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1 調査団員・氏名

(1) 第一回現地調査

分担業務	氏 名	所属	派遣期間
業務主任／道路計画 I	辰巳　正明	(株)オリエンタルコンサルタンツ	7 月 15 日（木） ～8 月 4 日（水）
橋梁設計	高城　信彦	(株)オリエンタルコンサルタンツ （大日本コンサルタント(株)）	7 月 15 日（木） ～8 月 4 日（水）
自然条件調査 I （水理／水文／河川）	小林　康和	(株)オリエンタルコンサルタンツ （(株)ランテックジャパン）	7 月 15 日（木） ～8 月 4 日（水）
自然条件調査 II （地形／地質）	坂田　篤稔	(株)オリエンタルコンサルタンツ （ティエラコンサルタント（有））	7 月 15 日（木） ～8 月 13 日（金）
施工・調達計画／積算	沖田　斉	(株)オリエンタルコンサルタンツ	7 月 30 日（金） ～8 月 13 日（金）
業務調整／積算補助	前田　武始	(株)オリエンタルコンサルタンツ	7 月 15 日（木） ～8 月 4 日（水）

(2) 第二回現地調査

分担業務	氏 名	所属	派遣期間
援助政策	平井　里絵	外務省国際協力局国別開発協力第三課	9 月 12 日（日） ～9 月 18 日（土）
総括	梅永　哲	独立行政法人国際協力機構 経済基盤開発部運輸交通・情報通信グループ 運輸交通・情報通信第三課	9 月 12 日（日） ～9 月 18 日（土）
計画管理	横井　博行	独立行政法人国際協力機構 経済基盤開発部運輸交通・情報通信グループ 運輸交通・情報通信第一課	9 月 12 日（日） ～9 月 18 日（土）
業務主任／道路計画 I	辰巳　正明	(株)オリエンタルコンサルタンツ	9 月 12 日（日） ～10 月 26 日（火）
橋梁設計	高城　信彦	(株)オリエンタルコンサルタンツ （大日本コンサルタント(株)）	9 月 12 日（日） ～10 月 26 日（火）
道路計画 II	水野　聡士	(株)エイト日本技術開発	9 月 15 日（水） ～10 月 29 日（金）
自然条件調査 I （水理／水文／河川）	小林　康和	(株)オリエンタルコンサルタンツ （(株)ランテックジャパン）	9 月 15 日（水） ～10 月 14 日（木）
自然条件調査 II （地形／地質）	坂田　篤稔	(株)オリエンタルコンサルタンツ （ティエラコンサルタント（有））	9 月 15 日（水） ～10 月 5 日（火）
環境社会配慮	根本　勝	(株)エイト日本技術開発	9 月 15 日（水） ～10 月 29 日（金）
施工・調達計画／積算	沖田　斉	(株)オリエンタルコンサルタンツ	9 月 27 日（月） ～10 月 26 日（火）
業務調整／積算補助	前田　武始	(株)オリエンタルコンサルタンツ	9 月 27 日（月） ～11 月 10 日（水）

(3) 第三回現地調査

分担業務	氏 名	所属	派遣期間
総括	晋川　眞	独立行政法人国際協力機構 エチオピア事務所次長	現地参団
計画管理	小田原　康介	独立行政法人国際協力機構 資金協力支援部実施管理第一課	3 月 10 日（木） ～3 月 18 日（金）
業務主任／道路計画 I	辰巳　正明	(株)オリエンタルコンサルタンツ	3 月 4 日（金） ～3 月 18 日（金）
橋梁設計	高城　信彦	(株)オリエンタルコンサルタンツ （大日本コンサルタント(株)）	3 月 4 日（金） ～3 月 18 日（金）

2 調査日程

(1) 第一回現地調査

日順	日時			業務主任／道路計画I	橋梁計画	自然条件調査（水理／水文／河川）	自然条件調査（測量／地質調査）	施工・調達計画／積算	業務調整／積算補助
				辰巳　正明	高城　信彦	小林　康和	坂田　篤稔	沖田　斉	前田　武始
1	7月	15 日	木	成田→アディスアベバ		成田→アディスアベバ			成田→アディスアベバ
2		16 日	金	現地JICA・ERA表敬、IC/R説明・協議		調査準備			調査準備
3		17 日	土	サイト調査		サイト調査			サイト調査
4		18 日	日						
5		19 日	月	ERA表敬、IC/R説明・協議		ERA表敬、IC/R説明・協議	再委託概要説明 再委託見積依頼		再委託概要説明 再委託見積依頼
6		20 日	火	資料収集		資料収集			資料収集
7		21 日	水	再委託入札・評価 経緯書作成・報告			再委託入札・評価 経緯書作成・報告		再委託入札・評価 経緯書作成・報告
8		22 日	木	サイト調査		サイト調査			サイト調査
9		23 日	金						
10		24 日	土	再契約締結					
11		25 日	日	サイト調査準備					
12		26 日	月	サイト調査					
13		27 日	火						
14		28 日	水	サイト調査結果のまとめ		サイト調査結果のまとめ			サイト調査結果のまとめ
15		29 日	木						
16		30 日	金					成田→アディスアベバ	
17		31 日	土					資料収集	
18	8月	1 日	日	団内打合		団内打合		団内打合	
19		2 日	月	サイト調査結果のまとめ		サイト調査結果のまとめ		サイト調査	サイト調査結果のまとめ
20		3 日	火	現地JICA・大使館・ERA報告		現地JICA・大使館・ERA報告			現地JICA・大使館・ERA報告
21		4 日	水	アディスアベバ→成田		アディスアベバ→成田			アディスアベバ→成田
22		5 日	木					調達事情・価格調査	
23		6 日	金						
24		7 日	土						
25		8 日	日						
26		9 日	月				再委託成果品受領		
27		10 日	火						
28		11 日	水				再委託成果品確認		
29		12 日	木				JICA報告	JICA報告	
30		13 日	金				アディスアベバ→成田	アディスアベバ→成田	

(2) 第二回現地調査

日順	月日			援助政策	総括	計画管理	業務主任／道路計画Ⅰ	橋梁計画	道路計画Ⅱ	自然条件調査（水理／水文／河川）	自然条件調査（測量／地質調査）	環境社会配慮	施工・調達計画／積算	業務調整／積算補助
				外務省	JICA	JICA	調査団							
				平井 里絵	梅永 哲	横井 博行	辰巳 正明	高城 信彦	水野 聡士	小林 康和	坂田 篤稔	根本 勝	沖田 斉	前田 武始
1	9月	12	日	成田→										
2		13	月	→ドバイ→アディスアベバ 大使館、JICA事務所表敬訪問										
3		14	火											
4		15	水	ERAとの協議					羽田→大阪→					
5		16	木						→ドバイ→アディスアベバ					
6		17	金	ミニッツ署名、大使館、JICA事務所報告 アディスアベバ→			ミニッツ署名、大使館、 JICA事務所報告		資料収集					
7		18	土	→ドバイ→成田										
8		19	日				サイト調査							
9		20	月											
10		21	火				地形測量 再委託準備	資料収集	地形測量 再委託準備	資料収集	地形測量 再委託準備	資料収集		
11		22	水											
12		23	木				測量再委託入札		測量再委託入札		測量再委託入札			
13		24	金				入札結果報告		入札結果報告		入札結果報告			
14		25	土											
15		26	日											
16		27	月								資料収集および サイト調査 再委託業務の 推進 データの分析解析 設計条件の検討 および決定		成田→	
17		28	火										→ドバイ→アディスアベバ	
18		29	水											
19		30	木											
20	10月	1	金							資料収集および サイト調査 データの分析解析 設計条件検討 および決定				
21		2	土								現地調査結果報告書作成			
22		3	日											
23		4	月								アディスアベバ→			
24		5	火								→ドバイ→大阪 →羽田			
25		6	水				資料収集および サイト調査 データの分析解析 道路計画設計方針決定 舗装設計方針決定	資料収集および サイト調査 データの分析解析 橋梁計画設計方針決定 構造物設計方針決定	再委託業務の 推進 資料収集および サイト調査 データの分析解析 道路計画設計 舗装設計			資料収集および サイト調査 データの分析解析 環境社会配慮検討	資料収集および サイト調査 単価調査 調達調査 サブコン調査 施工計画検討	
26		7	木											
27		8	金											
28		9	土											
29		10	日											
30		11	月							現地調査結果報告書作成				
31		12	火											
32		13	水							アディスアベバ→				
33		14	木							→ドバイ→成田				
34		15	金											
35		16	土											
36		17	日											
37		18	月											
38		19	火											
39		20	水											
40		21	木				団内ミーティングおよびERAとの協議					団内ミーティングおよびERAとの協議		
41		22	金											
42		23	土				現地調査結果報告書作成					現地調査結果報告書作成		
43		24	日											
44		25	月				ERA、大使館、JICA事務所報告 アディスアベバ→						アディスアベバ→	
45		26	火				→ドバイ→大阪→羽田						→ドバイ→大阪→	
46		27	水											
47		28	木											
48		29	金						アディスアベバ→			アディスアベバ→		調査団・ERA間の調整
49		30	土						→ドバイ→成田			→ドバイ→成田		調査団・再委託業者間の調整
50		31	日											資料収集 データの分析解析
51	11	1	月											
52		2	火											
53		3	水											
54		4	木											
55		5	金											
56		6	土											
57		7	日											現地調査結果報告書作成
58		8	月											
59		9	火											アディスアベバ→
60		10	水											→ドバイ→大阪→

(3) 第三回現地調査

日順	月日			総括	計画管理	業務主任／道路計画Ⅰ	橋梁計画
				JICA	JICA	調査団	
				晋川 眞	小田原 康介	辰巳 正明	高城 信彦
1	3月	4 日	金			成田→	
2		5 日	土			→ドバイ→アディスアベバ	
3		6 日	日			資料収集	
4		7 日	月			JICAエチオピア事務所との打合せ	
5		8 日	火			ERAとの打合せ	
6		9 日	水			現地調査	
7		10 日	木		成田→		
8		11 日	金	→ドバイ→アディスアベバ 団内での打合せ		資料収集 団内での打合せ	
9		12 日	土	現地調査			
10		13 日	日				
11		14 日	月	現地調査		ERAとの打合せ	
12		15 日	火	ERAとのDraft Final Reportの説明協議			
13		16 日	水	ERAとのDraft Final Reportの協議 ERAとの間での討議議事録の署名			
14		17 日	木	エ国財務経済開発省への報告／日本大使館への報告 アディスアベバ→ドバイ→			
15		18 日	金		→成田		

3 相手国関係者リスト

(1) エチオピア道路公社（ERA）

Mr. Zaid Wolde Gabriel	Director General
Mr. Bekele Negussie	Deputy Director General, Planning and ICT
Mr. Abdu Mohammed	Deputy Director General, Engineering and Regulatory Department
Mr. Gelaso Bore	Deputy Director General, Human Resource and Finance Department
Mr. Yoseph Kidane	Manager Engineering Service Procurement, Design & Technical Support Division
Mr. Daniel Mengestie	Director, Planning & Program Management Branch
Mr. Daniel Nebro	Team Leader, Quality Assurance, Inspection and Road Safety Manegement Team
Mr. Abebe Assefa	Engineer, Design and Technical Support Branch
Ms. Rahel	Engineer, Design and Technical Support Branch
Mr. Gashew	Manager, District Engineering Division (DED) Debre Markos
Mr. Aschalew	Highway Engineer, District Engineering Division (DED), Debre Markos
Ms. Hiwot	Regional Office Director
Ms. Bezawit	Regional Office
Ms. Meseret	Regional Office
Mr.Abdissa Megersa Debela	Team Leader, Environmental and Social Management Branch
Mr. Sisay Bekele	Finance Management Director (Finance Division Manager)

(2) エチオピア国　財務経済省（MOFED）

Mr. Tilahun Tadasse	Director, Bilateral Cooperatiton Directorate
Mr. Aklog Demissie	Senior Advisor, Legal Depertment

(3) エチオピア電気公社（EEPCO）

Mr. Alemayehu	Team Leader, Ethiopian Electric Power Corporation (EEPCO)

(4) 再委託業者

Mr. Zerihun Nuru	General Manager, Gondwana Engineering
Mr. Behailu Teferra	General Manager Highway Engineers and Consultants (HEC)

(5) 日本大使館

Mr. Daisuke KOMORI	Economic Division

(1) JICA エチオピア事務所

Mr. Koji OHTA	Chief Representative
Mr. Makoto SHINKAWA	Senior Representative
Ms. Momoko SUZUKI	Representative
Mr. Atsushi NAKAGAWA	Representative

(6) アディスアベバ大学

Mr. Meselle Haile	A/Professor of Civil Engineering

(7) 関連施工業者

Mr. Sharma	LEA International Ltd./General Manager

4 討議議事録（M／D）

4.1 現地調査時（2010.9.16）

MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY
ON THE PROJECT FOR REHABILITATION OF TRUNK ROAD, PHASE IV
IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
(Second Field Survey)

In response to the request from the Government of the Federal Democratic Republic of Ethiopia (hereinafter referred to as "Ethiopia"), the Government of Japan decided to conduct a Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV (hereinafter referred to as "the Project") and entrusted the survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Ethiopia the Preparatory Survey Team for the field survey (hereinafter referred to as "the Team"), which is headed by Mr. Satoshi Umenaga, Director, Transportation and ICT Division 3, Economic Infrastructure Department, JICA, and is scheduled to stay in the country from September 13th to November 9th, 2010.

The Team held discussions with the officials concerned of the Government of Ethiopia and conducted a field survey at the Project sites.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Preparatory Survey Report.

Addis Ababa, September 16, 2010

Satoshi Umenaga
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Zaid Wolde Gabriel
Director General
Ethiopian Roads Authority
Federal Democratic Republic of Ethiopia

Witnessed by

Tilahun Tadesse
Bilateral Cooperation Sub Process Owner
Ministry of Finance and Economic Development
Federal Democratic Republic of Ethiopia

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve the smooth traffic flow and safety of transport on the A3 trunk road between Dejen and Debre Markos through the rehabilitation of the road and bridges.

2. Project Site

The site is the section between Dejen and Debre Markos on the A3 trunk road shown in Annex-1.

3. Responsible and Implementing Organizations

The responsible ministry is the Ministry of Works and Urban Development.
The implementing organization is the Ethiopian Roads Authority (ERA).
The organization chart of the implementing organization is shown in Annex-2

4. Items requested by the Government of Ethiopia

4-1. The Ethiopian side requested the rehabilitation of the road and bridges between Dejen and Debre Markos on A3 Trunk Road. However, the Team explained that it would be significantly difficult to rehabilitate all the sections at one time due to budgetary constraint, and suggested the Ethiopian side that the Project be divided into the two phases, that is, Phase 1 of the section between Dejen and Lumame and Phase 2 of the section between Lumame and Debre Markos. Both sides agreed that the phasing implementation plan, however, the Ethiopian side mentioned that all of the sections need to be completed before the end of June, 2015 in response to the target year of its Road Sector Development Program IV (RSDP IV).

4-2. Alignment plan will be discussed by the Team and the Ethiopian side in response to the field survey which would be conducted by both sides and the result would be informed to JICA Ethiopia office by September 24, 2010.

4-3.Both sides confirmed that there was no duplication for the Project to be conducted by other donors.

5. Japan's Grant Aid Scheme

5-1.The Ethiopian side understands the Japan's Grant Aid Scheme and necessary

measures to be taken by the Government of Ethiopia. The Team explained the procedures for the Project described in Annex-3, 4.

5-2. The Ethiopian side will take the necessary measures, as described in Annex-5 for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. JICA Guidelines for Environmental and Social Considerations

6-1. The Team explained the outline of the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "the JICA Guidelines"), and the Ethiopian side agreed to take the JICA Guidelines fully into consideration for EIA by the Ethiopian side.

6-2. The Ethiopian side agreed to arrange the budget allocation for land acquisition, resettlement and compensation for the Project Affected Persons (PAPs) as soon as possible, and to take necessary measures for PAPs and secure the land before the Invitation To Bid for the Project.

7. Schedule of the Study

7-1. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around March, 2011.

7-2. If the contents of the draft report are accepted in principle by the Government of Ethiopia, JICA will complete the final report and send it to the Government of Ethiopia by July, 2011.

8. Other Relevant Issues

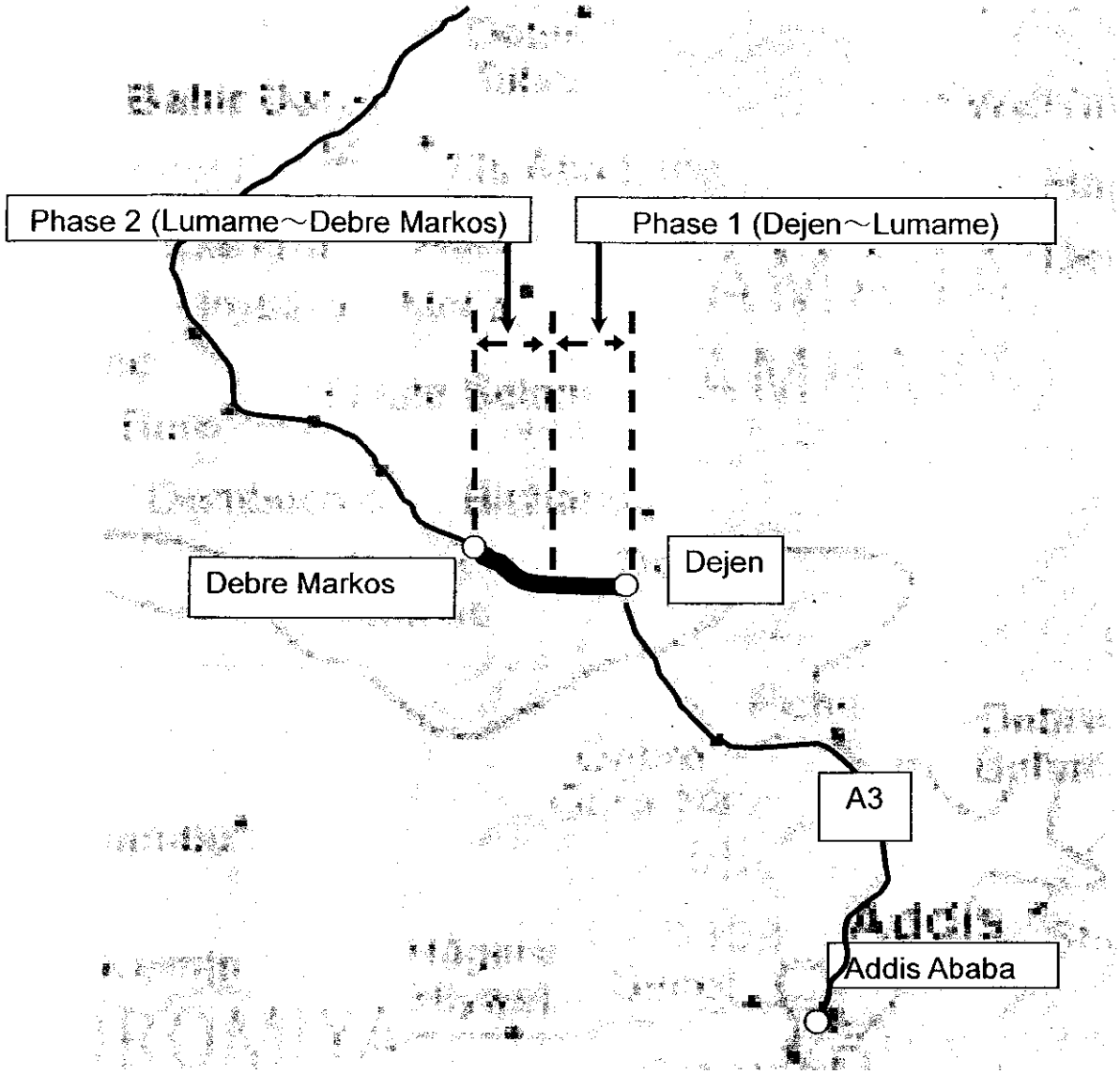
8-1. Both sides agreed that, in principle, the following undertakings shall be taken by the Ethiopian side at their own expenses;

- Improvement and/or repair of existing utilities (power lines, telecommunication lines, water lines, etc.), if necessary.
- Identification of underground utilities located within the site and exemption of contractor's responsibility in case of occurrence of any damage against unidentified utilities.
- To facilitate access to borrow pit(s) and quarry site(s).
- Securing of site for disposal of waste.
- To secure temporary yard(s).
- Maintaining the security at the sites for the Project.
- Coordination to relevant agencies regarding traffic control during construction.
- Public relations and dealing with any complaints raised by affected persons.

- Necessary arrangement for the tax exemption of import materials and equipment and timely refunding for the exemption of VAT for purchase of local products and services.
- Necessary arrangement and assistance for issuing of VISA for concerned persons.

8-2. The Ethiopian side shall secure enough budget and personnel necessary for the operation and maintenance of the facilities implemented by the Project, including the periodical maintenance work after the completion of the Project.

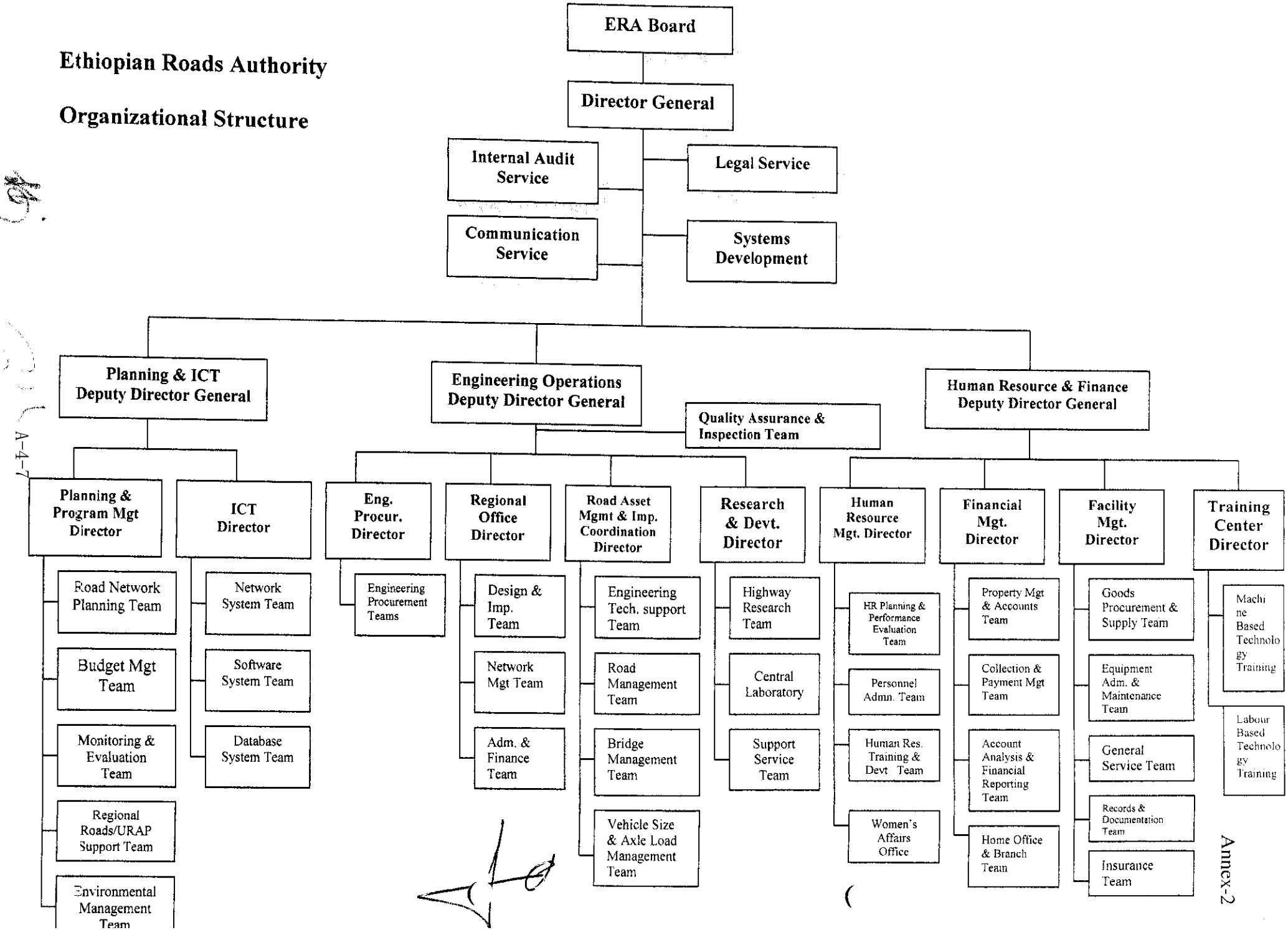
Annex-1 Project Site
Annex-2 Organization Chart (ERA)
Annex-3 Japan's Grant Aid
Annex-4 Flow Chart of Japan's Grant Aid Procedures
Annex-5 Major Undertakings to be taken by Each Government



Project Site

Ethiopian Roads Authority

Organizational Structure



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Annex-2

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.

(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)

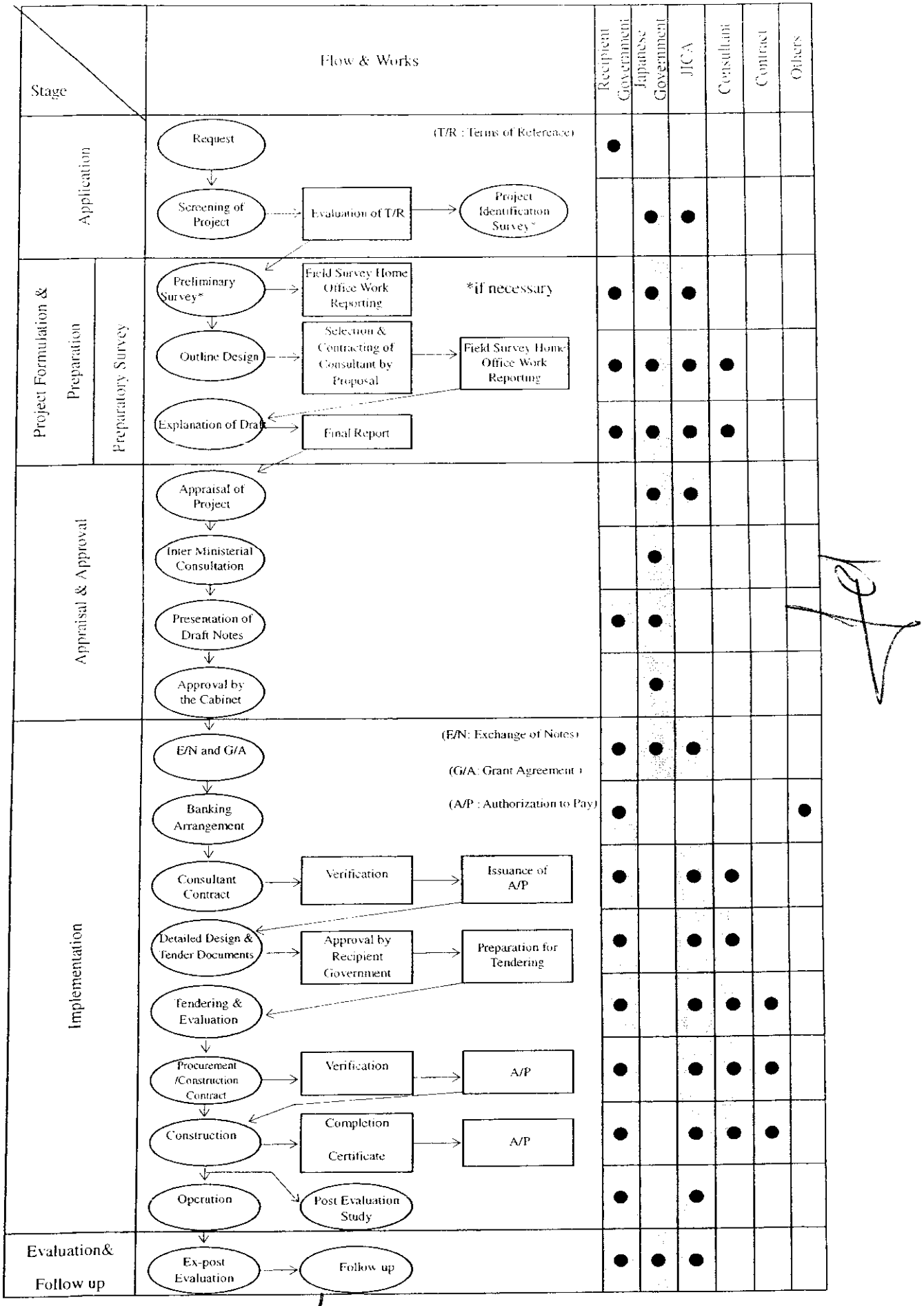
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment

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.

FLOW CHART OF JAPAN's GRANT AID PROCEDURES



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 sites;		●
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 custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation 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 nationals 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 performance of their work		●
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	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement. A/P : Authorization to pay)

4.2 概略設計概要書説明時（2011.3.16）

MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY
ON THE PROJECT FOR REHABILITATION OF TRUNK ROAD, PHASE IV
IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
(Explanation on Draft Final Report)

In July 2010 and September 2010, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team on the Project for Rehabilitation of Trunk Road, Phase IV to the Federal Democratic Republic of Ethiopia (hereinafter referred to as "Ethiopia"), and through discussions, field surveys and technical examination of the results in Japan, JICA prepared a Draft Final Report of the study.

In order to explain the Draft Final Report and to consult with the concerned officials of the Government of Ethiopia on its contents, JICA sent to Ethiopia the Preparatory Survey Team (hereinafter referred to as "the Team"). The Team is headed by Mr. Makoto Shinkawa, Senior Representative, JICA Ethiopia Office and is scheduled to stay from March 5 to March 17, 2011.

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

Addis Ababa, March 16, 2011

Makoto Shinkawa
Senior Representative
JICA Ethiopia Office
Japan International Cooperation Agency
Japan

Zaid Wolde Gabriel
Director General
Ethiopian Roads Authority
Federal Democratic Republic of Ethiopia

Witnessed by

Tilahun Tadesse
Director, Bilateral Cooperation Directorate
Ministry of Finance and Economic Development
Federal Democratic Republic of Ethiopia

ATTACHMENT

1. After the explanation of the contents of Draft Final Report by the Team, the Ethiopian side agreed in principle to the project contents.

2. Cost Estimation

Both sides agreed that the Project Cost Estimation as attached in Annex-1 should never be duplicated or disclosed to any third parties before the signing of all the contract(s) with contractor(s) for the Project.

3. Japan's Grant Aid Scheme

The Ethiopian side understood the Japan's Grant Aid scheme and the necessary measures to be taken by the recipient country as explained by the Team and described in Annex-3, Annex-4 and Annex-5 of the Minutes of Discussions signed on September 16, 2010.

4. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to the Ethiopian side around July, 2011.

5. Environmental and Social Considerations

5-1. The Ethiopian side agreed to complete the EIA certification process for the newly proposed route in the Draft Final Report and inform the result to JICA Ethiopia office by the end of May, 2011.

5-2. Both sides agreed the contents of the Environmental Checklist as shown in Annex-2.

5-3. The Ethiopian side agreed that the monitoring for Environmental and Social considerations should be conducted by Ethiopian Roads Authority (hereinafter referred to as "ERA") in accordance with the Monitoring Plan for the Project described in the Preparatory Survey Report and EIA report. The results of the monitoring will be provided to JICA Ethiopia office by filling the Monitoring Form attached as Annex-3, bimonthly in the pre- construction phase and monthly in construction phase.

5-4. The Ethiopian side agreed that JICA will disclose the results of the monitoring conducted by ERA on JICA's website and report the results of the monitoring to the Advisory Committee for Environmental and Social Considerations established by JICA on a periodic basis.

6. Other Relevant Issues

6-1. The Project shall be divided into the two phases, that is, Phase 1 of the section between Dejen and Lumame and Phase 2 of the section between Lumame and Debre Markos.

6-2. The Ethiopian side promised to ensure necessary budget for land acquisition and facility relocation for the Project Affected Persons (PAPs) as soon as possible, and to take necessary measures for PAPs, relocate facilities and secure the land by the end of September 2011 for the Phase 1 section upon receiving the relocation information such as station, distance from the center line and type of building, by the end of March from the Japanese side, and by the end of April 2013 for the Phase 2 section.

6-3. The Ethiopian side promised to complete the relocation/resettlement work from the Project site before the contractor mobilization.

6-4. The Ethiopian side agreed the countermeasure and design against Black Cotton Soil proposed for the Project, which was carefully determined based upon ERA manual, knowledge available in Ethiopia, and related design criteria in Ethiopia and other countries. The Japanese side explained that the appropriate specification would be set in the Detailed Design for enhancing the reliability of the countermeasure, however, the Ethiopian side also agreed, in view of introducing this countermeasure in Ethiopia for the first time, that the Japanese side including the Japanese consultant and contractor involved in the Project in the future to be exempted from responsibilities for the future defects that may occur by applying the countermeasure except for improper construction work.

6-5. The Team expressed concern over the delay in custom clearance and tax exemption which would negatively affect the successful completion of the Project within the expected schedule. The Ethiopian side understood the concern and promised to take necessary arrangement for prompt custom clearance with custom duties exemption for import materials and equipment, and timely refunding for VAT for the local purchase of products and services.

6-6. The Ethiopian side shall bear the banking commissions as a condition for the Japan's Grant Aid to be implemented, and secure the sufficient budget to cover the following cost.
1) The commissions for the banking services based upon Banking Arrangement (B/A)
2) The advising commission of the Authorization to Pay (A/P)

6-7. The Ethiopian side shall secure enough budget and personnel necessary for the operation and maintenance of the road and the facilities constructed by the Project.

6-8. The Ethiopian side raised a concern on estimated cost of the project which is higher compared with other similar roads in the country. The Japanese side explained that the project needs countermeasure on Black Cotton Soil and huge volume of earthwork for embankment to be treated under this Project, and also explain to review the project cost during Detailed Design stage.

Annex-1 Project Cost Estimation
Annex-2 Environmental Checklist
Annex-3 Monitoring Form

<Confidential>

Project cost to be borne by Japan's Grant Aid

(1) Cost to be borne by Japanese side

Phase	Items			Cost (Hundred Million JPY)
Phase I	Construction Facilities	Road	Earthwork, Pavement work and other related works	37.0
		Structure	Bridge, Culvert works	1.7
		Ancillary work	Drainage, Traffic Safety facilities, Other related works	1.7
		Subtotal		40.4
	Detailed Design and Construction Supervision			2.0
	Total			42.4
Phase II	Construction Facilities	Road	Earthwork, Pavement work and other related works	38.6
		Structure	Bridge, Culvert works	2.5
		Ancillary work	Drainage, Traffic Safety facilities, Other related works	3.9
		Subtotal		45.0
	Detailed Design and Construction Supervision			1.5
	Total			46.5

Note: The cost estimates in the above table are provisional and will be further examined by the Government of Japan for the approval of the Grant.

(2) Cost to be borne by Ethiopian side

Phase	Items	Cost (Million ETB)
Phase I	Cost of Environment Consideration	2.9
	Relocation cost of public utilities including telephone and electric poles	0.1
	Leveling of Temporary yards	0.4
	Refund of VAT / Import Tax	65.6
	Total	69.0
Phase II	Cost of Environment Consideration	3.8
	Relocation cost of public utilities including telephone and electric poles	0.1
	Leveling of Temporary yards	0.4
	Refund of VAT / Import Tax	71.1
	Total	75.4

Note: ETB = Ethiopian Birr

(3) Estimation Conditions

The conditions at the point of estimation in November 2010 are as follows.

1) Exchange rate: USD1.0 = JPY87.11, ETB1.0=JPY5.9559

2) Implementation period: The Project intends to be executed approximately 37 months for Phase-I and 32 months for Phase-II being set aside for the detailed design, tender assistance and construction work as shown in the implementation schedule.

3) Other: The Project will be implemented in accordance with the grant aid scheme of the Government of Japan.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	① Have EIA reports been officially completed? ② Have EIA reports been approved by authorities of the host country's government? ③ Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? ④ In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	A1: Yes. ERA will prepare a supplementary EIA report with a current draft EIA report based on the output from the JICA Survey Team and issue the Environmental Compliance Certificate by May, 2011. A2: No, not yet. Environmental Compliance Certificate will be issued by ERA as authorized entity because predicted impacts are not serious. A3: No information at the moment A4: No information at the moment
	(2) Explanation to the Public	① Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? ② Are proper responses made to comments from the public and regulatory authorities?	A1:Stakeholder meetings (SHMs) were convened in accordance with the EIA process. And participated stakeholders agreed with a plan. Exchange information and discussions between ERA and Debre Markos Town Administration should be monitored for smooth implementation of a series of resettlement activities. A2:, SHMs were held for inhabitants along the target road and for local authorities respectively, most opinions were about receiving fair compensation, minimizing land acquisition, ensuring adequate land allocation and livelihood restoration. These minutes of meetings were compiled in RAP report.
2 Mitigation Measures	(1) Air Quality	① Is there a possibility that air pollutants emitted from various sources, such as vehicle traffic will affect ambient air quality? Does ambient air quality comply with the country's ambient air quality standards? ② Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	A1: Ethiopia does not have any criteria for air pollution. In addition, air pollution level will be in the same range of existing road because traffic volume increase with this project is not assumed. A2: Industrial area is not located along the project area.
	(2) Water Quality	① 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? ② Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? ③ Do effluents from various facilities, such as stations and parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas that do not comply with the country's ambient water quality standards?	A1: Outflow of soil will be minimized by construction work in dry season and slope protection. A2: Road surface water in residential area should be properly treated by drainage facilities such as side ditch. It is therefore any pollution by road surface water is not assumed. A3: Parking stations and service stations are not planned. Hence water pollution by these facilities is not supposed.
	(3) Noise and Vibration	① Do noise and vibrations from vehicle and train traffic comply with the country's standards?	A1: Ethiopia does not have any criteria for noise level and vibration level. In addition, noise level and vibration level will be in the same range of existing road because traffic volume increase with this project is not assumed.
3 Natural Environment	(1) Protected Areas	① 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?	A1: No, there are not any conservation areas in the project area.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
3 Natural Environment	(2) Ecosystem	① Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? ② Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? ③ If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? ④ Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? ⑤ Is there a possibility that installation of 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? ⑥ In cases where the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	A1: There are not any precious natural areas in the site. A2: There are not any designated and protected habitats for considerable species. A3: This project is basically road rehabilitation, not new road construction. Most construction sites are categorized agricultural areas, thus the project does not give adverse impacts on this item. A4: Most construction sites are categorized agricultural areas, and there are not any areas such as migration corridors and habitats of considerable species. Livestock can move along the road same as the present situation. And also they can across the road, because gentle slope (1:2 or more) is adopted. A5: This is not basically a new road construction project, thus the project does not give adverse impacts on this item. Cutting of forest is minimized and limited to plantation. A6: This is not basically a new road construction project. Most construction sites are categorized agricultural areas, thus the project does not give adverse impacts on this item.
	(3) Hydrology	① Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	A1: This project is basically road rehabilitation, not new road construction. Tunnels are not planned. Road facilities such as bridges and culverts are designed at same lication and proper size. Therefore, there are not likely to be serious impacts to underground water and hydrological situation.
	(4) Topography and Geology	① Is there a soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? ② 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? ③ 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?	A1,A2: There are not any landslide areas in the site. Slope is secured 1:2 or more, and protection work such as planting trees and installation of berm in embankment will be adopted as required. A3: Soil errosion will be minimized because earth work in dry season, mitigation measures for borrow pits and slope protection are adopted.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
4 Social Environment	(1) Resettlement	① Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? ② Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? ③ Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? ④ Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? ⑤ Are agreements with the affected persons obtained prior to resettlement? ⑥ Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? ⑦ Is a plan developed to monitor the impacts of resettlement?	A1: Some new alignments and COI (Corridor of Impact) concept were recommended by JICA Survey Team, and if this concept is adopted, the number of affected houses will reduce from 159 to 41. A2: SHMs were held in EIA and RAP process (Scoping phase: 3rd, 4th Nov. 2009). A3: Compensation for affected properties shall be carried out with replacement costs out of consideration of depreciation in RAP. A4: SHMs were held for inhabitants along the target road and for local authorities respectively. These minutes of meetings were compiled in RAP report. A5: A series of SHMs were conducted on the EIA process and formulated on basic consensus from participated stakeholders and local authorities. As for the resetting of cutoff date, exchange information and discussions between ERA and Debre Markos Town Administration will be conducted. A6: ERA will secure a required budget for a series of Land Acquisition and Resettlement Action Plan. Relevant bodies such as ROW Branch of ERA, Administration, Municipality and Agriculture Bureau will revise existing RAP based on implementation of Detailed Measurement Survey (DMS) and Replacement Cost Survey (RCS). The ROW Branch with the above mentioned members will create contracts with the owners and obtain the required land. According to an on-going road project which was finded by the African Development Bank, DMS and RCS was already carried out, and basic consensus was formulated with stakeholders for a smooth project implementation. ERA has sufficient capacity and budget secured to implement of land acquisition and resettlement. A7: Monitoring plan was prepared in current EIA report.
	(2) Living and Livelihood	① Where roads or railways 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 adequate measures considered for preventing these impacts? ② Is there a possibility that the project will adversely affect the living conditions of inhabitants other than the affected inhabitants? Are adequate measures considered to reduce the impacts, if necessary? ③ Is there a possibility that diseases, including communicable diseases, such as HIV will be introduced due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? ④ Is there a possibility that the project will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents)? ⑤ Is there a possibility that roads and railways will cause impede the movement of inhabitants? ⑥ Is there a possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	A1: This is not basically a new road construction project. Therefore the project does not give adverse impacts to existing transportation system and the associated workers. A2: No, there is not. A3: Distribution of infectious diseases such as STDs is predicted during construction. Thus educational activities and medical checks are planned for construction workers and inhabitants during construction. A4: This project does not raise any adverse impacts to road traffic in the surrounding area. A5: No, there are no serious impacts because large scale structures such as flyover are not planned. Traffic safety will be secured due to alignment improvement, widening of the road and setting up walkways in the residential area. A6: No, there are no serious impacts because large scale structures such as flyover are not planned.
	(3) Heritage	① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	A1: No, there are not any precious cultural heritages in the site. Some religious facilities are identified along the road, but these are considered in alignment plan and avoided basically.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
4 Social Environment	(4) Landscape	① Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	A1: No, there are not any considerable landscapes in the site.
	(5) Ethnic Minorities and Indigenous Peoples	① Where ethnic minorities and indigenous peoples are living in the rights-of-way, are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples? ② Does the project comply with the country's laws for rights of ethnic minorities and indigenous peoples?	A1 ,A2: No ethnic minorities or indigenous peoples are living in the ROW, thus the project does not give adverse impacts on this item.
5 Others	(1) Impacts during Construction	① Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? ② If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? ③ If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? ④ If necessary, is health and safety education (e.g., traffic safety, public health) provided for project personnel, including workers?	A1: Mitigation measures for public pollution were planned in environmental management and monitoring plan in current draft EIA report. Generally, in residential area, construction works are carried out in the day time and water is splinked for earth works. A2: Most construction sites are categorized agricultural areas, and cutting of forest is minimized and limited to plantation. Thus the project does not give adverse impacts on natural environment. A3: During construction, temporary facilities and sites such as base camp, borrow pits and detours will cause some impact. Appropriate mitigation measures will be conducted. A4: Environmental education such as accident and health care for workers were planned in environmental management and monitoring plan in current draft EIA report.
	(2) Monitoring	① Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? ② Are the items, methods and frequencies included in the monitoring program judged to be appropriate? ③ Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? ④ 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?	A1: In principle, monitoring of noise level and dust level should be carried out. A2: Monitoring items and methodology were adequately indicated in environmental management and monitoring plan in current draft EIA report. A3 ,A4: Monitoring shall be carried out by environmental specialists from the contractor and supervisor, and the results of monitoring shall be reported to ERA. This condition will be indicated in TOR for construction.

MONITORING FORM

ERA shall implement environmental monitoring based on the following monitoring form. And in construction phase, the contractor shall monitor and report following items to ERA.

