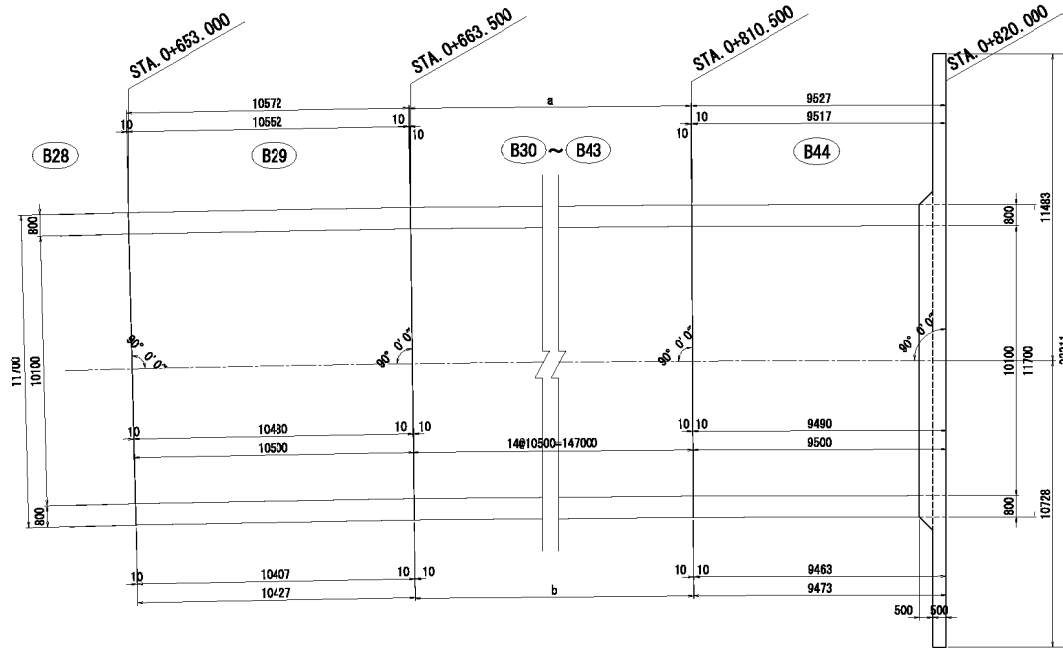
Dimension list table

	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12~B27
a	10522	10535	10548	10564	10596	10596	10610	10625	10689	10645	10661
b	10478	10485	10451	10436	10404	10404	10390	10375	10331	10355	10339