1. Pre-construction phase (Bimonthly)

(1) EIA Approval, Land Acquisition and Resettlement Process

	Monitoring Item	Responsibility	Methods	Monitoring period	Results (Progress*)
1	Issue of Environmental Compliance Certificate, and conditionality. Its countermeasures and their implementation by ERA	ERA	- Preparation of a supplemental EIA report with current draft EIA report based on the output from JICA Survey Team, and issue a Environmental Compliance Certificate	After Preparatory Survey (By May 2011)	
2	Update of Resettlement Action Plan (RAP)	ERA	- Implementation of additional inventory of property loss and population census in re-alignment section, declaration of cut-off date and holding of stakeholder meetings	After Preparatory Survey (Immediately)	
3	Implementation of Land Acquisition and Resettlement	ERA	- Implementation of Detailed Measurement Survey and Replacement Cost Survey - Land Acquisition after implementation of negotiation, contract and compensation	Before Construction phase	
4	Monitoring after Resettlement	ERA	- Interview to involved resident and stakeholders	Before Construction phase	
5	Relocation of public utilities such as power poles, and complaints by local people	ERA	- Interview to involved resident and stakeholders	Before Construction phase	

* Interview to Environmental and Resettlement sections

2. Construction phase (Monthly)

(1) Soil Erosion, Water Pollution

	Monitoring Item	Methods	Places	Standards	Monitoring period	Results (Situation)
1	Confirmation of Embankment stabilization (Outflow of soil)	visual observation	Embankment slope and cut slope	Good / Bad	Once/ After completion	
2	Implementation of mitigation measures at borrow pits and quarry sites	visual observation	Borrow pits and quarry sites	Good / Bad	Once/ After use	

(2) Sanitation, Infectious diseases such as HIV/AIDS

	Monitoring Item	Methods	Places	Standards	Monitoring period	Results (Situation)
1	Health check of construction workers	Interview in regard to morbidity*	Local medical office	Good / Bad	Quarterly	

* Comparison with the Pre-construction condition (If necessary)

(3) Accident

	Monitoring Item	Methods	Places	Standards	Monitoring period	Results (Situation)
1	Occurrence situation of traffic accidents	Interview in regard to traffic accidents*	Police station	Occurred / Not	Monthly	

* Comparison with the Pre-construction condition (If necessary)

(4) Air Pollution (Dust)

	Monitoring Item	Methods	Places	Standards	Monitoring period	Results (Situation)
1	Confirmation of watering	visual observation*	Residential area	Implemented/ Not	Monthly	

* Interview to inhabitants (If necessary)

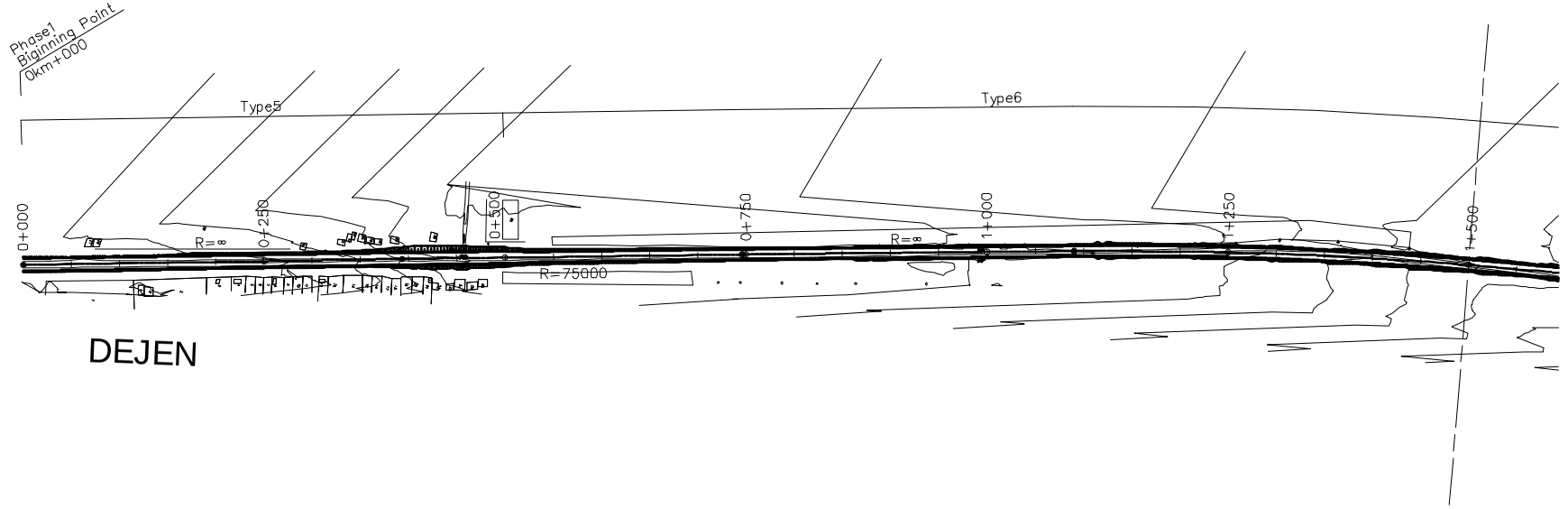
(5) Noise and Vibration

	Monitoring Item	Methods	Places	Standards	Monitoring period	Results (Situation)
1	Confirmation of working time (Limited work time during the daytime)	visual observation*	Residential area	Limited / Not	Monthly	

* Interview to inhabitants (If necessary)

5 概略設計図

図 面 名		測 点	縮 尺	頁
縦平面図	(1 /45)	0+000 － 1+500	1:5,000	A － 5 － 2
縦平面図	(2 /45)	1+500 － 3+000	1:5,000	A － 5 － 3
縦平面図	(3 /45)	3+000 － 4+500	1:5,000	A － 5 － 4
縦平面図	(4 /45)	4+500 － 6+000	1:5,000	A － 5 － 5
縦平面図	(5 /45)	6+000 － 7+500	1:5,000	A － 5 － 6
縦平面図	(6 /45)	7+500 － 9+000	1:5,000	A － 5 － 7
縦平面図	(7 /45)	9+000 － 10+500	1:5,000	A － 5 － 8
縦平面図	(8 /45)	10+500 － 12+000	1:5,000	A － 5 － 9
縦平面図	(9 /45)	12+000 － 13+500	1:5,000	A － 5 －10
縦平面図	(10 /45)	13+500 － 15+000	1:5,000	A － 5 －11
縦平面図	(11 /45)	15+000 － 16+500	1:5,000	A － 5 －12
縦平面図	(12 /45)	16+500 － 18+000	1:5,000	A － 5 －13
縦平面図	(13 /45)	18+000 － 19+500	1:5,000	A － 5 －14
縦平面図	(14 /45)	19+500 － 21+000	1:5,000	A － 5 －15
縦平面図	(15 /45)	21+000 － 22+500	1:5,000	A － 5 －16
縦平面図	(16 /45)	22+500 － 24+000	1:5,000	A － 5 －17
縦平面図	(17 /45)	24+000 － 25+500	1:5,000	A － 5 －18
縦平面図	(18 /45)	25+500 － 27+000	1:5,000	A － 5 －19
縦平面図	(19 /45)	27+000 － 28+500	1:5,000	A － 5 －20
縦平面図	(20 /45)	28+500 － 30+000	1:5,000	A － 5 －21
縦平面図	(21 /45)	30+000 － 30+531	1:5,000	A － 5 －22
縦平面図	(22 /45)	30+531 － 32+000	1:5,000	A － 5 －23
縦平面図	(23 /45)	32+000 － 33+500	1:5,000	A － 5 －24
縦平面図	(24 /45)	33+500 － 35+000	1:5,000	A － 5 －25
縦平面図	(25 /45)	35+000 － 36+500	1:5,000	A － 5 －26
縦平面図	(26 /45)	36+500 － 38+000	1:5,000	A － 5 －27
縦平面図	(27 /45)	38+000 － 39+500	1:5,000	A － 5 －28
縦平面図	(28 /45)	39+500 － 41+000	1:5,000	A － 5 －29
縦平面図	(29 /45)	41+000 － 42+500	1:5,000	A － 5 －30
縦平面図	(30 /45)	42+500 － 44+000	1:5,000	A － 5 －31
縦平面図	(31 /45)	44+000 － 45+500	1:5,000	A － 5 －32
縦平面図	(32 /45)	45+500 － 47+000	1:5,000	A － 5 －33
縦平面図	(33 /45)	47+000 － 48+500	1:5,000	A － 5 －34
縦平面図	(34 /45)	48+500 － 50+000	1:5,000	A － 5 －35
縦平面図	(35 /45)	50+000 － 51+500	1:5,000	A － 5 －36
縦平面図	(36 /45)	51+500 － 53+000	1:5,000	A － 5 －37
縦平面図	(37 /45)	53+000 － 54+500	1:5,000	A － 5 －38
縦平面図	(38 /45)	54+500 － 56+000	1:5,000	A － 5 －39
縦平面図	(39 /45)	56+000 － 57+500	1:5,000	A － 5 －40
縦平面図	(40 /45)	57+500 － 59+000	1:5,000	A － 5 －41
縦平面図	(41 /45)	59+000 － 60+500	1:5,000	A － 5 －42
縦平面図	(42 /45)	60+500 － 62+000	1:5,000	A － 5 －43
縦平面図	(43 /45)	62+000 － 63+500	1:5,000	A － 5 －44
縦平面図	(44 /45)	63+500 － 65+000	1:5,000	A － 5 －45
縦平面図	(45 /45)	65+000 － 65+469	1:5,000	A － 5 －46
標準横断図	(1 /4)	－	1:100	A － 5 －47
標準横断図	(2 /4)	－	1:100	A － 5 －48
標準横断図	(3 /4)	－	1:100	A － 5 －49
標準横断図	(4 /4)	－	1:100	A － 5 －50
ブラックコットンソイル対策工図	(1 /2)	－	1:100	A － 5 －51
ブラックコットンソイル対策工図	(2 /2)	－	1:100	A － 5 －52
構造一般図	(1 /13)	アサマテッチ橋梁	1:100	A － 5 －53
構造一般図	(2 /13)	ベケット橋梁	1:100	A － 5 －54
構造一般図	(3 /13)	アバアデム橋梁	1:100	A － 5 －55
構造一般図	(4 /13)	アベヤBoxカルバート	1:100	A － 5 －56
構造一般図	(5 /13)	エキエトBoxカルバート	1:100	A － 5 －57
構造一般図	(6 /13)	ゲトラ橋梁	1:100	A － 5 －58
構造一般図	(7 /13)	ミントカット橋梁	1:100	A － 5 －59
構造一般図	(8 /13)	ジバ橋梁	1:100	A － 5 －60
構造一般図	(9 /13)	イエダ-A Boxカルバート	1:100	A － 5 －61
構造一般図	(10 /13)	イエダ-B Boxカルバート	1:100	A － 5 －62
構造一般図	(11 /13)	イエダ-C Boxカルバート	1:100	A － 5 －63
構造一般図	(12 /13)	アンベッシュ Boxカルバート	1:100	A － 5 －64
構造一般図	(13 /13)	ウセタ橋梁	1:100	A － 5 －65



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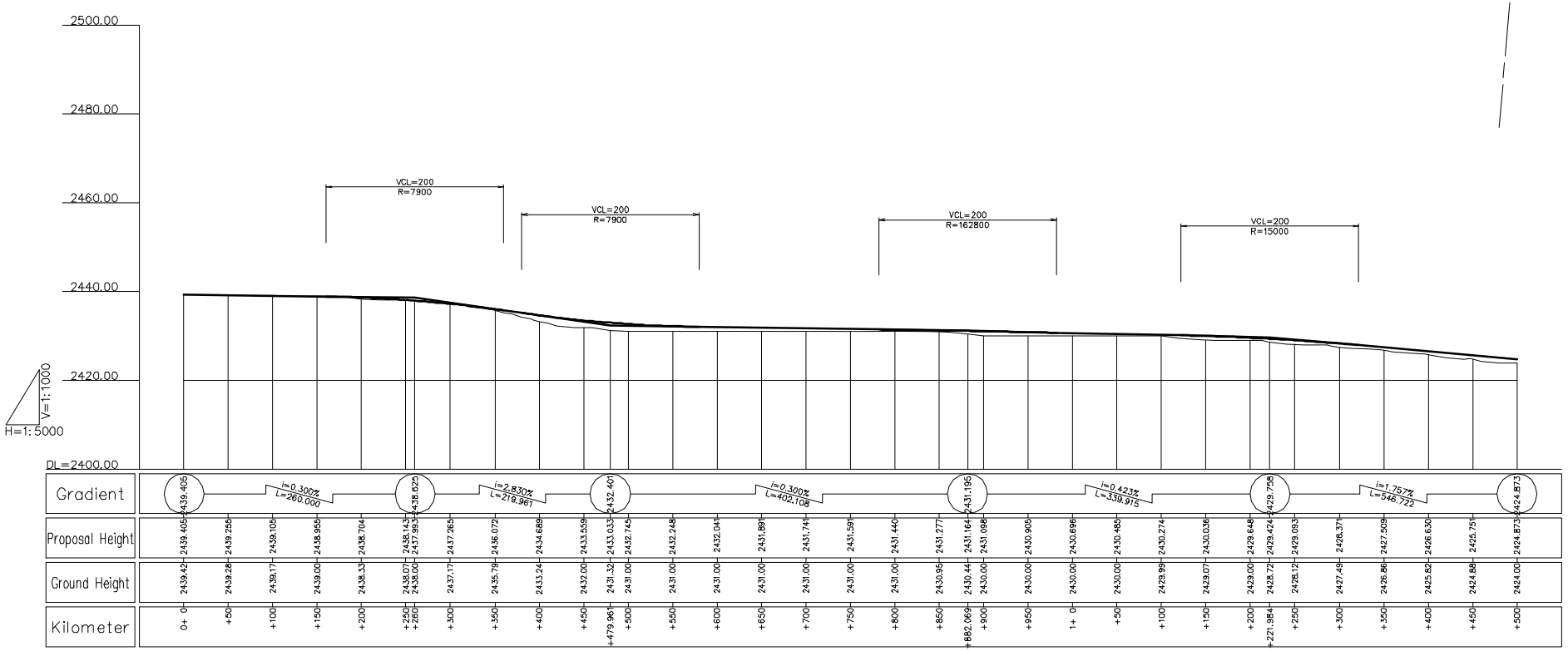
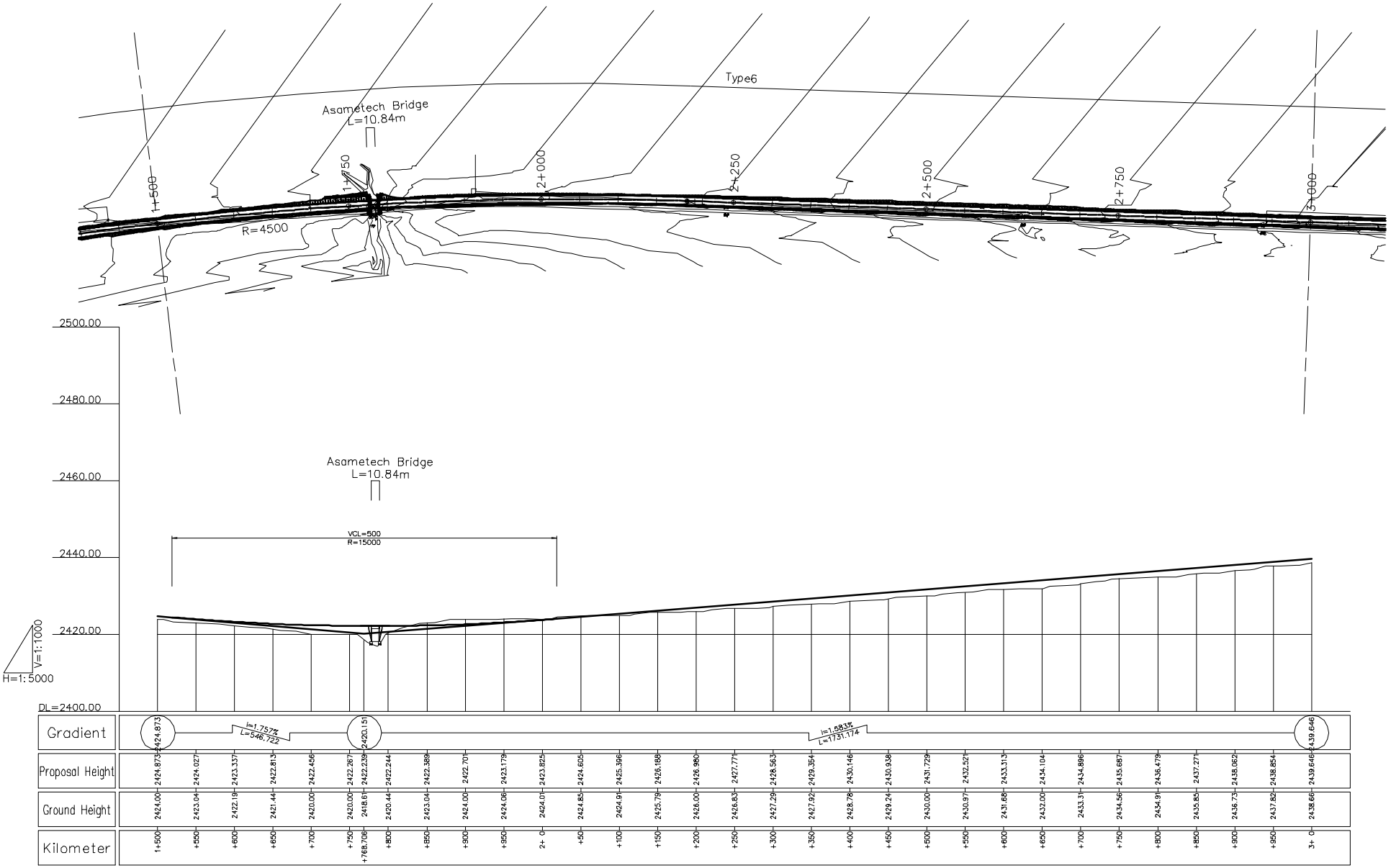


A-5-2

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (1/45)

	PREPARED BY	CHECKED BY	APPROVED BY	SCALE	SHEET NO.	DRAWING NO.	REV. NO.
NAME							
SIGNATURE							
DATE				1:5000			-



A-5-3

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia			
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (2/45)		
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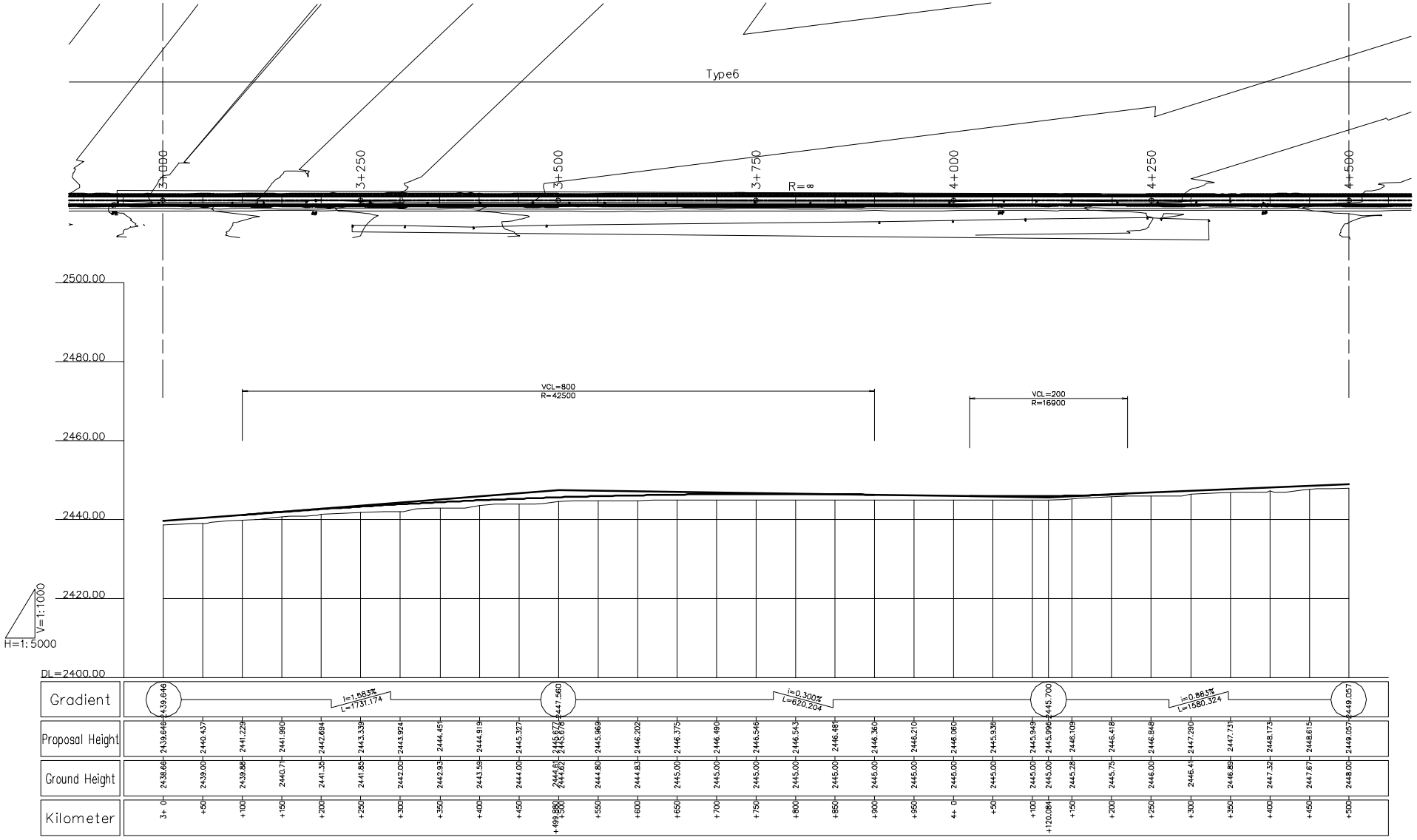

A-5-4

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (3/45)

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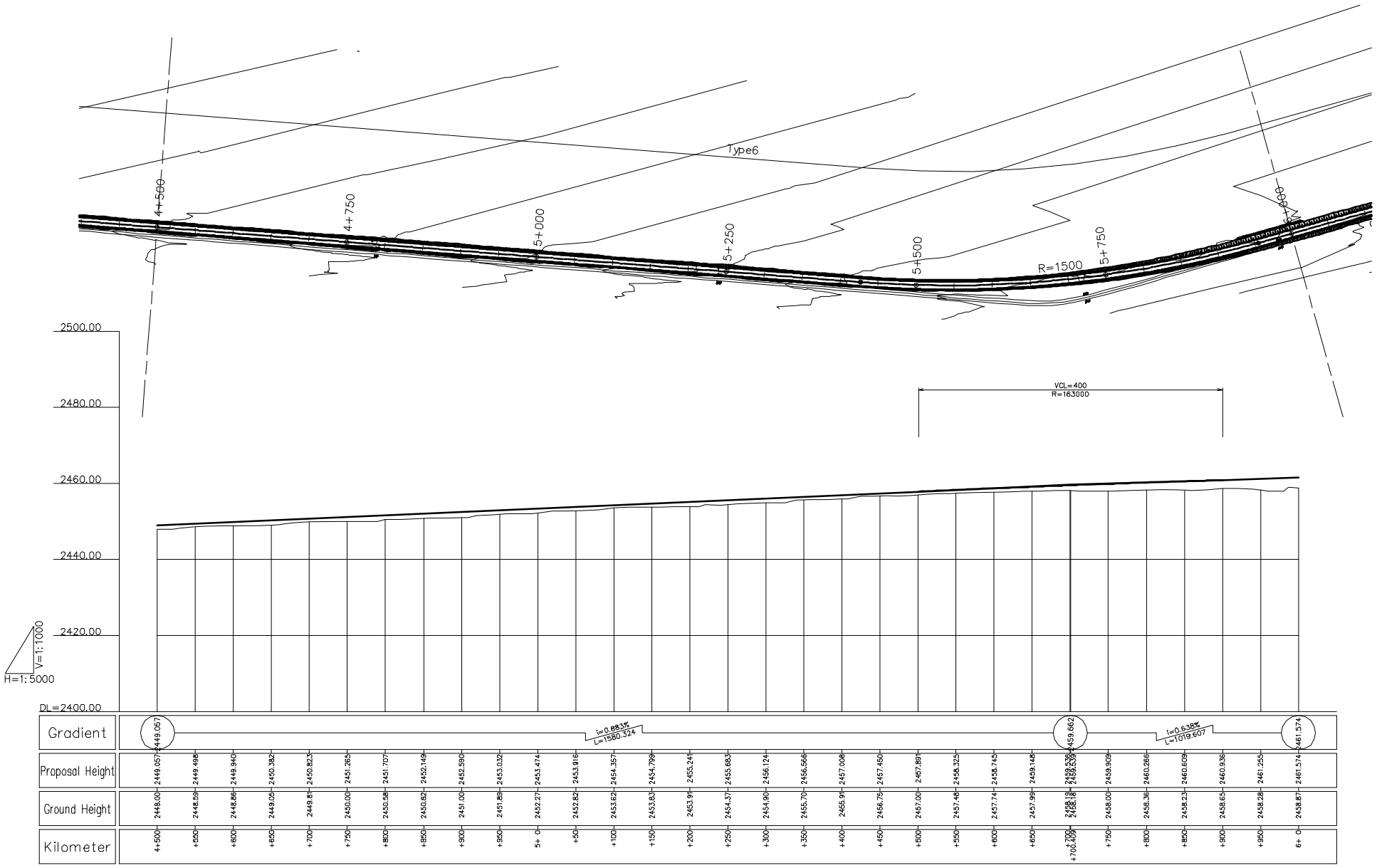
SIGNATURE							
DATE							



A-5-5

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia			
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.			DRAWING TITLE: Plan and Profile (4/45)
			PREPARED BY	CHECKED BY	APPROVED BY
		NAME			
		SIGNATURE			
		DATE			

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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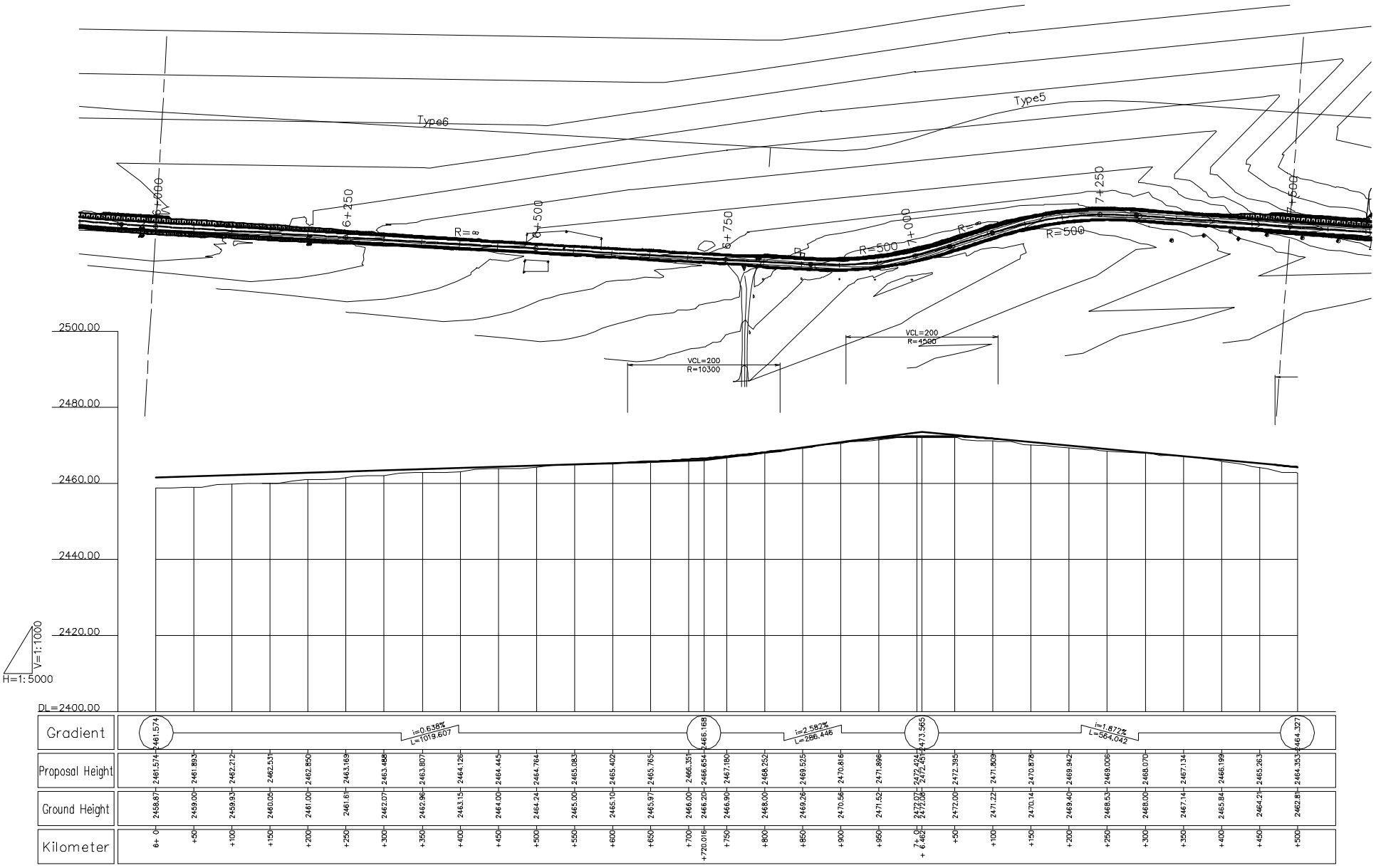

A-5-6

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:
ETHIOPIAN ROADS AUTHORITY	

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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NAME			
SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (5/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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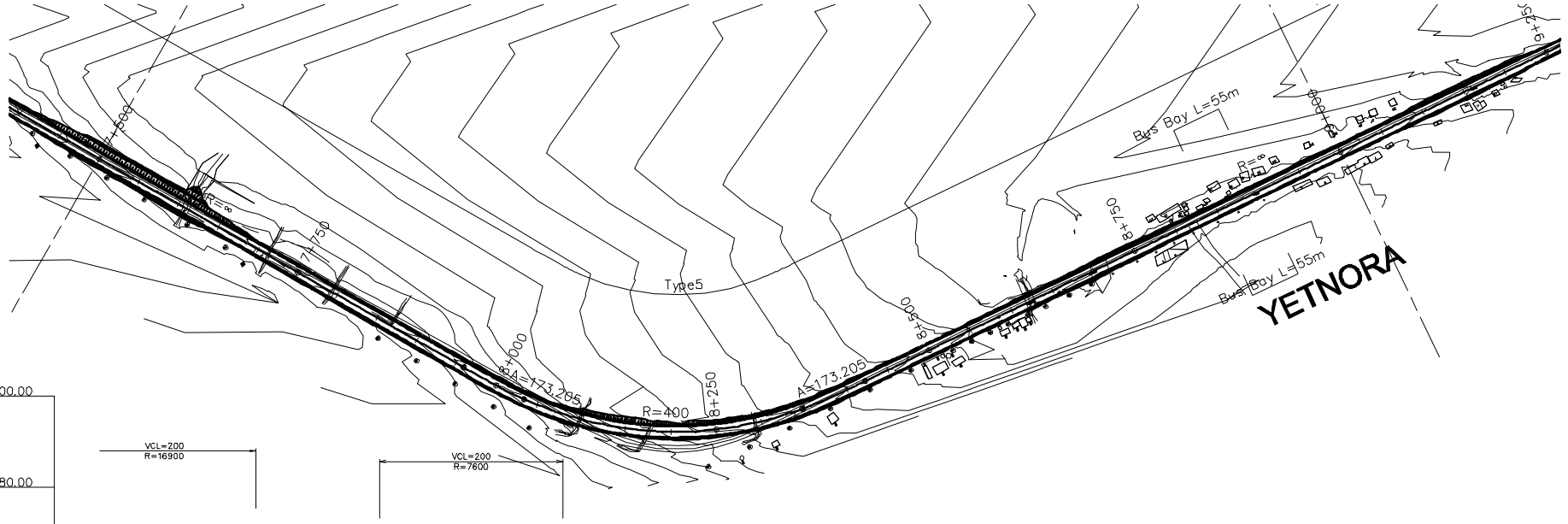
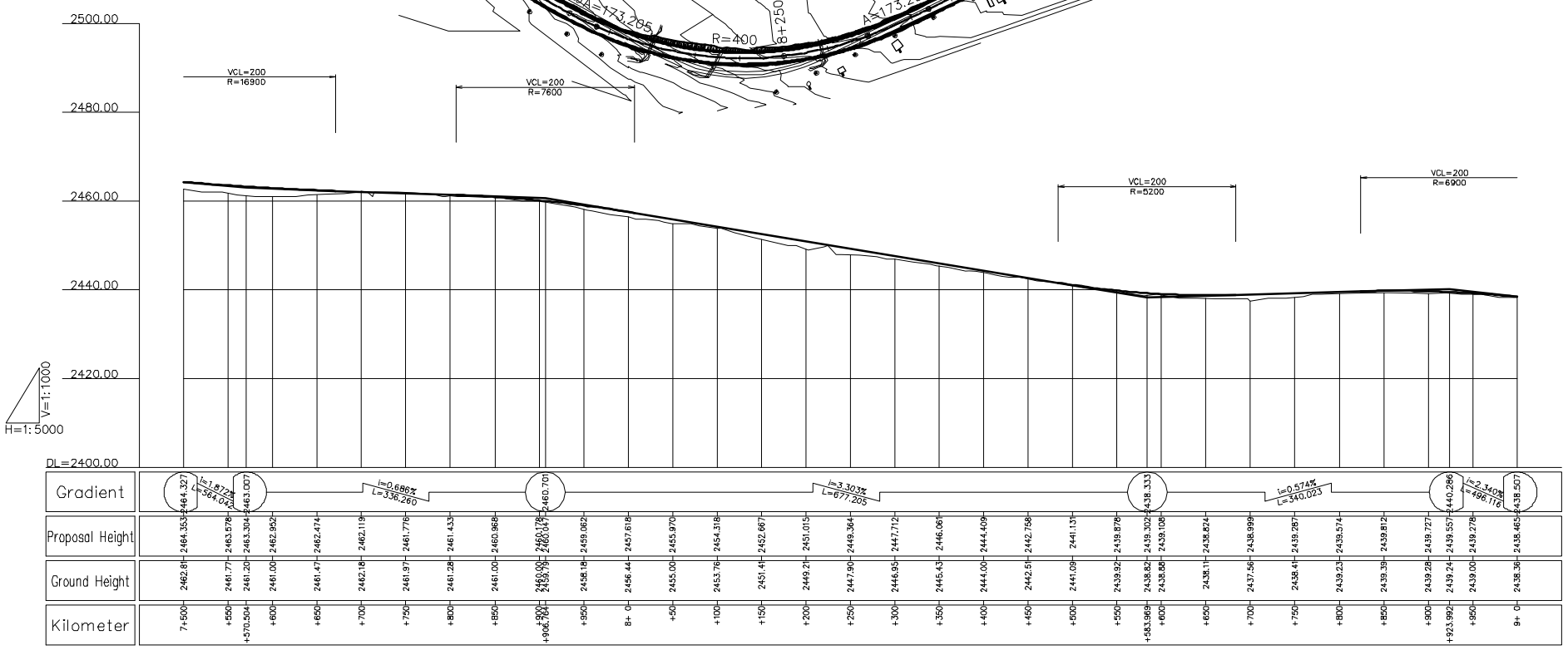
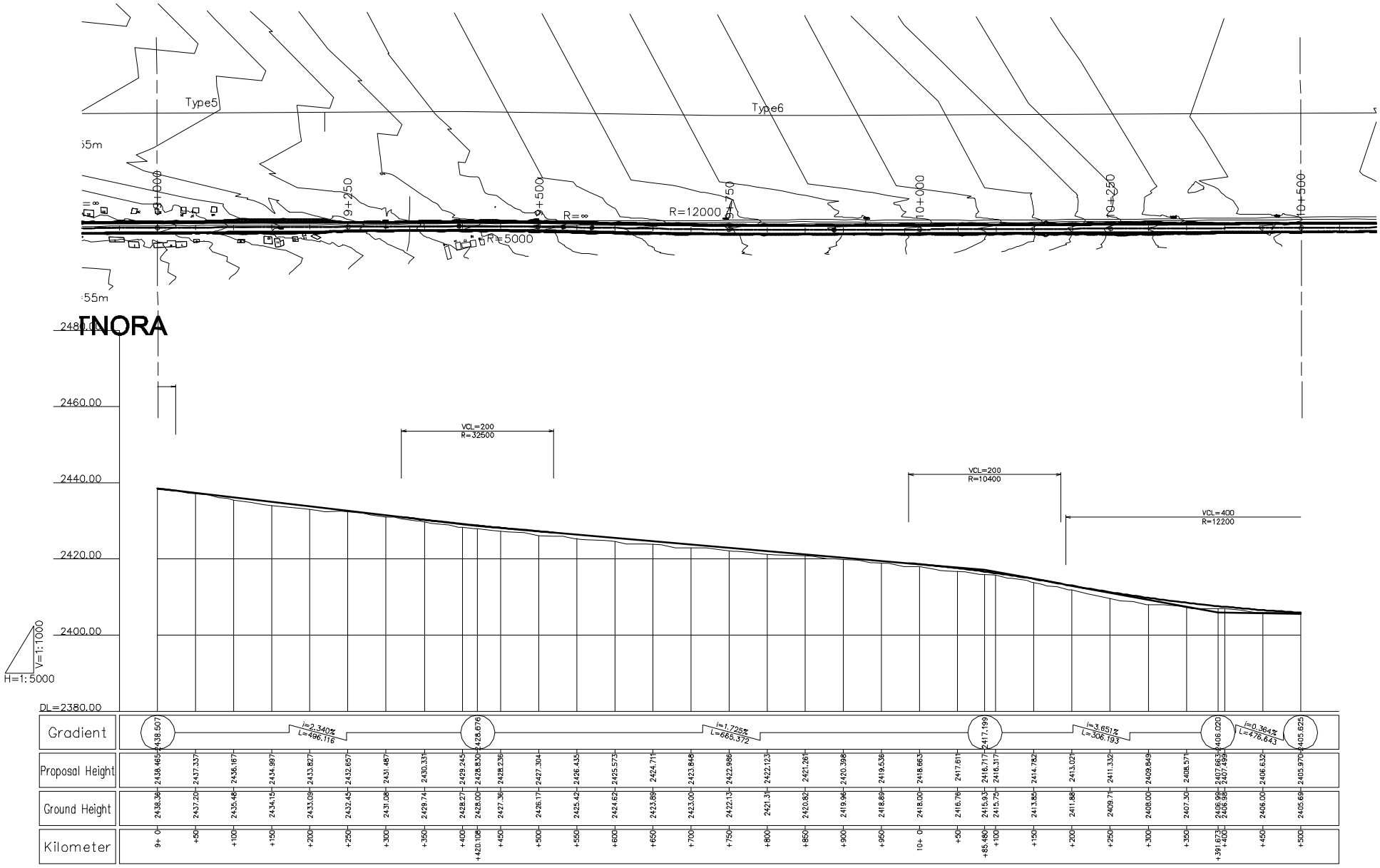




A-5-7

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia			
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE Plan and Profile (6/45)		
		PREPARED BY / CHECKED BY / APPROVED BY	SCALE	SHEET NO.	DRAWING NO. / REV. NO.
		NAME / SIGNATURE / DATE	1:5000		-



A-5-8

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (7/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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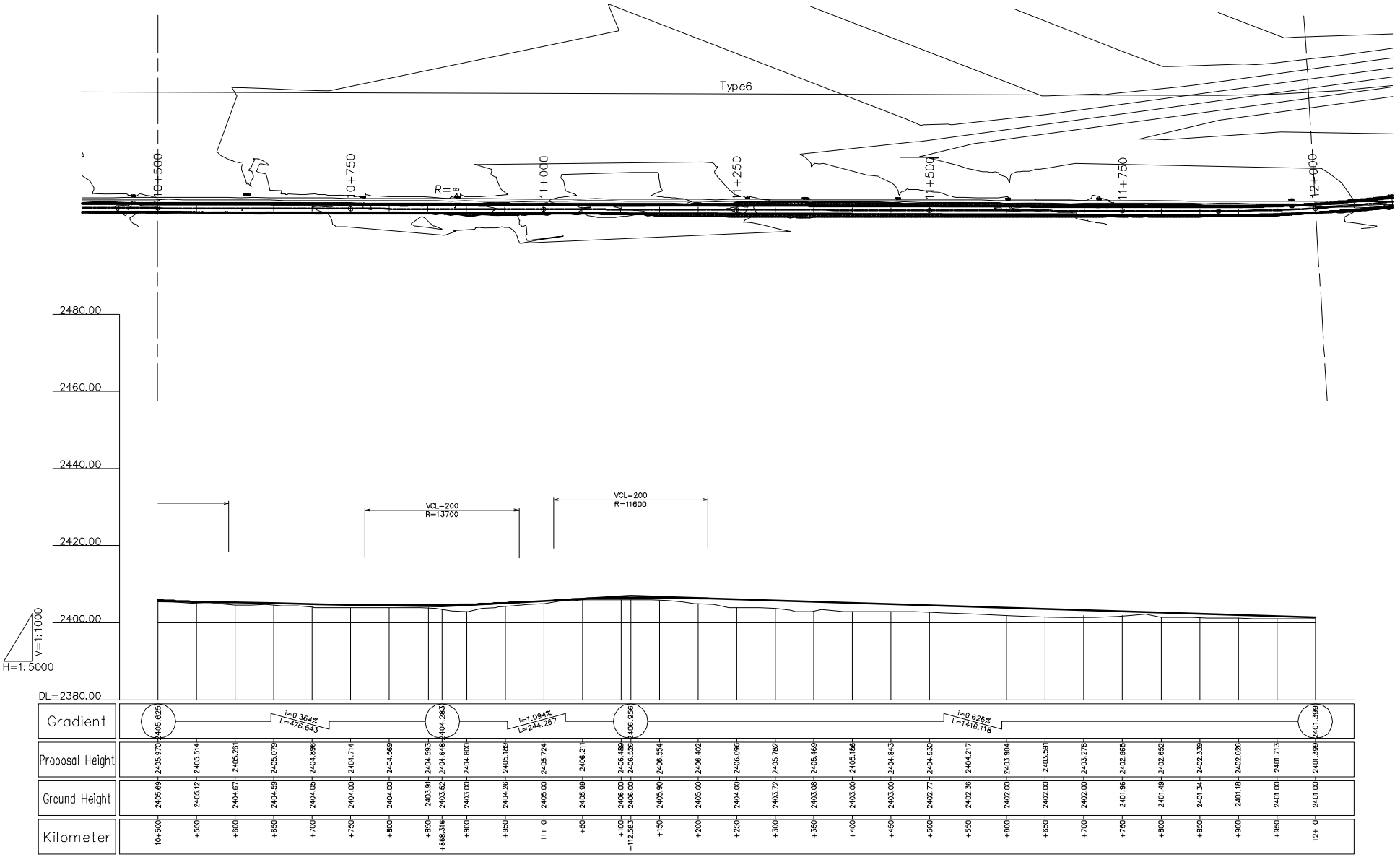

A-5-9

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia			
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE Plan and Profile (8/45)		
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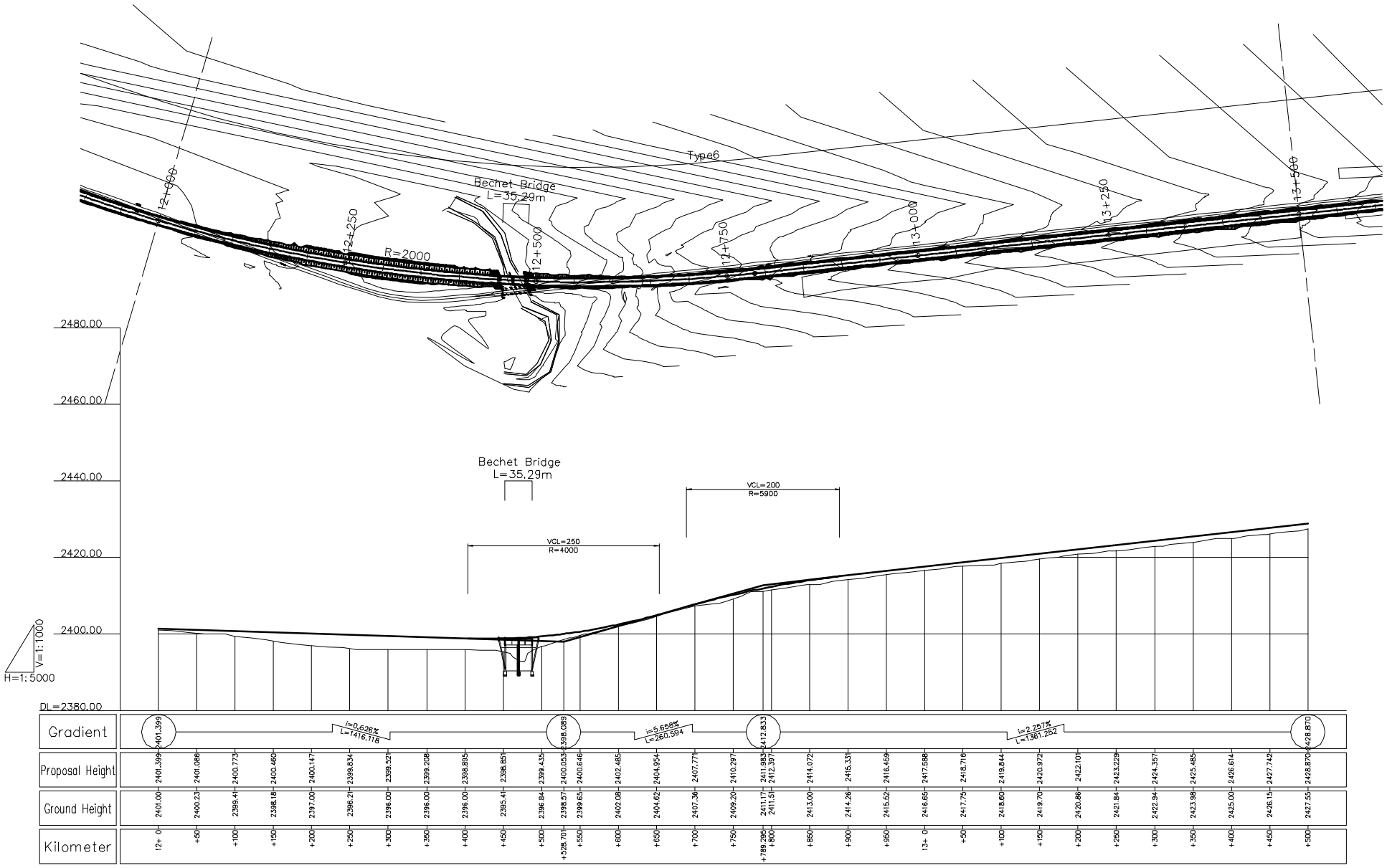
		NAME / SIGNATURE / DATE	1:5000		-



A-5-10

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (9/45)

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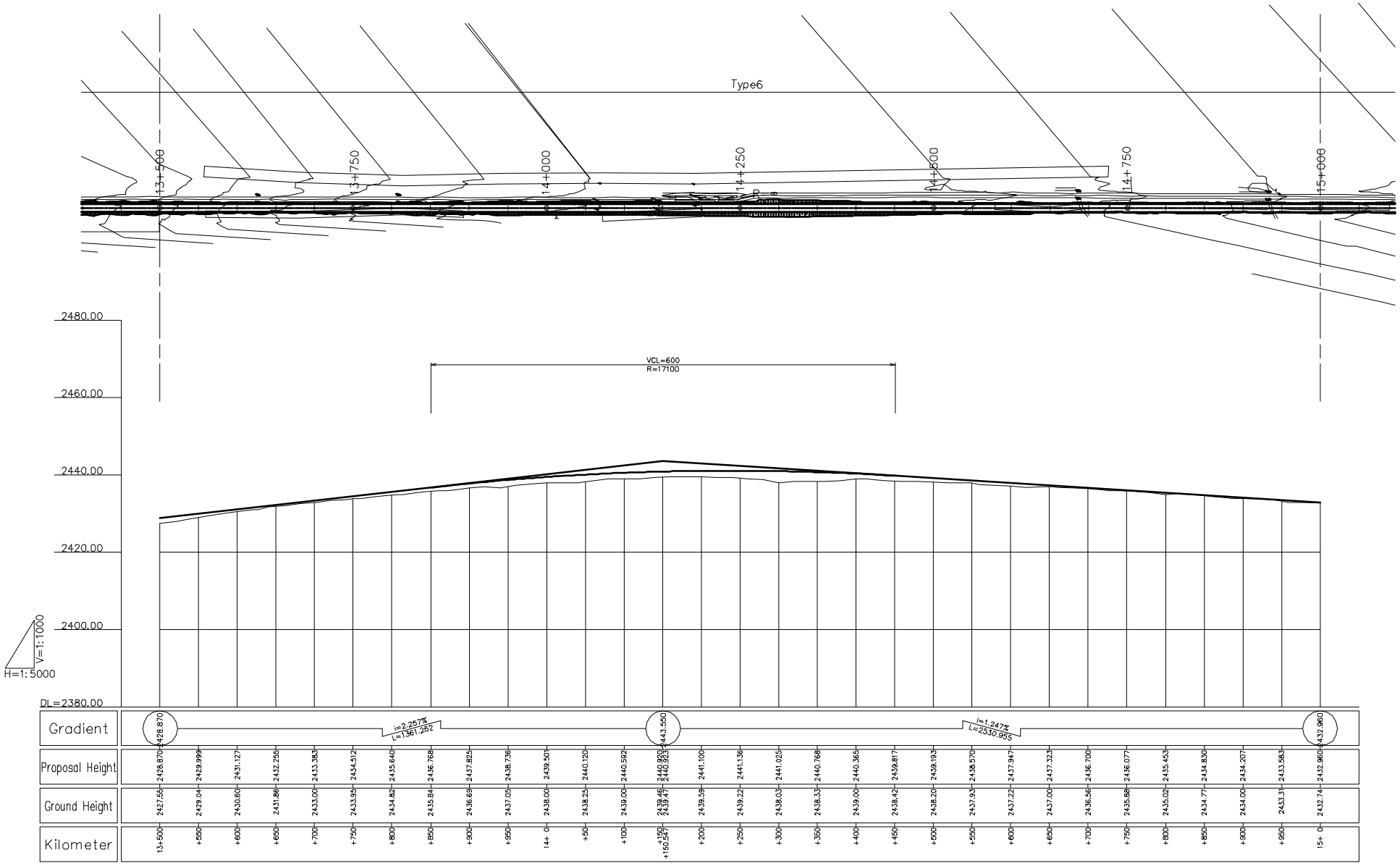

A-5-11

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia			
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (10/45)		
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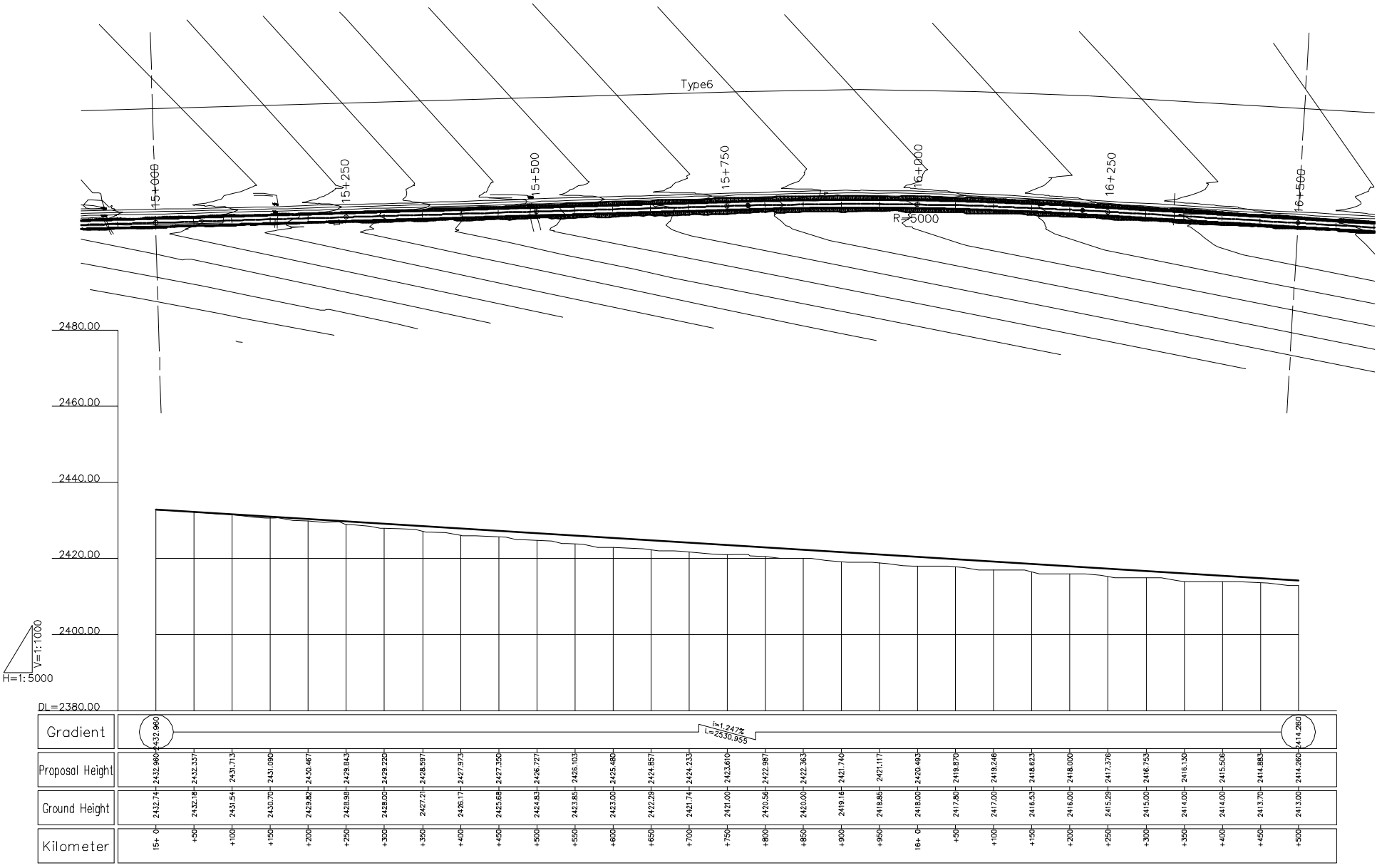

A-5-12

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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NAME			
SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (11/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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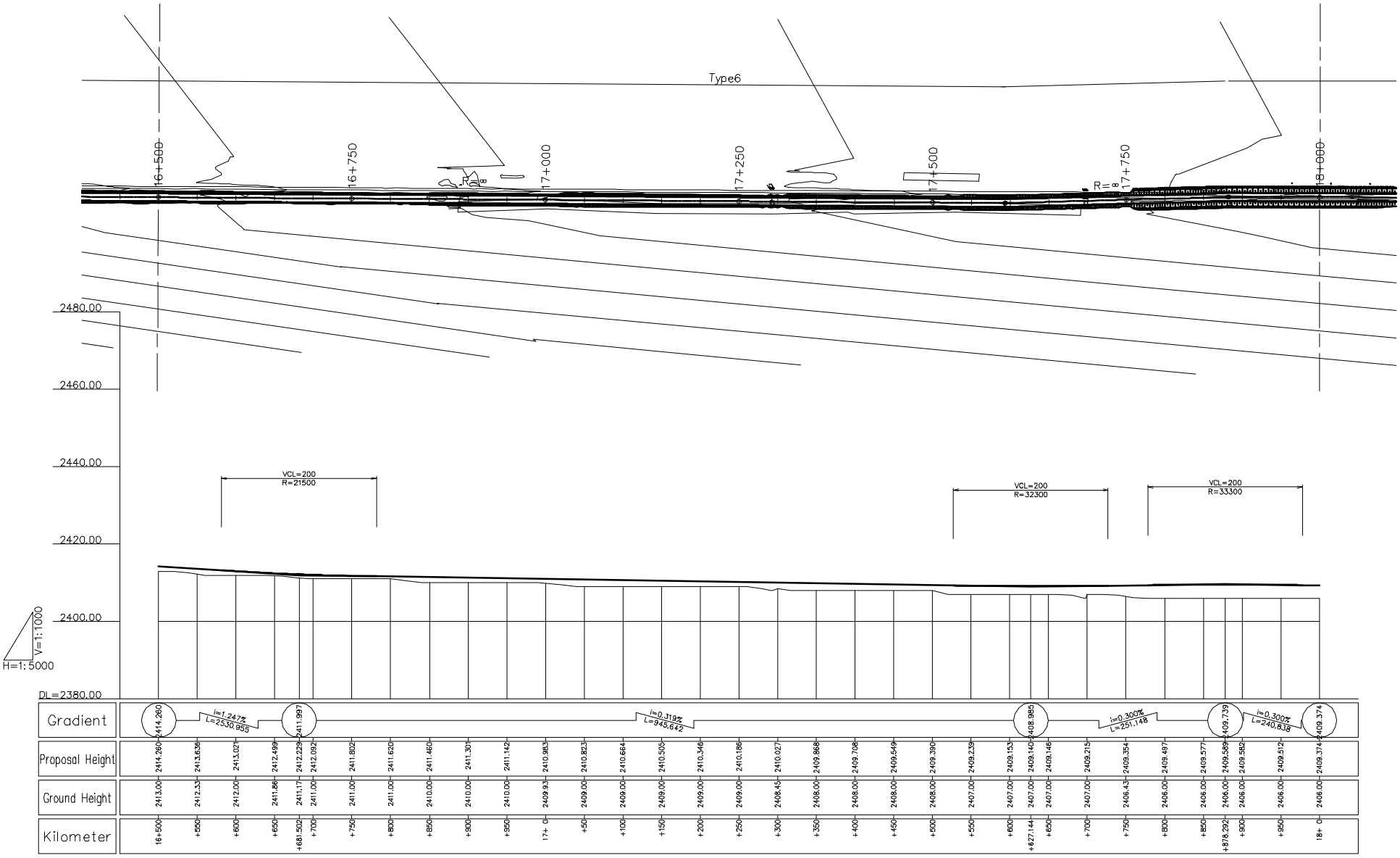

A-5-13

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (12/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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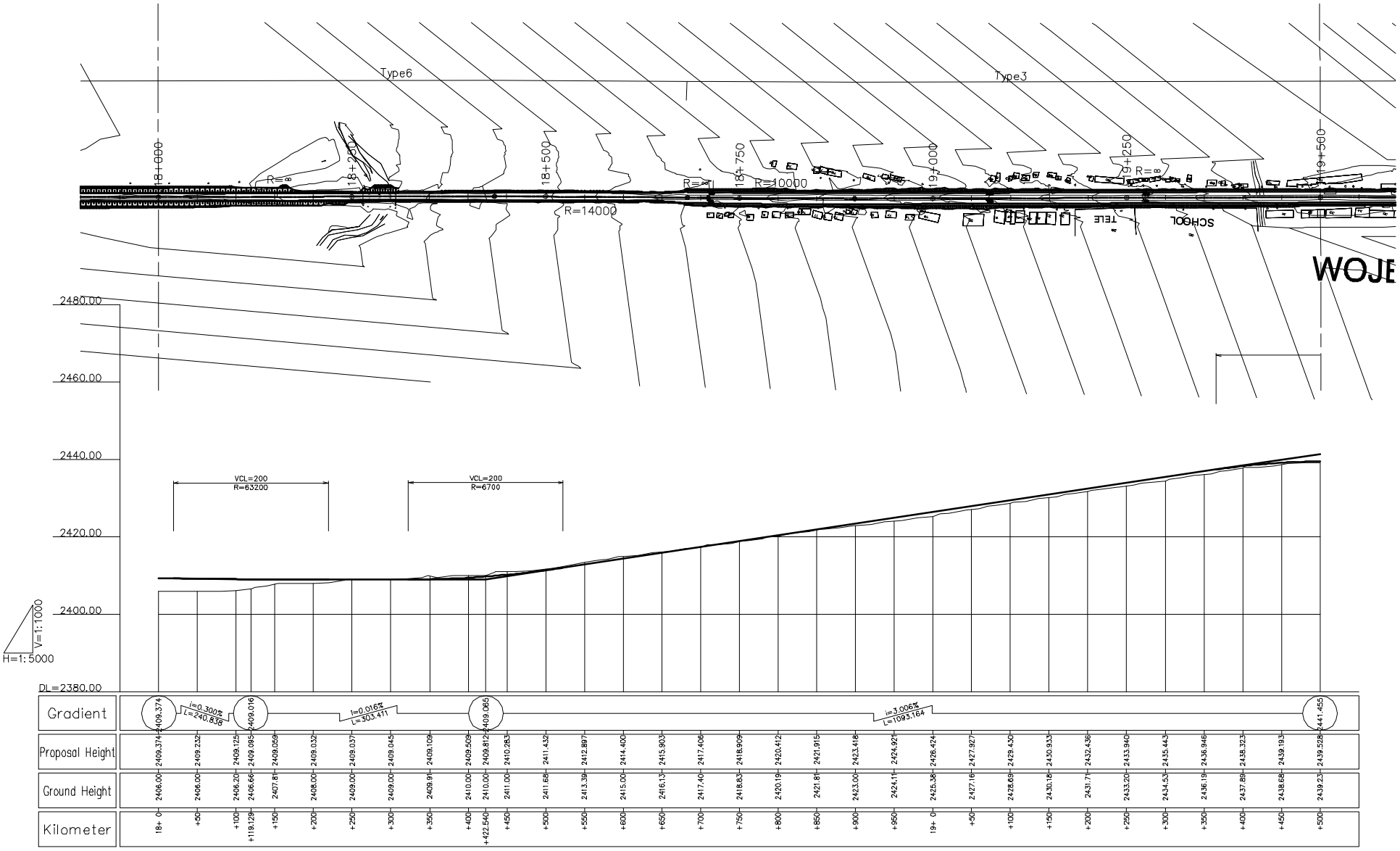

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ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (13/45)		
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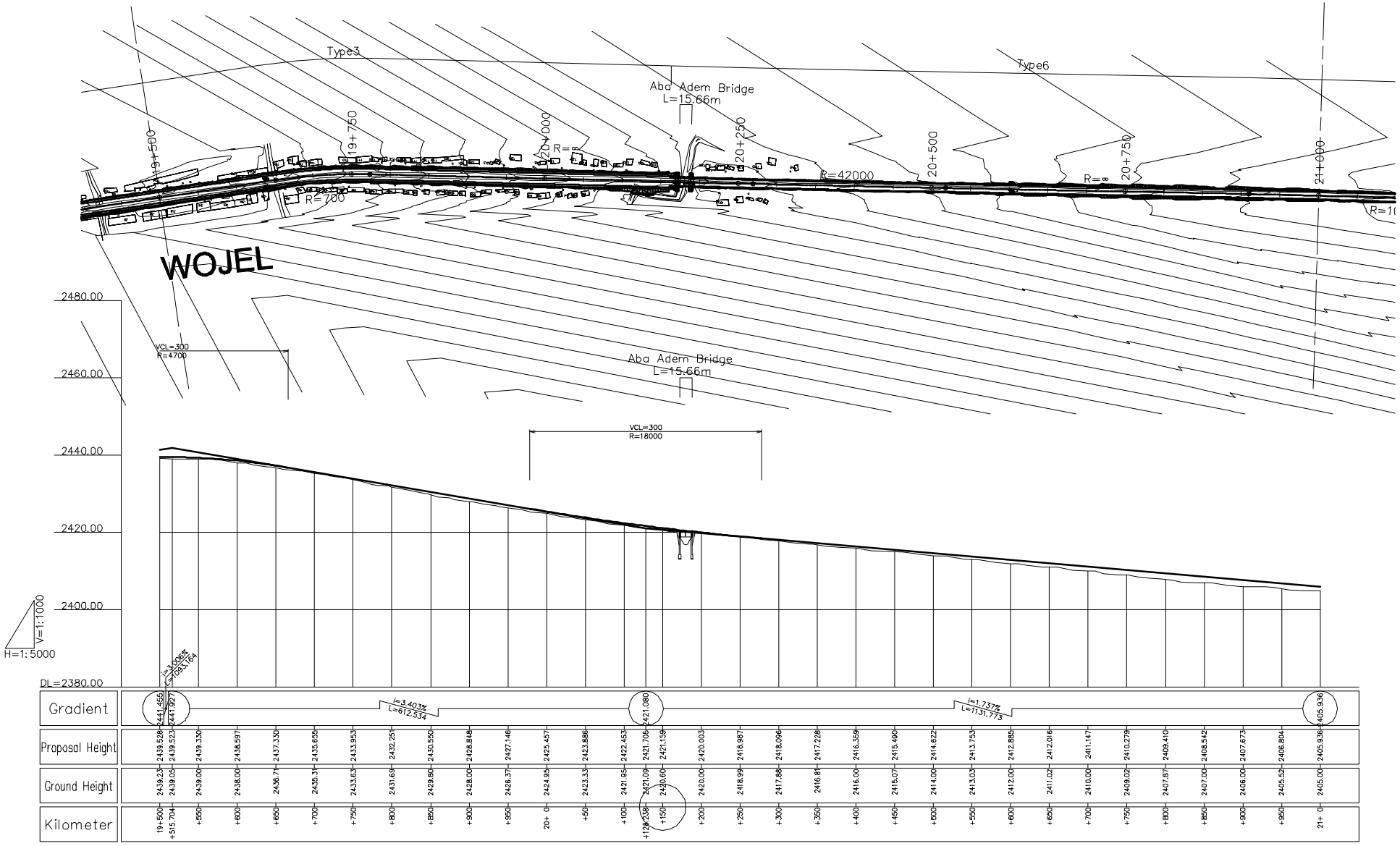

A-5-15

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (14/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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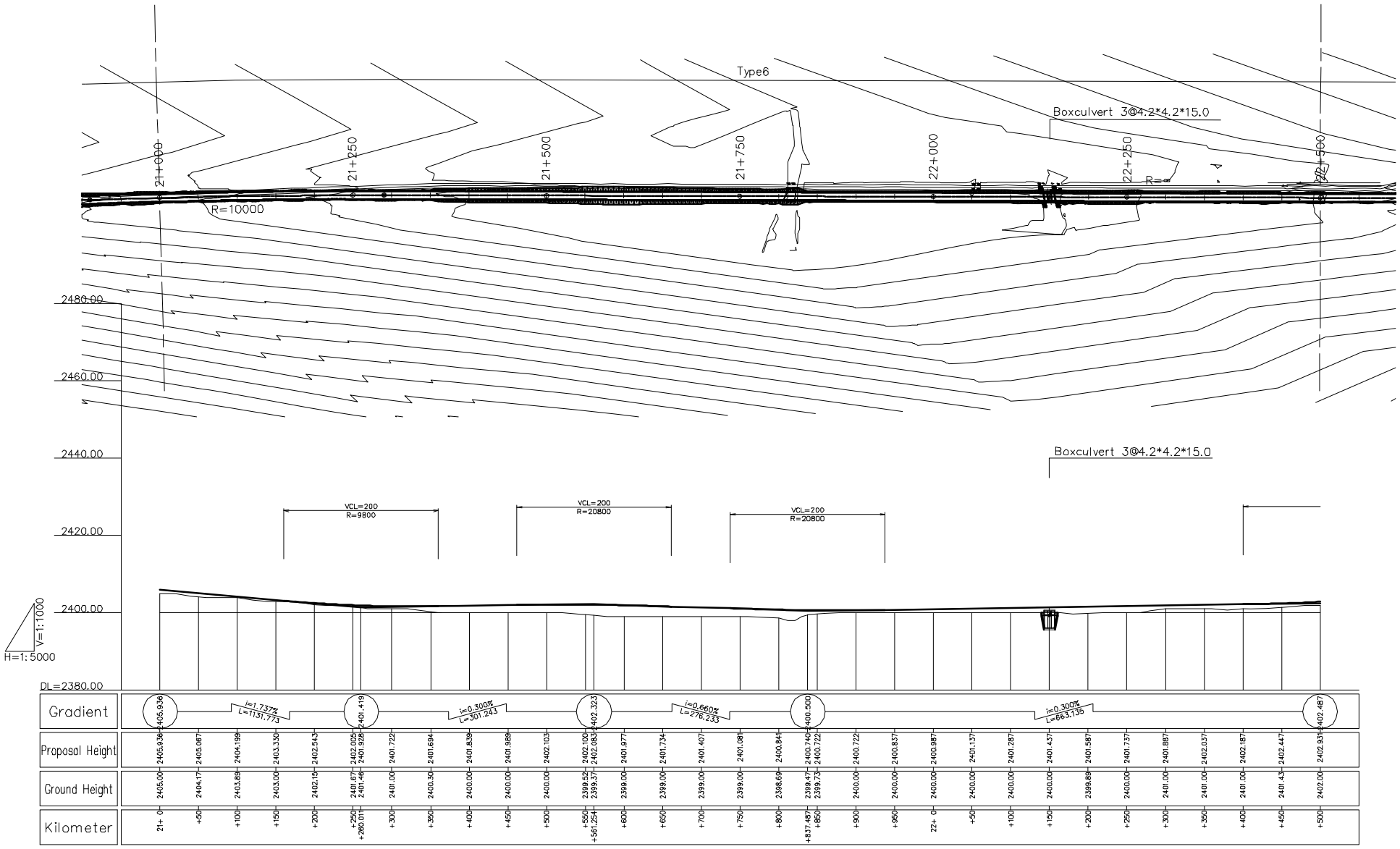

A-5-16

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (15/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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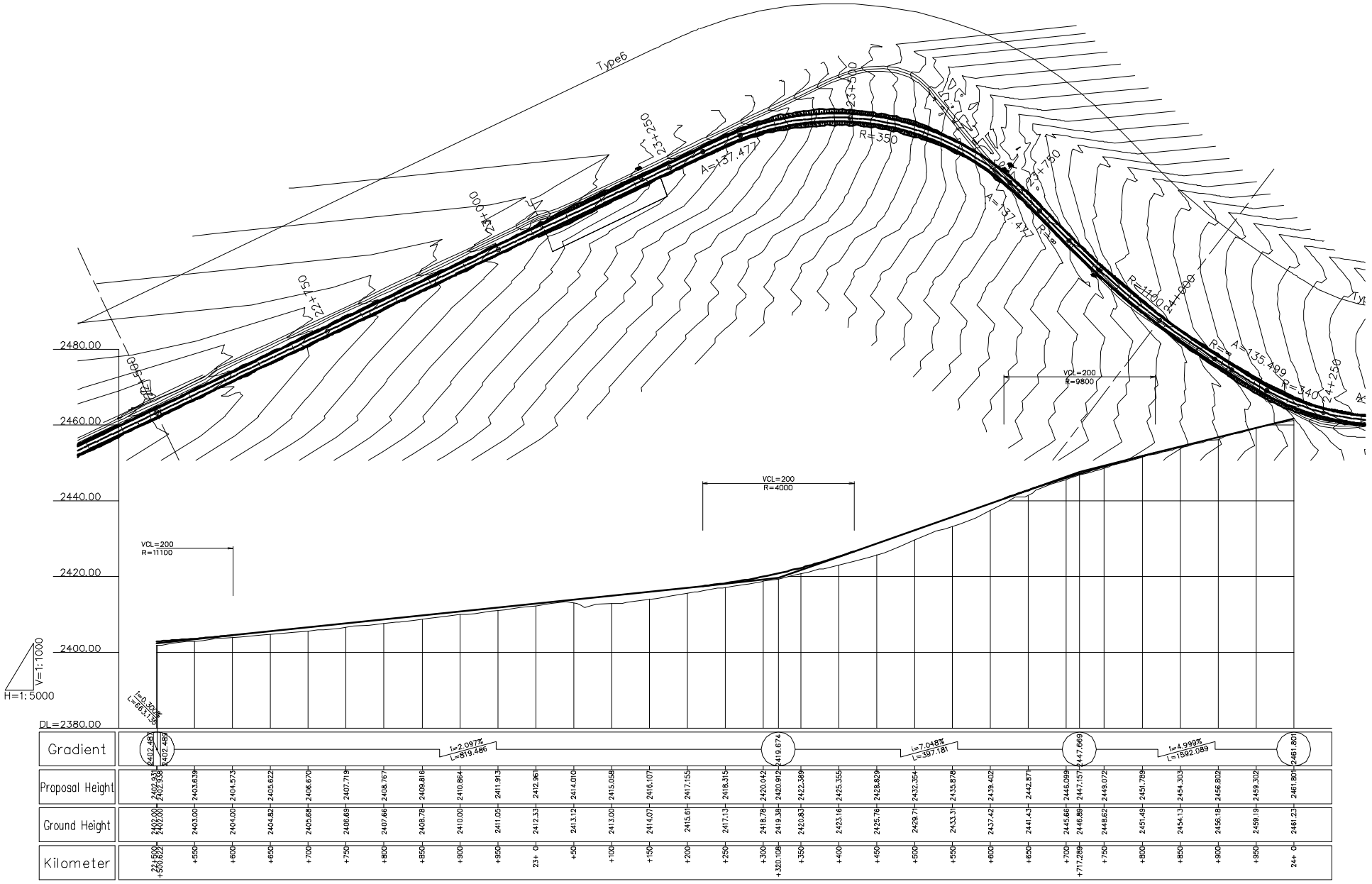

A-5-17

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (16/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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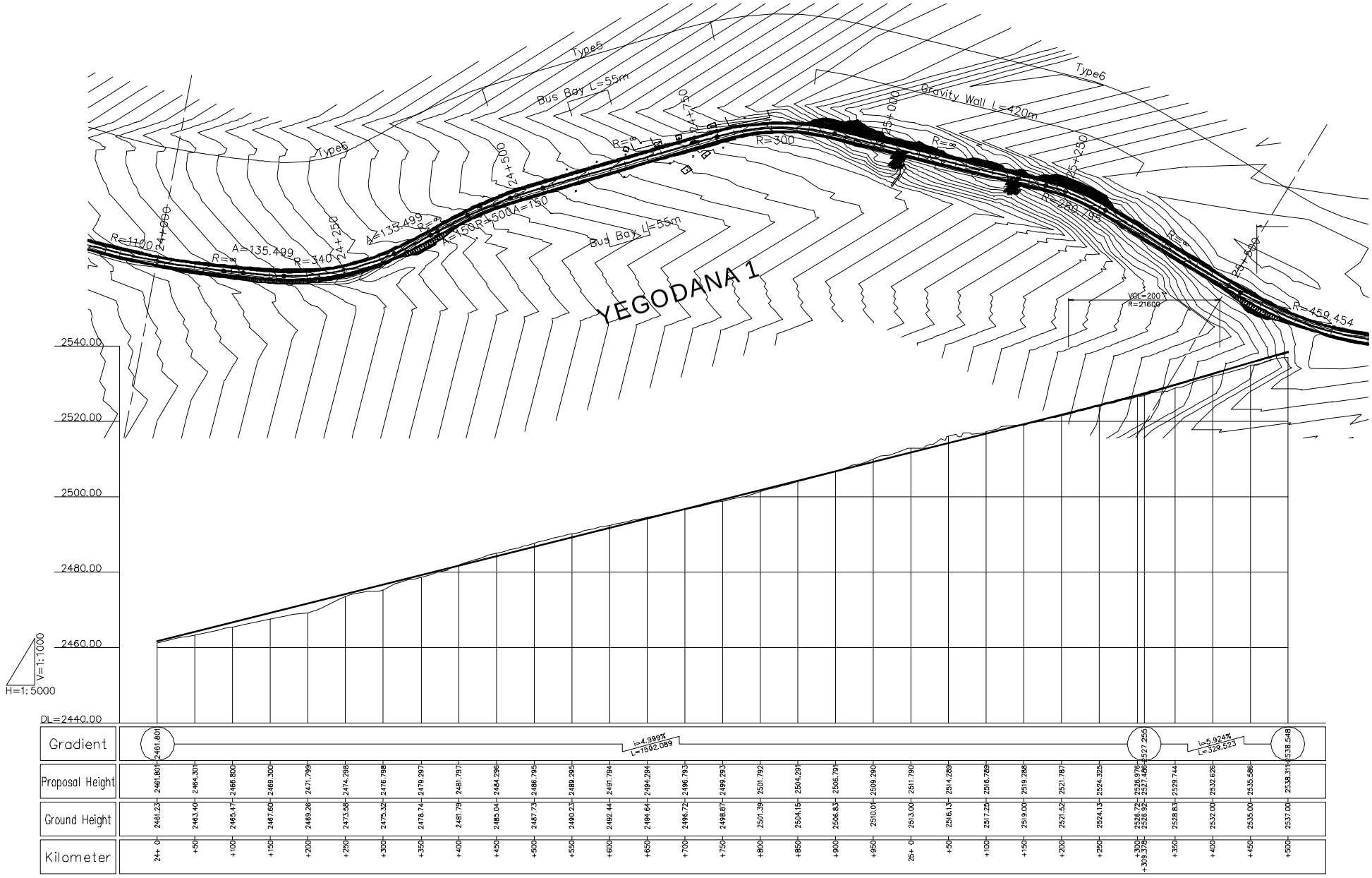

A-5-18

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (17/45)

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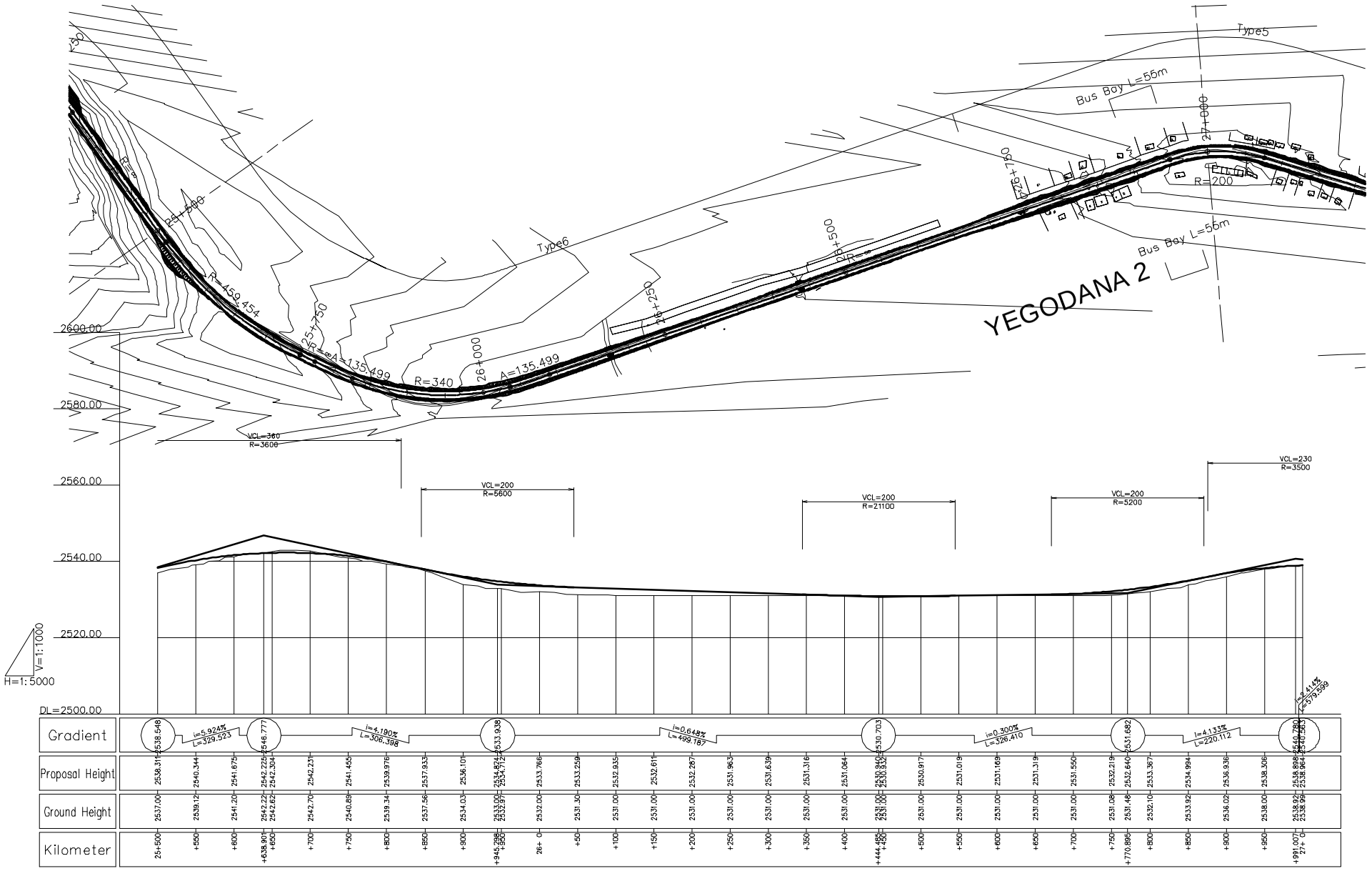

A-5-19

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (18/45)

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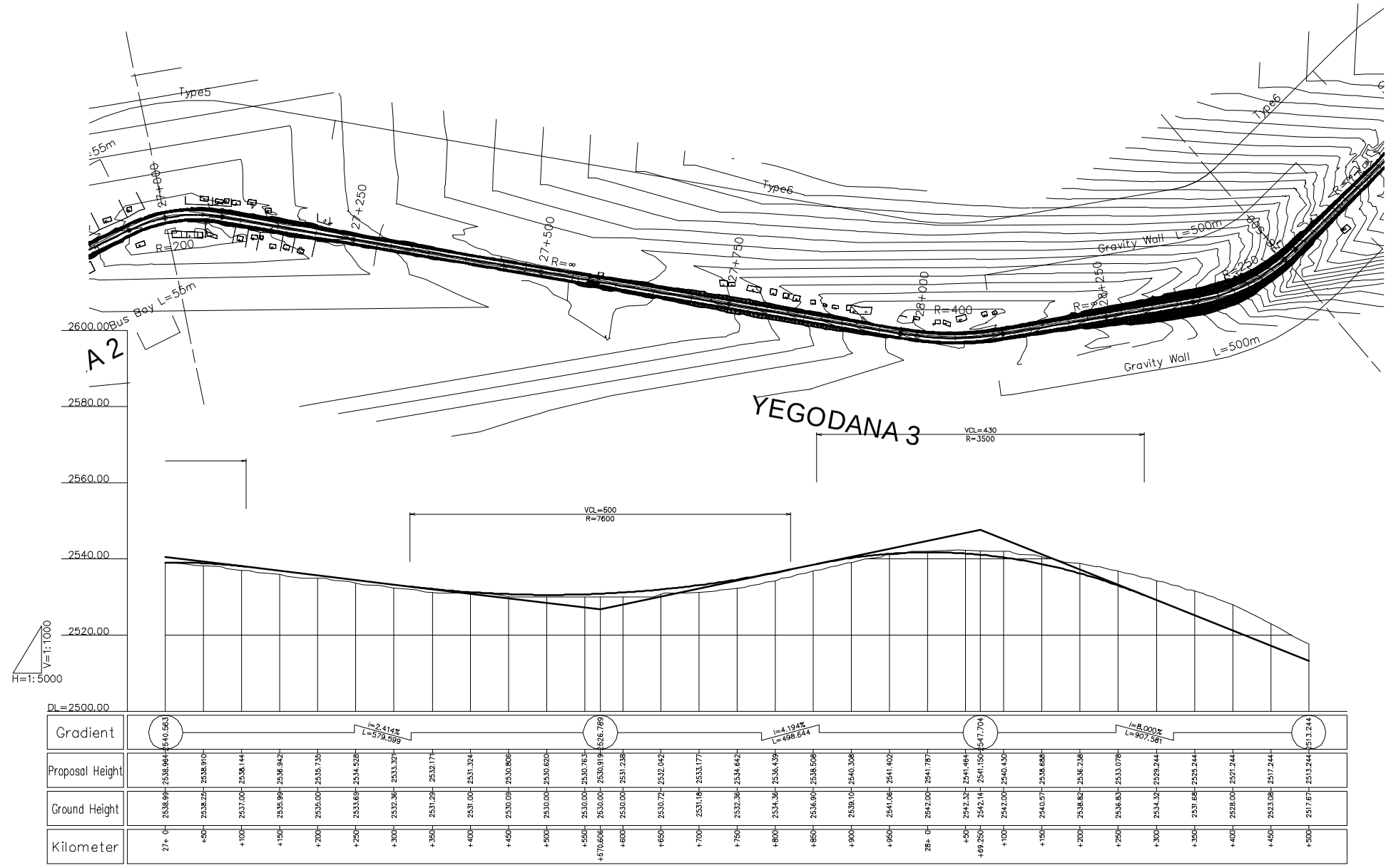

A-5-20

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (19/45)

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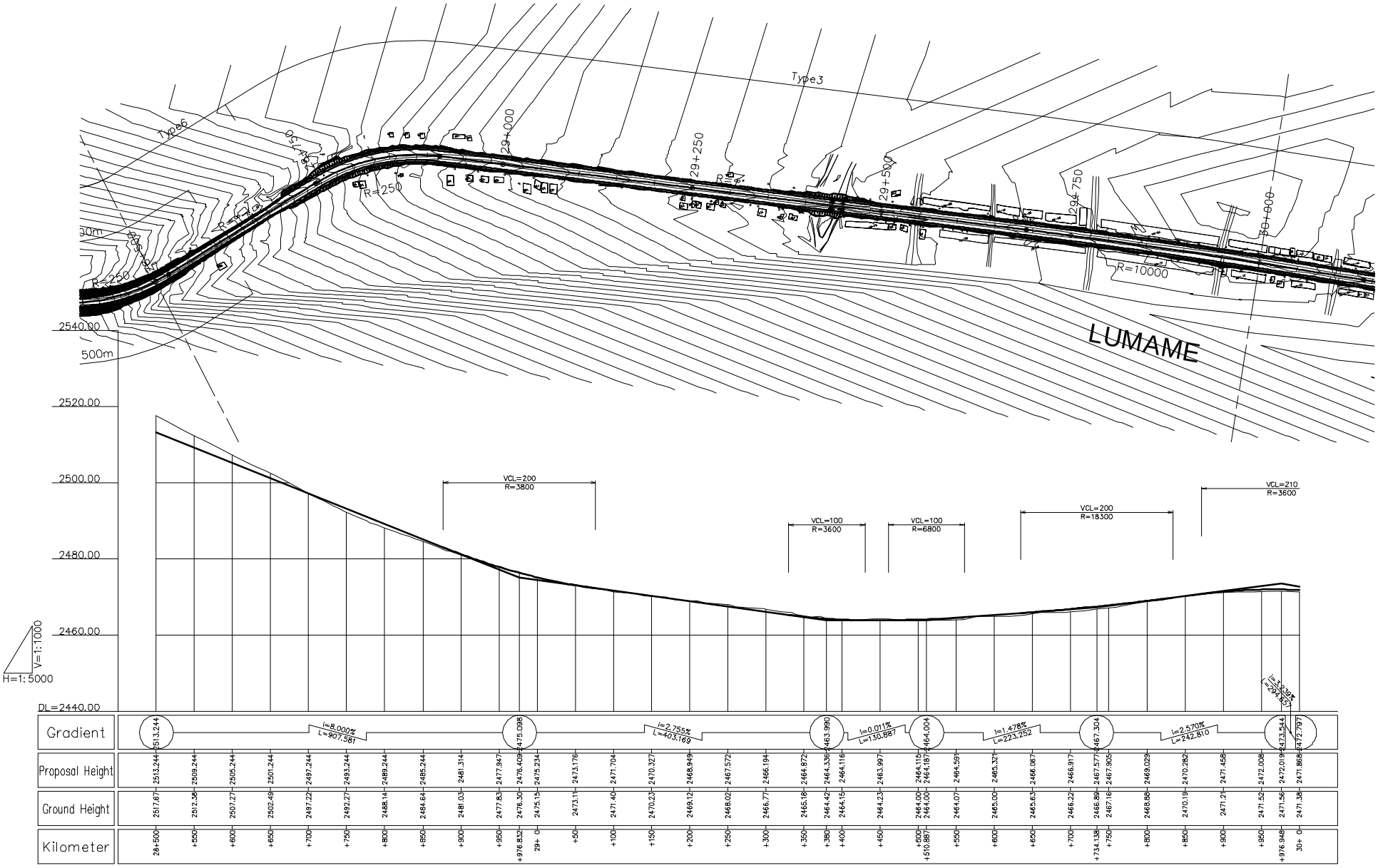

A-5-21

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (20/45)

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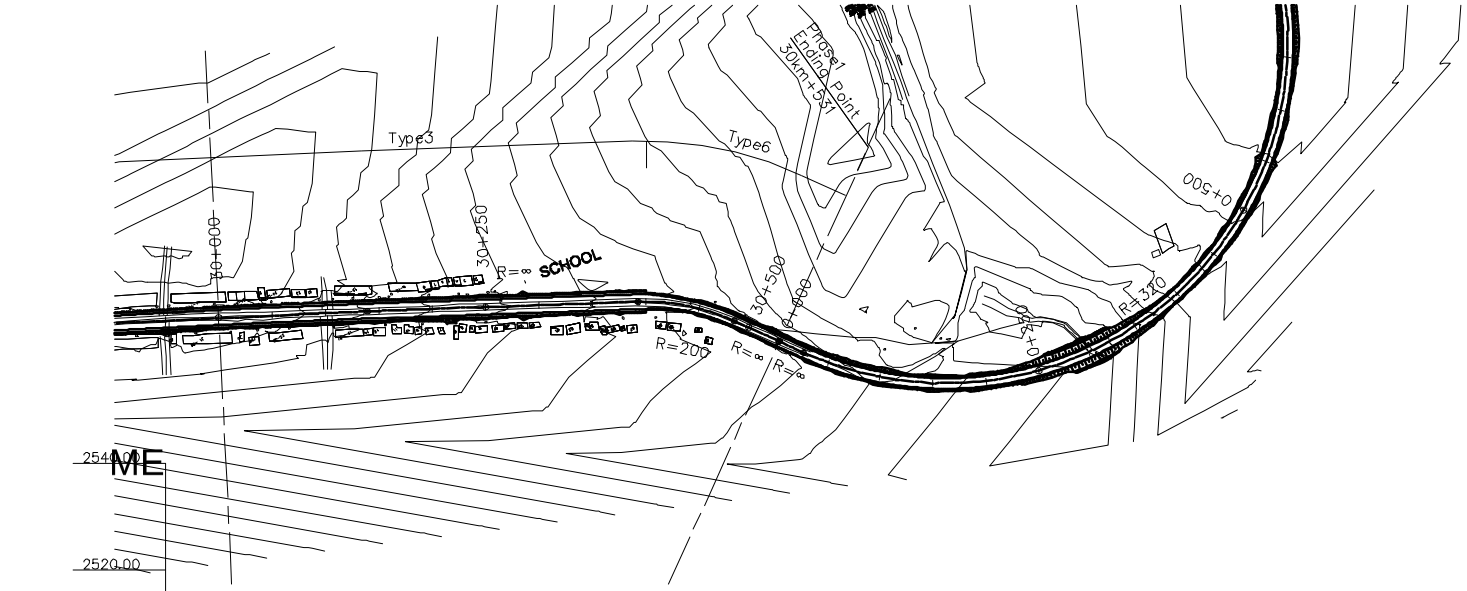

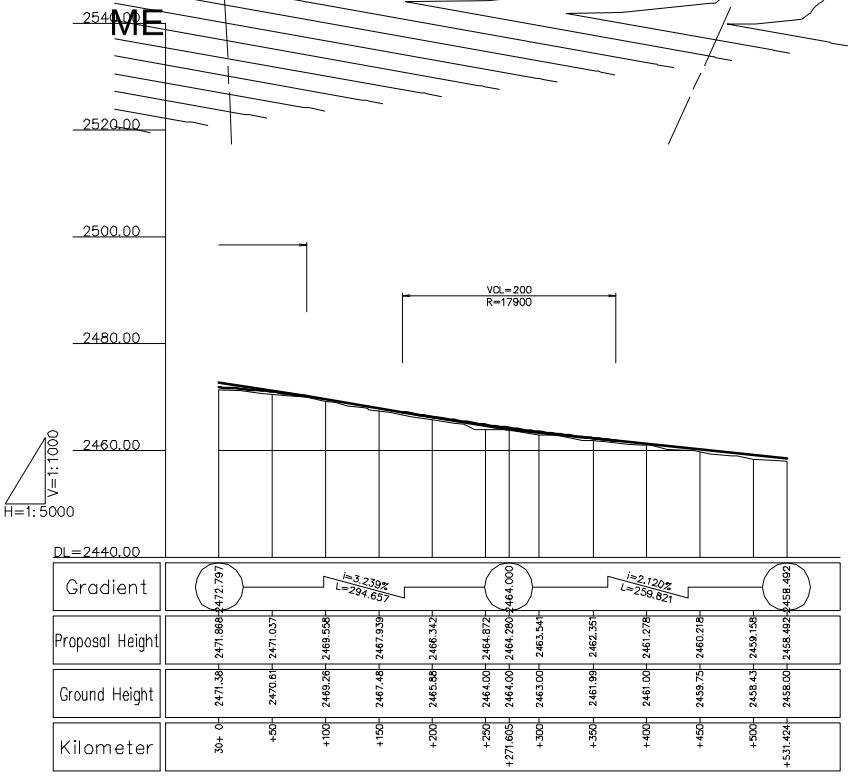

A-5-22

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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NAME			
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DATE			

DRAWING TITLE

Plan and Profile (21/45)

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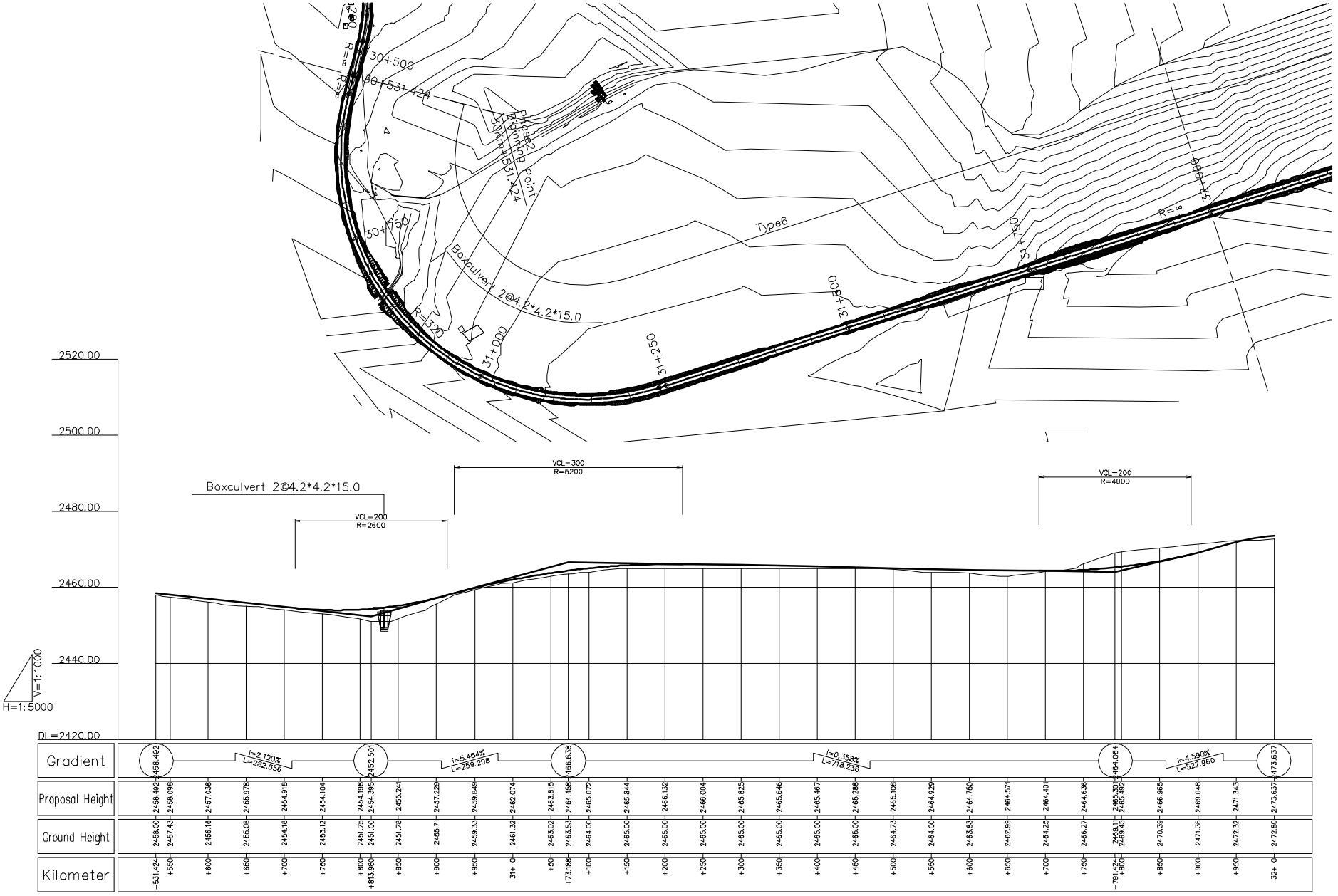

A-5-23

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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SIGNATURE			
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DRAWING TITLE

Plan and Profile (22/45)

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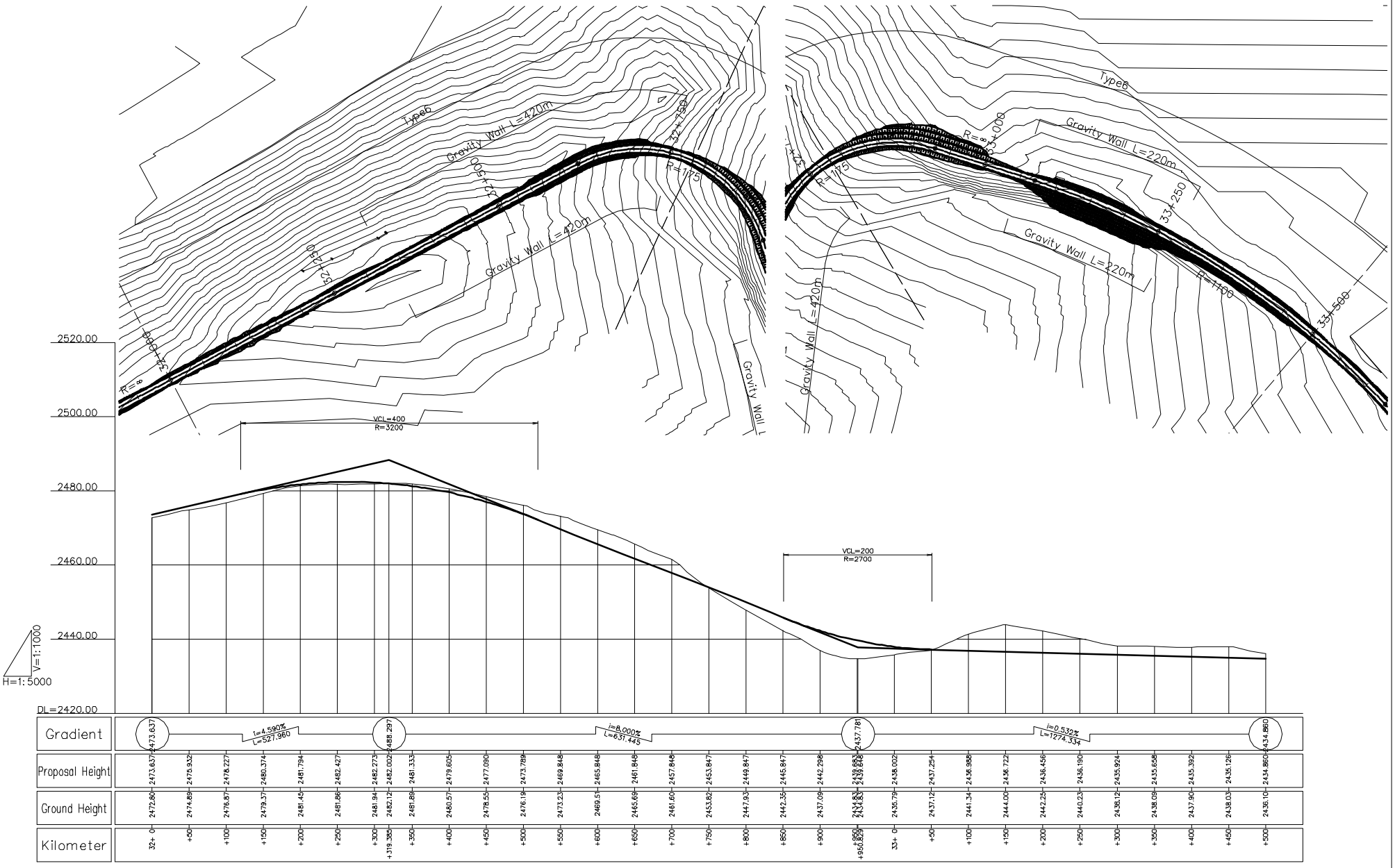

A-5-24

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (23/45)

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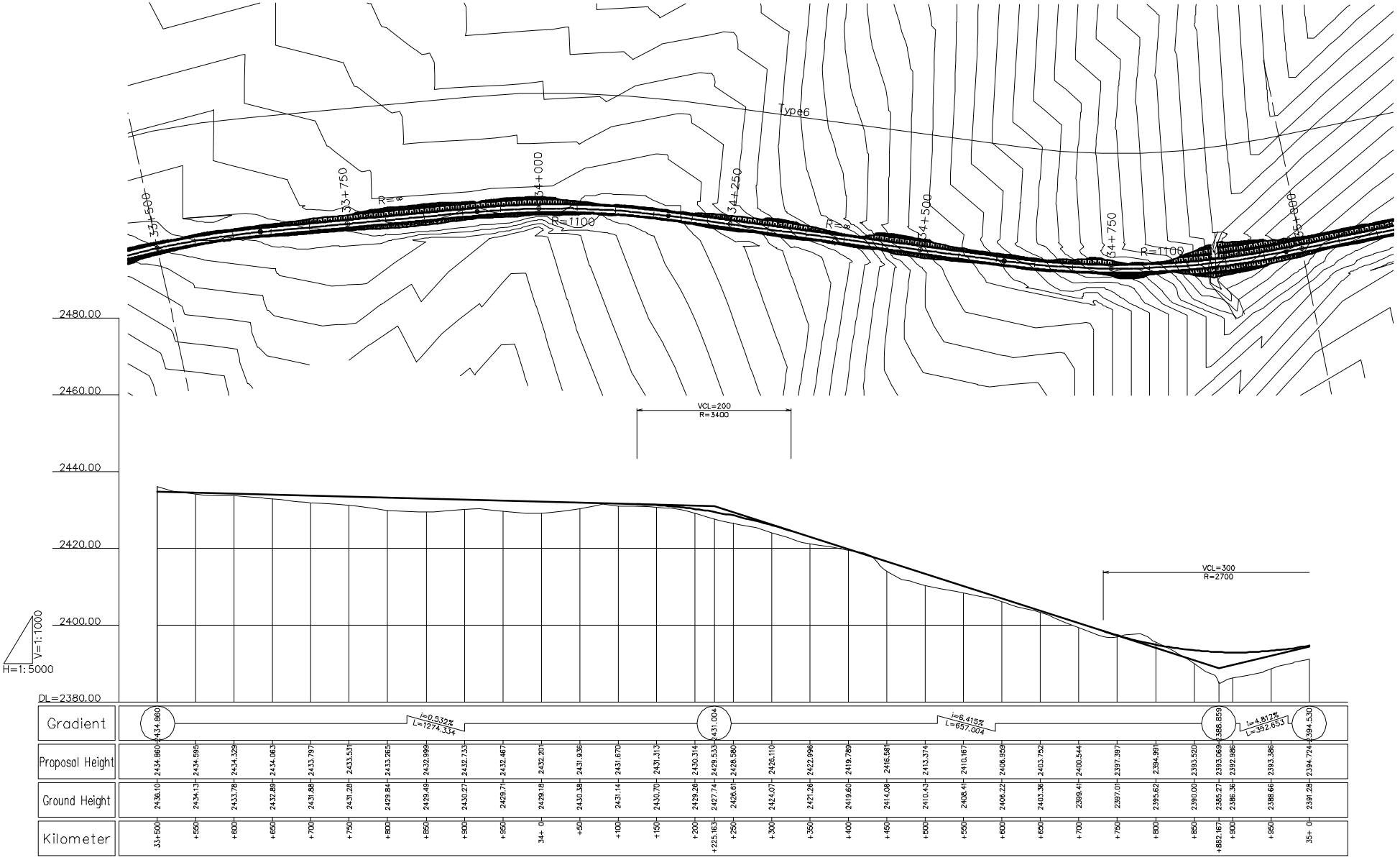

A-5-25

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (24/45)