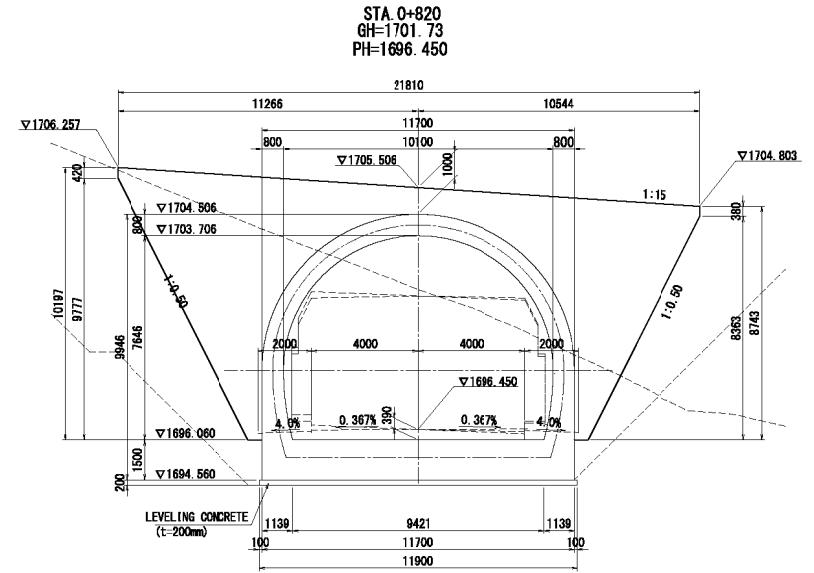
### PROFILE



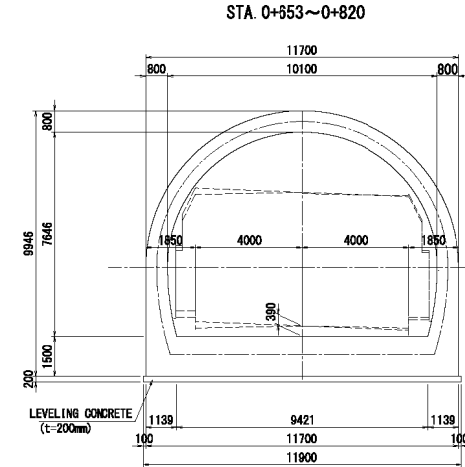
### PLAN



### TYPICAL CROSS SECTION



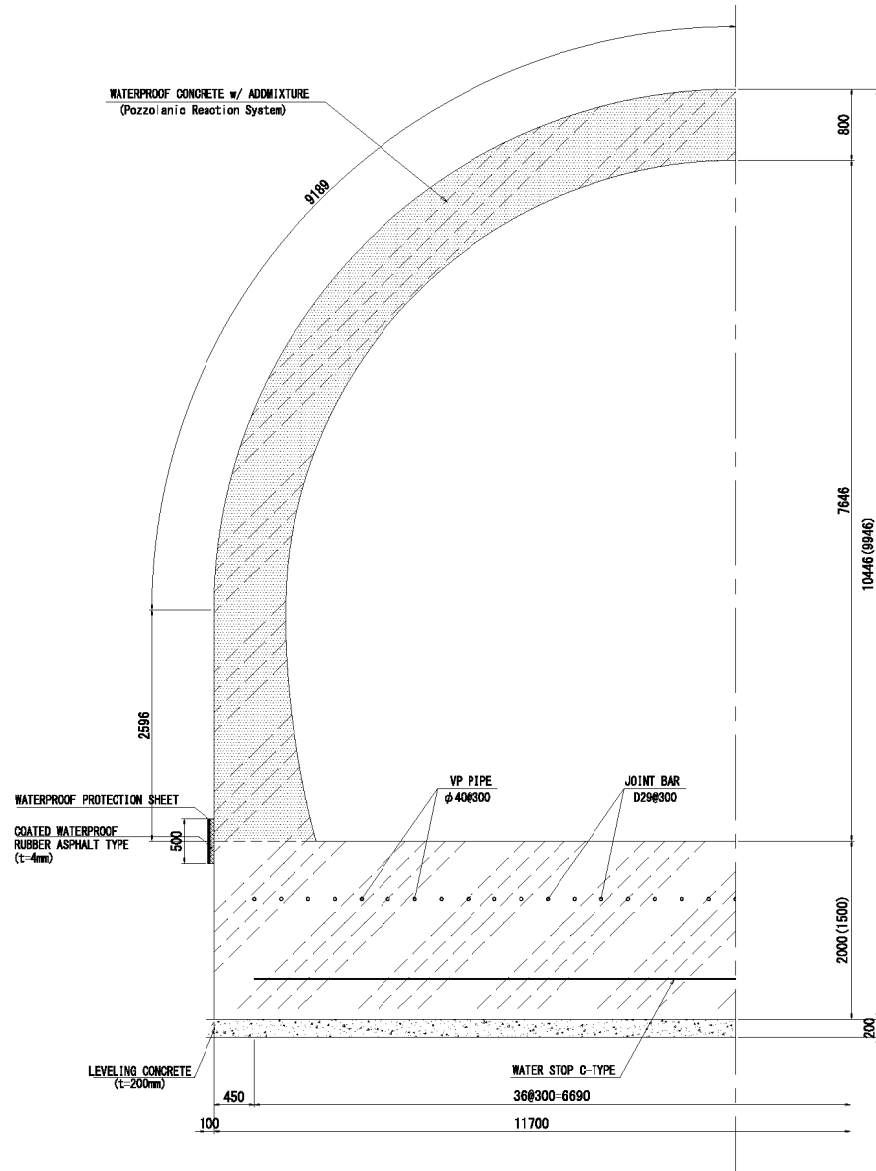
### TYPICAL CROSS SECTION



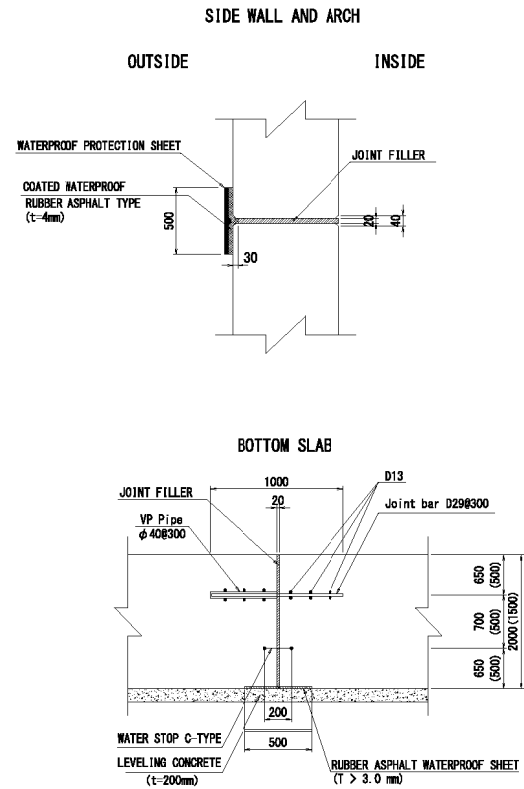
Dimension list table

	B30~B33	B34	B35	B36	B37	B38	B39	B40	B41	B42	B43
a	10661	10657	10665	10659	10638	10646	10606	10591	10576	10572	10544
b	10339	10343	10336	10341	10382	10354	10394	10409	10424	10428	10456