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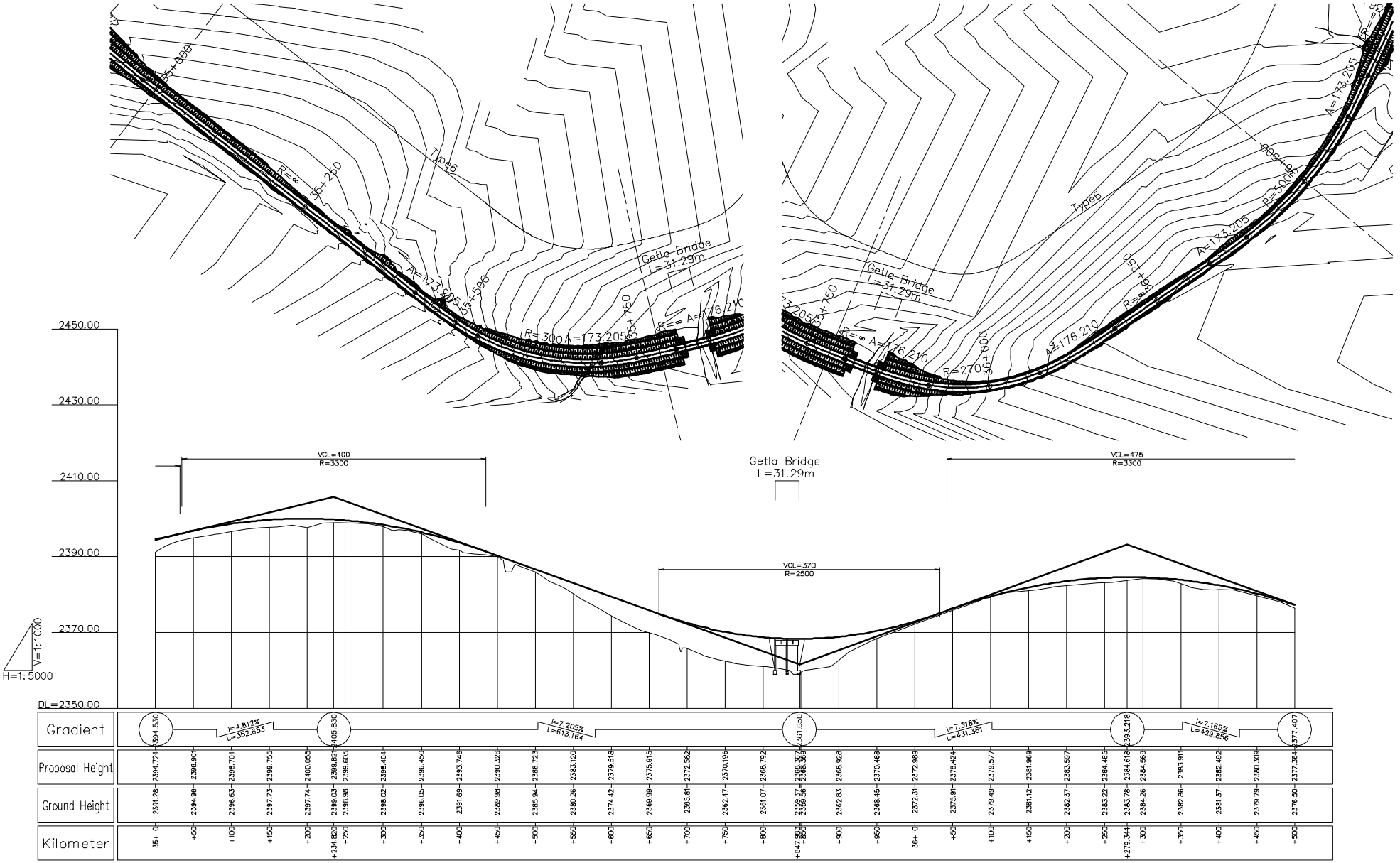

A-5-26

REMARKS:

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (25/45)

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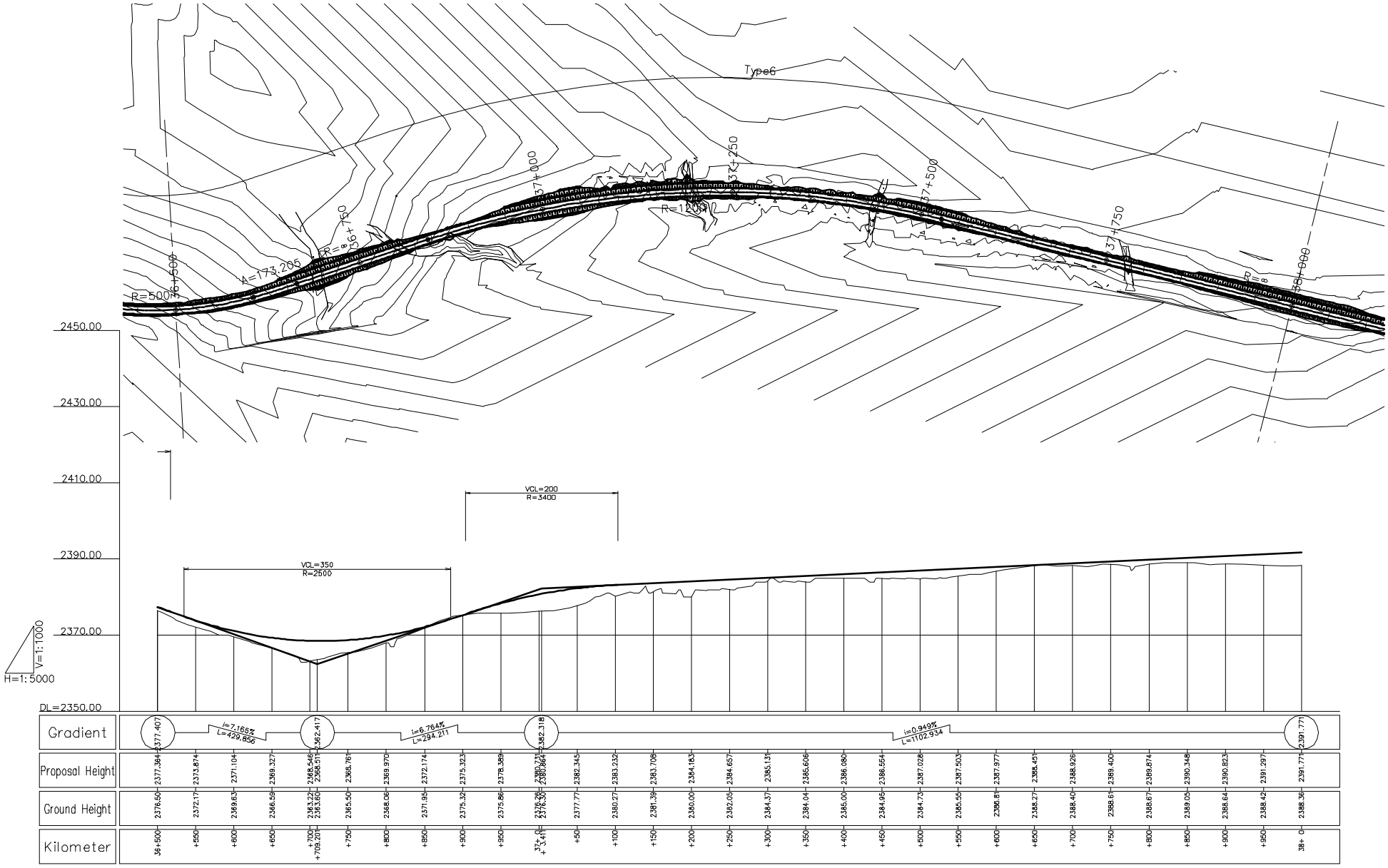

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (26/45)

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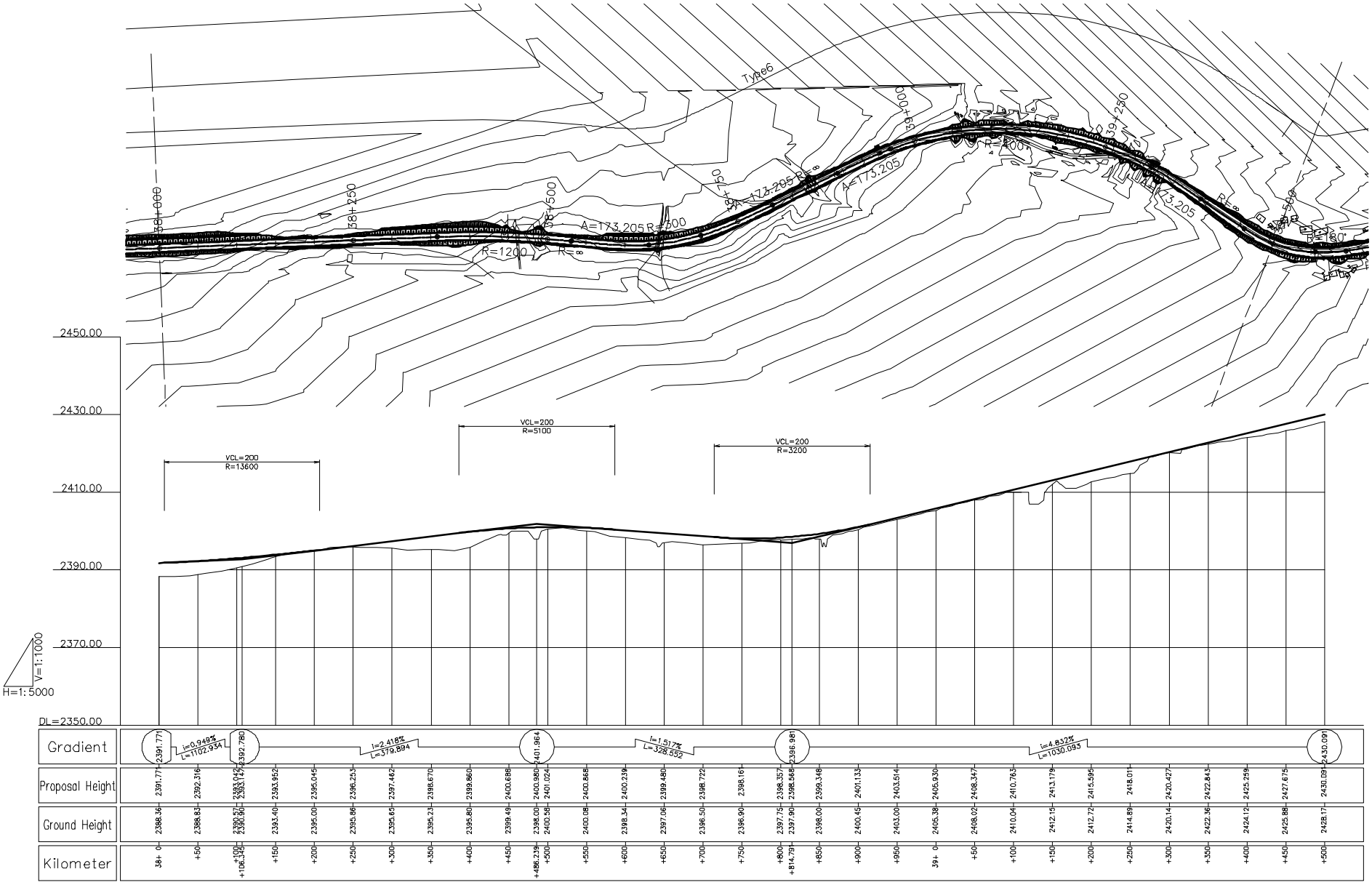

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (27/45)

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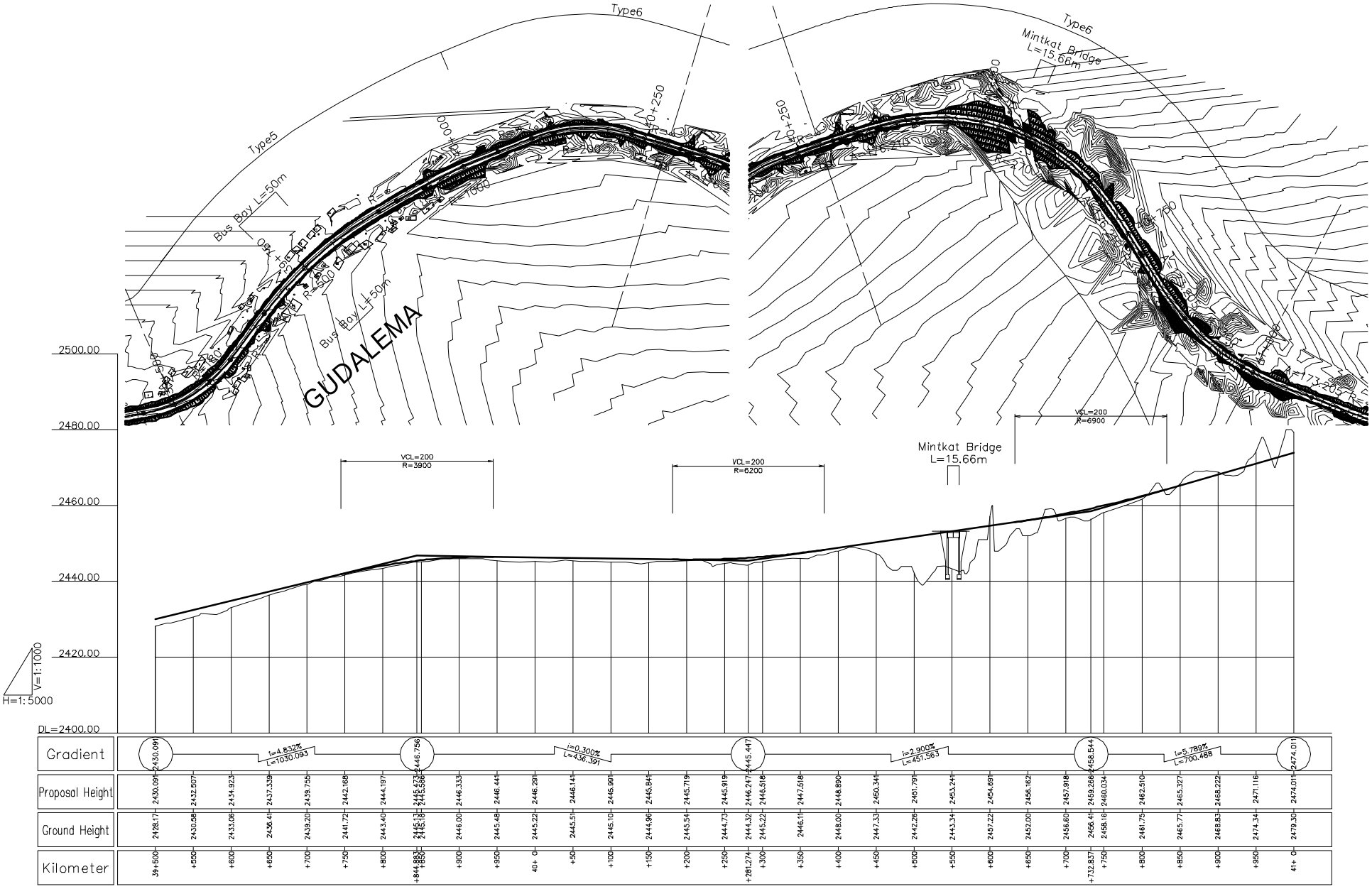

A-5-29

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (28/45)

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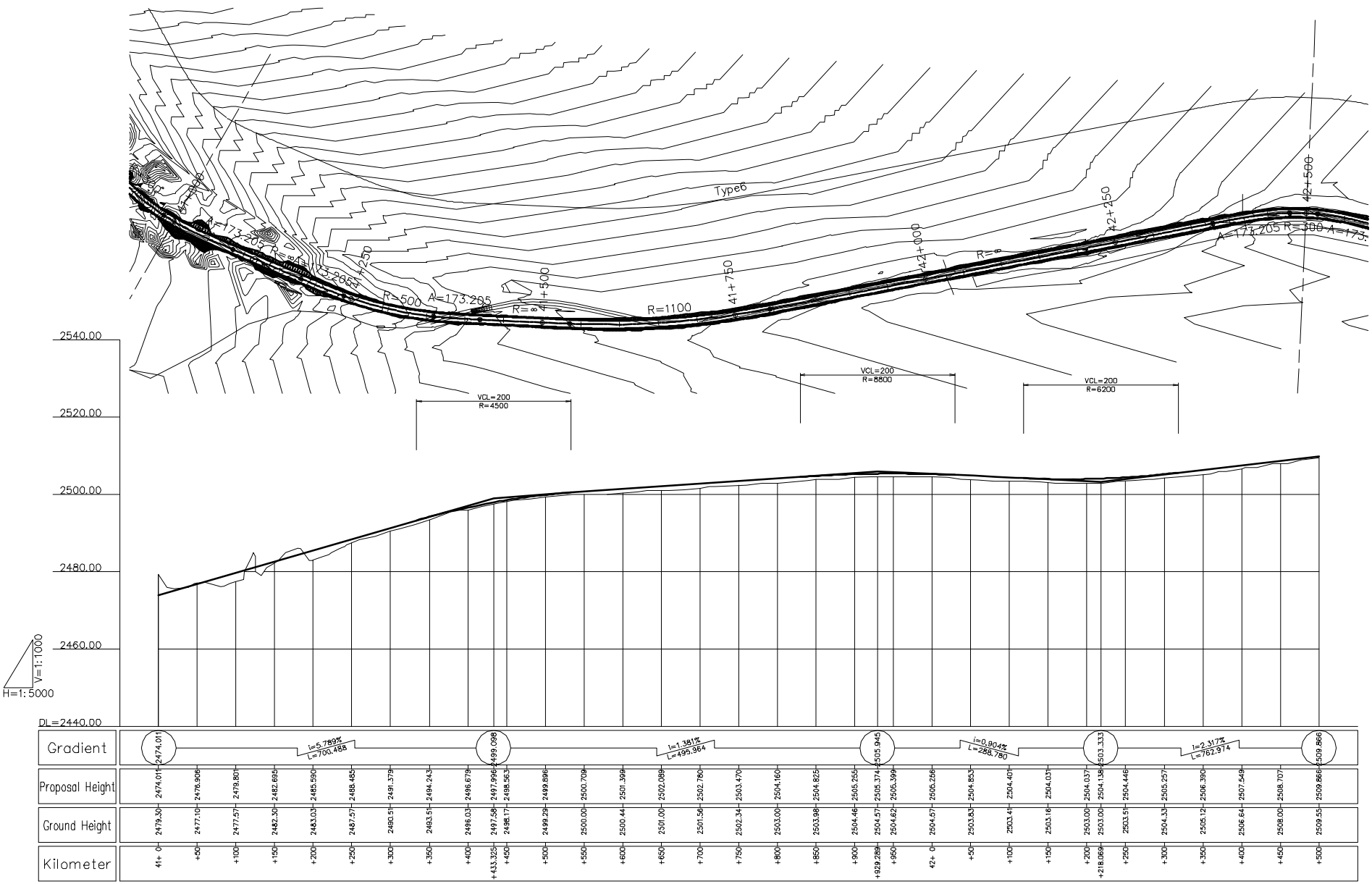

A-5-30

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (29/45)

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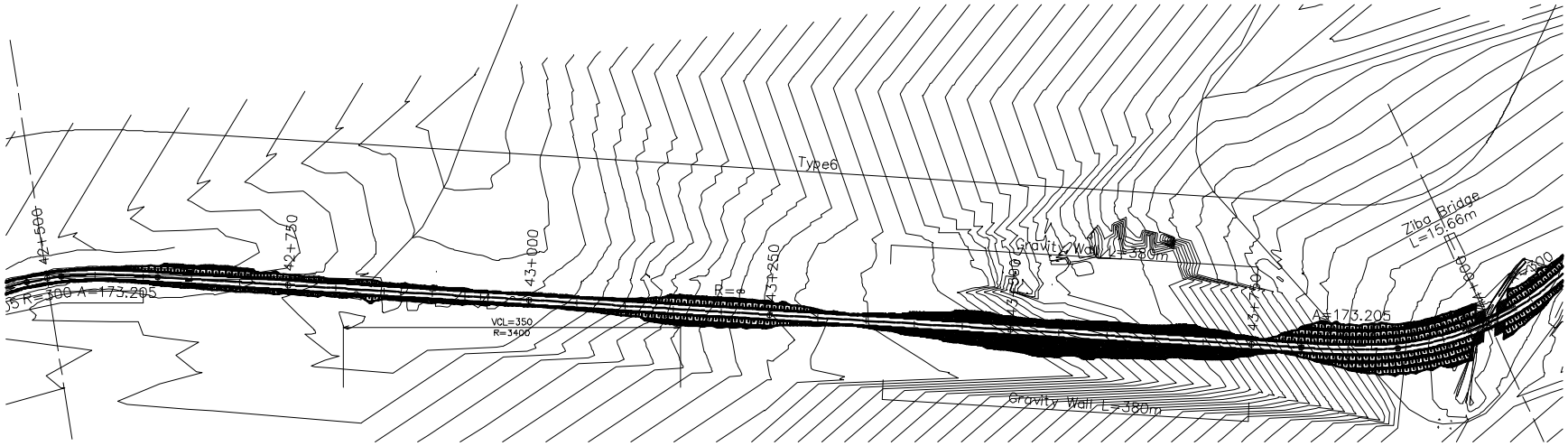

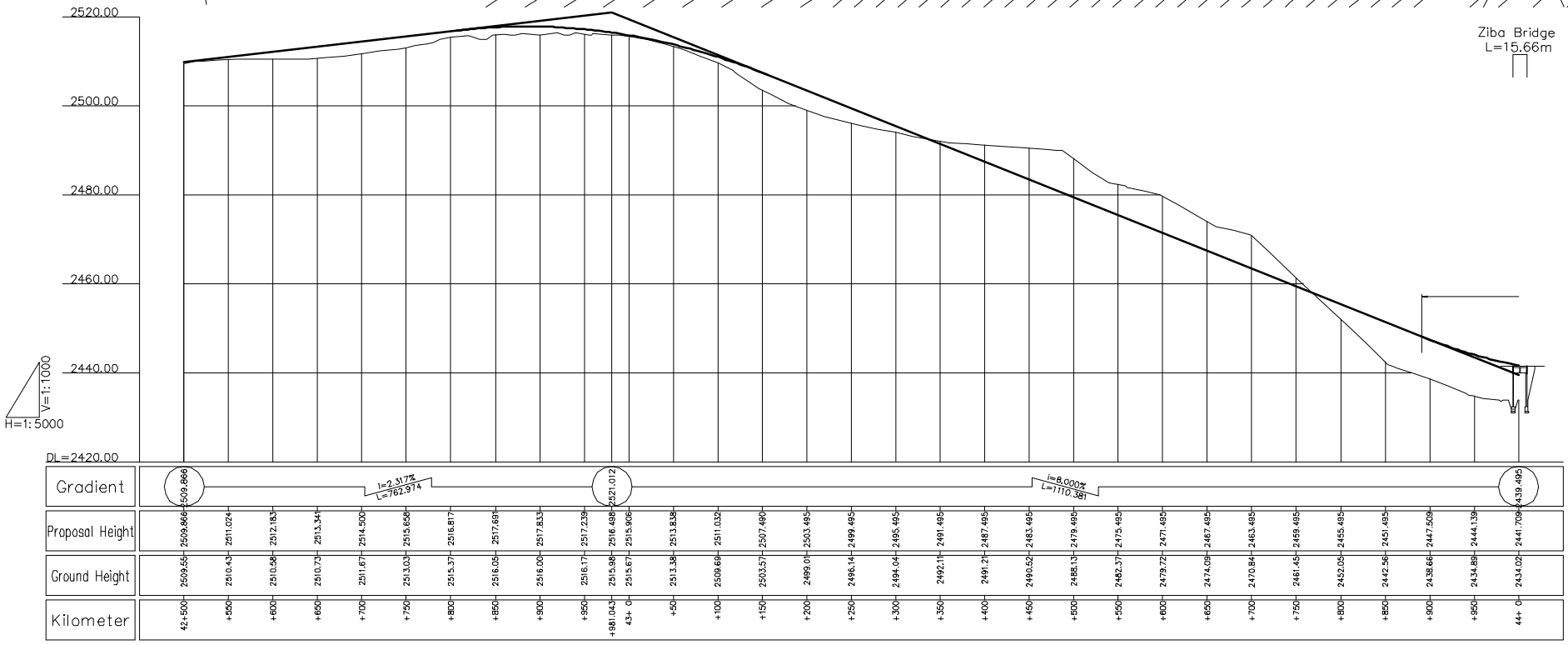

A-5-31

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (30/45)

	PREPARED BY	CHECKED BY	APPROVED BY	SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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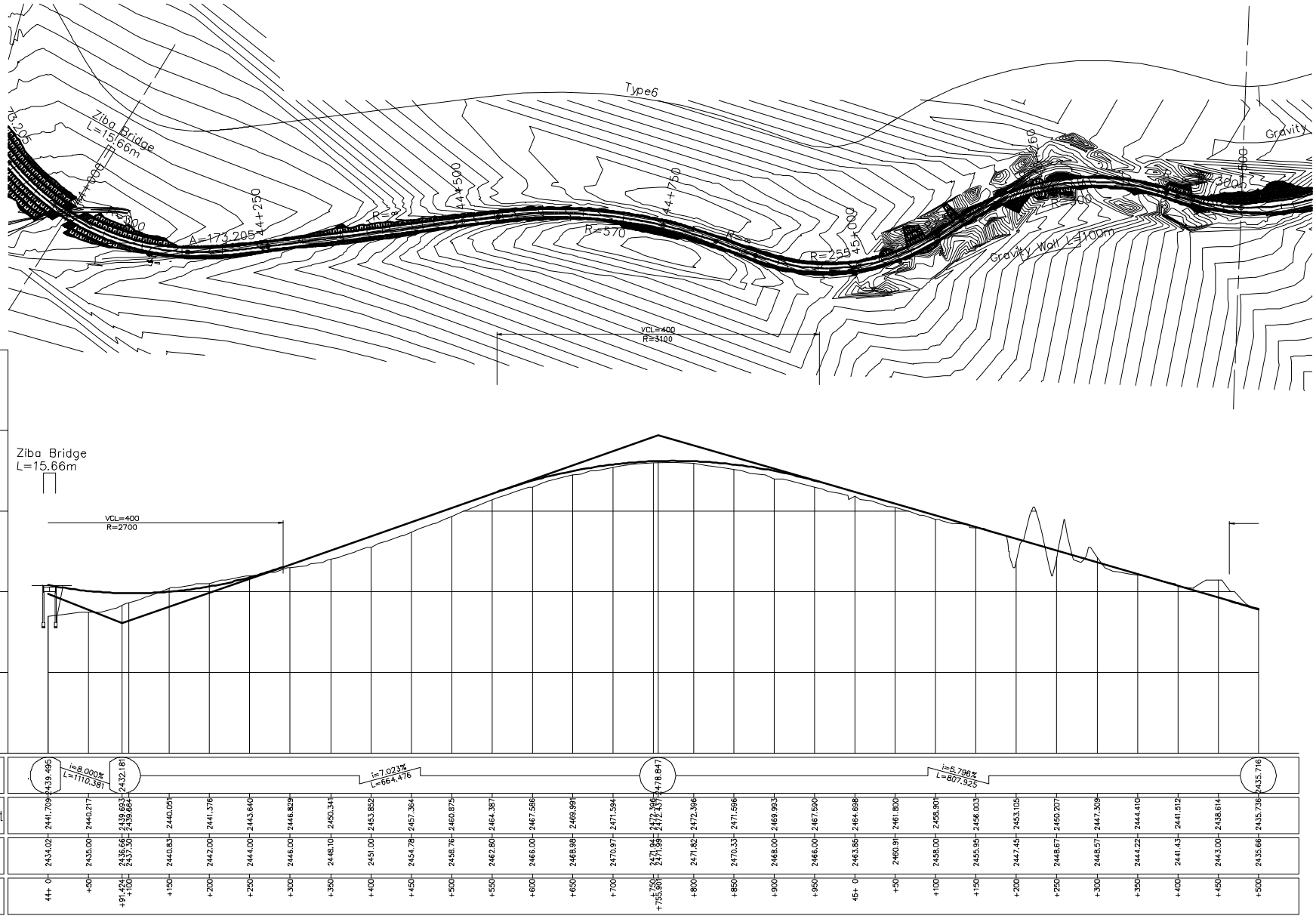

A-5-32

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:
ETHIOPIAN ROADS AUTHORITY	

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (31/45)

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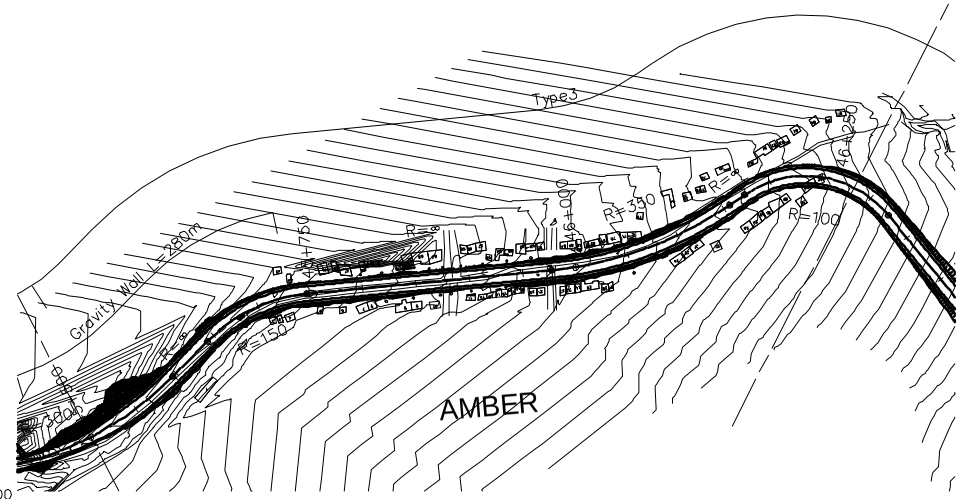

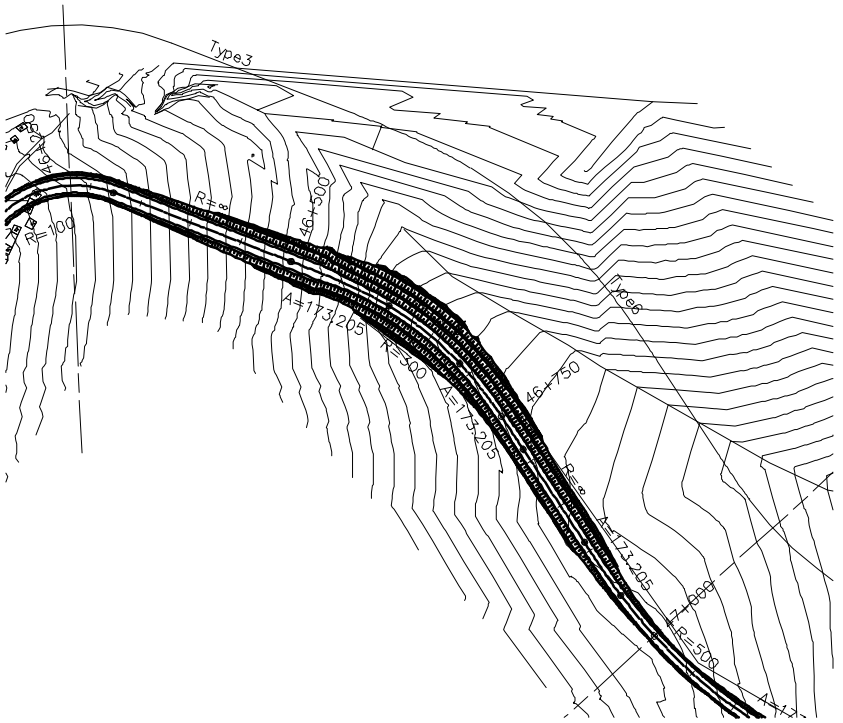

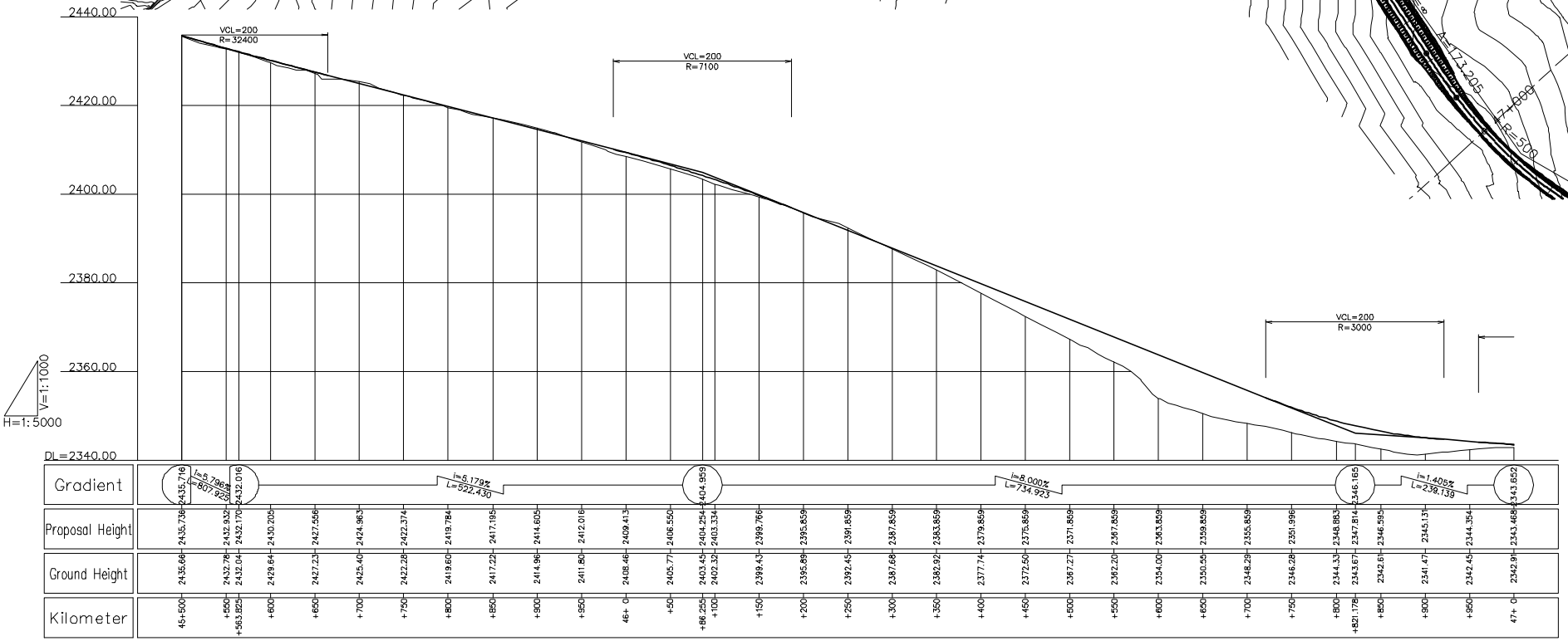

A-5-33

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (32/45)

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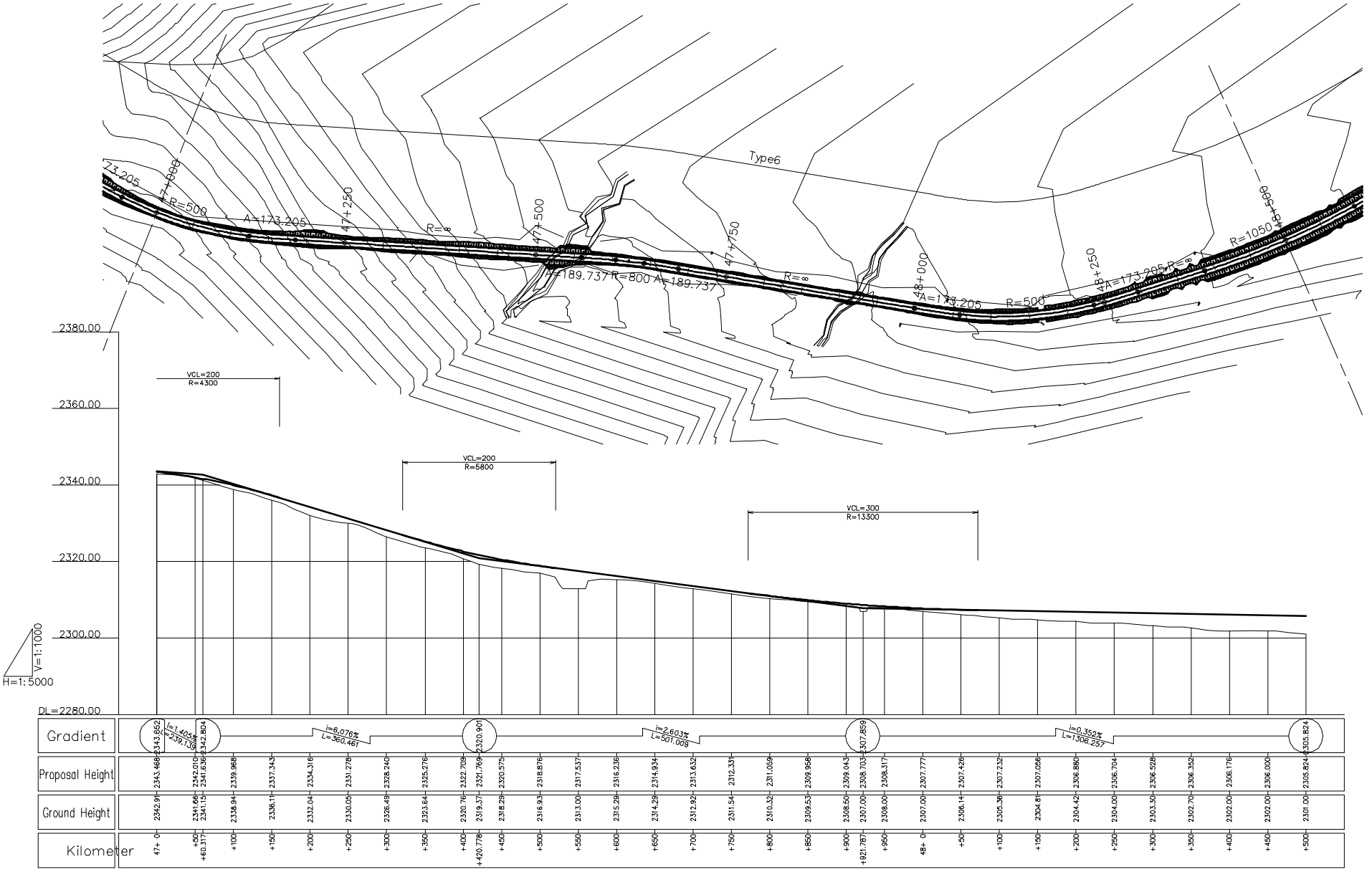

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (33/45)

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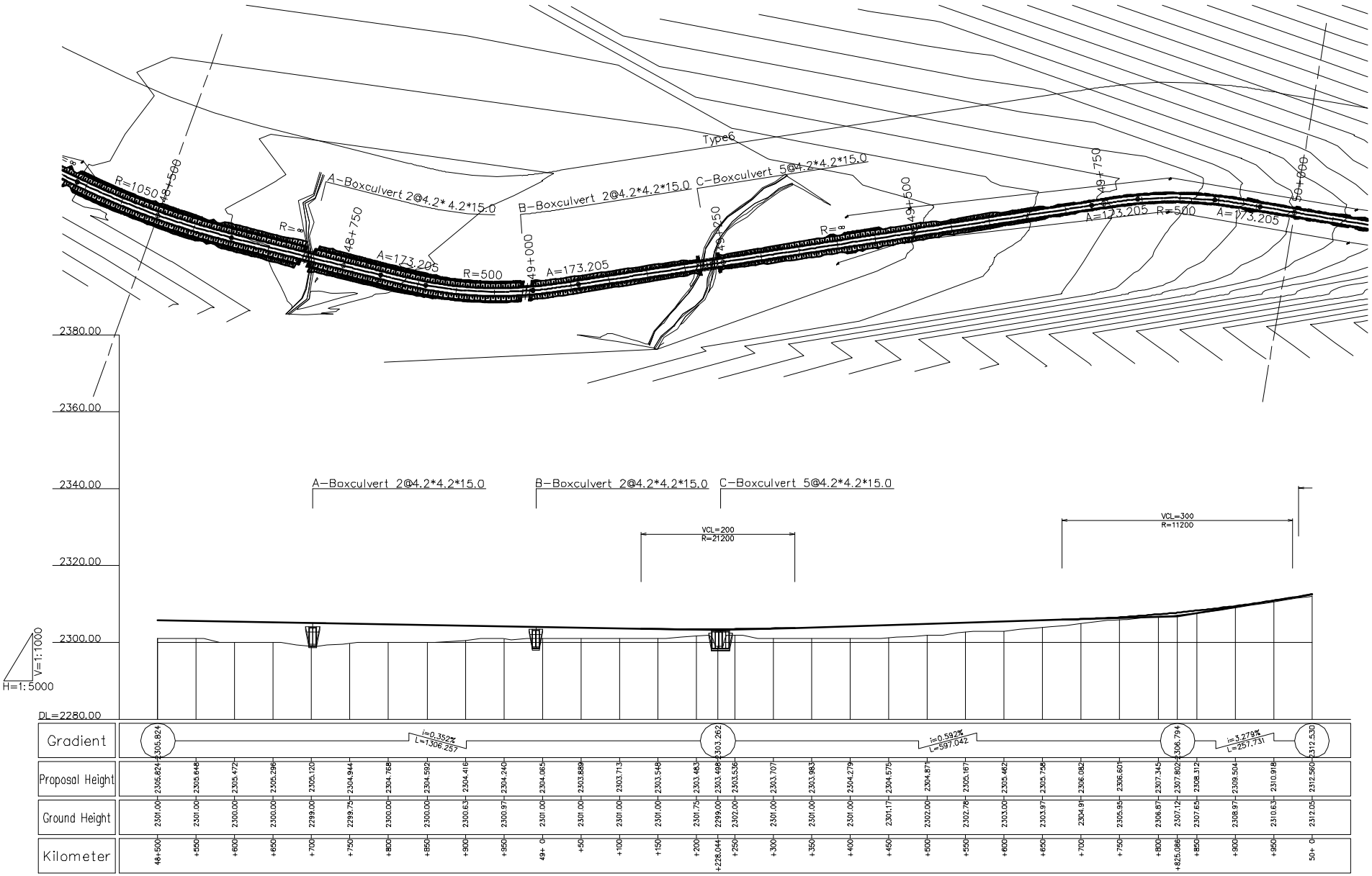

A-5-35

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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SIGNATURE			
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DRAWING TITLE

Plan and Profile (34/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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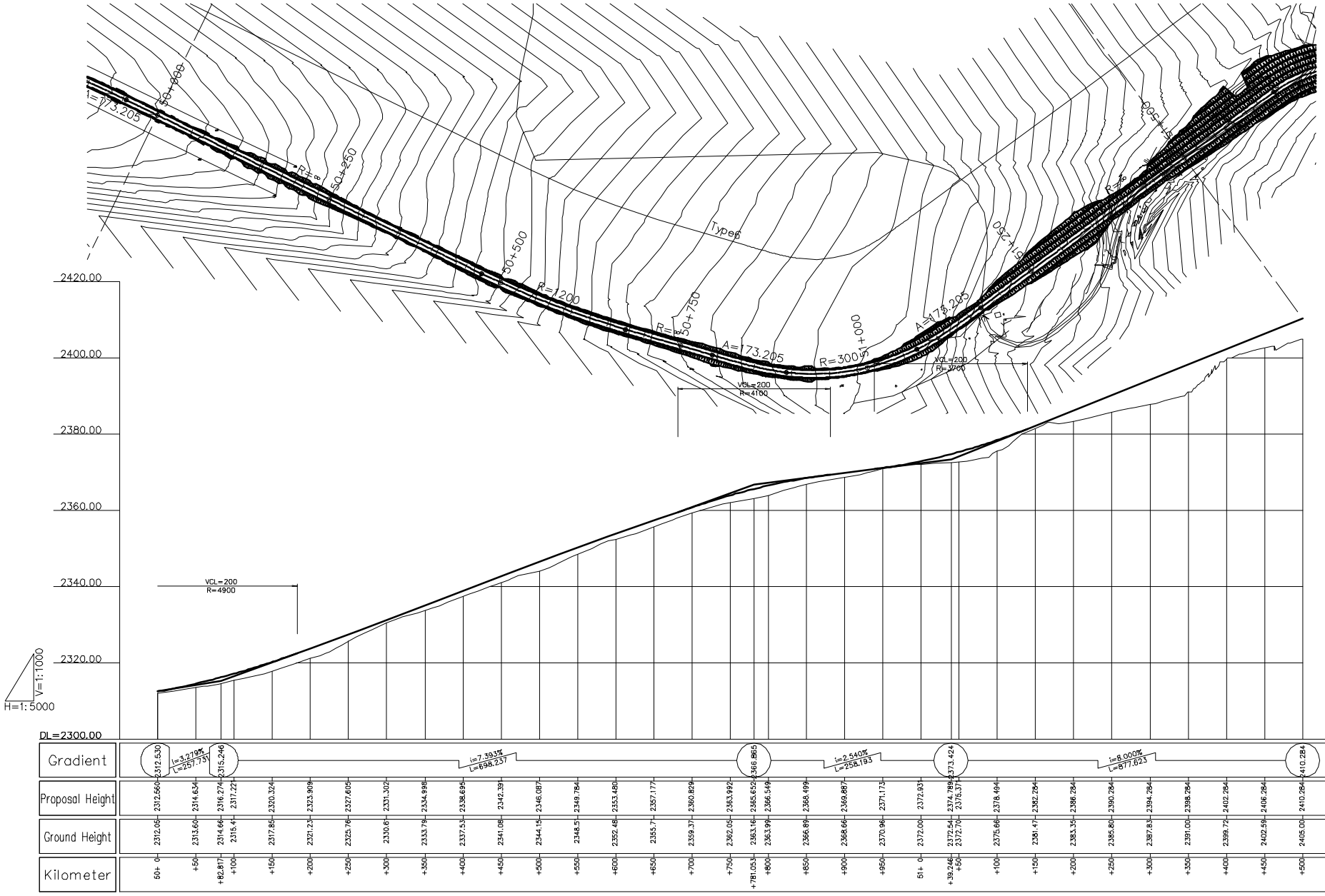

A-5-36

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

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Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (35/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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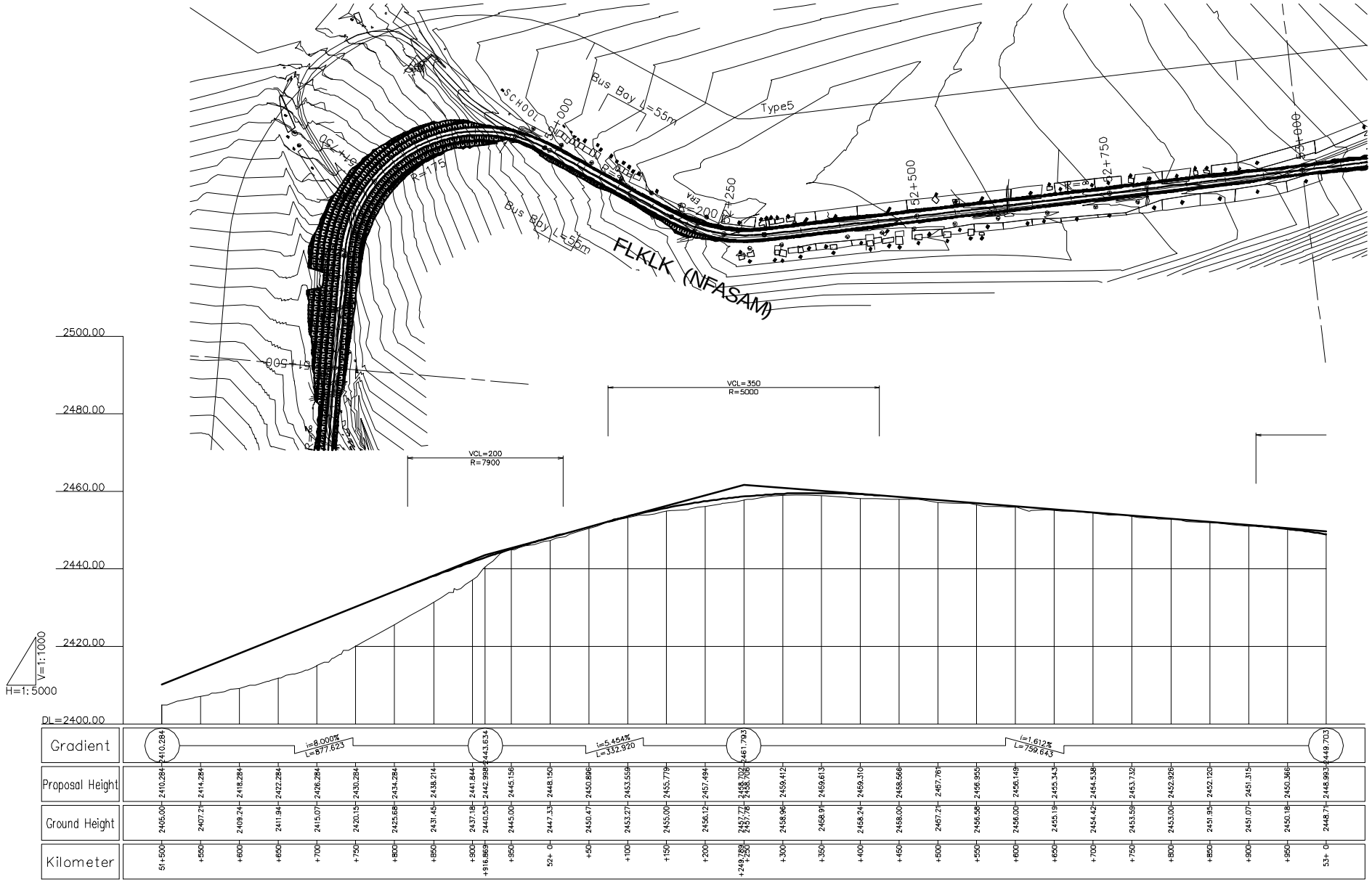

A-5-37

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (36/45)

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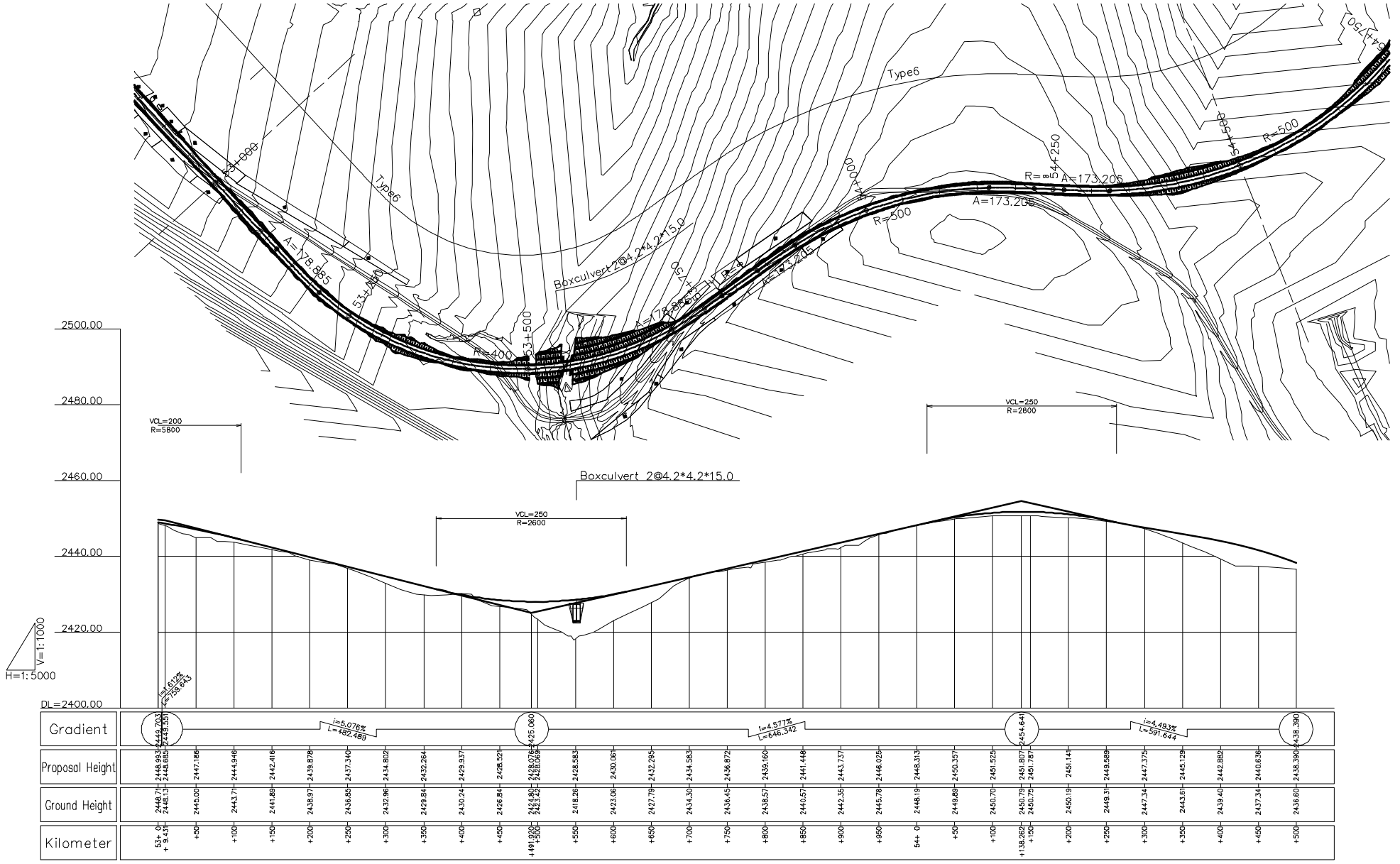

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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SIGNATURE			
DATE			

DRAWING TITLE

Plan and Profile (37/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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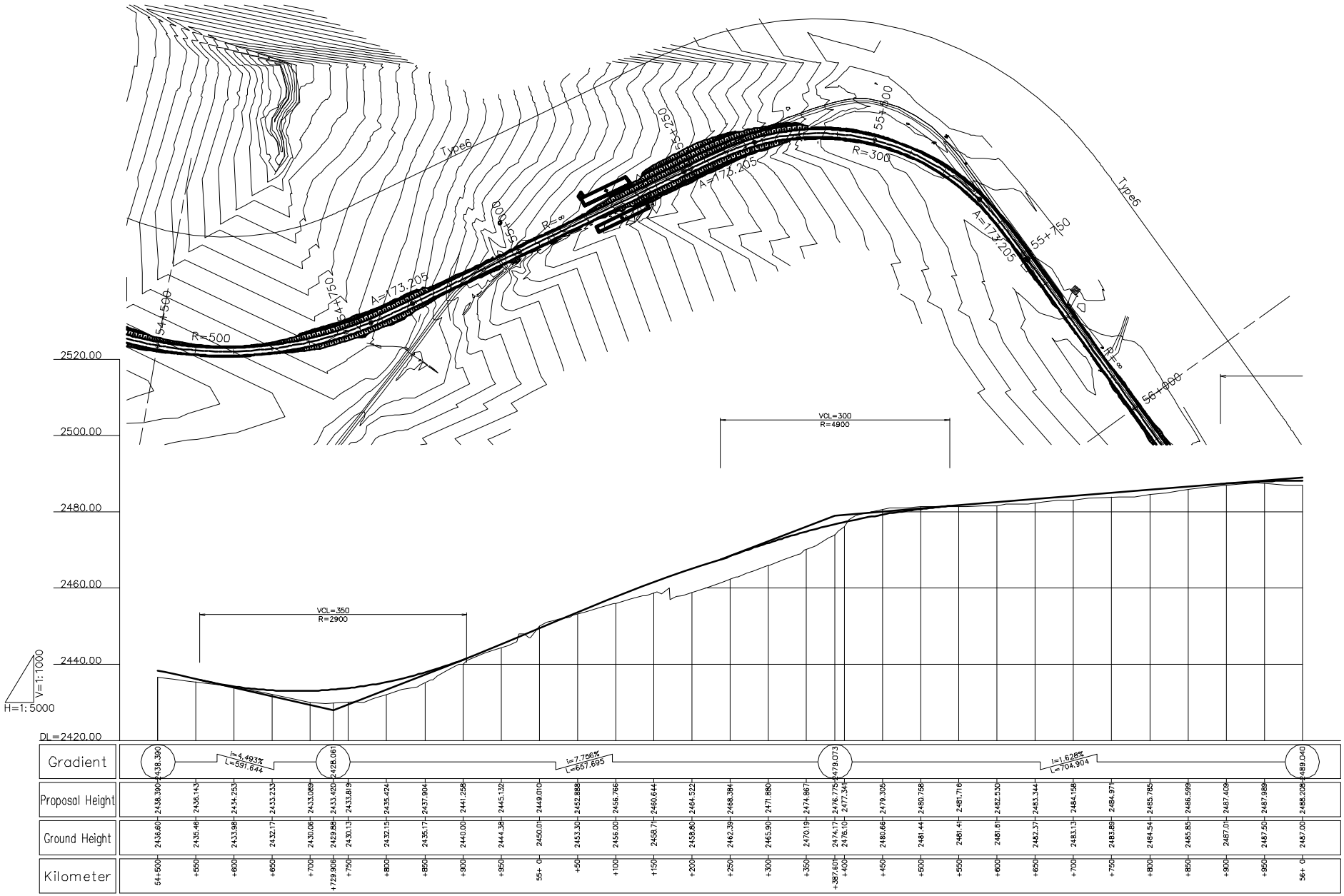

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (38/45)

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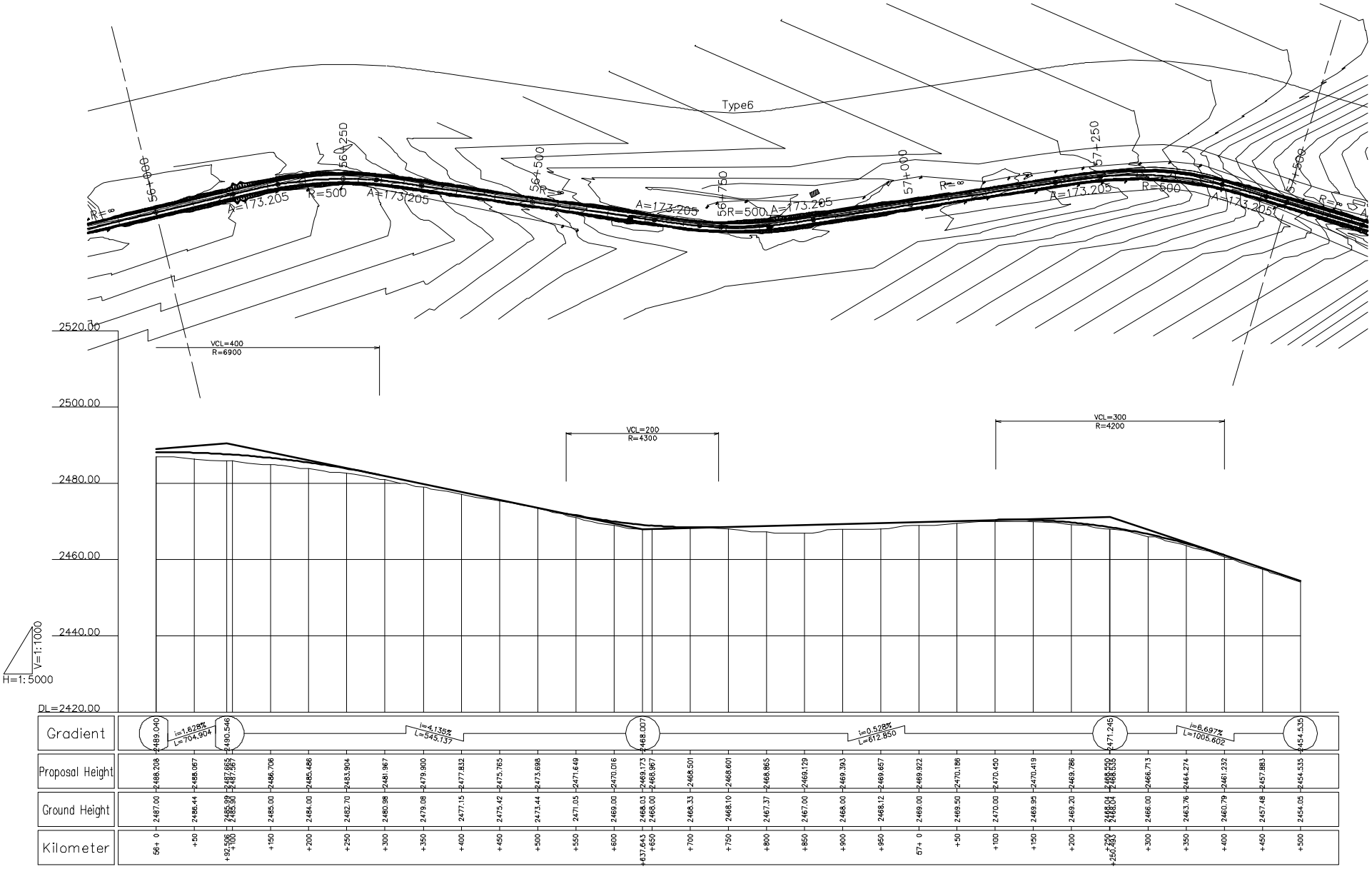

A-5-40

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (39/45)

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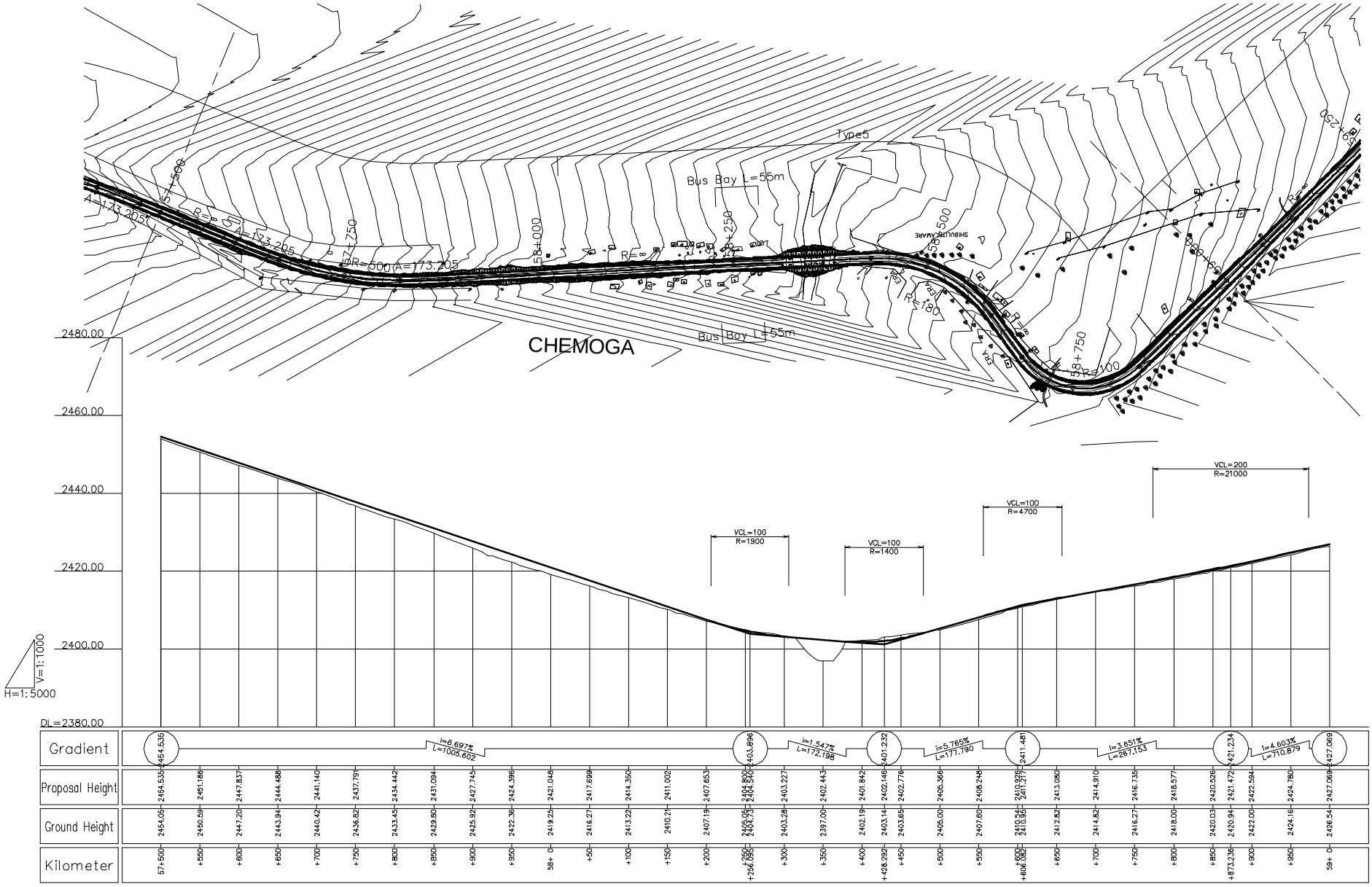

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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SIGNATURE			
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DRAWING TITLE

Plan and Profile (40/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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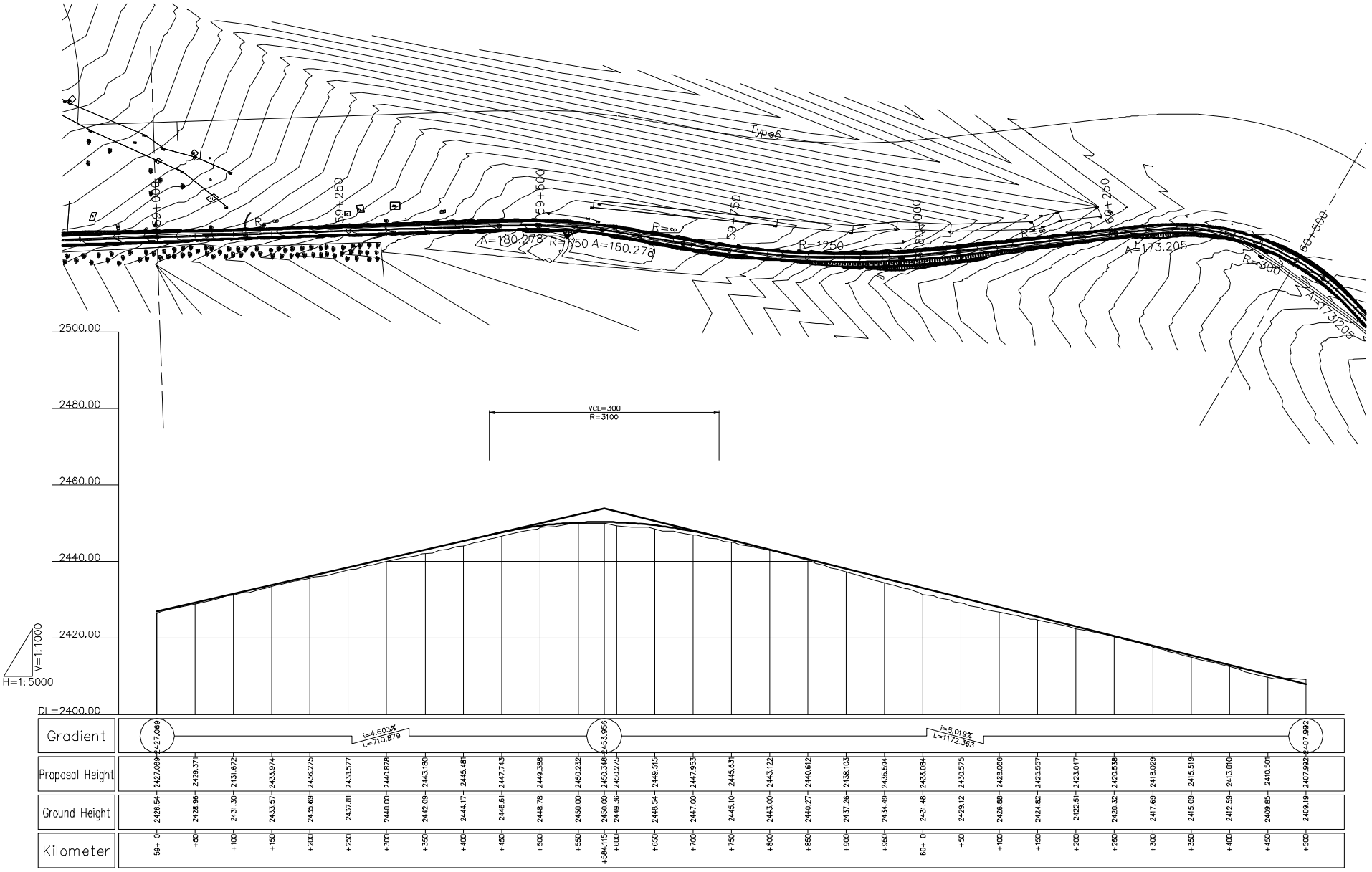

A-5-42

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (41/45)

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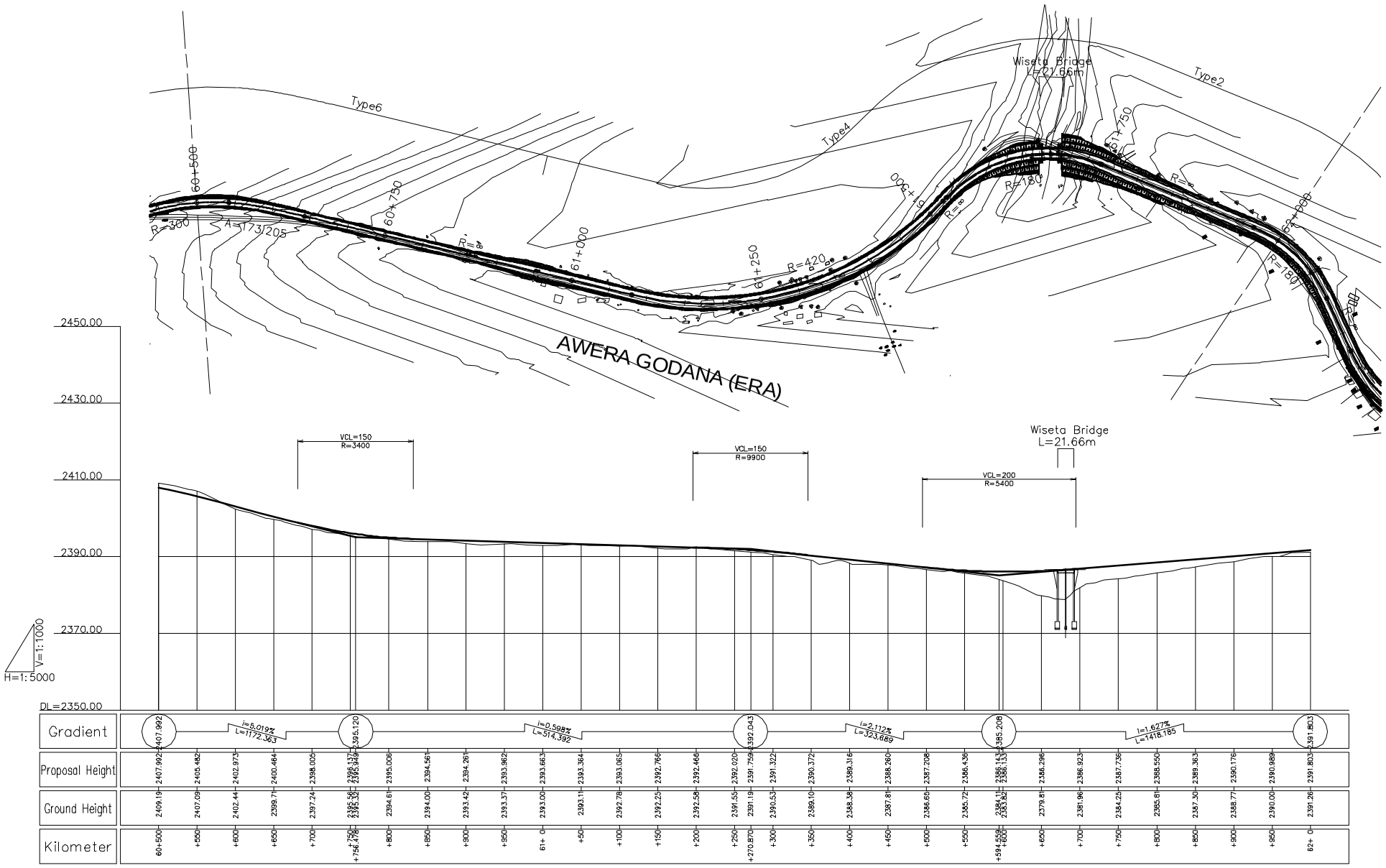

A-5-43

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
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SIGNATURE			
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DRAWING TITLE

Plan and Profile (42/45)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
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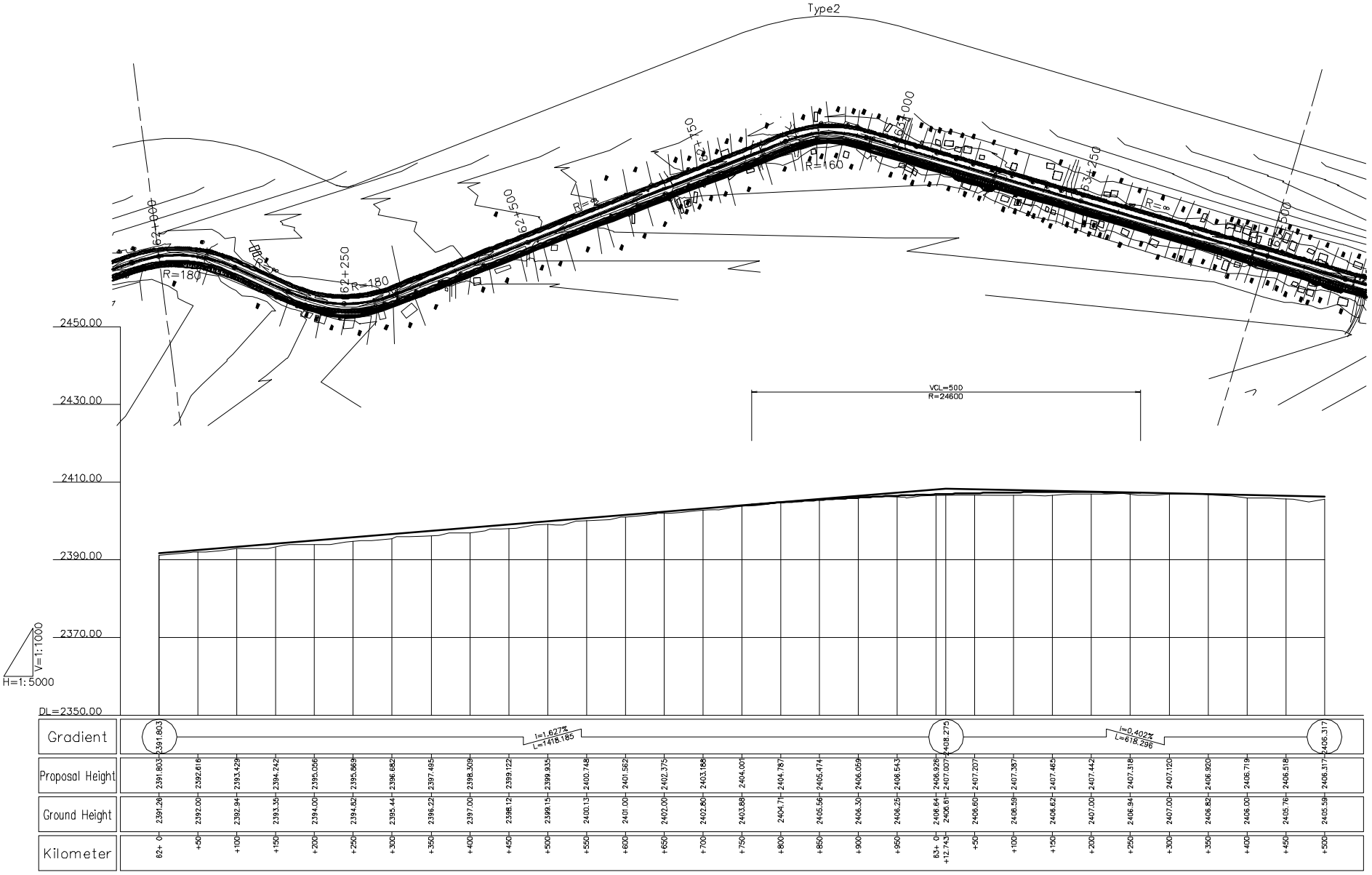

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia			
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Plan and Profile (43/45)		
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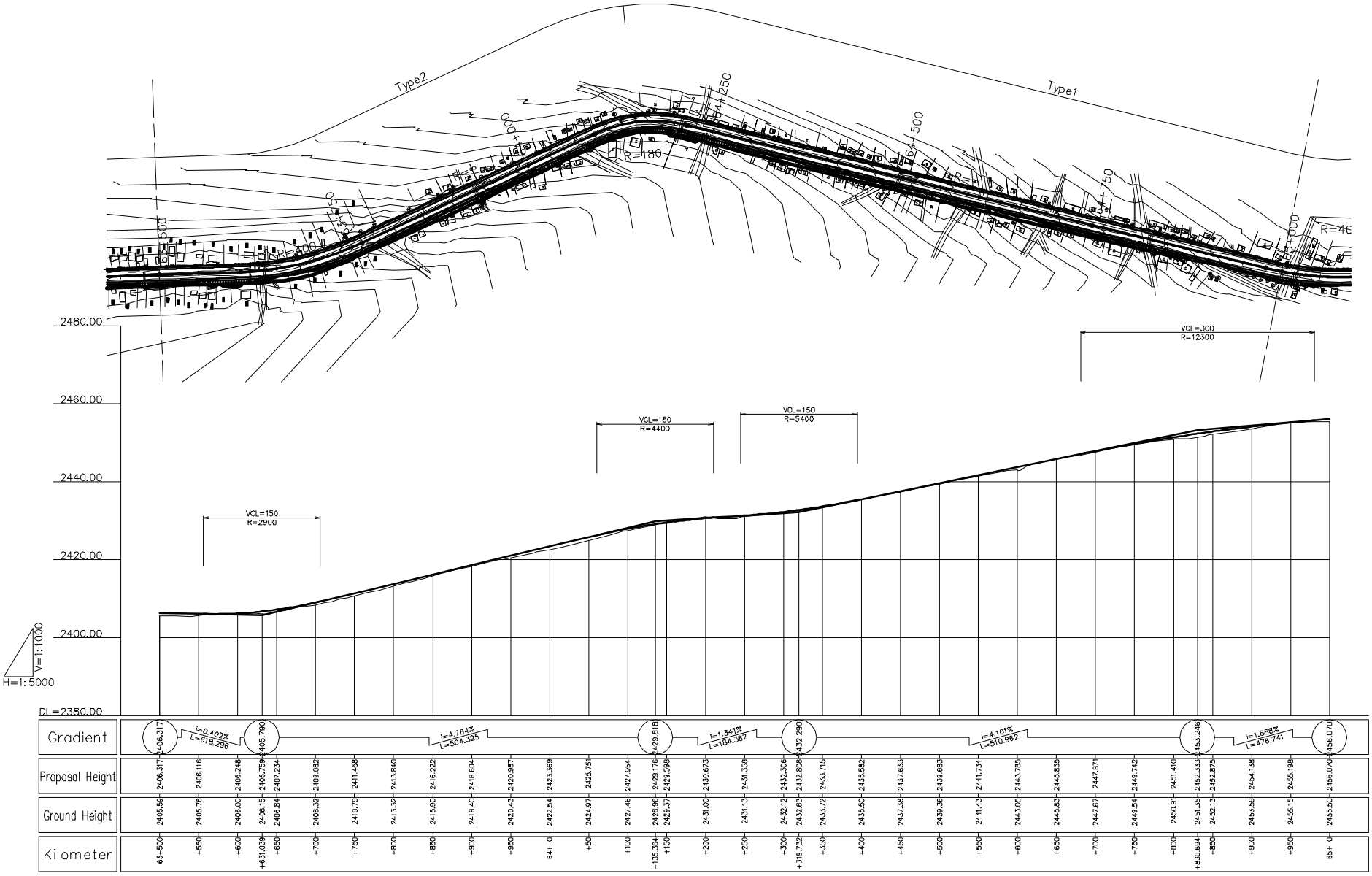

A-5-45

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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DRAWING TITLE

Plan and Profile (44/45)

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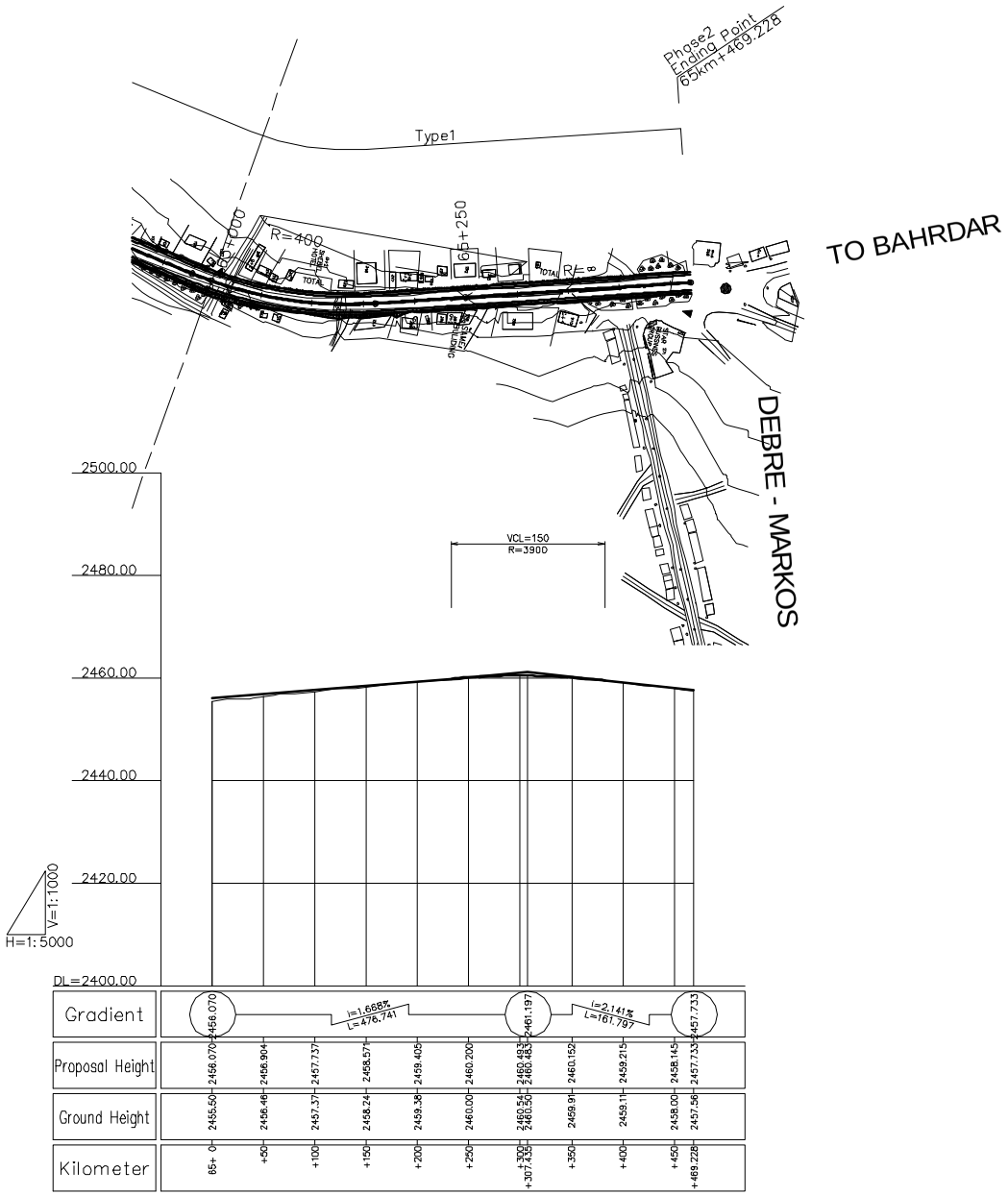

A-5-46

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

DRAWING TITLE: Plan and Profile (45/45)

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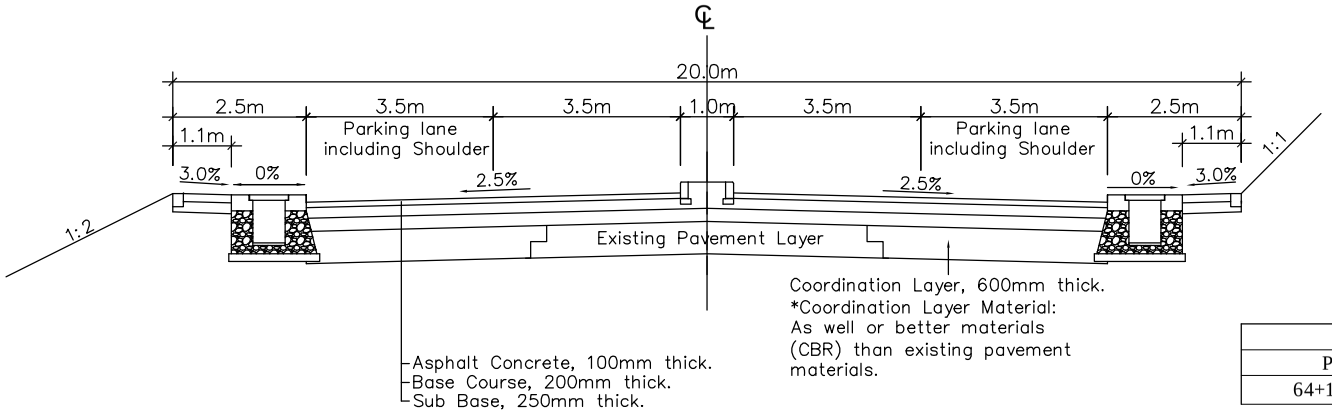
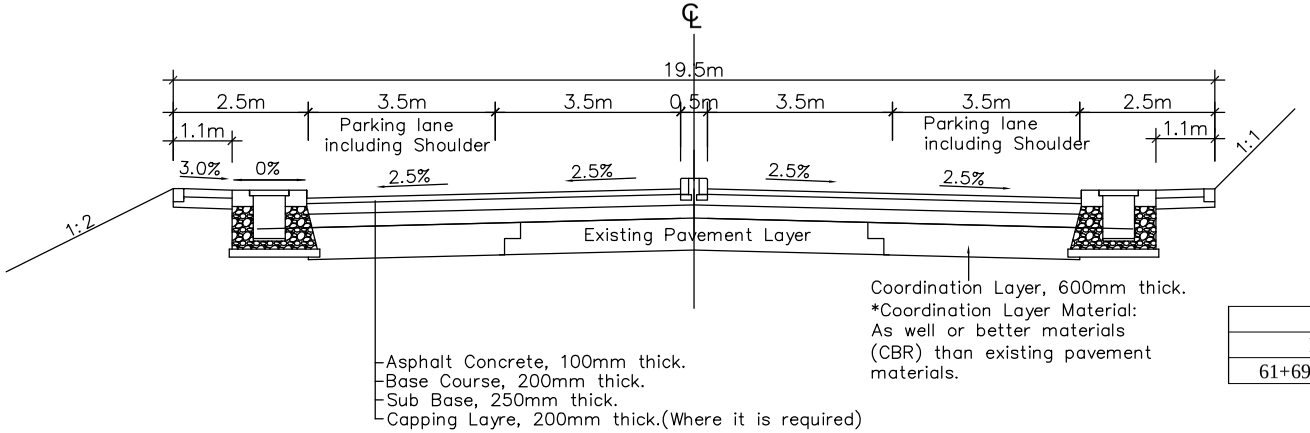
SIGNATURE			
DATE			

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
1:5000			-



D/Markos Town Center	
Phase II	L=34.938
64+151.4 - End	D/M Town Center

D/Markos Town Center (Type-1)



Populated Area in D/Markos	
Phase II	L=34.938
61+691.4 - 64+151.4	D/Markos Town

Populated Area in D/Markos (Type-2)

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

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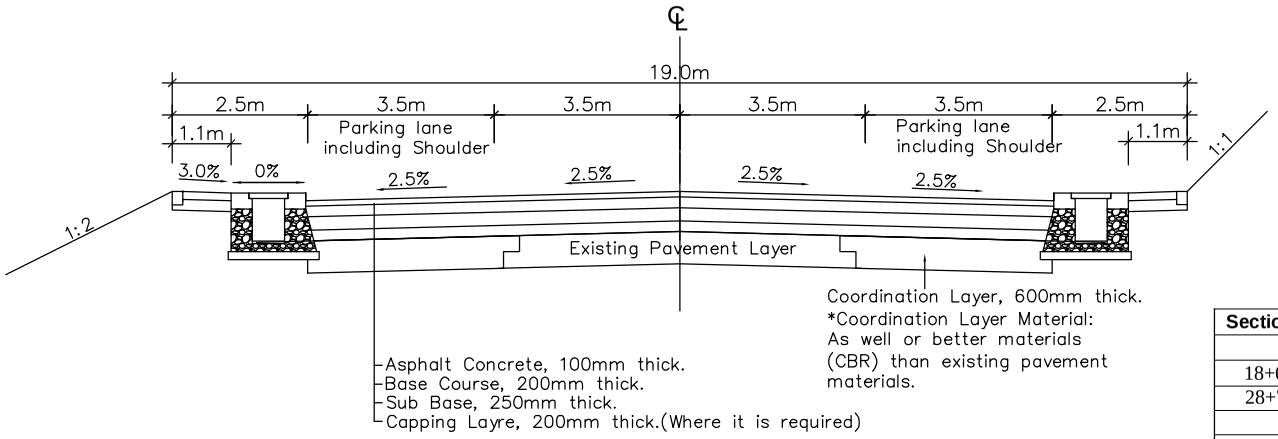
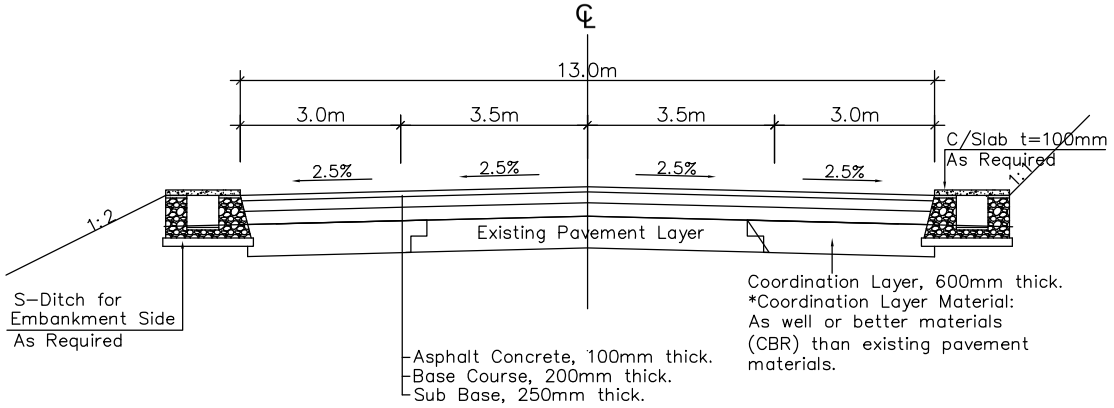
DRAWING TITLE: Typical Cross Sections (1)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
1:100			-



Wereda Town Area (Type-3)

Sections Where Wereda Towns Located	
Phase I	L=30.531km
18+680.0 - 20+160.0	Wejel Town
28+700.0 - 30+400.0	Lumame Town
Phase II	L=34.938
45+531.4 - 36+531.4	Amber Town



Entrance of D/Marikos (Type-4)

Entrance of D/Markos	
Phase II	L=34.938
60+931.4 - 61+691.4	Entrance of D/M

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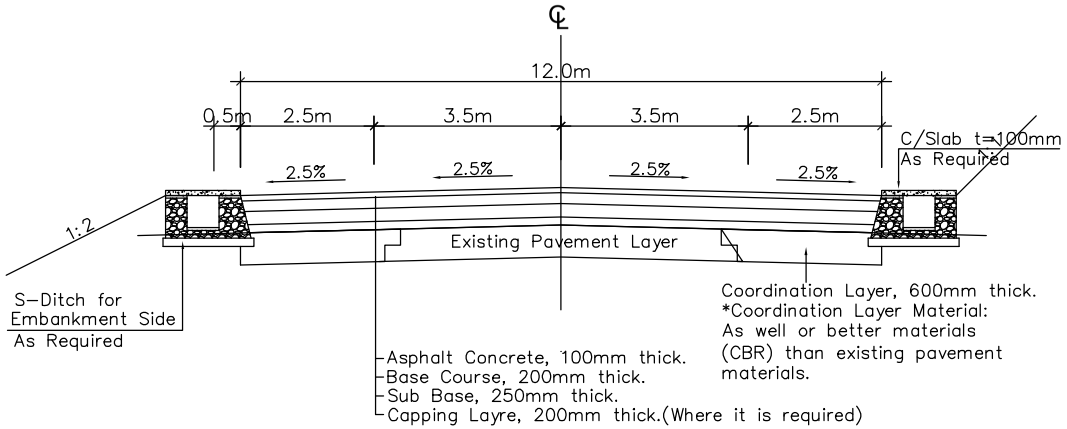
DATE			

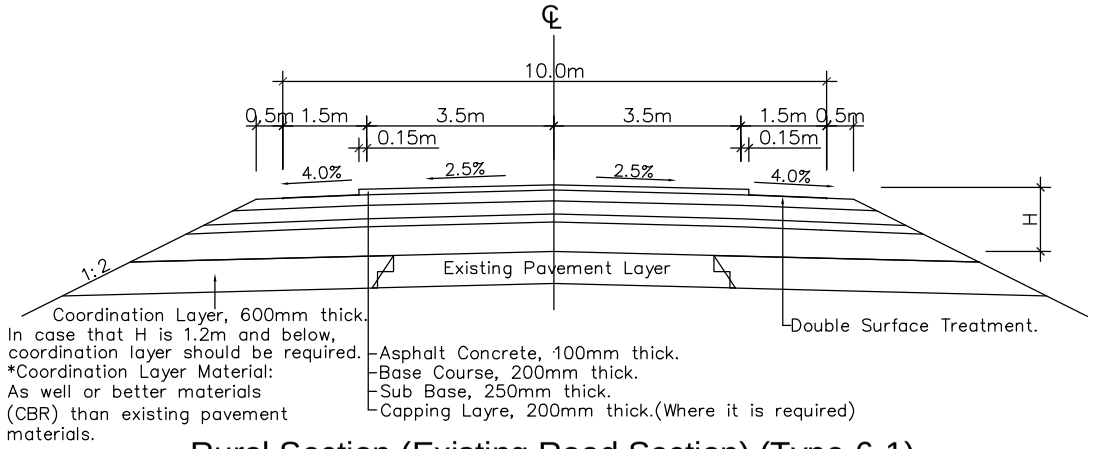
DRAWING TITLE: Typical Cross Sections (2)

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
1:100			-



Kebele & End of Dejen (Type-5)

Sections Where Kebele Towns Located	
Phase I	L=30.531km
0+000.0 - 0+500.0	End of Dejen Town
6+800.0 - 9+220.0	Yitnora Kebele
24+500.0 - 24+800.0	Yegodena Kebele 1
26+700.0 - 27+200.0	Yegodena Kebele 2
Phase II	L=34.938
39+431.4 - 40+ 31.4	Godelma Kebele
51+991.4 - 52+631.4	Filiklik Kebele
58+ 31.4 - 59+ 31.4	Chemoga Kebele



Rural Section (Existing Road Section) (Type-6-1)

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ETHIOPIAN ROADS AUTHORITY

REMARKS:

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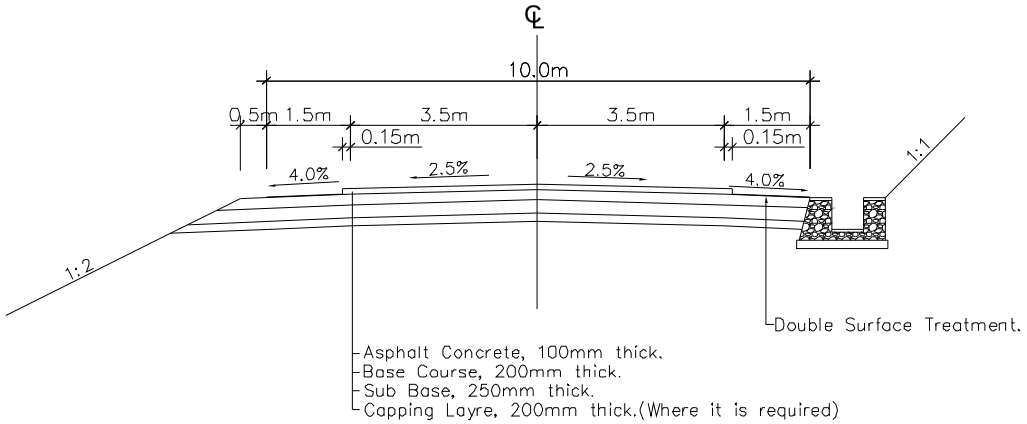
DRAWING TITLE: Typical Cross Sections (3)

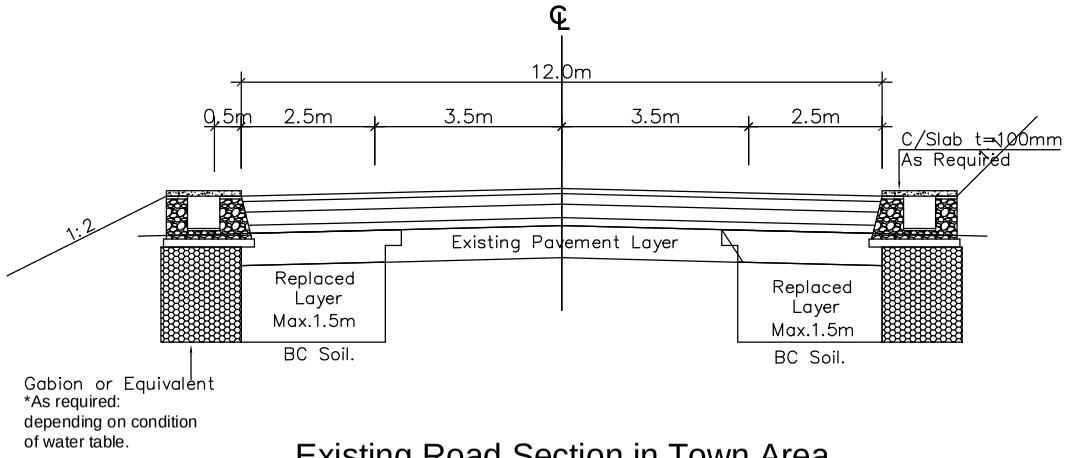
SCALE	SHEET NO.	DRAWING NO.	REV. NO.
1:100			-