**CROSS SECTION** S=1:30



**JOINT DETAIL** S=1:10



MINISTRY OF TRANSPORT AND  
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GOVERNMENT OF KYRGYZ REPUBLIC

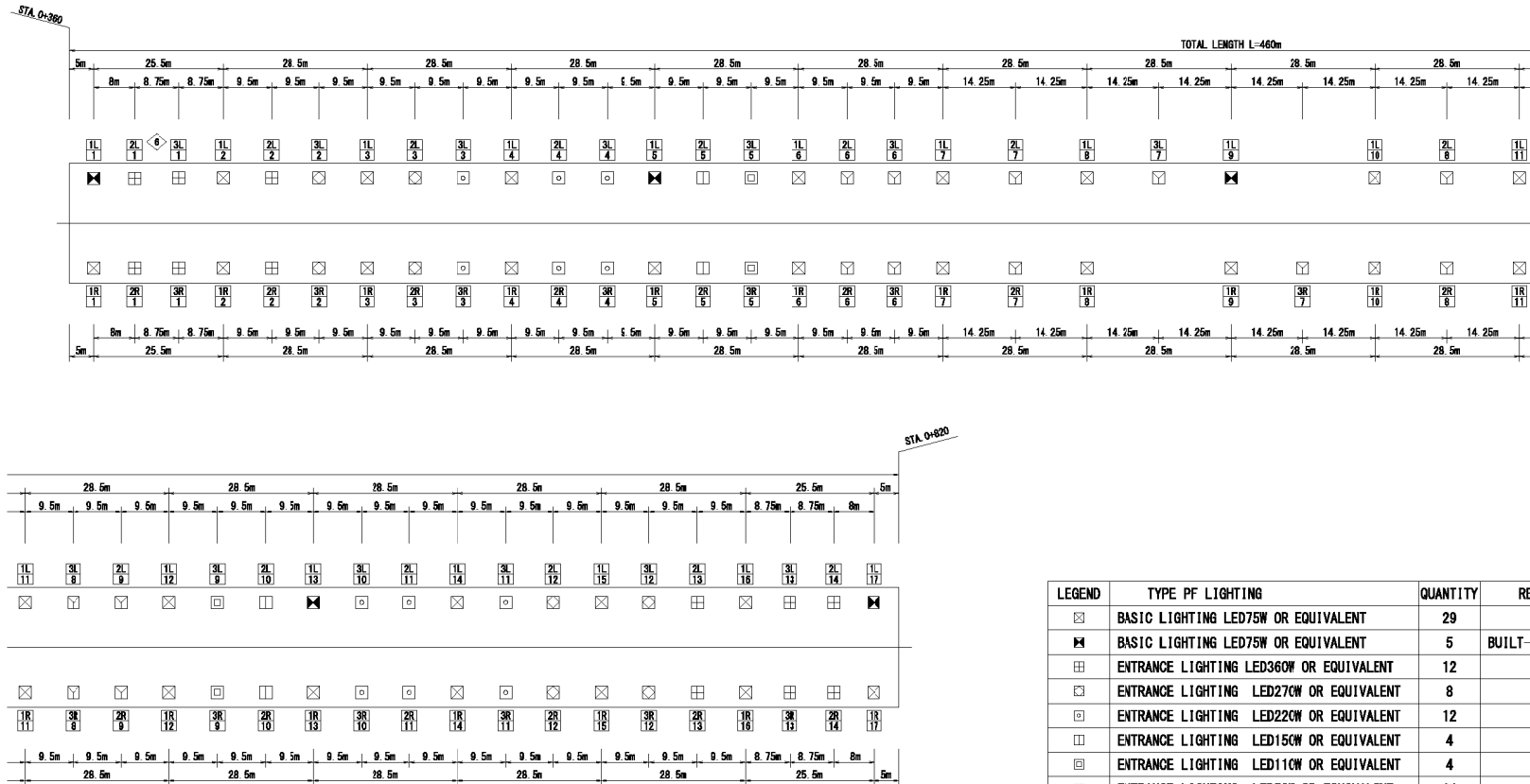
PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:  
DETAIL OF ARCH CULVERT (3/3)

SCALE	SHEET NO.
AS SHOWN	AC-03
DATE	

# LAYOUT OF LIGHTING IN ARCH CULVERT



LEGEND	TYPE PF LIGHTING	QUANTITY	REMARKS
☒	BASIC LIGHTING LED75W OR EQUIVALENT	29	
☒	BASIC LIGHTING LED75W OR EQUIVALENT	5	BUILT-IN BATTERY
☒	ENTRANCE LIGHTING LED360W OR EQUIVALENT	12	
☒	ENTRANCE LIGHTING LED270W OR EQUIVALENT	8	
☒	ENTRANCE LIGHTING LED220W OR EQUIVALENT	12	
☒	ENTRANCE LIGHTING LED150W OR EQUIVALENT	4	
☒	ENTRANCE LIGHTING LED110W OR EQUIVALENT	4	
☒	ENTRANCE LIGHTING LED70W OR EQUIVALENT	14	

## DESIGN CONDITION

OUTSIDE LUMINANCE	2500 (cd/m <sup>2</sup> )	INTERIOR PLATE	NONE
DESIGN SPEED	60 (km/h)	UTILIZATION FACTOR (BASIC)	U=0.597
PAVEMENT	CONCRETE (ρ=25%)	UTILIZATION FACTOR (ENTRANCE)	U=0.646
AVERAGE ILLUMINANCE CONVERSION FACTOR	K=13 (lx/cd/m <sup>2</sup> )	HEIGHT OF LUMP	Ho=5.5 (m)
CARRIAGEWAY WIDTH	W=7.0 (m)	INTERVAL OF BASIC LIGHTING	S=28.5 (m) :FACE TO FACE LAYOUT
MAINTENANCE MODULES	M=0.7	TYPE OF LIGHTING	LED

Appendix 6-28

MINISTRY OF TRANSPORT AND  
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PREPARATORY SURVEY OF THE PROJECT FOR  
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IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

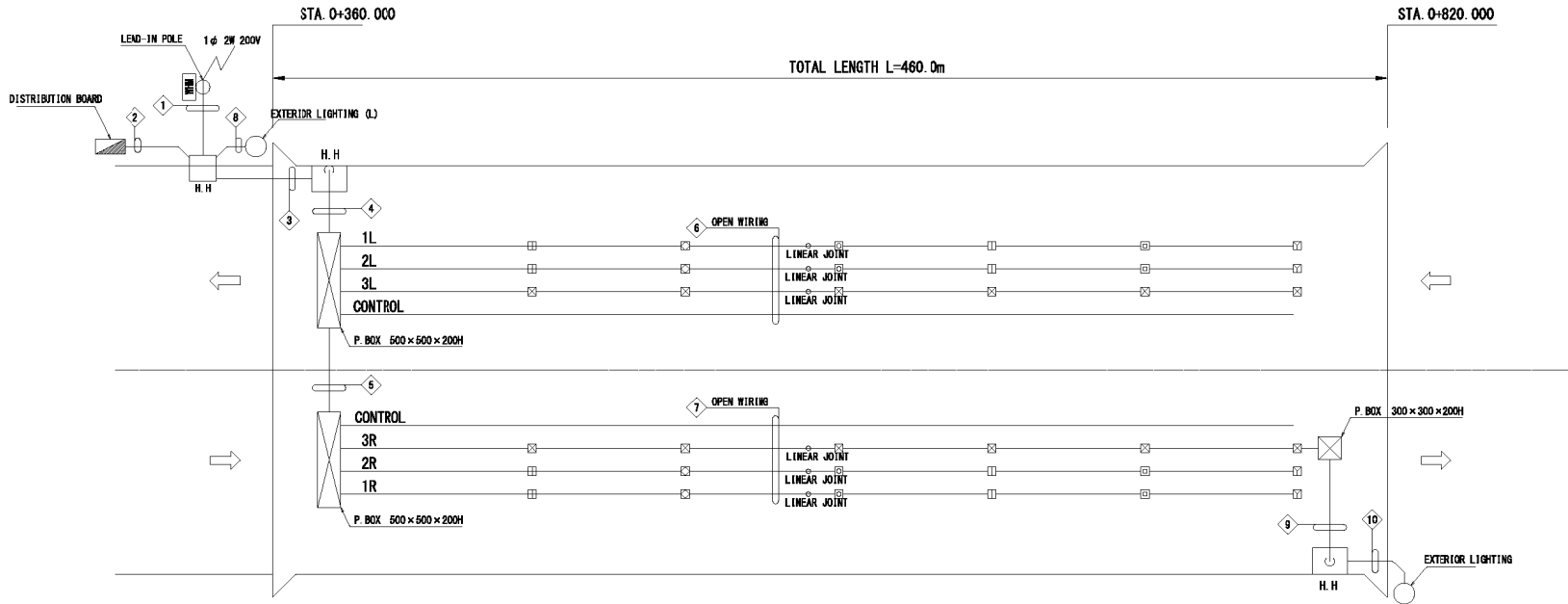
TITLE:

LAYOUT OF LIGHTING IN ARCH CULVERT

SCALE SHEET NO.

DATE LL-01

# WIRING SYSTEM OF LIGHTING



**TYPE OF WIRING AND CONDUIT**

LEGEND	CIRCUIT	WIRING	CONDUIT
1	LEAD-IN	EM-CE 8sq-3C	FEP50

LEGEND	CIRCUIT	WIRING	CONDUIT
2	LEAD-IN	EM-CE 8sq-3C	FEP50
	LIGHTING 1L	EM-CE 3.5sq-2C	FEP50
	LIGHTING 2L	+ 14sq-2C	
	LIGHTING 3L	+ 8sq-2C+1E3.5sq	
	LIGHTING 1R-EXTERIA-R	EM-CE 3.5sq-2C	FEP50
	LIGHTING 2R	+ 14sq-2C	
	LIGHTING 3R	+ 8sq-2C+1E3.5sq	
LIGHTING CONTROL	EM-CEE 2sq-4C	FEP50	
LIGHTING CONTROL	EM-CEE 2sq-4C		
EXTERIA-L	EM-CE 3.5sq-2C+1E3.5sq	FEP30	

LEGEND	CIRCUIT	WIRING	CONDUIT
3	LIGHTING 1L	EM-CE 3.5sq-2C	FEP50
	LIGHTING 2L	+ 3.5sq-2C	
	LIGHTING 3L	+ 3.5sq-2C+1E3.5sq	
	LIGHTING 1R-EXTERIA-R	EM-CE 3.5sq-2C	FEP50
	LIGHTING 2R	+ 3.5sq-2C	
LIGHTING 3R	+ 3.5sq-2C+1E3.5sq	FEP50	
LIGHTING CONTROL	EM-CEE 2sq-4C		
LIGHTING CONTROL	EM-CEE 2sq-4C		