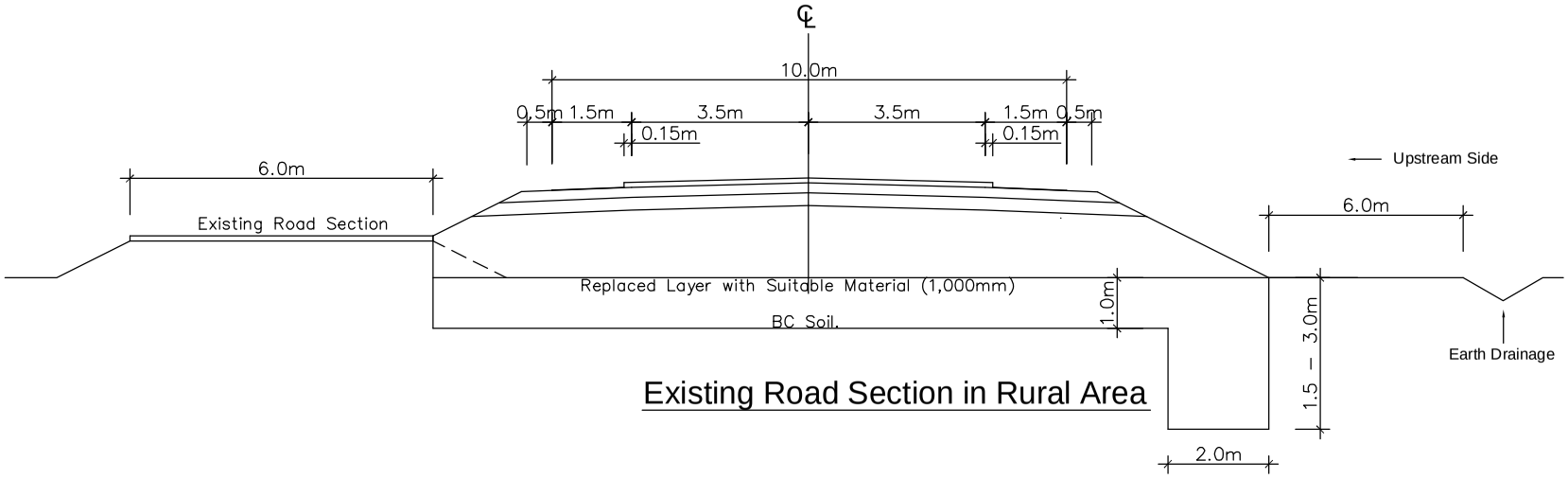
Rural Section (New Road Section) (Type-6-2)

A-5-50

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia					
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.			DRAWING TITLE Typical Cross Sections (4)		
			PREPARED BY	CHECKED BY	APPROVED BY		
		NAME					
		SIGNATURE				SCALE	SHEET NO.	DRAWING NO.	REV. NO.
		DATE				1:100			-



Existing Road Section in Town Area



Existing Road Section in Rural Area

A-5-51

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia	
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: Countermeasure for BC Soil (1)

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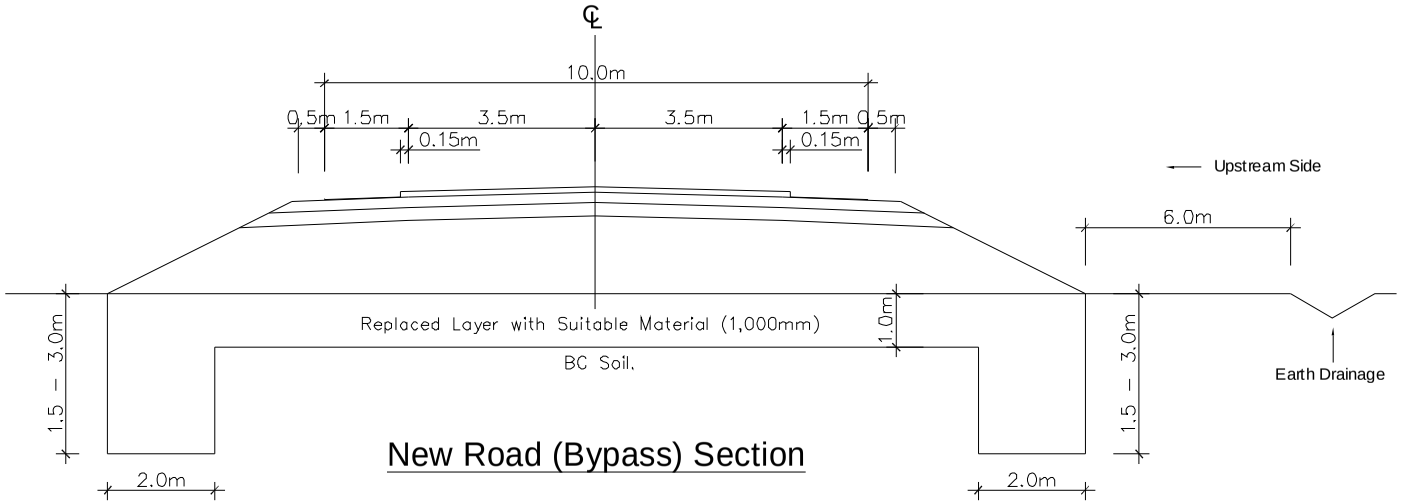
DATE			

SCALE	SHEET NO.	DRAWING NO.	REV. NO.
1:100			-



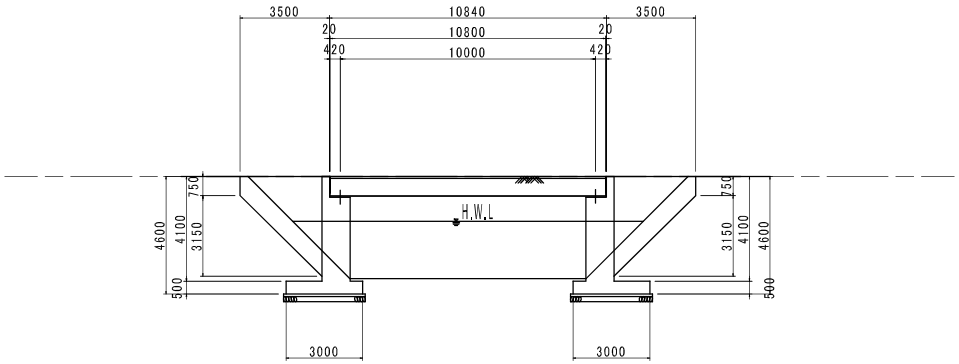
New Road (Bypass) Section

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia					
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.			DRAWING TITLE Countermeasure for BC Soil (2)		
			PREPARED BY	CHECKED BY	APPROVED BY		
		NAME					
		SIGNATURE				SCALE	SHEET NO.	DRAWING NO.	REV. NO.
		DATE				1:100			-

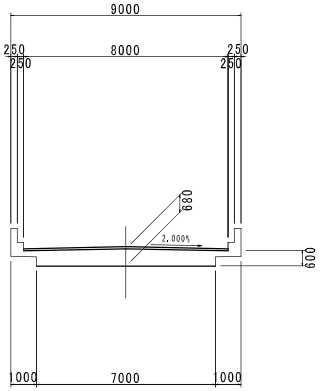
ASAMATECH

GENERAL VIEW

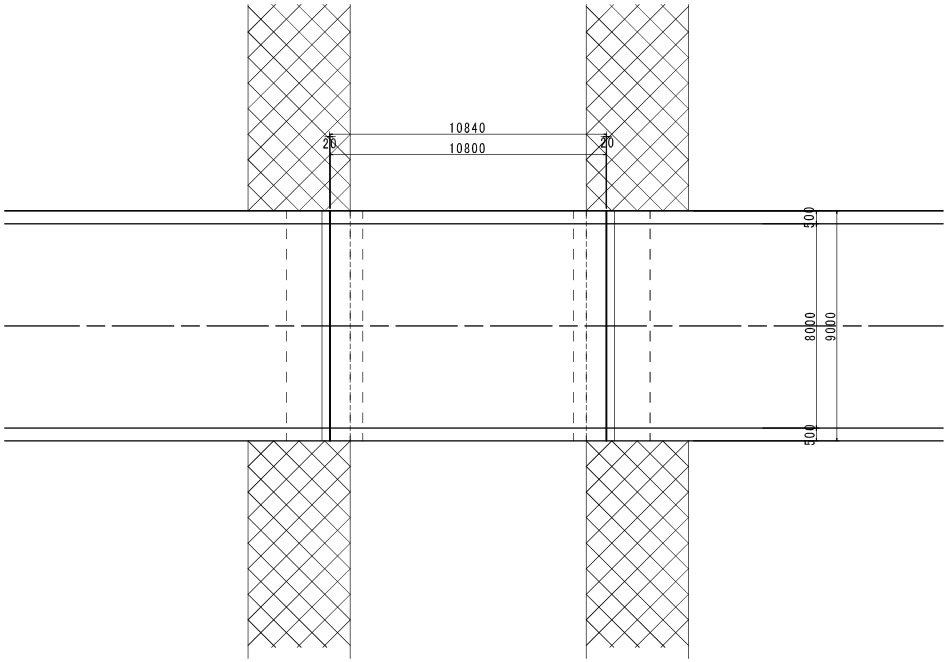
SIDE ELEVATION SCALE 1:100



CROSS SECTION SCALE 1:100



PLAN SCALE 1:100



A-5-53

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

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DATE			

DRAWING TITLE

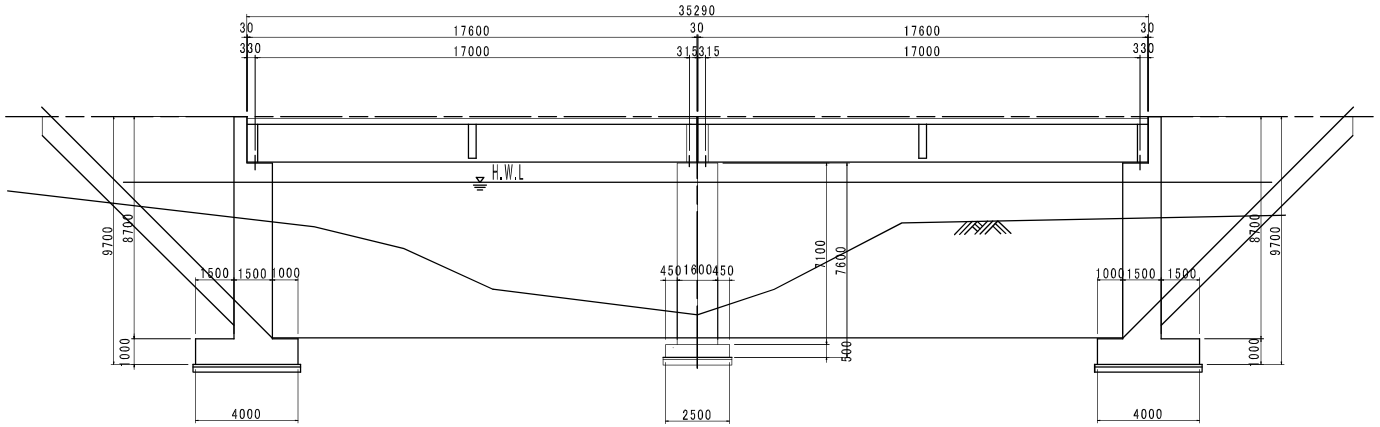
ASAMATECH Bridge

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

BECHET

GENERAL VIEW

SIDE ELEVATION scale 1:100



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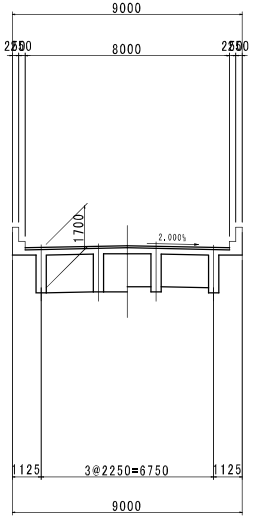

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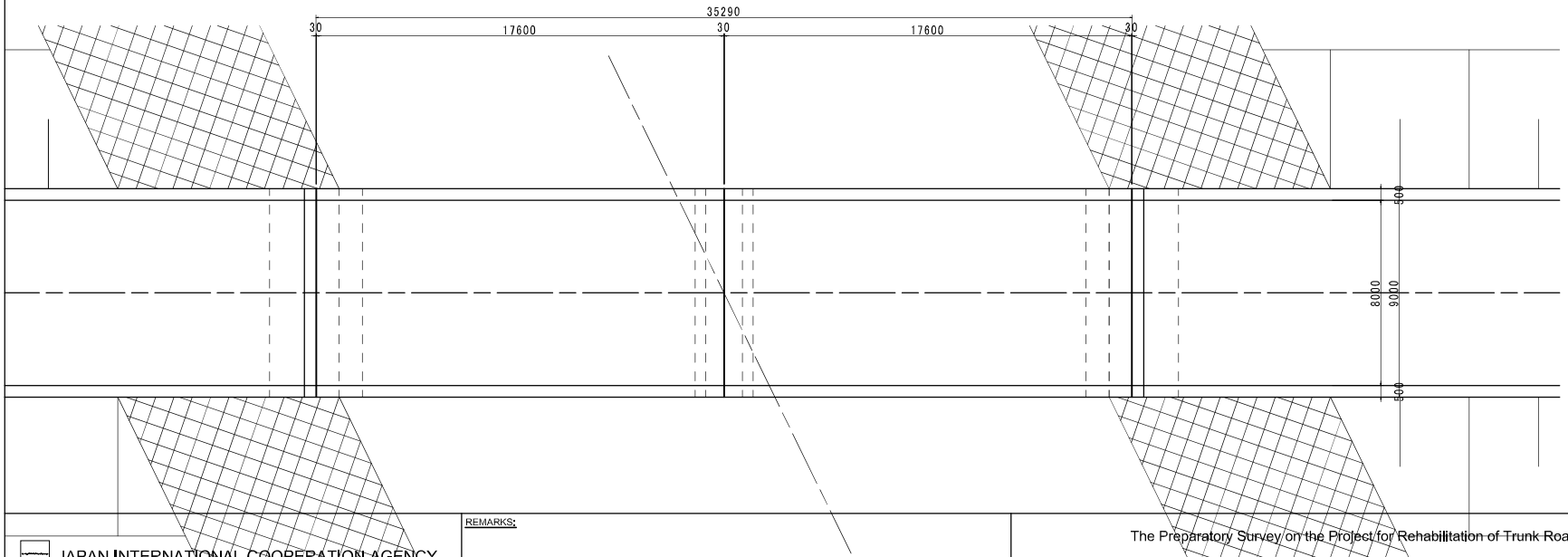

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIA ROAD AUTHORITY

REMARKS:

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NAME			
SIGNATURE			
DATE			

DRAWING TITLE

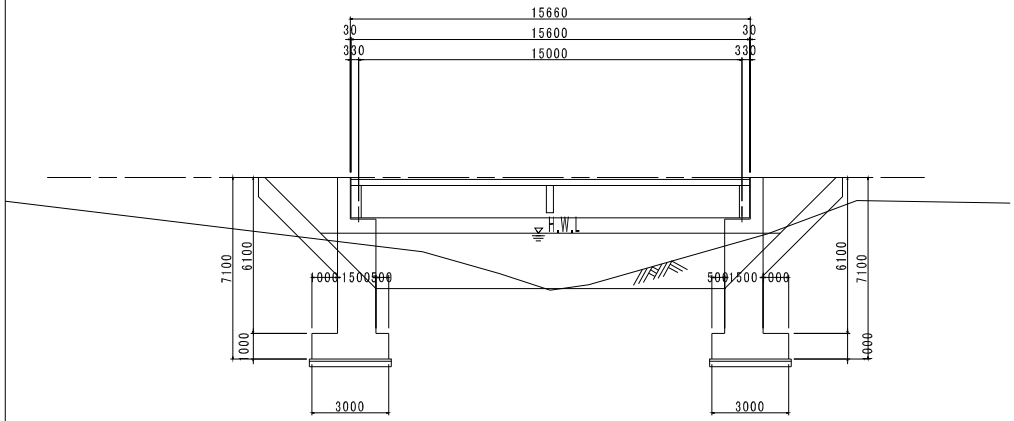
BECHET Bridge

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

ABA ADEM

GENERAL VIEW

SIDE ELEVATION scale 1:100



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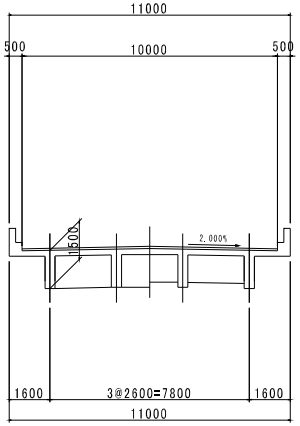

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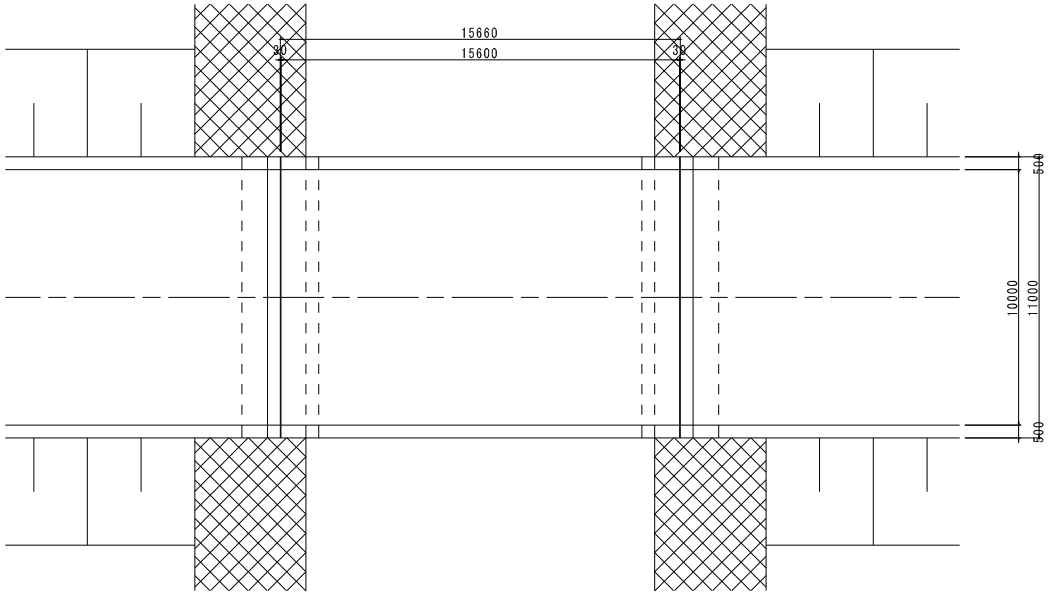

A-5-55

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

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NAME			
SIGNATURE			
DATE			

DRAWING TITLE

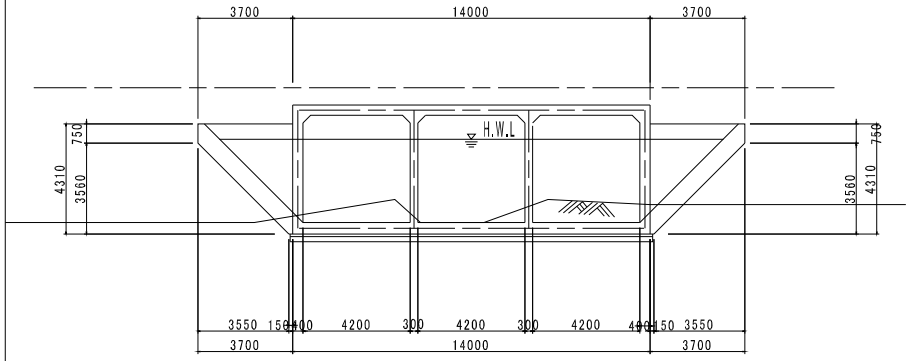
ABA ADEM Bridge

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

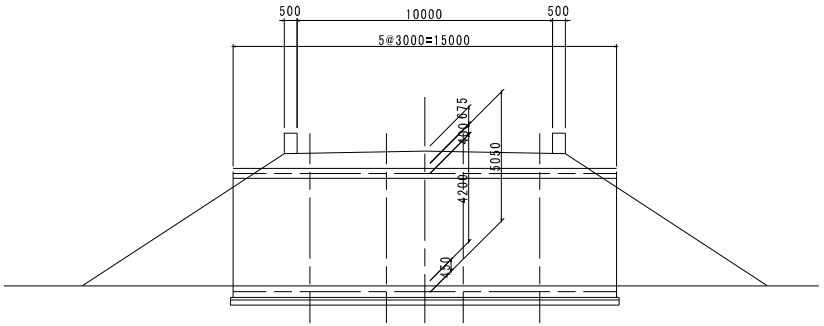
Abeya

GENERAL VIEW

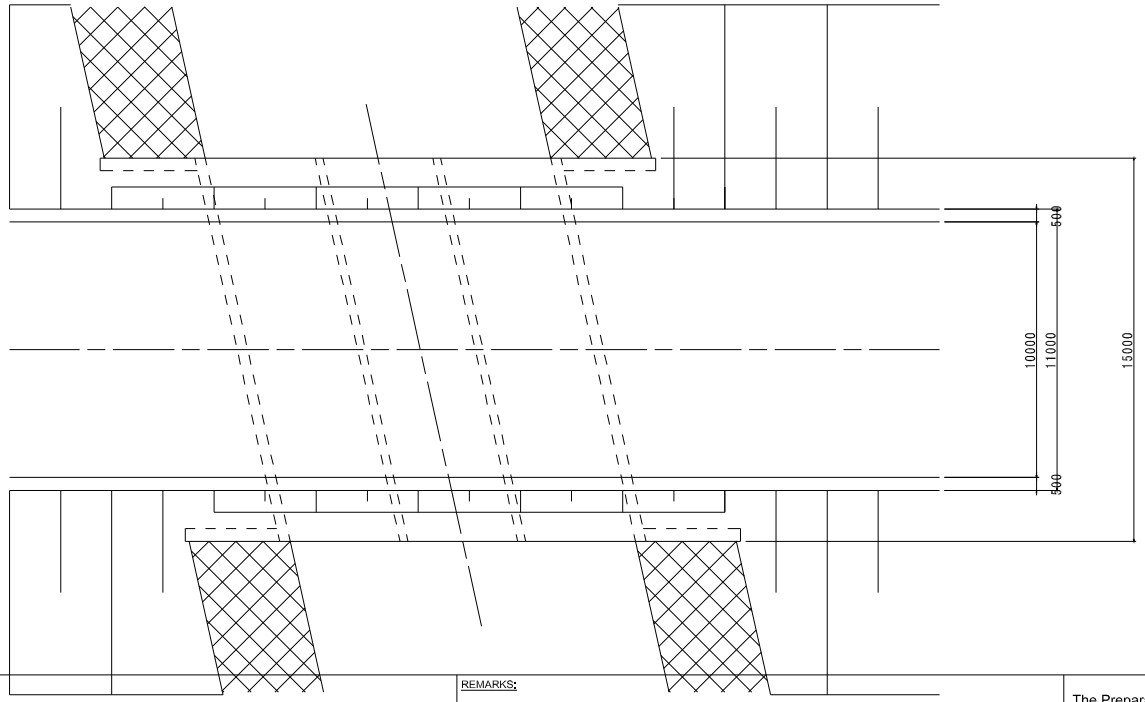
SIDE ELEVATION scale 1:100



CROSS SECTION scale 1:100



PLAN scale 1:100



JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

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SIGNATURE			
DATE			

DRAWING TITLE

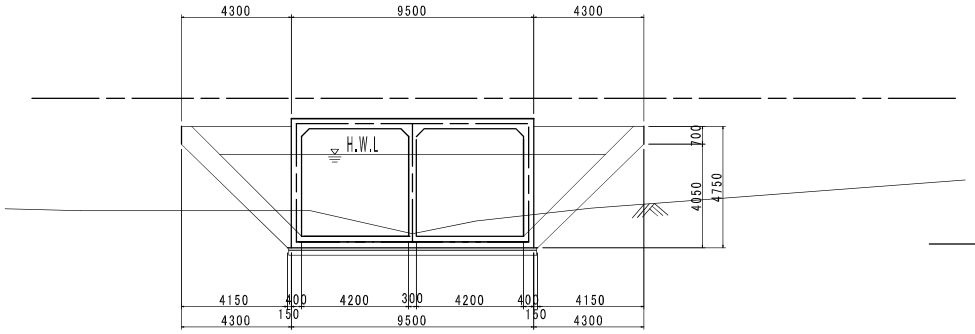
ABEYA Box Culvert

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

Yekeyet

GENERAL VIEW

SIDE ELEVATION scale 1:100



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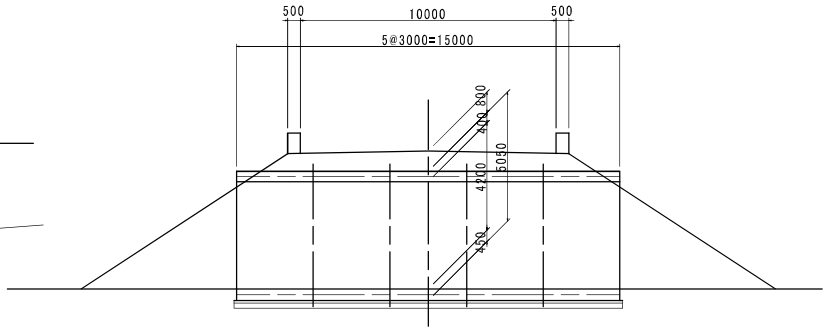

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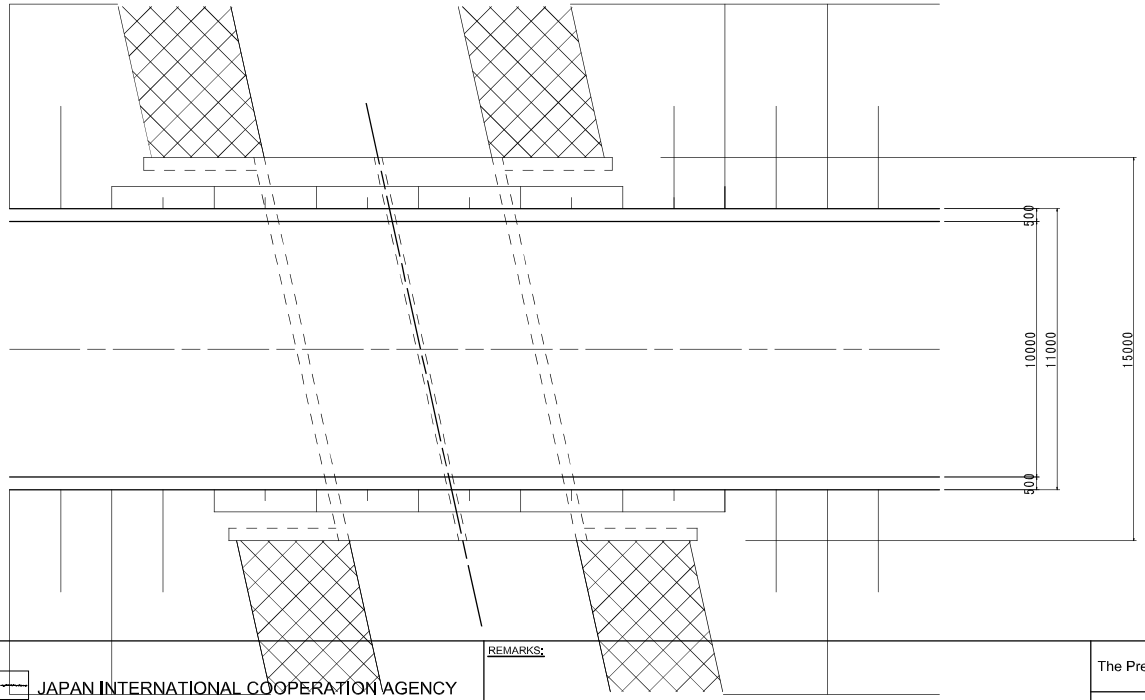

A-5-57

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

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SIGNATURE			
DATE			

DRAWING TITLE

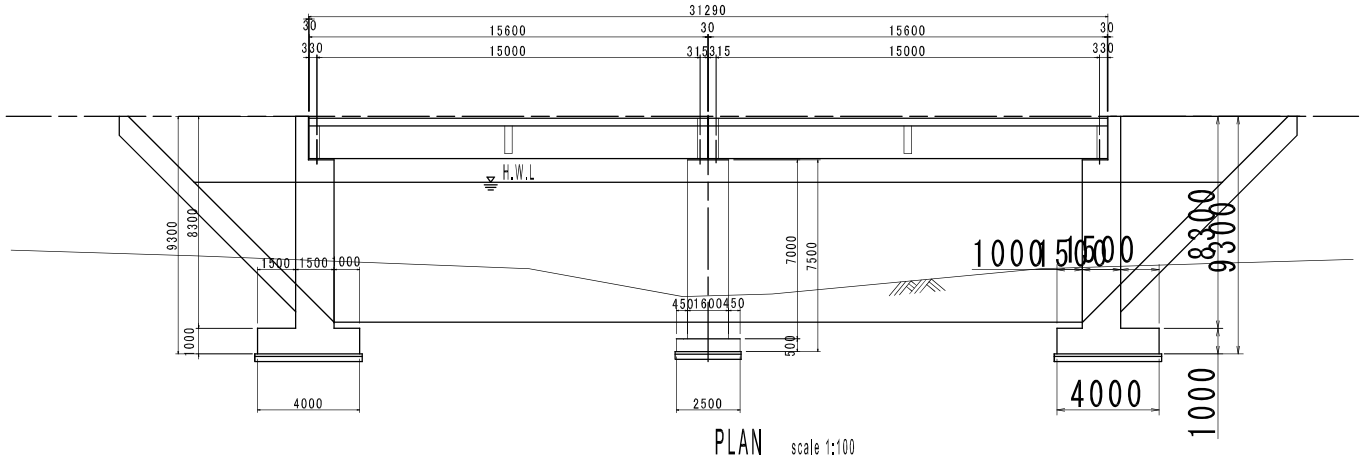
YEKEYET Box Culvert

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

GETLA

GENERAL VIEW

SIDE ELEVATION scale 1:100



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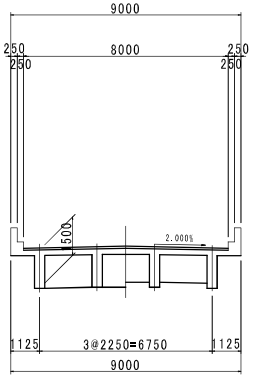

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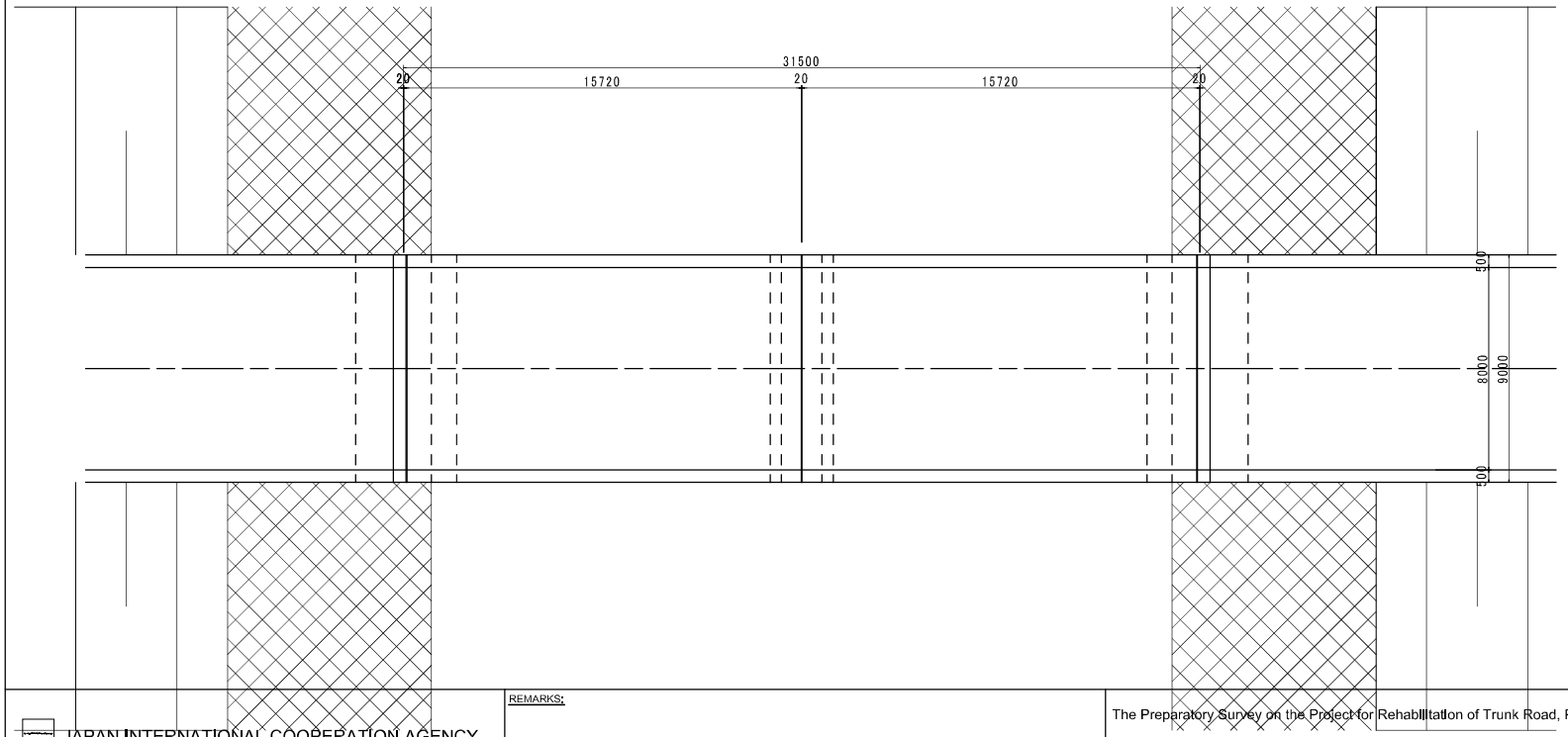

A-5-58

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

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NAME			
SIGNATURE			
DATE			

DRAWING TITLE

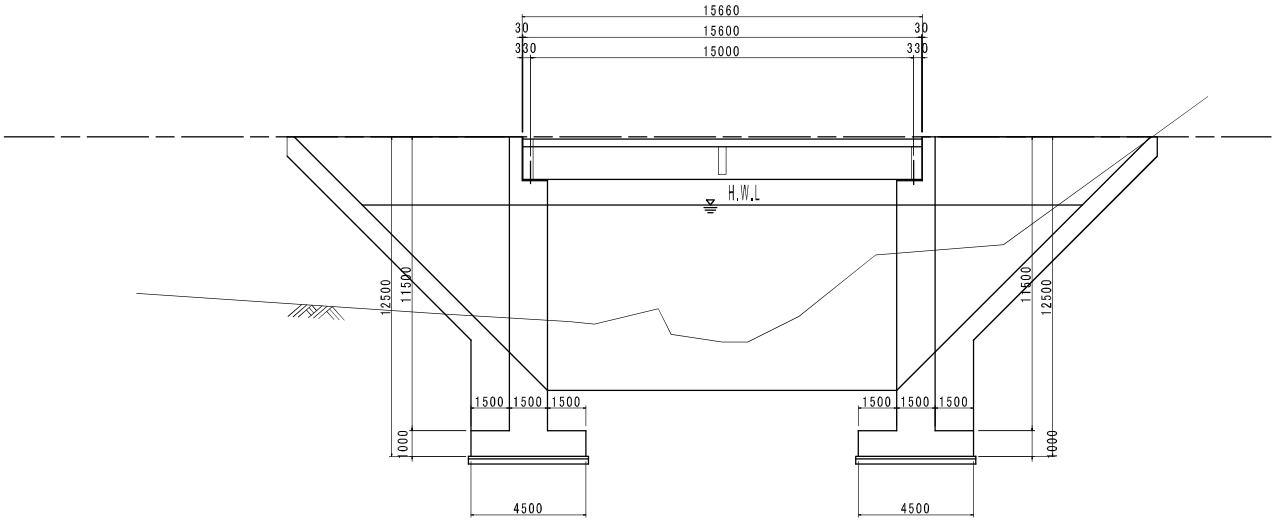
GETLA Bridge

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

MINT KAT

GENERAL VIEW

SIDE ELEVATION scale 1:100



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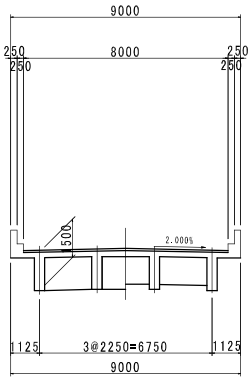
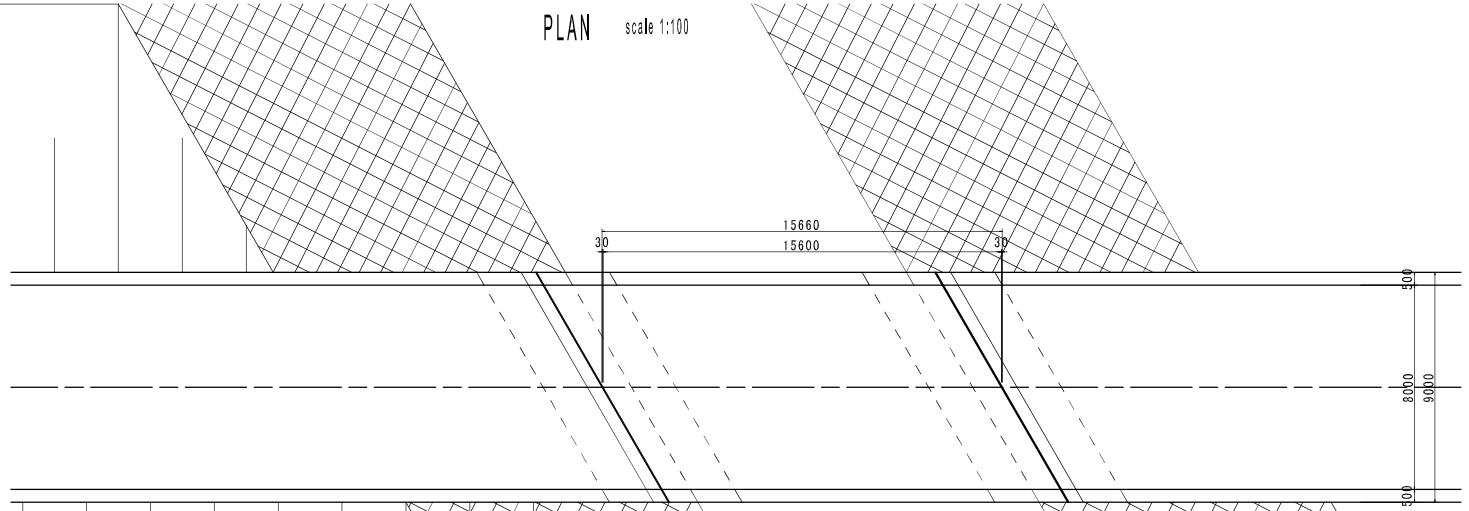


PLAN scale 1:100



REMARKS

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NAME			
SIGNATURE			
DATE			

DRAWING TITLE

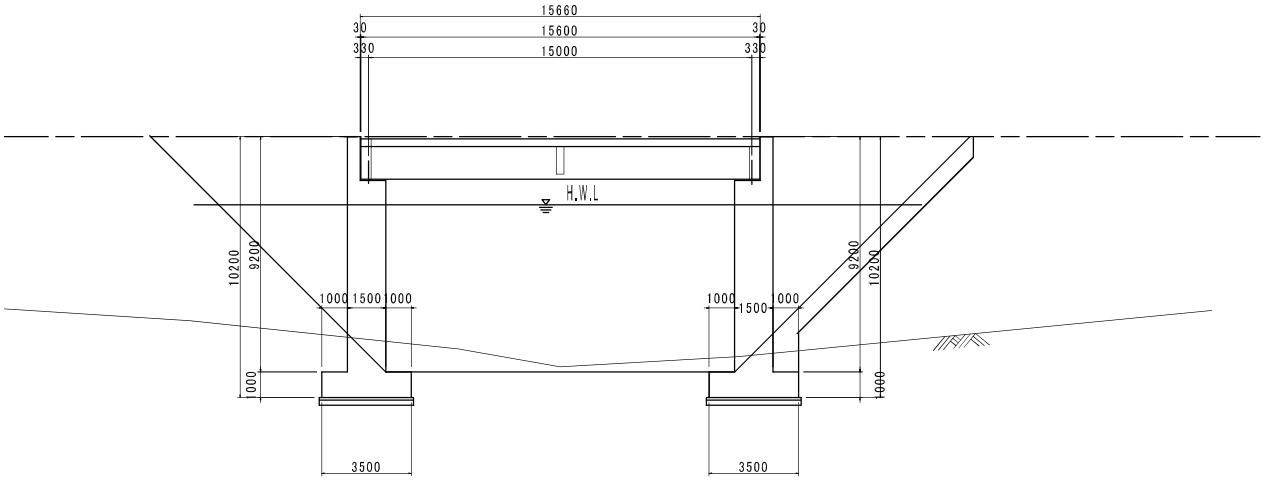
MINT KAT Bridge

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

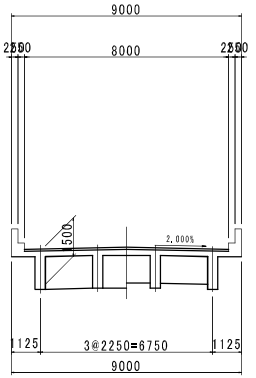
ZIBA

GENERAL VIEW

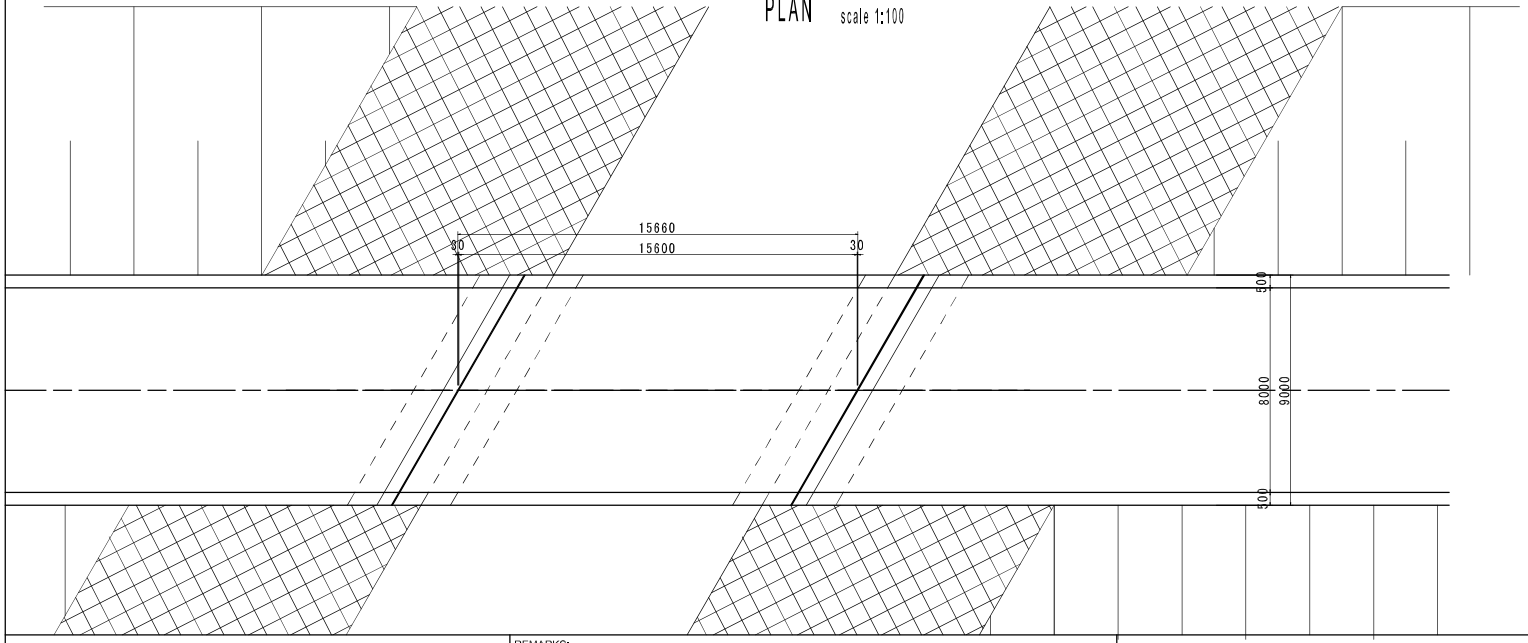
SIDE ELEVATION scale 1:100



CROSS SECTION scale 1:100



PLAN scale 1:100



A-5-60

JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV In the Federal Democratic Republic of Ethiopia
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.