LEGEND	CIRCUIT	WIRING	CONDUIT
4	LIGHTING 1L	EM-CE 3.5sq-2C	G54
	LIGHTING 2L	+ 14sq-2C	
	LIGHTING 3L	+ 8sq-2C+1E3.5sq	
	LIGHTING 1R-EXTERIA-R	EM-CE 3.5sq-2C	G54
	LIGHTING 2R	+ 14sq-2C	
LIGHTING 3R	+ 8sq-2C+1E3.5sq	G54	
LIGHTING CONTROL	EM-CEE 2sq-4C		
LIGHTING CONTROL	EM-CEE 2sq-4C		

LEGEND	CIRCUIT	WIRING	CONDUIT
5	LIGHTING 1R-EXTERIA-R	EM-CE 3.5sq-2C	G54
	LIGHTING 2R	+ 14sq-2C	
	LIGHTING 3R	+ 8sq-2C+1E3.5sq	
LIGHTING CONTROL	EM-CEE 2sq-4C	G54	

LEGEND	CIRCUIT	WIRING	CONDUIT
6	LIGHTING 1L	EM-CE 3.5sq-2C	OPEN WIRING
	LIGHTING 2L	+ 14sq-2C	
	LIGHTING 3L	+ 8sq-2C+1E3.5sq	
	LIGHTING CONTROL	EM-CEE 2sq-4C	

LEGEND	CIRCUIT	WIRING	CONDUIT
7	LIGHTING 1R-EXTERIA-R	EM-CE 3.5sq-2C	OPEN WIRING
	LIGHTING 2R	+ 14sq-2C	
	LIGHTING 3R	+ 8sq-2C+1E3.5sq	
	LIGHTING CONTROL	EM-CEE 2sq-4C	

LEGEND	CIRCUIT	WIRING	CONDUIT
8	EXTERIA-L	EM-CE 3.5sq-2C+1E3.5sq	FEP30

LEGEND	CIRCUIT	WIRING	CONDUIT
9	EXTERIA-R	EM-CE 3.5sq-2C+1E3.5sq	G22

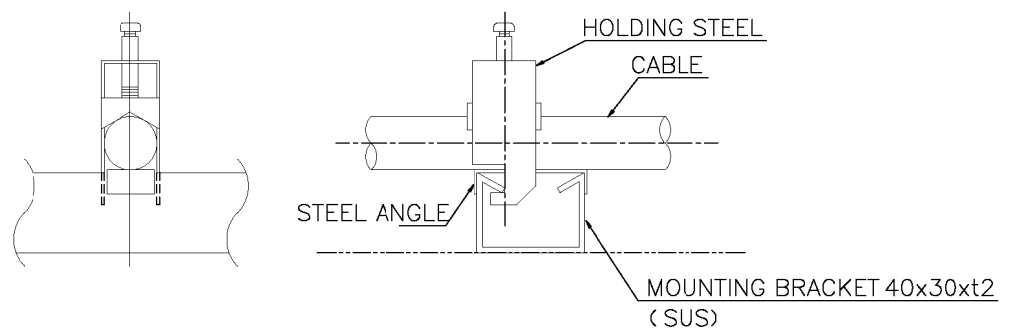
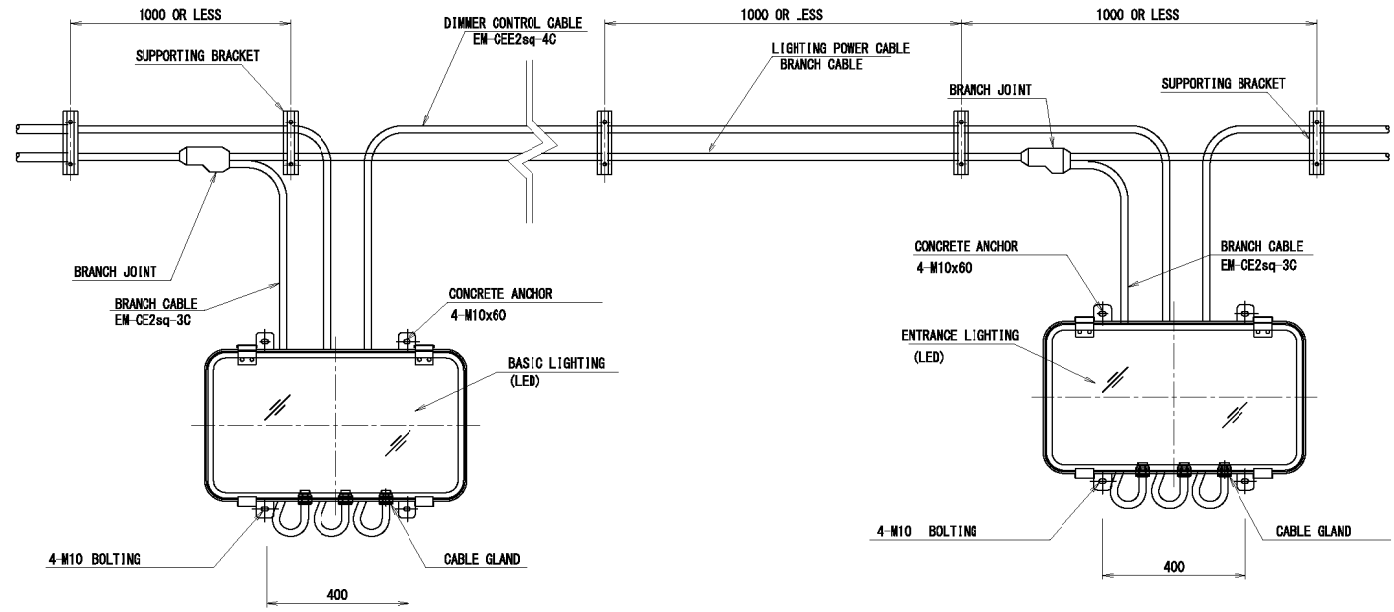
LEGEND	CIRCUIT	WIRING	CONDUIT
10	EXTERIA-R	EM-CE 3.5sq-2C+1E3.5sq	FEP30

**TABLE OF LAMPS**

LEGEND	LAMP	CIRCUIT REMARKS	NUMBER OF LAMP						TOTAL	
			BASIC LIGHTING			ENTRANCE LIGHTING				
			1L	1R	4	2L	3L	2R		3R
☒	LED75W OR EQUIVALENT	REGULAR	12	17						29
☒	LED75W OR EQUIVALENT	EMERGENCY	5							5
☒	LED360W OR EQUIVALENT				4	2	4	2		12
☒	LED270W OR EQUIVALENT				2	2	2	2		8
☒	LED220W OR EQUIVALENT				2	4	2	4		12
☒	LED160W OR EQUIVALENT						2			4
☒	LED110W OR EQUIVALENT						2	2		4
☒	LED70W OR EQUIVALENT				4	3	4	3		14
○	LED110W OR EQUIVALENT	EXTERIOR		1	1					2
TOTAL			17	18	1	14	13	14	13	80

Appendix 6-29

# INSTALLATION OF LAMP AND WIRING

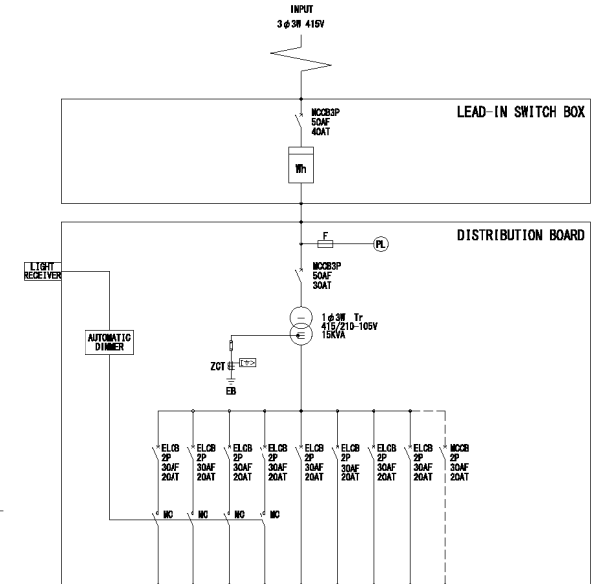
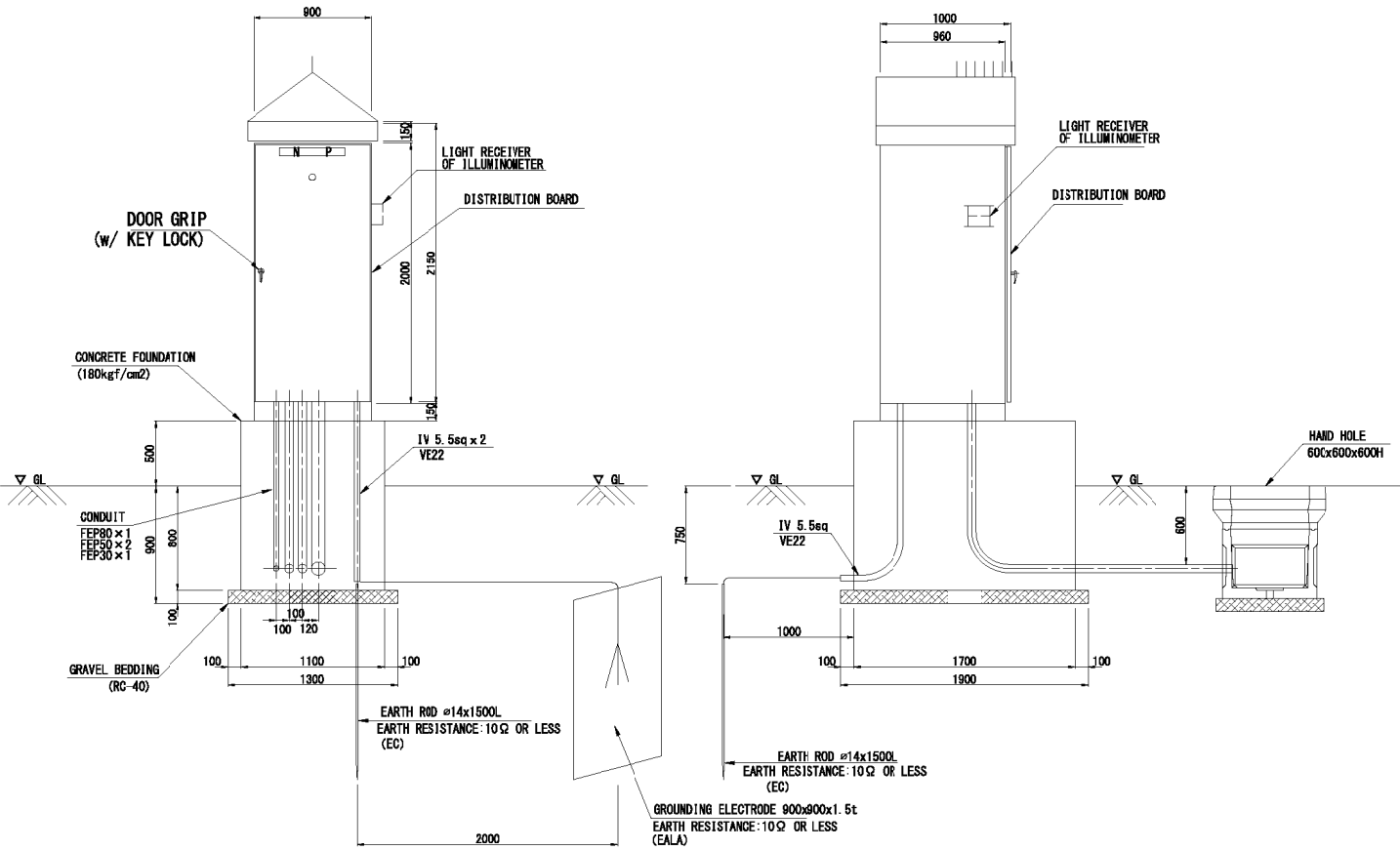