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NAME			
SIGNATURE			
DATE			

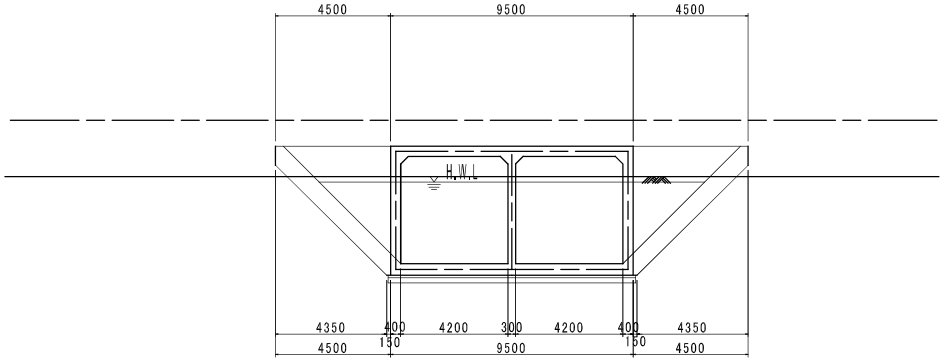
DRAWING TITLE: ZIBA Bridge

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

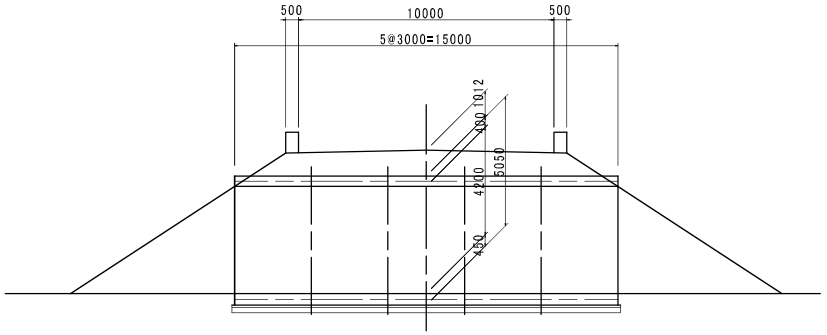
Yeda-a

GENERAL VIEW

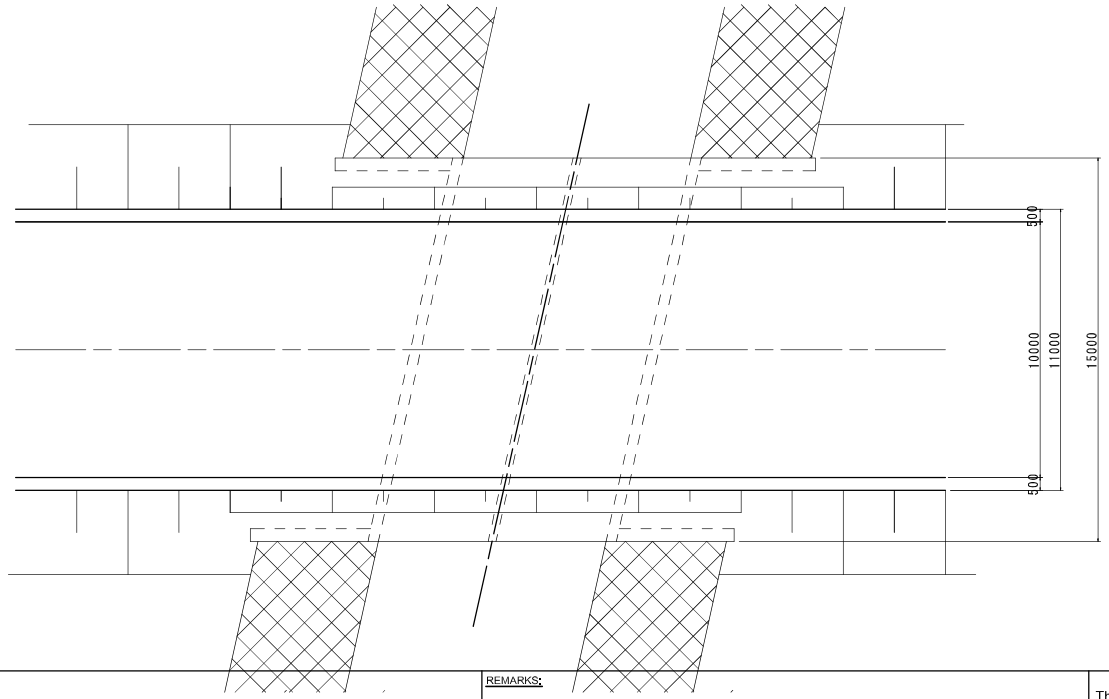
SIDE ELEVATION scale 1:100



CROSS SECTION scale 1:100



PLAN scale 1:100



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ETHIOPIAN ROADS AUTHORITY

REMARKS:

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NAME			
SIGNATURE			
DATE			

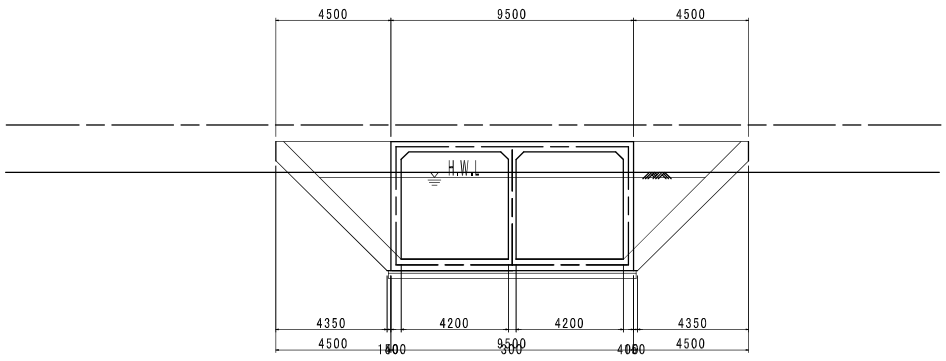
DRAWING TITLE

YEDA-A Box Culvert

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

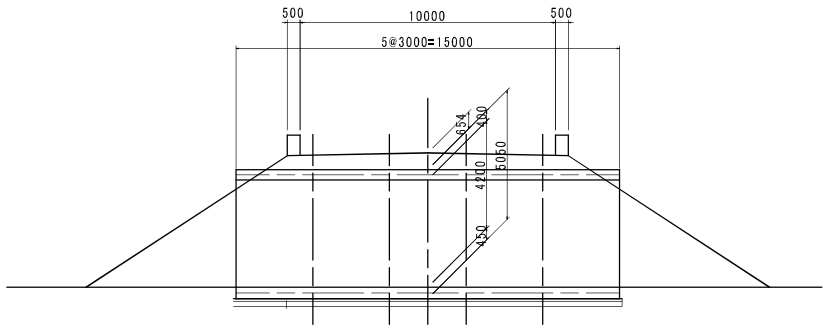
Yeda-b

SIDE ELEVATION scale 1:100

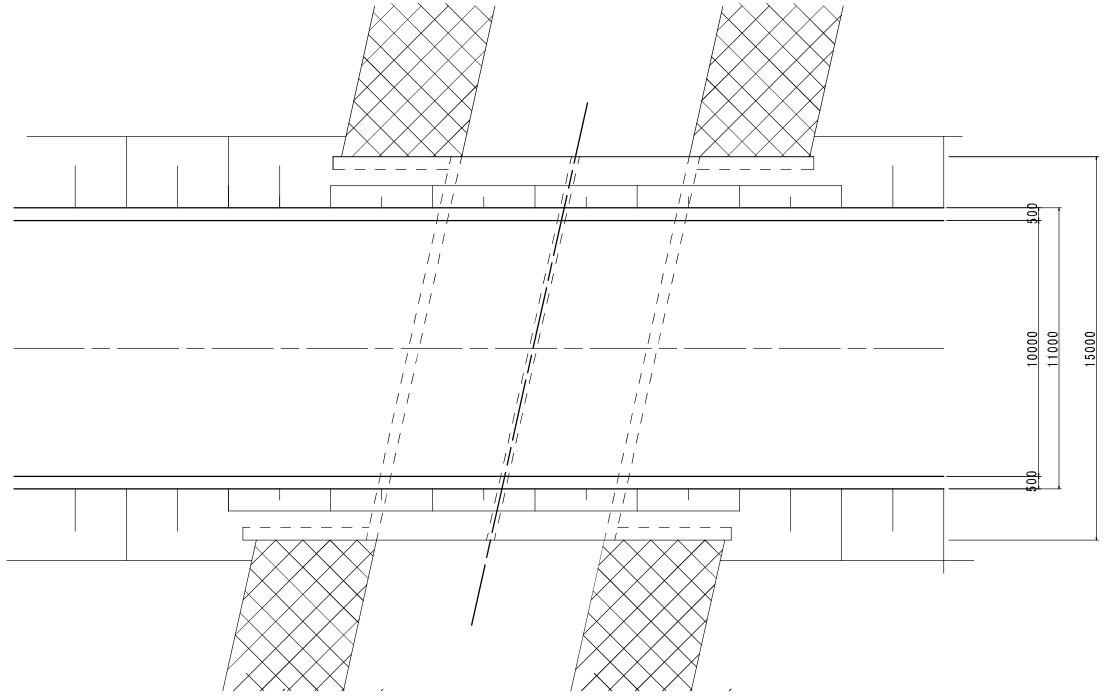


GENERAL VIEW

CROSS SECTION scale 1:100



PLAN scale 1:100



A-5-62

JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV In the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE

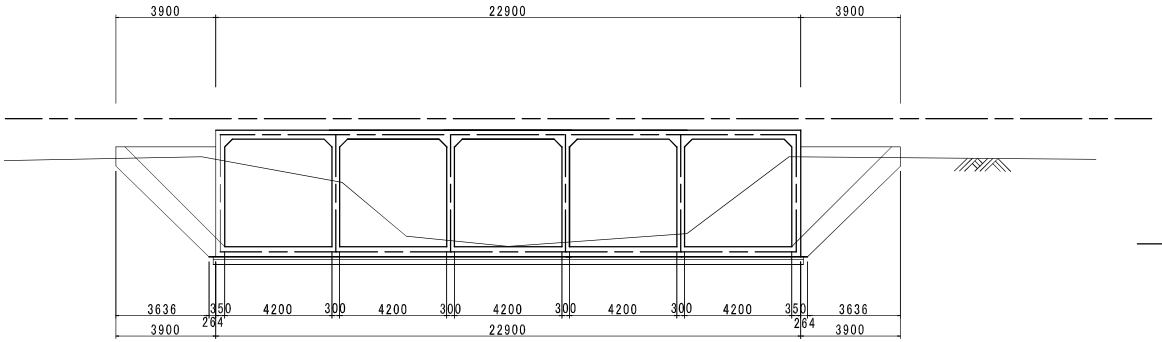
YEDA-B Box Culvert

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

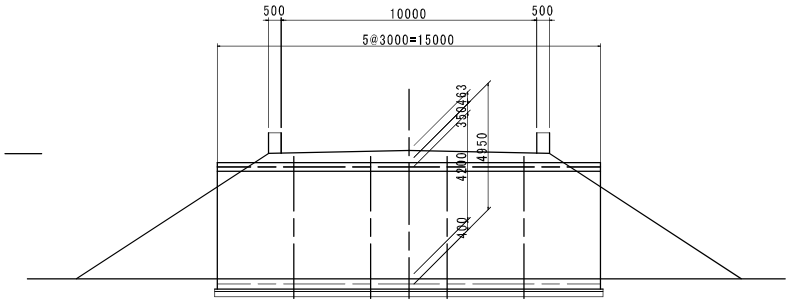
Yeda-c

GENERAL VIEW

SIDE ELEVATION scale 1:100



CROSS SECTION scale 1:100



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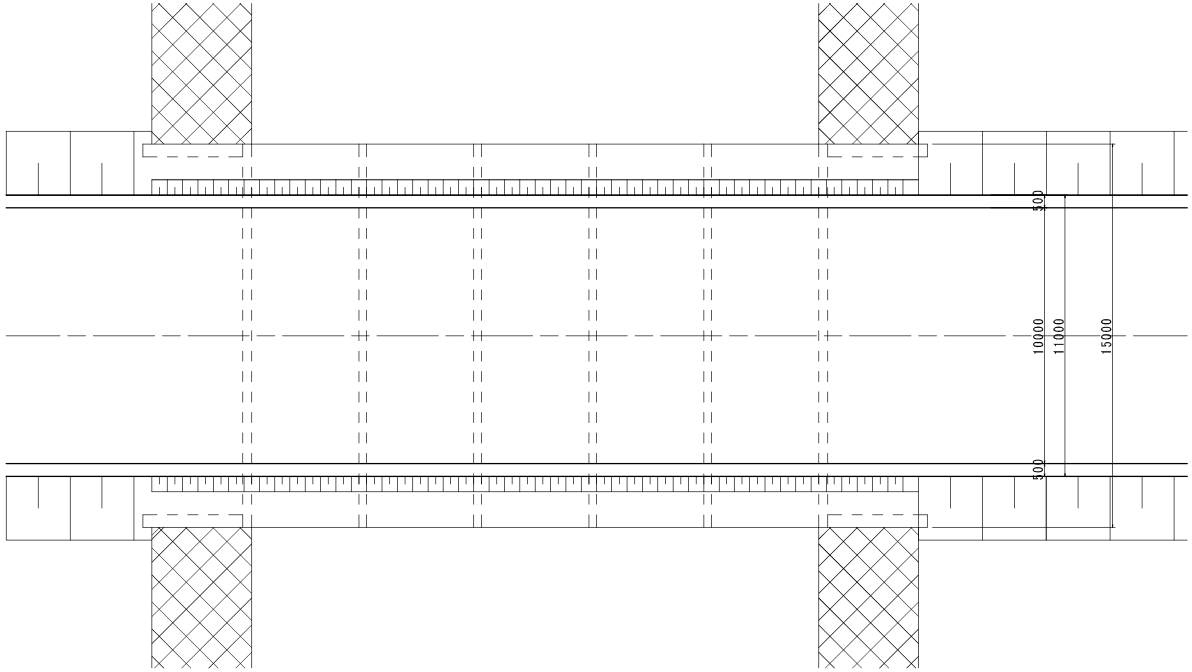


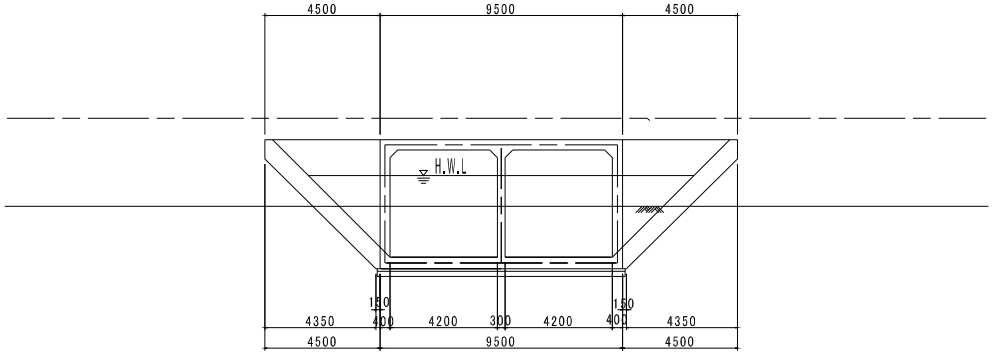
JAPAN INTERNATIONAL COOPERATION AGENCY	REMARKS:	The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV In the Federal Democratic Republic of Ethiopia	(JICA PERMARKS)
ETHIOPIAN ROADS AUTHORITY		Oriental Consultants Co., Ltd. Eight-Japan Engineering Consultants Inc.	DRAWING TITLE: YEDA-C Box Culvert

	PREPARED BY	CHECKED BY	APPROVED BY	SCALE	SHEET NO. DRAWING NO.	REV. NO.
NAME						
SIGNATURE						
DATE						-

AMBESH

GENERAL VIEW

SIDE ELEVATION scale 1:100



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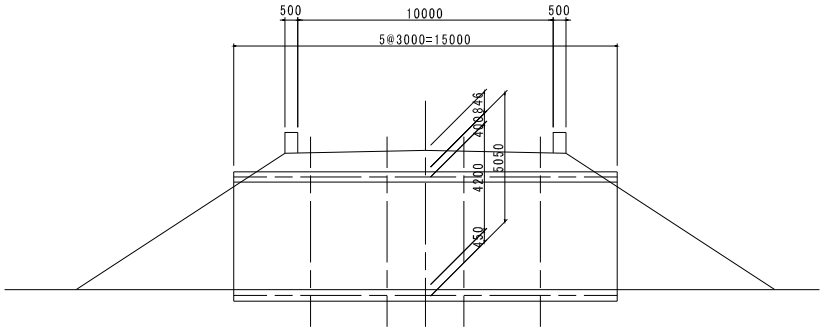

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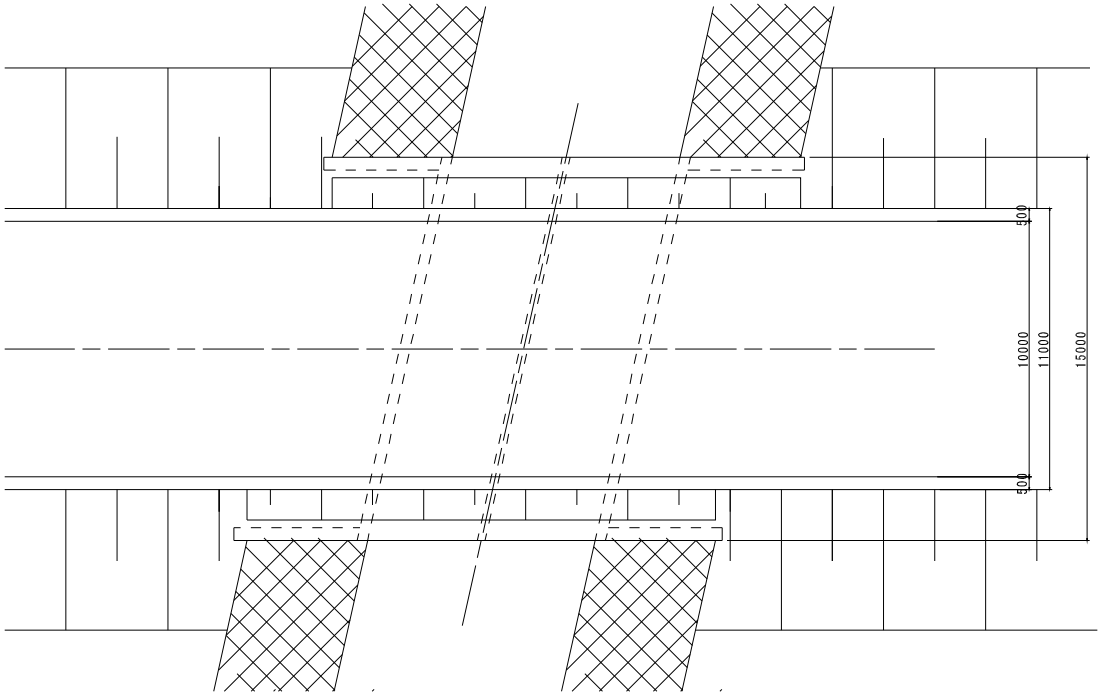


JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV in the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE

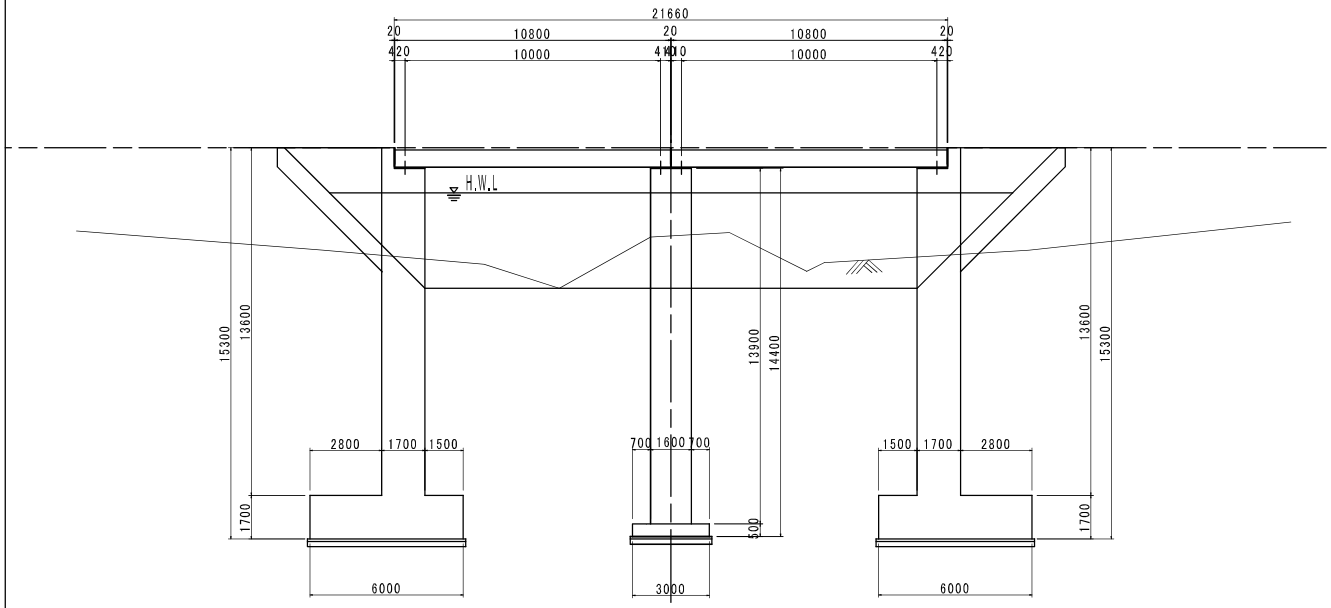
AMBESH Box Culvert

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

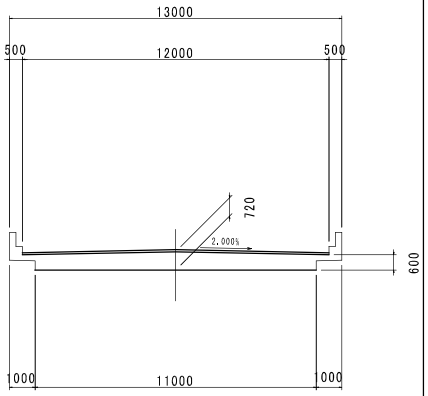
WISETA

GENERAL VIEW

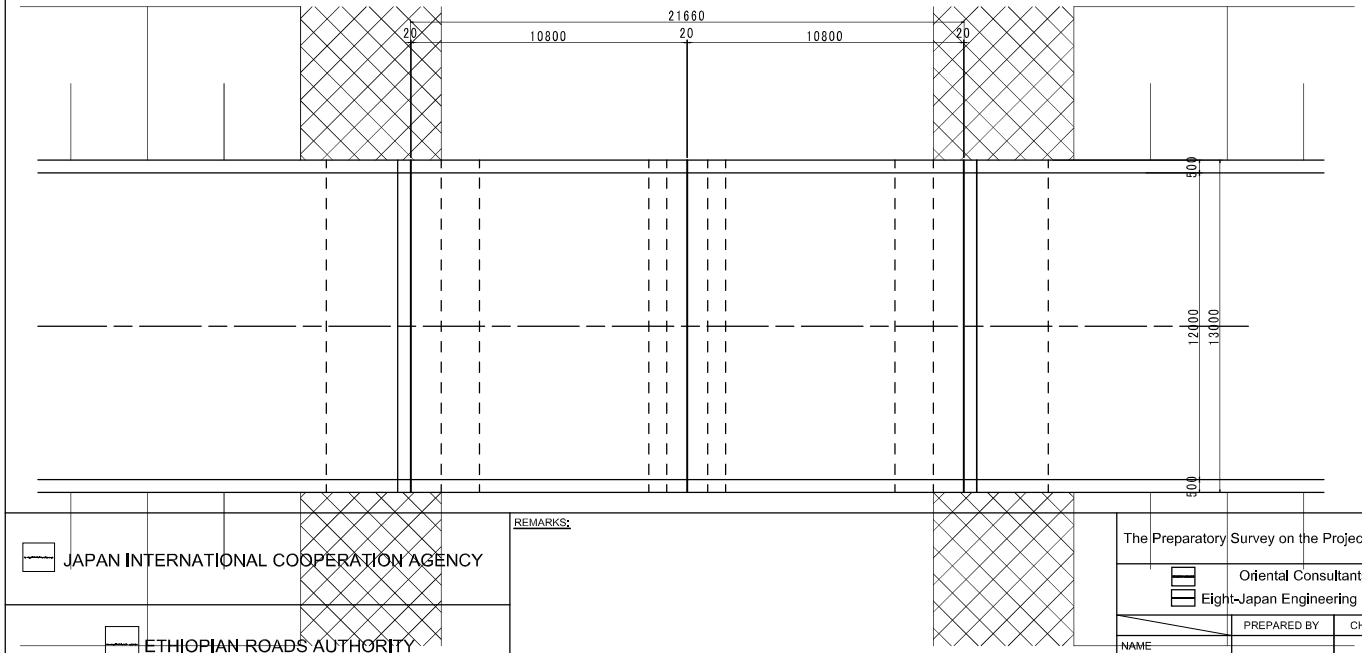
SIDE ELEVATION SCALE 1:100



CROSS SECTION SCALE 1:100



PLAN SCALE 1:100



JAPAN INTERNATIONAL COOPERATION AGENCY

ETHIOPIAN ROADS AUTHORITY

REMARKS:

The Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV In the Federal Democratic Republic of Ethiopia

Oriental Consultants Co., Ltd.
Eight-Japan Engineering Consultants Inc.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

DRAWING TITLE: WISETA Bridge

SCALE	SHEET NO. DRAWING NO.	REV. NO.
		-

6 参考資料

6.1 ERA との協議 Technical Notes

Study for Route Selection in Debre Markos under the Project for Rehabilitation of Trunk Road, Phase IV

1. Background

Detailed design for the study section (L=65km) between Dejen and Debre Markos had already been finished by HEC under ERA. According to the final detailed design report, the number of affected houses along the study section goes up to 159. This number is categorized in category A of the Environment Guideline of World Bank and JICA. In case of category A, it is necessary to consult and get approval of the JICA Advisory Committee on the Social and Environmental Issues. Consequently, this procedure may affect the implementation schedule for the Project causing delay and it is convenient to minimize the number of affected houses by selecting the best suitable route in Debre Markos to realize the planned implementation.

2. Comparison of two Routes

Outline of Alternative Routes in Debre Markos

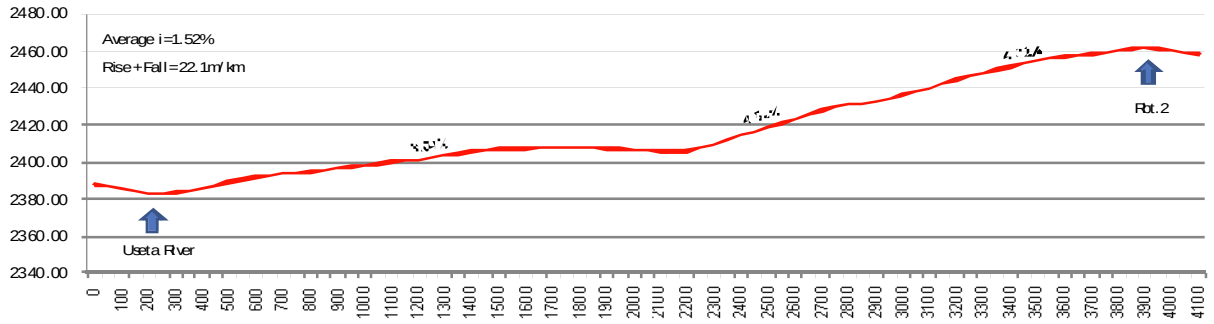
Alt.1: DD Route by HEC (Blue)
At entrance of Debre Markos, it diverts from existing A3 to unpaved town road and rejoins A3 in the city center via two new roundabouts.
Length: 4,100m
No. of Bridges: 2
Land Use: Residential and Commercial
Road Width planned by DD = 21.5m

Alt.2: Existing A3 (Red)
Existing A3 in Debre Markos is paved.
Length: 4,100m
No. of Bridges: 1
Land Use: Residential and Commercial
Road Width: See "4. Impact to Social Environment".

Fig.-1 Outline of Each Alternative

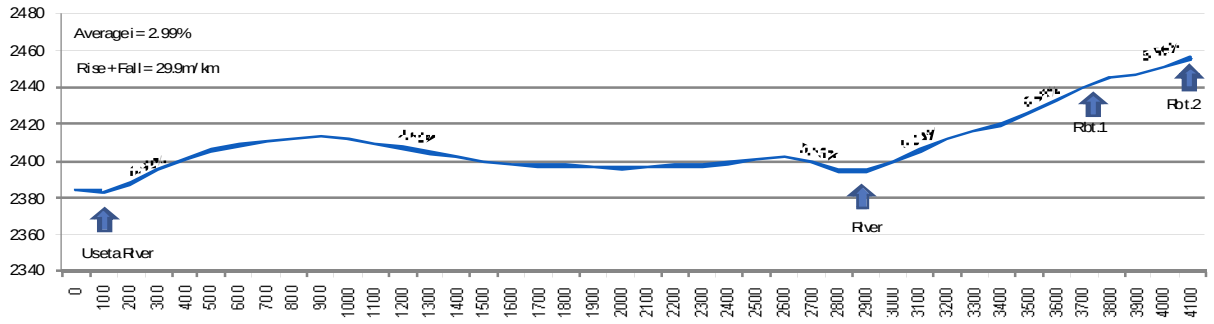
3. Evaluation from engineering point of view

(1) Vertical and Horizontal Alignment



Average I = 1.52%, Max. I = 4.52%, Rise and Fall = 22.1m/km

Reduction of risk of traffic accident will be expected by installation of road safety facilities.



Average I = 2.99%, Max. I = 6.93%, Rise and Fall = 29.9m/km

Increse of risk of traffic accident will be a matter of concern at two right-angled turns in densely populated area of Debre Markos Town.

Fig.-2 Comparison of Characteristics of Each Alternative

(2) Disadvantages of Horizontal and Vertical Alignment.

As mentioned earlier, the DD route by HEC passes two new roundabouts located within a congested town area before connecting to the existing A3. However, the elevation difference of A3 and DD route at connecting point at Rbt.2 is approximately 3m. This will result in a steep grade of more than 10% at Rbt.2 and more than 7% at Rbt.1. Consequently, these poor geometric features will constrain heavy trucks that commonly use this route. In addition, unexpected affected houses will likely be increased with the construction of roundabouts.

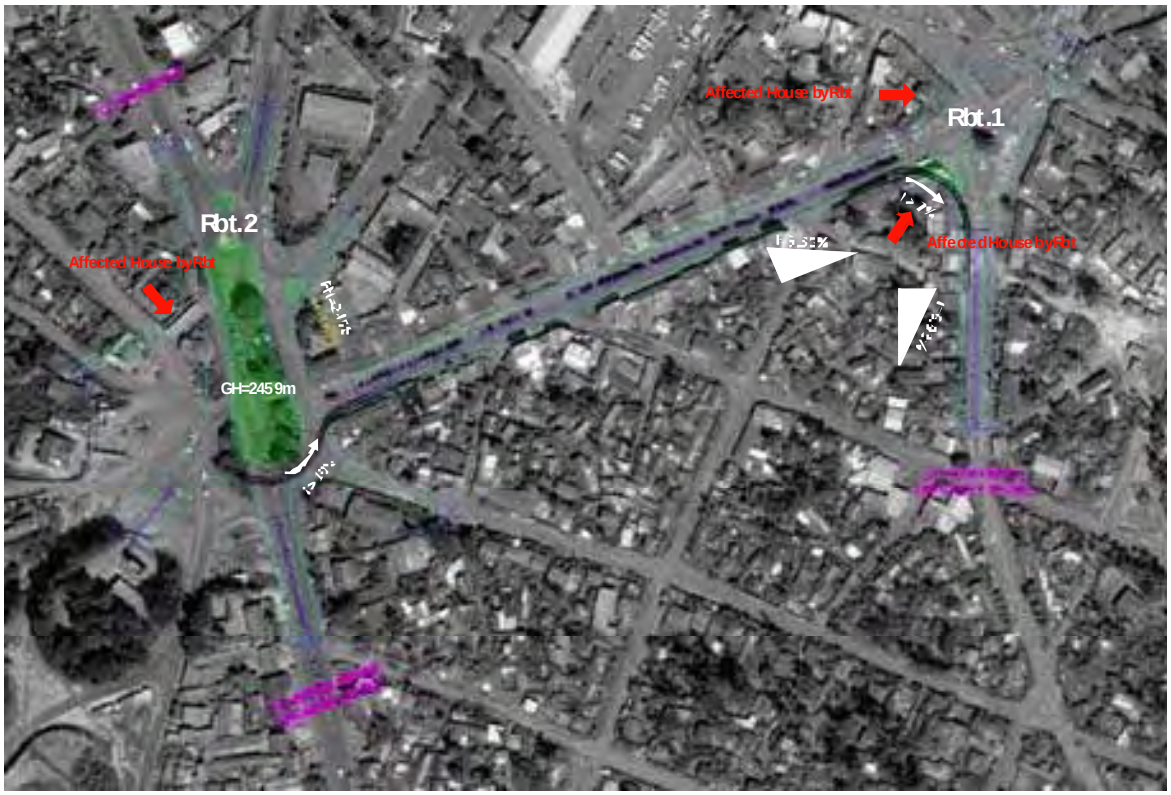


Fig.-3 Issues of Connecting Point to existing A3

(3) Summary of Comparison of the existing A3 (Alt.2) and DD Route by HEC (Alt.1) in Technical Aspect

Table-1 shows that rehabilitation of existing A3 (Alt.2) is more superior than HEC (Alt.1) in all items of technical aspect.

Table-1 Comparison of two alternatives in technical aspect

	Alt.2 Existing A3	Alt.1 DD Route by HEC
Alignment		
(1)Length of route	4.1km	4.1km
(2)Gradient (average)	1.52%	2.99%
(3)Gradient (max.) Inclination	4.52%	6.93% Over 7% at Rbt.1 Over 10% at Rbt.2
(4)Flatness (Rise and Fall)	22.1m/km	29.9m/km
(5)Number roundabout	0	2
(6)Turning	0	2 intersections at a right angle
(7)Radius of curve (min)	200m	30m
Traffic condition & traffic safety		
(8)Disturbance by transit traffic & local traffic	Less	Heavy
(9)Traffic jam	Less	Heavy and frequent due to (3), (5), (6), (7)& (8)
(10)Vehicle Speed	Good	Slow due to (9)
(11)Traffic safety	Good	Poor due to (8)
(12)Comfort	Good	Poor due to (4) & (9)
(13) Transportation cost	Low	High

4. Impact to Social Environment

1. On-site Investigation of the alignment of ERA/DD

(1) Date

- 20th September 2010

(2) Members

- ERA; Mr.Gashaw and one highway engineer
- HEC; Survey engineer
- Debre Markos Municipal; One engineer
- JICA Study Team; Dr.Tatsumi, Mr.Takagi, Mr.Mizuno, Mr.Nemoto

2. Number of Affected Houses

In case the existing route A3 alignment is used in Debre Markos, the number of affected houses shall be greatly reduced as shown in Table-2 below:

Table-2 Comparison of the Number of Affected Houses

Section			Road Width (m)	Number of Affected Houses		
				Rehabilitation of Existing A3(*1)	DD Route	
					The Study Team (*1)	ERA･RAP
Dejen to entrance of D/Markos (*2)	Sta.00+185-60+857		10.0－19.0	26	26	75
D/Markos Town	1	Section-1 Sta.60+857-61+900	15.0	10	86	84
		Section-2 Sta.61+900-64+300	19.0			
		Section-3 Sta.64+300-65+000	21.5			
	2	Section-1	15.0	6		
		Section-2	17.0			
		Section-3	19.0			
Total（Dejen－D/Markos）				32 - 36 (*3)	112	159

Note) *1: The number of affected houses is based on site survey by the Study Team and/or google map
Rental housings should be included in affected houses because of involuntary relocation.
*2: Section between Dejen to entrance of Debre Markos
*3: The number of affected houses will vary (from 32 to 36) depending on the road section plan.

5. Recommendation

The JICA Study Team recommends that the existing A3 route in Debre Markos should be rehabilitated under the Project for Rehabilitation of Trunk Road, Phase IV taking into account the following;

(1) Environmental aspect

① The number of affected houses of DD Route by HEC (Alt.1) is obviously classified in Category A of the JICA Environmental Guideline.

② The number of affected houses of rehabilitation of existing A3 is less than that of Category A.

③ Effect of heavy vehicles noise and exhaust emissions to residents is reduced in case of rehabilitation of existing A3.

(2) Technical aspect

① The rehabilitation plan of existing A3 (Alt.2) is superior to DD Route by HEC (Alt.1) in all items of technical aspect.

② Transit traffic and local traffic should be separated as much as possible, so it is common practice that the international trunk road should be planned to avoid to passing through the center of populous city.

(3) Recommendation

In the context of above two aspects, the rehabilitation of existing A3 in Debre Markos should be recommended.

(3) Number of Affected Houses in case of Rehabilitation of existing route A3

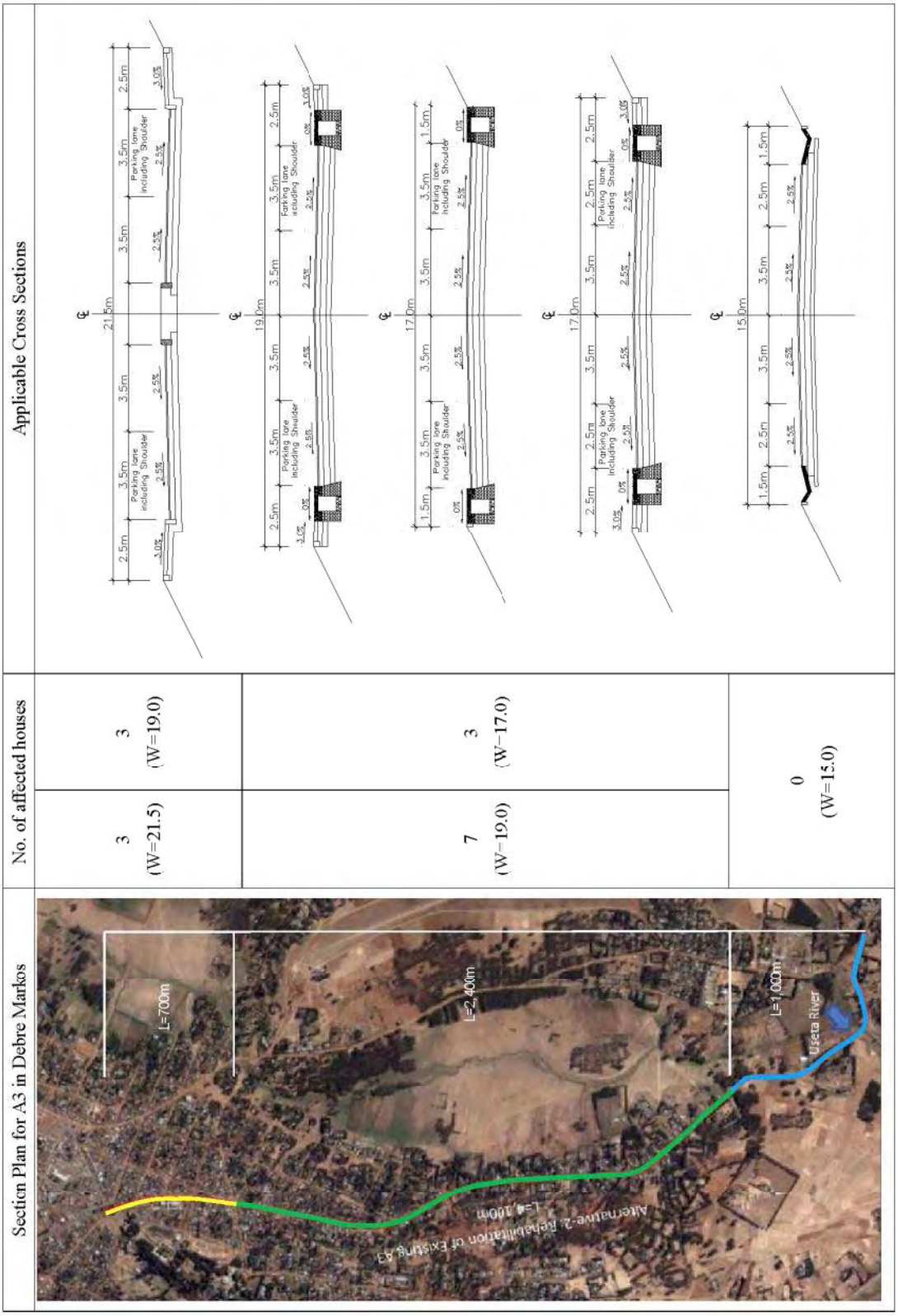


Fig.-4 Section and Cross Section Plan

Annex-1: Detailed Number of Affected Houses (Whole Section)

Section	Town	Affected houses (AH)by ERA・D/D・RAP								Distance between AH and road centerline (m)							Road width	Judge by JICA Team*4
		Mud	Tkul	Block	G+1	G+2	G+3	G+4	計	Mud	Tkul	Block	G+1	G+2	G+3	G+4	—	
Sta.00+185-03+043	Dejen	8							8	12-15							19.0	0
Sta.06+754-09+226	Yitonora	9							9	13-15							12.0	0
Sta.18+552-21+604	Wejel	24							24	12-15							19.0	0
Sta.27+444-30+497	Lumame	9							9	13-14							19.0	5
Sta.30+497-33+198	(Rural)	3							3	11-15							10.0	0
Sta.38+764-41+216	Godelma	1							1	15							12.0	0
Sta.45+400-47+500	Amber*1	ND							ND	ND							19.0	14
Sta.50+186-52+669	(Rural)*2								1								10.0	4
Sta.57+700-57+900	Chemoga	11							11	10-13							12.0	0
Sta.58+090-60+857	(Rural)*3	9							9	1-10							10.0	3
Subtotal (From Dejen to D/Markos entrance)									75	Subtotal by JICA's proposal								26
Sta.60+857-63+613	D/Markos	31		6	2	6	2	3	50	5-15		10-15	7-10	10	10	11	21.5	30
Sta.63+613-64+889	(DD Route)	28		2	2	2			34	2-18		10	10-11	10				56
Total by ERA's design									159	Total by JICA's proposal								112
Sta.60+857-61+900	D/Markos																15.0	0
Sta. 61+900-64+300*5	(Ex. A3)	2		5					7	9-15		10-15					19.0	7
																	17.0	3
Sta.64+300-65+000		3							3	9-10							21.5	3
																	19.0	3
Total in case of using existing road in D/Markos (Dejen－D/Markos)																		32-36*6

Note: *1 No data on ERA・RAP.
*2 Realignment sections in Yeda
*3 Short cut for realignment
*4 Satellite photograph besides field survey is used.
*5 4m-strips outside the road width are assumed affected during construction stage.
*6 Depend on road width in the D/Markos city, the number of a ffected houses varies from 32 to 36.

Ref. No.ERA/ADM/101022/PO

Date: 22 October 2010 22/10/2010

Ms Hiwot Mossisa
Central Region Directorate, Acting Director
Ethiopian Roads Authority (ERA)
Addis Ababa

Dear Madam,

RE: ROAD/STRUCTURE DESIGN CONDITION, ROAD ALIGNMENT, CROSS SECTIONS AND COUNTERMEASURE FOR BLACK COTTON SOILS ON THE PROJECT FOR REHABILITATION OF TRUNK ROAD, PHASE IV

We would like to draw your attention to the aforementioned project and previous meetings we have held, the latest one being on 19th of October, 2010 in your office at Alemgena on the subject matter referenced above.

In a series of previous meetings which consisted of discussion on the matter of road realignment in Debre Markos town, we have explained to your institution the inappropriateness of the realignment proposed by the HEC in their detail design. To support our argument/proposal in favor of taking the existing route A3 alignment, we have submitted in the meeting a document titled "*Study for Route Selection in Debre Markos under the Project for Rehabilitation of Trunk Road, Phase IV*" dated 28th September 2010. It has since been agreed that we proceed with our study and design following the existing route A3 in Debre Markos town.

Regarding the latest meeting held with yourselves on 19th October 2010 regarding applicable design standard, typical cross sections of road, countermeasure for expansive soil (black cotton soil) and bridge planning (bridges and culverts) including cross sections, we discussed matters based on the guiding document distributed in the meeting titled "*Discussion for the Design Conditions and Concepts*". In the course of the meeting most matters in the above documents were agreed upon except few that were left pending for further reconsideration or after the conclusion of topographic survey. Of the pending matters, we would like to mention them one by one and state our envisaged action plan

Pending Item	Planned action
1. Min. gradient (from 0.5% to 0.3%	The team will prepare an explanation covering such matters as drainage, cross gradient, pavement design for skid resistance in wet conditions etc, and explain to ERA
2. Km 58~58.7 alignment to follow existing A3 route	The Team to complete topographic survey to assess and confirm elements such as number of PAPs and alignment geometry before settling for the proposed alignment.
3. Km 61.3~62.4 Road width	The Team to re-check the possibility of increasing the shoulder width from 2.5m to 3.5m depending on the availability of free space without increase in number of affected houses and PAPs
4. Km 64.2~65.4 Median width	Median size of 0.5m is acceptable in principle but the team will reconsider widening the median according to the results of topographic survey and if the number of affected houses and PAPs does not increase.
5. Black Cotton Soil treatment	The Team will revise the plan for countermeasure including but not limited to; benching into existing pavement for proper interlocking between exiting pavement layers and widened section and to minimize/eliminate differential settlement, increasing the replacement depth, installing sub-drains, etc .

13 Page(s)

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Tel. +81-3-6311-7894 Fax. +81-3-6311-8043 Cell: 0912 964 852 E-mail. tatsumi@oriconsul.com

Regarding plan for detour during bridge or road construction, the Team will consider case by case depending on season of construction and site condition, where to apply soil embankment detour, temporary culvert and embankment detour, Bailey bridge detour, graded and gravel-leveled detour road, etc, in the project construction plan. However, the final plan will be subject to modifications arising from e.g. the Contractor's proposal and so on.

This is for your kind information, update concerning pending design issues for your action and/or the Team's action where applicable.

Attached hereto please find documents with the following titles:

1) Study for Route Selection in Debre Markos under the Project for Rehabilitation of Trunk Road, Phase IV
2) Discussion for the Design Conditions and Concepts

Yours sincerely,

ORIENTAL CONSULTANTS Co. Ltd. The Project for Rehabilitation of Trunk Road, ETHIOPIA

Masaaki TATSUMI Dr. Eng
Oriental Consultants Company Limited
JICA Study Team, Chief Consultant

Cc: Mr. Abdo Mohammed,
DDG Engineering & Regulatory Department,
Ethiopian Roads Authority.

for 22/10/10

12-1, Honmachi 3-chome, Shibuya-ku, Tokyo, 151-0071 Japan
Tel. +81-3-6311-7894 Fax. +81-3-6311-8043 Cell: 0912 964 852 E-mail. tatsumi@oriconsul.com

Agenda for the meeting
for the Preparatory Survey on the Project for Rehabilitation of Trunk Road, Phase IV
in the Federal Democratic Republic of Ethiopia

Venue: ERA Central Regional Directorate Office, Alemgena

Time: 2010/10/19, 14:30 – 16:00

Agenda: The meeting will discuss matters related to the abovementioned project with particular attention to the following items;

1. Applicable Design Standard
2. Typical Cross Sections of Road
3. Countermeasure for the Expansive soil (Black Cotton soil)
4. Bridge Planning (Bridges and culverts) including cross sections

Meeting Material Content

(1) Table of Geometric Design Conditions
(2) Figure of Typical Cross Section of Road
(3) Figure of Countermeasure for the BC soil
(4) Table of Subgrade Condition in the Project Road
(5) Table of Concept of Structures (Bridges and Culverts)

Discussion for the Design Conditions and Concepts

1. Applicable Design Standard

(1) Design Standards

The application of proper design standards will ensure road safety, high standard service level and comfort for road users through the provision of adequate sight distance and roadway space.

The design and construction standards for new roads and bridges have been established by ERA in Ethiopia. The following is the composition of ERA's Road Design Manual:

- Geometric Design Manual
- Drainage Design Manual
- Pavement Design Manual Vol.1: Flexible Pavements and Gravel Roads
- Pavement Design Manual Vol.2: Rigid Pavements
- Pavement Rehabilitation and Asphalt Overlay Manual
- Bridge Design Manual
- Site Investigation Manual
- Standard Detail Drawings
- Standard Technical Specifications

The latest version of the manual was published in 2002.

The Road Design Manual is intended for use in the design of all federal roads in Ethiopia. The purpose of the manual is to give guidance and recommendations to the engineers responsible for the design of federal roads.

(2) Geometric Design Parameters

Geometric design standard was prepared as part of the Road Design Manual in Ethiopia. This design standard will be basically followed for this study as well as HEC's design. In case essential parameters are not expressly stipulated in design standard, the Study Team will refer to other design standards and manuals (such as SATCC and Japanese Road Geometric Standard).

Observations during the field survey indicate that the Road under Study traverses various topographical conditions. Thus, the Study Team finally recommends following geometric standard based on the design standard and HEC's design.

Road Class (DS3: Paved)							
Design Element	Unit	Flat	Rolling	Mountainous	Escapment	Urban/Peri-Urb	Remarks
Design Speed	km/h	100	85	70	60	50	
Min. Stopping Sight Distance	m	205	155	110	85	55	
Min. Passing Sight Distance	m	375	340	275	225	175	
% Passing Opportunity	%	50	33	25	0	20	
Min. Horizontal Curve Radius	m	395	270	175	125	85	
Min. Length of Curve	m	300	300	300	300	300	Tangent Angle of 5° or less (ERA Standard)
	m	350	260	190	150	100	Japanese Standard: Design Speed x 6sec.
Transition Curves Required	-	Yes	Yes	No	No	No	
Max. Radius for use of a Transition Curve	m	1450	1050	-	-	-	SATCC: 0.145 x V^2
Spiral Length	m	R=400:L=123, R=500:L=98, R=600:L=82, R=700:L=70, R=800:L=62, R=900:L=55, R=1,000:L=49, R=1,100:L=45, R=1,200:L=41, R=1,300:L=38, R=1,400:L=35	R=300 L=100, R=400 L=75, R=500 L=60, R=600 L=50, R=700:L=43, R=800 L=38, R=900 L=34, R=1,000:L=30	-	-	-	SATCC: 0.0702V^3/ (RC) C: Rate of increase in centripetal acceleration (m/s3); 1<C<3 (1.438 is recommended.)
Max. Gradient (desirable)	%	3.0	4.0	6.0	6.0	6.0	
Max. Gradient (absolute)	%	5.0	6.0	8.0	8.0	8.0	
Min. Gradient (desirable)	%	0.5	0.5	0.5	0.5	0.5	
Min. Gradient (absolute)	%	0.3	0.3	0.3	0.3	0.3	Japanese Standard: Design Speed x 6sec.
Crest Vertical Curve (k-value)	k	105	60	31	18	12	
Sag Vertical Curve (k-value)	k	51	36	25	18	12	
Max. Superelevation (e)	%	8.0	8.0	8.0	8.0	8.0	
Normal Crossfall	%	2.5	2.5	2.5	2.5	2.5	
Shoulder Crossfall	%	4.0	4.0	4.0	4.0	4.0	
Right of Way	m	COI	COI	COI	COI	COI	Corridor of Impact (Construction Limit)
***Normal Wereda towns and Kebele towns are included in Urban/Pre-Urban.**							

Major changes and additions are as follows:

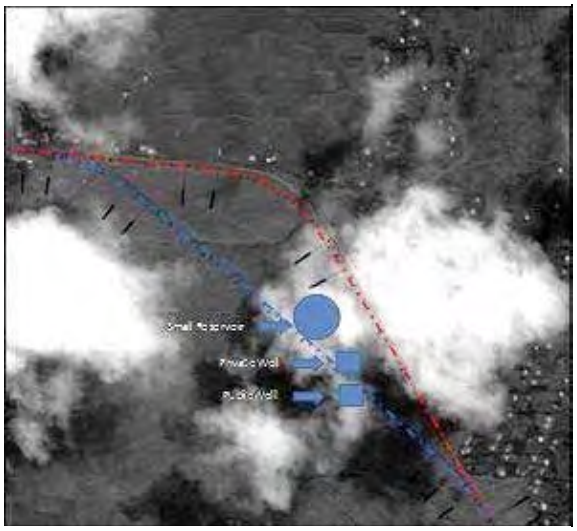
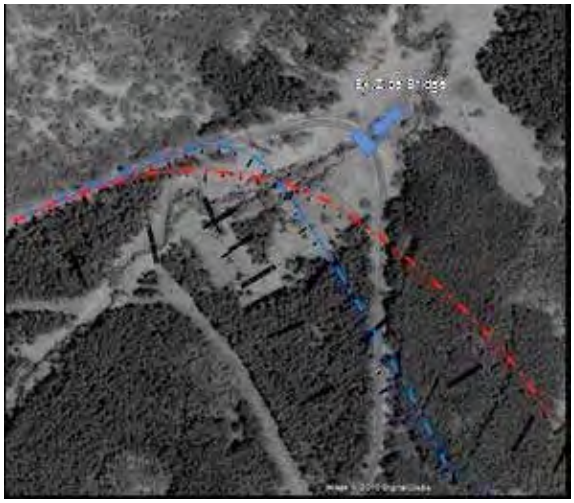
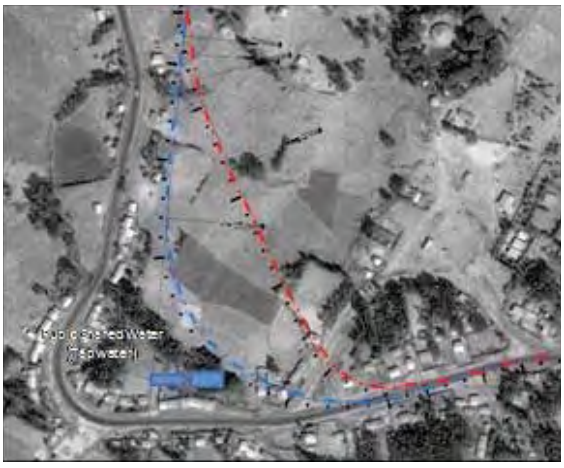
- Min. Length of Curve: Regardless of design speed, ERA's standard stipulates length of 300m. However, it is difficult to secure the curve length of 300m in hilly, mountainous and densely populated areas. It is for this reason that the Study Team will recommend the use of Japanese Standard that considers the curve length depending on the design speed.