Appendix 6-30

MINISTRY OF TRANSPORT AND COMMUNICATION GOVERNMENT OF KYRGYZ REPUBLIC	PREPARATORY SURVEY OF THE PROJECT FOR AVALANCHE PROTECTION ON BISHKEK-OSH ROAD IN KYRGYZ REPUBLIC	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD. KOKUSAI KOGYO CO., LTD.	TITLE:  INSTALLATION OF LAMP AND WIRING	SCALE	SHEET NO.
				-	IL-01
				DATE	

# DISTRIBUTION BOARD

Appendix 6-31



DISTRIBUTION		1 $\phi$ 2W 210V								
CIRCUIT		2L	3L	2R	3R	1L	1R	4	—	—
LIGHTING		ENTRANCE LIGHTING	ENTRANCE LIGHTING	ENTRANCE LIGHTING	ENTRANCE LIGHTING	BASIC LIGHTING	BASIC LIGHTING	EXTERIOR LIGHTING	DISTRIBUTION BOARD CONTROL	SPARE
(VA)		2,568	2,182	2,568	2,182	629	709	80	200	—
TOTAL		11,118								

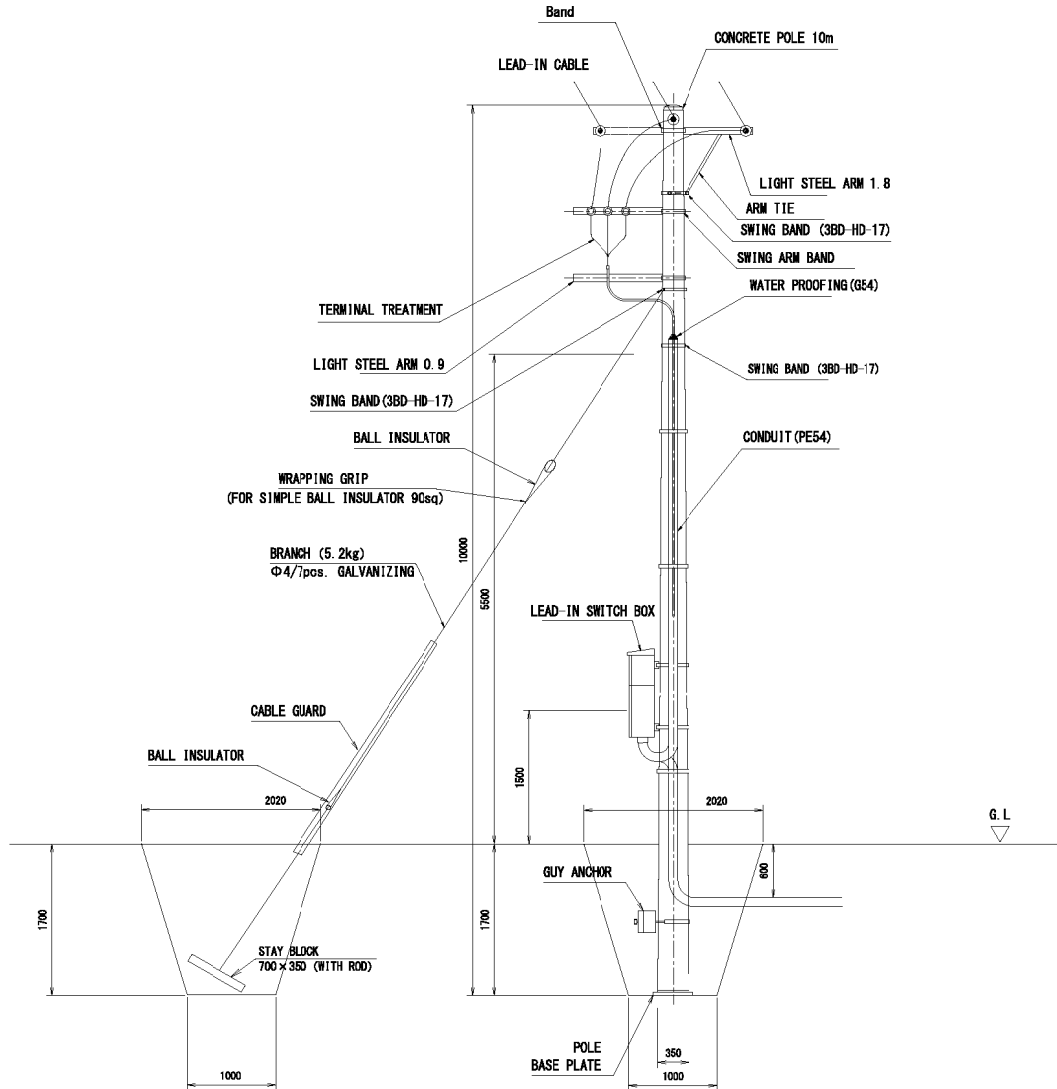
- NOTE:
- EXTERIA LIGHTING ON-OFF SHALL BE CONTROLLED BY AUTOMATIC SELF CONTROLLER.
  - BASIC LIGHTING SHALL BE FULL-TIME LIGHTING.
  - ENTRANCE LIGHTING SHALL BE FULLY LIGHTING DURING DAYTIME (100% MODULATED IN CLEAR DAY, 50% MODULATED IN CLOUDY DAY)

**GENERAL VIEW OF DISTRIBUTION BOARD S=1/30**

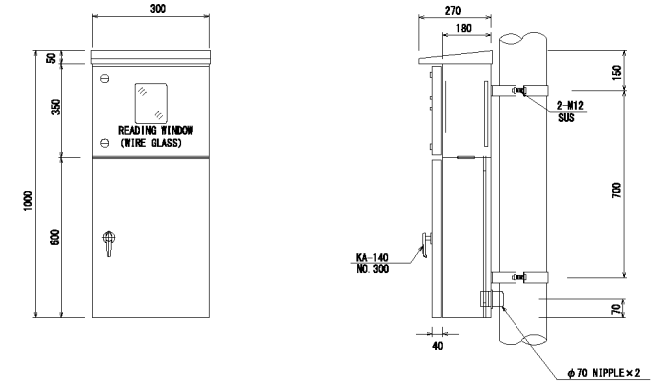
**SINGLE LINE DIAGRAM**

# LEAD-IN POLE AND SWITCH BOX S=1/30

## LEAD-IN POLE S=1:30



## LEAD-IN SWITCH BOX S=1/10 (REFERENCE ONLY)



Appendix 6-32

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:

LEAD-IN POLE AND SWITCH BOX

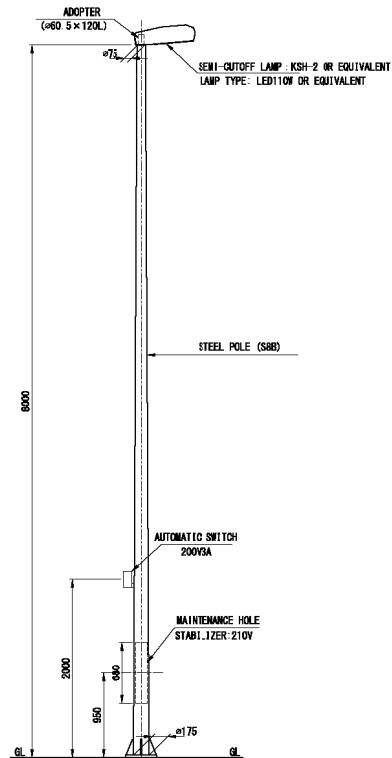
SCALE	SHEET NO.
AS SHOWN	LP-01
DATE	



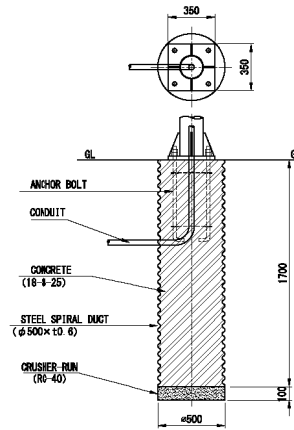
# EXTERIOR LIGHT

S=1/30

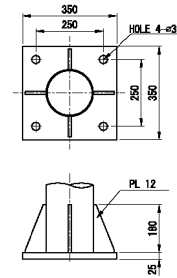
**LIGHTING POLE** S=1/30



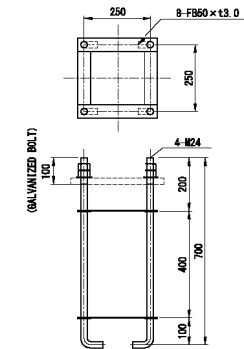
**FOUNDATION** S=1/20



**STEEL BASE PLATE** S=1/10



**ANCHOR BOLT** S=1/10



Appendix 6-33

MINISTRY OF TRANSPORT AND  
COMMUNICATION  
GOVERNMENT OF KYRGYZ REPUBLIC

PREPARATORY SURVEY OF THE PROJECT FOR  
AVALANCHE PROTECTION ON BISHKEK-OSH ROAD  
IN KYRGYZ REPUBLIC

JAPAN INTERNATIONAL COOPERATION AGENCY  
CTI ENGINEERING INTERNATIONAL CO., LTD.  
KOKUSAI KOGYO CO., LTD.

TITLE:

EXTERIOR LIGHT

SCALE	SHEET NO.
AS SHOWN	EL-01
DATE	