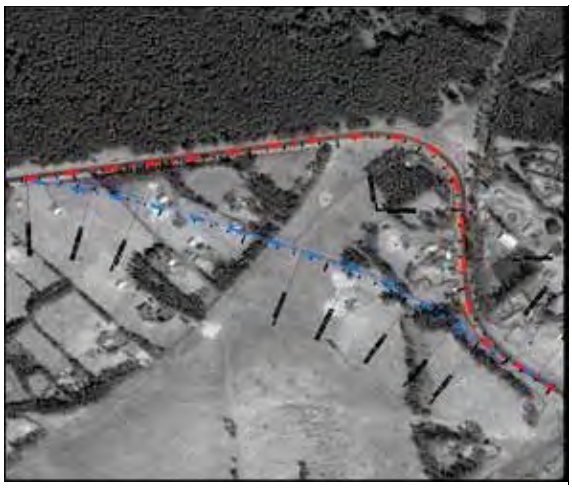
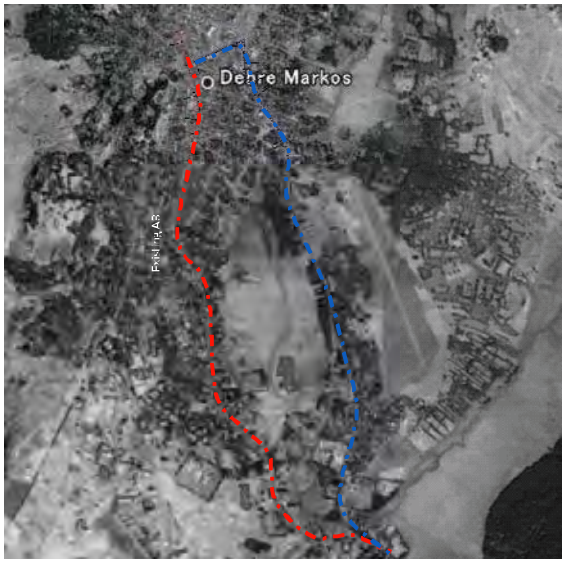
- Max. Radius for use of a Transition Curve: not stipulated (Use of SATTC)

- Spiral Length: not stipulated (Use of SATTC)

- Min. Gradient: ERA's standard stipulates minimum gradient of 0.5%. However, securing of min. 0.5% in flat area such as Yeda would mean a substantial increase in construction cost with the commensurate increase in affected area. Thus min. gradient of 0.3% on Japanese standard will be used in absolute necessity.

(3) Major Alignment Change

Location Map	Reasons & Interferences
	7.4km – 8.7km: Yetnora Reason - To avoid the following interferences - To reduce the number of affected houses - Possible to improve horizontal alignment by new CL Interference - Two wells - Small reservoir - Some houses : Original CL by HEC : Proposed new CL
	44.0km: Ziba Br. Reason - To improve the alignment for traffic safety (response to high speed) Interference: - : Original CL by HEC : Proposed new CL
	46.2 – 46.7km: Amber Reason - To avoid the following interferences - To reduce the number of affected houses - Possible to improve horizontal alignment by new CL Interference - Public water supply facility - Some houses : Original CL by HEC : Proposed new CL

	52.1 – 55.2km: Erosion prone Area Reason - To avoid the serious erosion area and high embankment - Possible to improve horizontal alignment by new CL Interference: - : Original CL by HEC : Proposed new CL
	58.0 – 58.7km: Chemoga Reason - To reduce the number of affected houses - Possible to improve horizontal alignment Interference - Some houses : Original CL by HEC : Proposed new CL
	61.3km – End: Debre Markos Reason - Adequacy of international trunk road - Complicated connection to A3 (Original route) - To reduce the number of affected houses Interference - Some houses and buildings : Original CL by HEC : Proposed new CL

(4) Pavement Design

- ✓ Pavement Design Condition: It is based on the HEC's design
- ✓ Design Life: 15years
- ✓ Sub-grade Strength Class: S2 (0km – 53km), S3 (53km – 65km)
- ✓ Vehicle Equivalent Factor (VEF): see table below:

Vehicle Category	Base year Traffic	T_c	EF	CESA
Large Bus	72	675853.48	2.29	1547704.47
Medium Truck	45	403331.17	2.76	1113194.03
Heavy Truck	36	322664.93	7.25	2339320.78
Truck and Trailer	46	412294.08	12.26	5054725.42
			Total	10,054,944.70
Applying lane distribution factor of 90% for single lane i.e. .9*10054944.7				9,049,450.23 (Class T6)

Based on ERA's manuals, for traffic classes of T6, the required pavement layers with asphalt concrete surfacing, crushed granular road base and granular sub-base for the design periods of 15 years are as shown in the table below.

Station	Sub-grade class	Pavement Layers (mm) for 15 years & traffic class T6			
		AC	Base course	Sub- base	G.C
0km-53km	S2	100	200	225	200
53km-65km	S3	100	200	250	-

Detail design report by HEC had finally recommended the following pavement layers because uncertainties such as the traffic volume and analysis as well as the sub grade soil testing and evaluation should be considered.

Station	Sub-grade class	Traffic class	Pavement Layers (mm) for 15 years & traffic class T6			
			AC	Base course	Sub- base	G.C
0km-53km	S2	T6	100	200	225	200
53km-65km	S3	T6	100	250	300	-

However, for Japanese ODA policy, minimum requirement based on technical theory is acceptable. Thus the Study Team will recommend the following pavement layers:

Station	Sub-grade class	Traffic class	Pavement Layers (mm) for 15 years & traffic class T6			
			AC	Base course	Sub- base	G.C
0km-53km	S2	T6	100	200	250*	200
53km-65km	S3	T6	100	200	250	-

*225mm of sub-base required by the manual will be changed to 250mm in consideration of easy construction and supervision.

2. Typical Cross Sections

(1) Recommendable Typical Cross Sections

The Study Team will recommend the following typical cross sections based on the field survey and design review. Main changes are as follows:

- ✓ Reduction of median strip: 2.5m to 0.5m
- ✓ Installation of unpaved protection shoulder: 0.5m

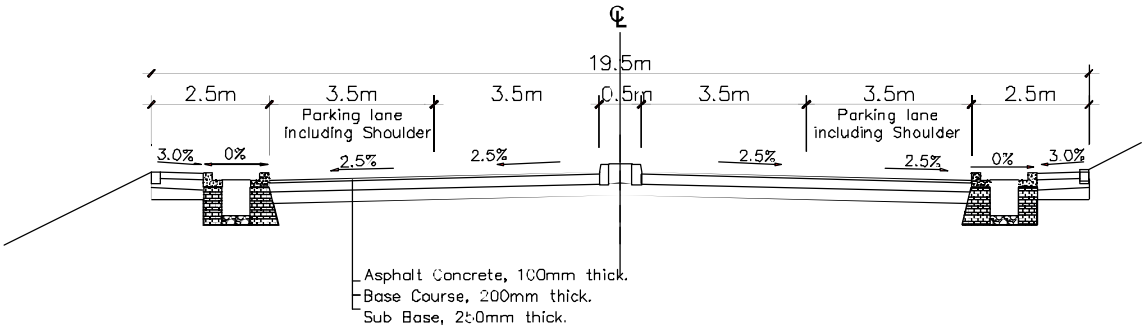


Figure-1 Proposed Typical Cross Section (D/Markos Town Center Section)

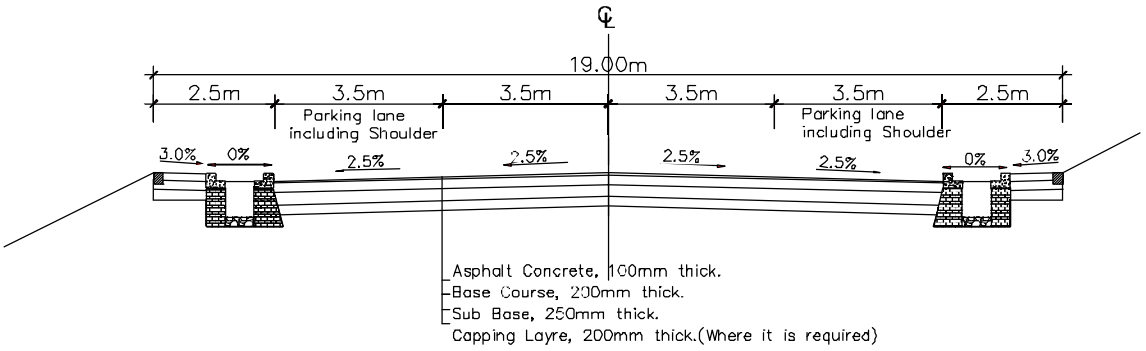


Figure-2 Proposed Typical Cross Section (Wereda Town and Populated Area in D/Markos)

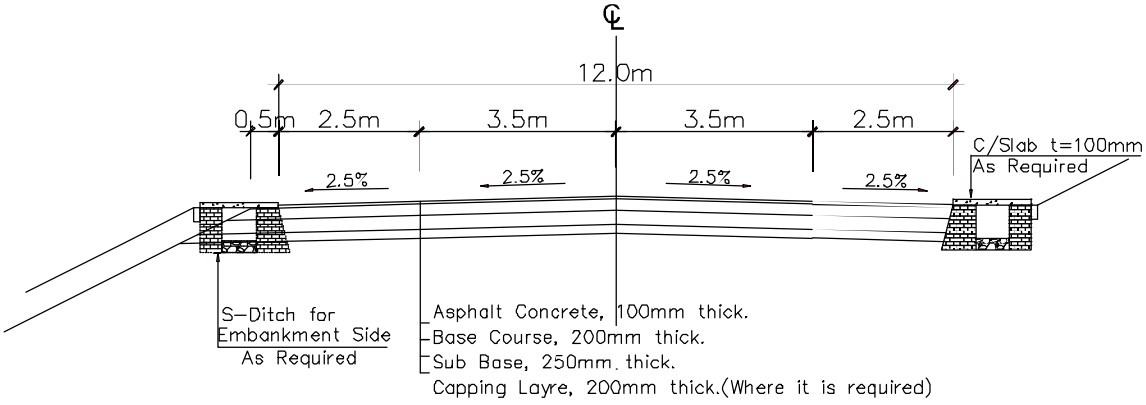


Figure-3 Proposed Typical Cross Section (Kebele Town & Entrance of D/M & End of Dejen)

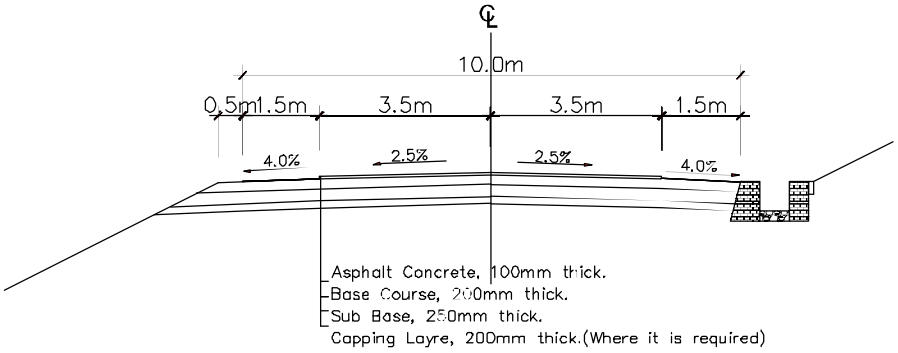
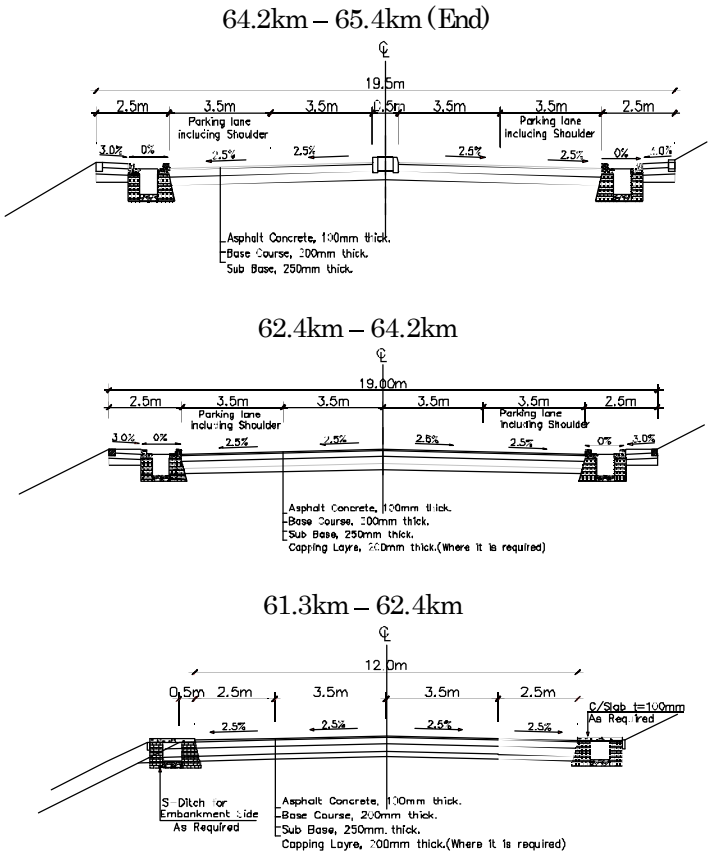


Figure-4 Proposed Typical Cross Section (Rural Section)

(2) Typical Cross Section in Debre Markos Town

Section Plan for A3 in Debre Markos	Applicable Cross Sections
	

3. Countermeasures for the BC Soil (Expansive Soil): e.g. Rural Area

Black cotton soils are problematic for Civil Engineers, because of their unconventional behavior. These soils show large volumetric changes with respect to seasonal variation of moisture content. These soils when subjected to vehicular traffic, road pavement heaves and cracks due to cycles of swelling and shrinkage. The Study Team will recommend the following measures based on the field survey, soil testing and visits made to similar projects.

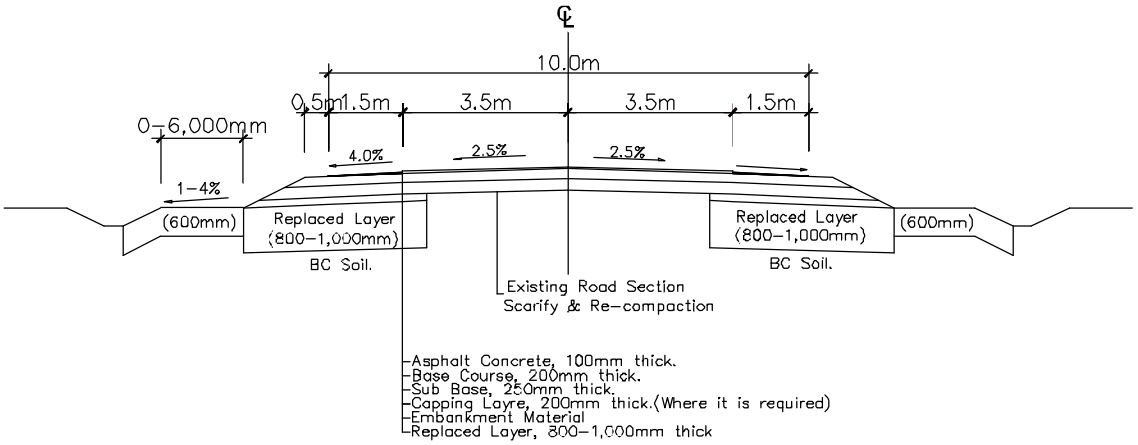


Figure-1 Existing Pavement Section in Rural Area

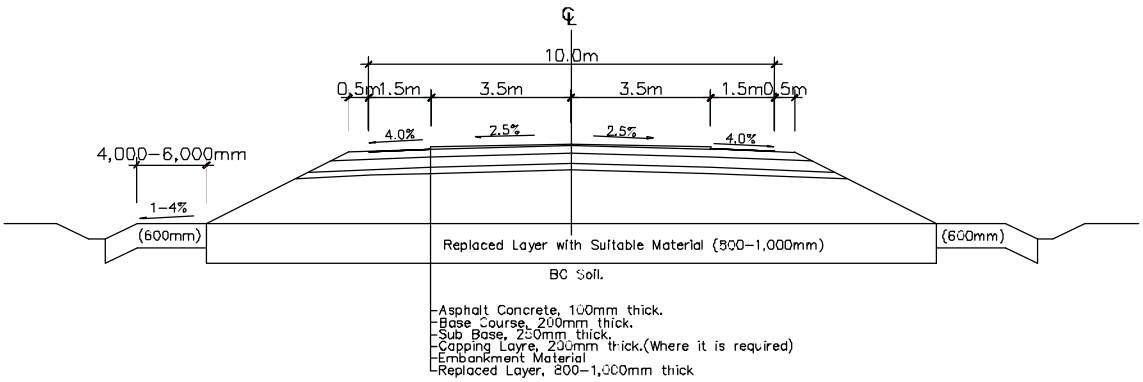


Figure-2 New Road Section (Bypass) in Rural Area

Subgrade condition between Dejen and Lumame

Boring or Pit	Chainage	Location	BCS	Red. / Brn	N value	CBR	Swell %	PI	NMC	S.L.	Eex
NTP 01	1+500		0.8-2.0		< 10			38			
NTP 02	4+000		0.6-2.6		< 10	2	10.0	51			112
NBH 01	5+060		1.0-2.5		8-9			77	39	3.2	
NTP 03	5+500		0.5-1.9		< 10			48			
BH 09	8+500	Yetnora	0.95-2.7		2-6			47			
NTP 05	9+500		0.8-2.8		< 10			46			
BH 10	10+500		0.0-2.0		3-10			36	31		
BH 11	11+400		0.0-4.0		4-9			25	40		
NTP 06	11+500		0.5-3.1		< 10			73			
BH 12	12+500	Bechet	0.5-2.5		1-6			52	46		
NTP 07	13+500		0.7-2.5		< 10	2	8.0	42			97
NBH 02	14+560		0.6-2.0		8			72	39	2.8	
NTP 08	15+500		0.8-2.5		< 10			62			
NTP 09	16+500		0.9-2.6		< 10			73			
NTP 10	17+500		0.6-2.4		< 10			74			
BH 13	18+500	Taba	0.0-3.0		1-4			78	51		
NTP 11	19+500	Wejel	0.5-2.4		< 10			47			
BH 14	20+000	Aba Adem	0.0-2.1		3-4			52			
NBH 03	20+090	Aba Adem	0.5-3.5		9-14			70	44	4,4	
NTP 12	21+500		1.1-2.4		< 10			51			
NBH 04	22+040	Abeya	1.0-13.0		2-9			51	46	7.3	
NBH 05	22+080	Abeya	1.0-11.0		4-11			53	44		
NTP 13	23+000		0.6-3.0		< 10	2	8.4	51			128
NTP 14	24+000		1.6-2.5		< 10			57			
NTP 15	26+500		0.8-3.0		< 10	2	12.4	43	53	9	90
NBH 06	26+500		0.6-2.5		4-5			52	53	6.2	
NTP 16	27+500		0.7-2.7		< 10			71			
NTP 17	29+000		0.5-3.0		< 10			63			
NBH 07	29+300	Bogena	0.6-3.9		10			43	31		
NBH 08	29+390	Bogena	1.0-3.9		5-6			70	61		
NPT 18	30+000		1.1-3.0		< 10			59			

Note; BCS: Black cotton soil, Eex: Expansiveness

Subgrade condition between Lumame and Debre Markos

Boring or Pit	Chainage	Location	BCS	Red. / Brn	N value	CBR	Swell %	PI	NMC	S.L.	Eex
NTP 19	32+000		-	Red		9	1	43	35	14	81
NTP 20	34+500		-	Brn				46			
NBH 09	35+670	Getla									
NTP 21	36+000		0.0-1.3		< 10			50			
NTP 22	37+500		0.0-1.4		< 10			54			
NTP 23	38+500		0.5-2.7		< 10			32			
NTP 24	40+500		-	Red				28			
NTP 25	42+500		-	Red		9	1.2	28	31	17	33
NTP 26	43+500		-	Red				25			
NBH 10	44+060		-	Red	> 12			21	35	15	
NTP 27	45+500		-	L/Brn				24			
NTP 28	46+500		-	D/Brn				40			
NBH 11	47+420	Yeda	0.0-5.5		4-10			57	35	6.8	
NTP 29	48+000	Yeda	> 4.0		< 10			58			
NBH 12	48+900	Yeda	0.0-10		5-10			40	43	7.8	
NBH 13	49+200	Yeda	0.0-10		1-9			32	49	10.7	
NTP 30	49+500	Yeda	> 4.0		< 10	2	7.9	43	36	14	81
NBH 13-2	50+200	Yeda	0.0-2.4		4-10			54	37	2.5	
NTP 31	50+500	Yeda	0.0-2.7		< 10			44	46	13	85
NTP 32	51+500		-	Red				37			
NTP 33	53+000		-	L/Brn				22			
NBH 15	53+500	Ambesh	-	D/Brn							
NTP 34	55+000		-	Red				38			
NTP 35	56+500		-	D/Brn		4	3.8	31	41	14	49
NTP 36	57+500		-	Red				39			
NBH 16	57+890	Chemoga	-	L/Brn	2-8			31	45		
NBH 17	58+020	Chemoga	-	L/Brn	> 11			40	35		
NTP 37	59+000		-	Red				36			
NTP 38	60+500		-	Red				23			
BH 19	61+000	Wiseta	-	Red	2			27	44		

Note; Red; Reddish silty clay, L/Brn; Light brown silty clay, D/Brn; Dark brown silty clay

4. BRIDGE PLANNING

(1) Use of Existing Bridges

Existing bridges will be used if they meet the criteria for compatibility to the new road alignment, structural soundness, and functional requirements. The Bridge Design manual of ERA requires the minimum carriageway of 7.0 m for 2-lane bridges. If necessary and if feasible, repair works will be conducted to improve the function and to satisfy the requirements.

(2) Bridge Length

Based on the necessary clearance under the superstructure such as waterway function and topography, the bridge length will be decided.

(3) Carriageway

Carriageway will be decided according to the Bridge Design Manual of ERA, in consideration of the continuity with approach roads and expected number of pedestrians. The carriageway width of bridges in rural area is 8.0m, (0.5m+3.5m+3.5 m+0.5m). The Aba Adem Bridge which is located in Wejel and the Useta Bridge in Debre Markos are expected to be used by many pedestrians. The carriageway of the Aba Adem Bridge and the Useta Bridge is 10m, (1.5m+3.5m+3.5m+1.5m), and 12m, (2.5m+3.5m+3.5m+2.5m), respectively taking into account the traffic conditions.

(4) Bridge Type

✓ Type by Material

The Reinforced Concrete Bridge (RC Bridge) is the most suitable bridge type for short spans. Table-1 shows the comparison of bridge types by materials.

Type		Features	Evaluation
Concrete Bridge	Reinforced Concrete Bridge	Suitable for short spans No major technical difficulties No difficulty in obtaining necessary materials No difficulty in Quality Control Cost-effective Suitable for Technology Transfer	○
	Prestressed Concrete Bridge	Suitable for longer spans than RC bridges Light weight than RC bridges Advance technology Need of imported materials Difficulty in Quality Control Costly than RC bridges	×
Steel Bridge		Imported materials Difficulty in construction Costly than concrete bridges Difficulty at maintenance stage Easy to repair than concrete bridges	×

✓ Structural Type

Structural Type will be decided by the following criteria.

Structural Type	Span Range
Reinforced Concrete Slab Bridge	5~10m
Reinforced Concrete Girder Bridge	10~20m

✓ RC Box Culvert

When the bridge construction is judged to be difficult or not appropriate due to difficult site conditions, the RC Box Culvert will be planned. The following table compares the bridges and RC box culverts.

Structure	Features
Bridges	Suitable for longer spans Wider clearance under the superstructure Concentration of forces at abutments and piers Need of strong ground layer Need of bearing supports and expansion joints
RC Box Culverts	Smaller clearance than that of bridges No bearing supports and expansion joints No need of abutments and piers Applicable to less strong ground condition No difficulty in adjustment of road surface

(5) Design Method

The bridge design shall meet the Bridge Design Manual of ERA. However, calculation is based on Japanese bridge design methods and check if the result meets the Bridge Design Manual of ERA.

✓ Bridge Planning

a) Existing Bridges

Bridge	Length	Carriageway	Type	Major Repair
Asamatech	5.0 m	7.0 m	RC Girder	Slab, Parapet
Taba	13+13 m	7.3 m	RC Girder	None
Bogena	13.1 m	7.0 m	RC Girder	Slab, Parapet
Chemoga	67.0 m	7.0 m	Masonry Arch	Slab, Parapet

b) New Bridges

Bridge	Length	Carriageway	Type	Substructure Type
Bechet	17+17 m	8.0 m	RC Girder	Direct Foundation
Abadem	15 m	10.0 m	RC Girder	Direct Foundation
Abeya	3@ 4.5 m	8.0 m	RC Culvert	—
A3-4-012	2@ 4.5 m	8.0 m	RC Culvert	—
Getla	15+15 m	8.0 m	RC Girder	Direct Foundation

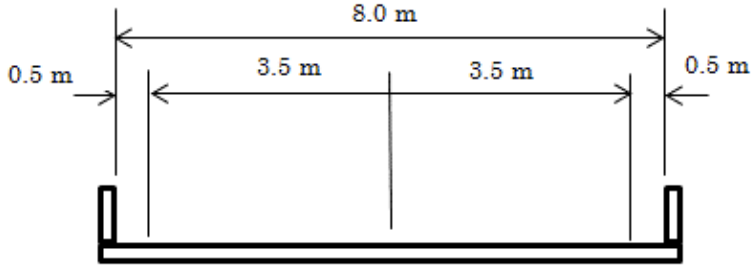
A3-4-017	15 m	8.0 m	RC Girder	Direct Foundation
Zeba	15 m	8.0 m	RC Girder	Direct Foundation
Yeda-A	2@ 4.5 m	8.0 m	RC Culvert	—
Yeda-B	2@ 4.5 m	8.0 m	RC Culvert	—
Yeda-C	5@ 4.5 m	8.0 m	RC Culvert	—
Ambesh	2@ 4.5 m	8.0 m	RC Culvert	—
Useta	10+10 m	12.0 m	RC Girder	Direct Foundation

c) Existing and New Bridges (reference)

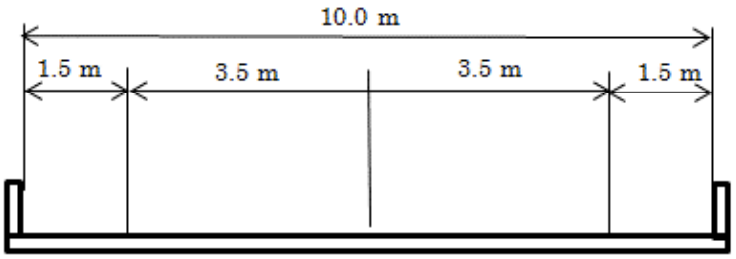
Bridge	Existing Bridge			New Bridge		
	Length	Carriageway	Type	Length	Carriageway	Type
Asamatech	5.0 m	7.0 m	RC Girder			
Bechet	32.0 m	6.0 m	Masonry Arch	17+17 m	8.0 m	RC Girder
Taba	13+13 m	7.3 m	RC Girder			
Abadem	12.0 m	6.0 m	Masonry Arch	15m	10.0 m	RC Girder
Abeya	7+7+7 m	6.0 m	RC Girder	3@ 4.5 m	8.0 m	RC Culvert
Bogena	13.1 m	7.0 m	RC Girder			
A3-4-012	7.8 m	5.5 m	Masonry Arch	2@ 4.5 m	8.0 m	RC Culvert
Getla	13.1 m	7.0 m	RC Girder	15+15 m	8.0 m	RC Girder
A3-4-017	7.0 m	6.0 m	Masonry Arch	15 m	8.0 m	RC Girder
Zeba	11.0 m	5.5 m	RC Girder	15 m	8.0 m	RC Girder
Yeda-1	4@ 5.0 m	7.0 m	RC Girder	2@ 4.5 m	8.0 m	RC Culvert
Yeda-2	4@ 5.0 m	7.0 m	RC Girder	2@ 4.5 m	8.0 m	RC Culvert
Yeda-3	6+6+6 m	7.0 m	RC Girder			
Yeda-4	3.5+4 m	7.0 m	RC Girder	5@ 4.5 m	8.0 m	RC Culvert
Ambesh	8.0 m	6.0 m	Masonry Arch	2@ 4.5 m	8.0 m	RC Culvert
Chemoga	67.0 m	7.0 m	Masonry Arch			
Useta	12.3 m	5.0 m	RC Girder	10+10 m	12.0 m	RC Girder

d) Carriageway Plan (reference)

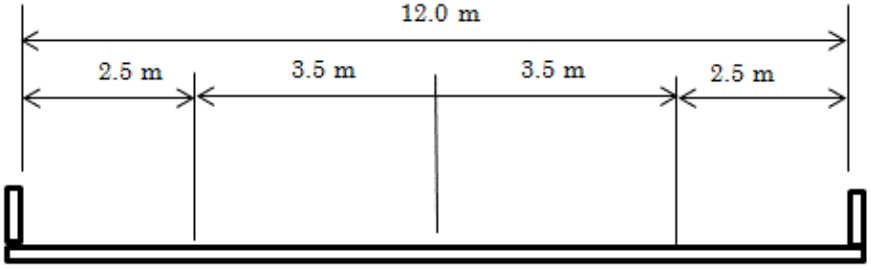
Rural Area



Aba Adem Br (Wejel)



Useta Br (Debre Markos)



Ref. No.ERA/ADM/101025/PO

Date: 25 October 2010

Ms Hiwot Mossisa
Central Region Directorate, Acting Director 25/10/2010
Ethiopian Roads Authority (ERA)
Addis Ababa

Dear Madam,

RE: PROPOSED COUNTERMEASURE FOR EXPANSIVE (BLACK COTTON) SOILS AND PROPOSED MINIMUM VERTICAL GRADIENT
ON
THE PROJECT FOR REHABILITATION OF TRUNK ROAD, PHASE IV

We would like to draw your attention to the aforementioned project and previous meetings we have held, the latest one being on 22nd of October, 2010 in your office at Alemgena on the subject matter referenced above. It was also agreed that bridge design will be based on ERA's Bridge Design Manual 2002 except that the design procedure will follow Japanese Standard, then the results will be rechecked whether or not they satisfy ERA Standards.

Regarding countermeasure for expansive (black cotton) soils, our proposal was agreed by your side but only in principle with some comments. Your comments were that the Consultant should incorporate a filter membrane (such as geo-textile sheet) and an impermeable membrane on the outer and inner face of the buried gabion, respectively. The inclusion of such membranes and protection method for gabion bed will be decided at a later stage after confirming matters such as highest ground water table, etc, and determining whether or not buried gabions will be applied. At the moment, the concept is to have the image of the probable features of road cross section in town areas. Moreover, your side recommended that a provision for side drains be indicated on the typical cross sections on the existing road section in high embankment and new road section in rural areas.

In response to your comments, we have duly modified our proposal for typical cross sections to be adopted in cases where black cotton soils are predominant. Please see the attached document titled "Countermeasure for expansive soil on the Trunk Road A3 between Dejen and Debre Markos"

Regarding the issue of minimum vertical gradient, we wish to clarify and reiterate our proposal to adopt the 0.3% min gradient as a deviation from the ERA Standard that states 0.5% min gradient as the usual norm. Your attention is drawn to *page 9.9, section 9.7 Minimum Gradients* of ERA Geometric Design Standard that states: "The minimum gradient for the usual case is 0.5 percent. However, flat and level gradients on uncurbed paved highways are acceptable when the cross slope and carriageway elevation above the surrounding ground is adequate to drain the surface laterally."

It is in the strength and spirit of the above extract from ERA manual that we would like to request for a departure from the ERA's usual-case standard in line with Chapter 2, Section 2.3 page 2-1 of ERA Manual 2002 that stipulates the information required to be submitted to ERA for approval of the requested departure from standard.

For details please refer to the attached document titled "Acceptable Minimum Gradient (Acceptable Geometric Parameter)" Moreover, please see our departure request as summarized in the table below;

12-1, Honmachi 3-chome, Shibuya-ku, Tokyo, 151-0071 Japan
Tel. +81-3-6311-7894 Fax. +81-3-6311-8043 Cell: 0912 964 852 E-mail. tatsumi@oriconsul.com

Road Name	Facet of Design	Usual Standard	Proposed departure	Reasons for Departure
Trunk Road A3, between Dejen and Debre Markos (Flat lowlands such as Yeda area)	Minimum (longitudinal) Gradient	Min 0.5%	Min 0.3%	- To reduce the volume of earthworks thereby reducing construction cost. - To reduce affected area.

Some of the mitigation measures we propose with the use of min 0.3% gradient are;

i) Use of high-type AC pavement: 10cm (double layer)
ii) Accurately set cross slope of 2.5% to ease lateral surface draining
iii) Use of high standard quality control to achieve improved firm sub-grade

We therefore request for your evaluation and approval of our proposals made in this letter for the expeditious progress of the design work.

Yours sincerely,

ORIENTAL CONSULTANTS Co. Ltd. The Project for Rehabilitation of Trunk Road, ETHIOPIA

Masaaki TATSUMI Dr. Eng
Oriental Consultants Company Limited
JICA Study Team, Chief Consultant

Cc: Mr. Abdo Mohammed, Sat 25/10/10
DDG Engineering & Regulatory Department,
Ethiopian Roads Authority.

1. Acceptable Minimum Gradient (Acceptable Geometric Parameter)

As discussed in the previous meetings held on 19th and 22nd of October, 2010, the JICA Study Team recommended using 0.3% as min. gradient as follows:

- Min. Gradient: ERA's standard stipulates minimum gradient of 0.5%. However, securing of min. 0.5% in flat area such as Yeda would mean a substantial increase in construction cost with the commensurate increment of affected area. Thus min. gradient of 0.3% according to Japanese standard will be used in absolute necessity.

Road Class (DS3: Paved)							
Design Element	Unit	Flat	Rolling	Mountainous	Escarpment	Urban/Peri-Urb	Remarks
Design Speed	km/h	100	85	70	60	50	
Min. Stopping Sight Distance	m	205	155	110	85	55	
Min. Passing Sight Distance	m	375	340	275	225	175	
% Passing Opportunity	%	50	33	25	0	20	
Min. Horizontal Curve Radius	m	395	270	175	125	85	
Min. Length of Curve	m	300	300	300	300	300	Tangent Angle of 5° or less (ERA Standard)
	m	250	260	190	150	100	Japanese Standard: Design Speed x 6sec.
Transition Curves Required	-	Yes	Yes	No	No	No	
Max. Radius for use of a Transition Curve	m	1450	1050	-	-	-	SATCC: $0.145 \times V^2$
Spiral Length	m	R=400:L=123, R=500:L=98, R=600:L=82, R=700:L=70, R=800:L=62, R=900:L=55, R=1,000:L=49, R=1,100:L=45, R=1,200:L=41, R=1,300:L=38, R=1,400:L=35	R=300:L=100, R=400:L=75, R=500:L=60, R=600:L=50, R=700:L=43, R=800:L=38, R=900:L=34, R=1,100:L=30	-	-	-	SATCC: $0.0702V^3/(RC)$ C: Rate of increase in centripetal acceleration (m/s3). 1<C<3 (1.438 is recommended)
Max. Gradient (desirable)	%	3.0	4.0	6.0	6.0	6.0	
Max. Gradient (absolute)	%	5.0	6.0	8.0	8.0	8.0	
Min. Gradient (desirable)	%	0.5	0.5	0.5	0.5	0.5	
Min. Gradient (absolute)	%	0.3	0.3	0.3	0.3	0.3	Japanese Standard: Design Speed x 6sec.
Crest Vertical Curve (k-value)	k	105	60	31	18	12	
Sag Vertical Curve (k-value)	k	51	36	25	18	12	
Max. Superelevation (e)	%	8.0	8.0	8.0	8.0	4.0	
Normal Crossfall	%	2.5	2.5	2.5	2.5	2.5	
Shoulder Crossfall	%	4.0	4.0	4.0	4.0	4.0	
Right of Way	m	COI	COI	COI	COI	COI	Corridor of Impact (Construction Limit)
- Normal Wereda towns and Kebele towns are included in Urban/Pre-Urban.							

For this recommendation, the Study Team fills in the gaps as follows.

2. Other Standards Recommendation

A. SATCC: not stipulated

B. AASHTO: Flat grades can typically be used without any problem on uncurbed highways where the cross slope is adequate to drain the surface water laterally. With curbed highways or streets, longitudinal grade should be provided to facilitate surface drainage. An appropriate minimum grade is typically 0.5 percent, but grades of 0.30 percent may be used where there is a high-type pavement accurately sloped and supported on firm sub-grade.

C. Japanese Standard: Flat grades are normally preferable, but long section with flat

grade will create some problem. Surface water on road should be drained by cross fall, but surface water sometimes remains on road surface due to problems such as rainfall intensity, drainage size, etc. It is therefore usual to set vertical gradient at least between 0.3 and 0.5 percent.

3. Reasons of Recommendation of 0.3 %

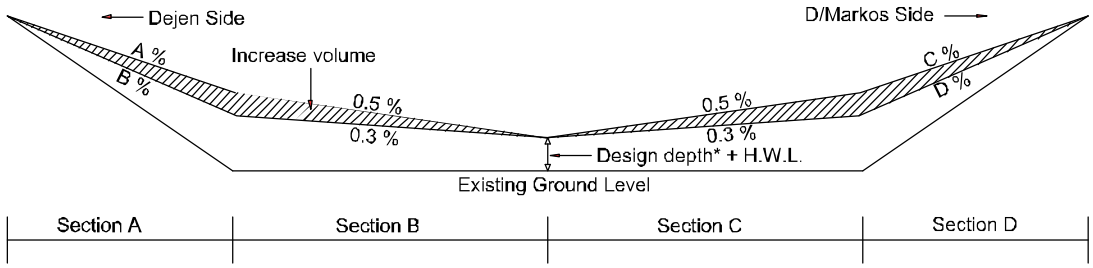
1) Livestock Corridor

Flat areas applied 0.3% min. gradient are currently being used as grazing land and/or livestock corridor. The study road may balkanize these areas and corridors by high embankment. For this reason, the embankments should be kept in low height as much as possible.

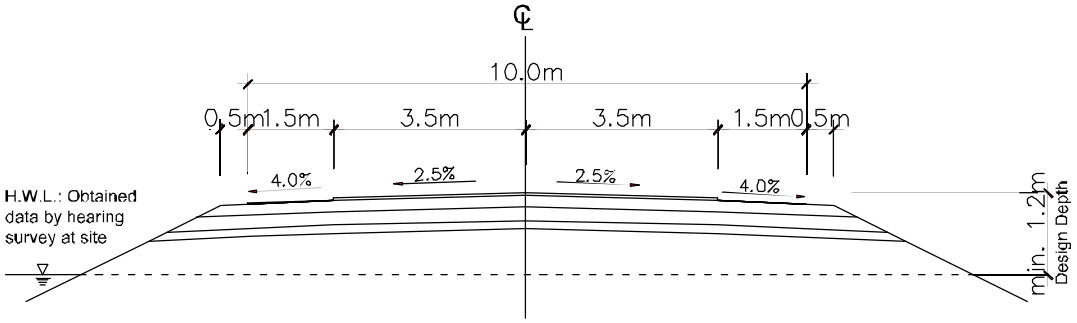
2) Reduction of Embankment Material

As mentioned previously, securing of min. 0.5% gradient in flat areas would mean a substantial increase in construction cost with the embankment material increase as follows:

Station										Gradient & Length				Total Increase Volume (m3)	Remark
										Sec.A	Sec.B	Sec.C	Sec.D		
0km+000	-	30km+510	0	+	200	-	1	+	200	1,000	2.65% 300	0.33% 700	- -	- -	7,496.10	Asametech
			11	+	0	-	12	+	420	1,420	1.60% 220	0.30% 1,200	- -	- -	28,840.20	Beket
			17	+	80	-	18	+	230	1,150	- -	0.30% 575	0.36% 575	- -	6,414.43	Taba
			21	+	280	-	23	+	220	1,940	- -	- -	0.30% 1,220	2.02% 720	40,320.18	Abeya
			25	+	580	-	26	+	920	1,340	4.54% 310	0.40% 405	0.30% 390	3.75% 235	2,922.05	Yegodena
Sub Total										**6,850**					**85,993**	
30km+540	-	65km+430	30	+	870	-	31	+	810	940	3.45% 222	0.36% 718	- -	- -	5,449.02	Rumame Behind of H.S.
			38	+	820	-	40	+	270	1,450	4.87% 1,025	0.35% 425	- -	- -	3,797.41	Godelma
			47	+	400	-	49	+	260	1,860	2.95% 560	0.30% 1,300	- -	- -	42,240.60	Yeda
Sub Total										**4,250**					**51,487**	
Total															**137,480**	



*Design depth: The design depth is defined as the depth from finished road level to the depth that load bearing strength of the soil no longer has an effect on the pavement's performance in relation to traffic loading. Following figure shows the design depth in relation to the main structural components of pavement and earthworks and it gives the design depth.



Flood and/or Flat Areas

Table: Standard for the Design Depth (i.e. Tanzania, S.A., Japan)

Tanzania Standard			S.A. Standard		Japanese Standard
Road Type	Design Depth (m)		Road Class	Design depth	
	General	Heavy Load			
Paved Trunk	0.8	1.2	A	1.0 – 1.2	1.0m from bottom of sub-base
			B	0.8 – 1.0	
Others	0.6	1.0	C	0.8	
			D	0.7	

4. Conclusion

From the results of study mentioned above, the Study Team recommend using gradient of 0.3% as minimum gradient under the following conditions based on AASHTO.

- To use asphalt concrete pavement: 10cm
- To set accurate slope (Cross slope)
- To support on firm sub-grade (well-compacted improved sub-grade)

Countermeasure for expansive soil on the Trunk Road A3 between Dejen and Debre Markos

1. Principle (ERA Site Investigation Manual 2002)

Mitigation measures for expansive soils are mentioned as follows in the Manual

(a) Realignment; this solution is possible only if the areas covered with expansive clays are of limited extent.

(b) Excavation and replacement; this simple procedure effectively eliminates the problems and is therefore recommended as much as possible. The investigations should focus on minimizing haulage of the materials, and this method will be economically viable only if suitable backfill material is available in the vicinity of the project road.

(c) Treatment with lime; treatment of expansive soils with hydrated lime can give good results. The addition of 4 to 6% of lime is usually required. This treatment is, however, costly, in particular because it is necessary to treat a substantial thickness of soil (minimum 30cm compacted thickness). Lime treatment would therefore be considered advantageous only where investigations failed to locate suitable backfill material.

(d) Minimizing Moisture Changes and Consequent Movements; if the above methods cannot be utilized, because of excessive costs or the absence of suitable backfill or replacement material, expansive clays may be used for fill and sub-grade. Special Practices are then necessary to avoid ingress of moisture into the road pavement that results in detrimental volume changes in the swelling soils. (Confining expansive clays under protective blankets, etc)

As the manual states, in case suitable backfill material is available, replacement procedure is applied as countermeasure for expansive soils. Since suitable backfill material is available in the vicinity of the project road, replacement method is preferable.

2. Thickness of soil replacement

Table-1 shows required replacement thickness stipulated in some countries' manual, recommended in some studies and adopted in some projects. ERA manual, Kenyan and SATCC manual mention maximum 1m as replacement thickness. Some U.S. state department procedure recommends 1.5m replacement thickness, and also 0.5 – 1.5m thickness was applied in Addis Ababa – Jima road. In the context of these manuals and experience, maximum replacement thickness is considered to be 1.5m.

Table-1: The provisions of manuals, performances and recommendations for replacement thickness for expansive soils

No	Name of manual	Description of the provision
1	ERA manual	It is usually considered sufficient to excavate the expansive soil to a depth of about 1m (even if some expansive soil remains under the backfill material, it will be confined and protected from moisture changes.) Such backfill material should exhibit strength (CBR) characteristics similar to those of the overlying embankment materials (preferably at least CBR on the order of 5, i.e. sub-grade strength class S3)
2	Zimbabwean Practice	Remove 700mm
3	Tanzanian practice	Remove 600mm
4	Kenyan manual	Recommends 1000mm
5	Indian case studies	Recommend removal of 1000mm
6	SATCC	Recommends 1000mm removal
7	Some U.S. state department procedure	Recommends removal up to 1500mm
8	CPC study in Ethiopia	Recommends 900 to 1200mm
9	Addis Ababa-Tarmaber project	Removed 800mm
10	Addis Ababa – Jima	•Removed 500 – 1500mm •Vertical barrier of LDPE sheeting (depth 2000mm)

3. Fluctuation area of water contents in expansive soil

The depth of moisture fluctuation is reported to be in the order of 2m to 3m, the Figure-1 shows the model of moisture fluctuation mechanism. Cracks develop from ground surface to maximum depth of about 1.5m according to some investigation. Moisture contents vary from ground surface to depth 3m as in Figure-1. Moisture content of ground surface increases with depth until about 3m during dry season, while it decreases during rainy season on the contrary. Moisture content below about a 3m depth is reported to be stable, and therefore does not fluctuate.

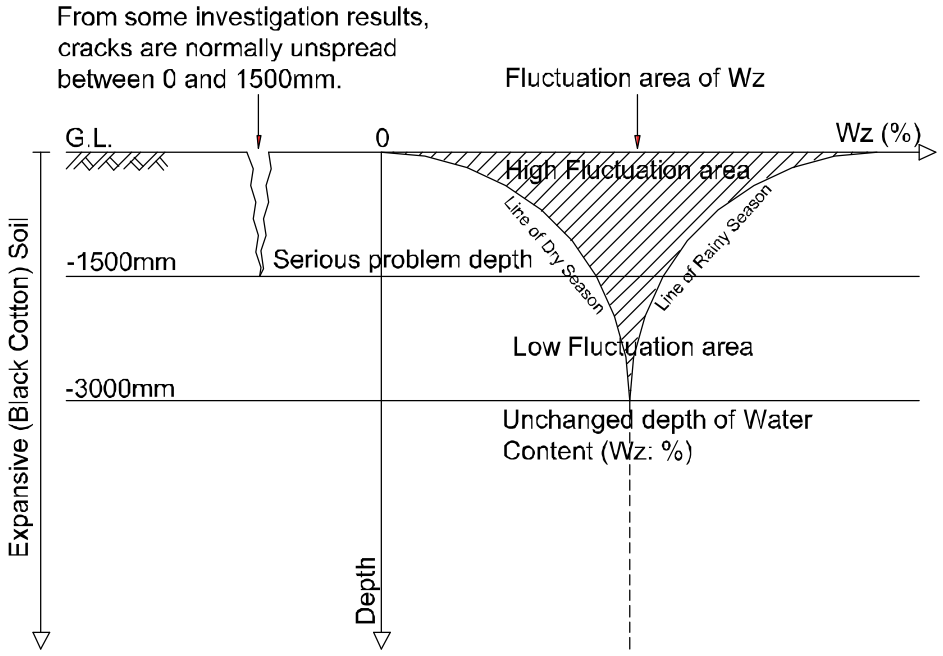


Figure-1: Extent of the Impact by BC Soil

4. Geological condition of project road

Geological conditions from Dejen to Lumame (30.5km) and from Lumame to Debre Markos (35km) are described in accordance with the results of test pits and borehole investigation in Tabel-2 and Table-3.

Expansive soil (BCS; Black cotton soil) is observed along the entire alignment between Dejen and Lumame. Most depths of BCS fall in the range 2 – 3m; however, some depths reach about 10m in Abeya river area where it is flooded sometimes during rainy season.

BCS is observed in some sections between Lumame and Debre Markos, and also depths of BCS in Yeda river area reach about 10m. Reddish and brown silty clay are observed over more than half of the section of 35km.

Table-2: Sub-grade condition between Dejen and Lumame

Boring or Pit	Chainage	Location	BCS	Red. / Brn	N value	CBR	Swell %	PI	NMC	S.L.	Eex
NTP 01	1+500		0.8-2.0		< 10			38			
NTP 02	4+000		0.6-2.6		< 10	2	10.0	51			112
NBH 01	5+060		1.0-2.5		8-9			77	39	3.2	
NTP 03	5+500		0.5-1.9		< 10			48			
BH 09	8+500	Yitnora	0.95-2.7		2-6			47			
NTP 05	9+500		0.8-2.8		< 10			46			
BH 10	10+500		0.0-2.0		3-10			36	31		
BH 11	11+400		0.0-4.0		4-9			25	40		
NTP 06	11+500		0.5-3.1		< 10			73			
BH 12	12+500	Bechet	0.5-2.5		1-6			52	46		
NTP 07	13+500		0.7-2.5		< 10	2	8.0	42			97
NBH 02	14+560		0.6-2.0		8			72	39	2.8	
NTP 08	15+500		0.8-2.5		< 10			62			
NTP 09	16+500		0.9-2.6		< 10			73			
NTP 10	17+500		0.6-2.4		< 10			74			
BH 13	18+500	Taba	0.0-3.0		1-4			78	51		
NTP 11	19+500	Wejel	0.5-2.4		< 10			47			
BH 14	20+000	Aba Adem	0.0-2.1		3-4			52			
NBH 03	20+090	Aba Adem	0.5-3.5		9-14			70	44	4,4	
NTP 12	21+500		1.1-2.4		< 10			51			
NBH 04	22+040	Abeya	1.0-13.0		2-9			51	46	7.3	
NBH 05	22+080	Abeya	1.0-11.0		4-11			53	44		
NTP 13	23+000		0.6-3.0		< 10	2	8.4	51			128
NTP 14	24+000		1.6-2.5		< 10			57			
NTP 15	26+500		0.8-3.0		< 10	2	12.4	43	53	9	90
NBH 06	26+500		0.6-2.5		4-5			52	53	6.2	
NTP 16	27+500		0.7-2.7		< 10			71			
NTP 17	29+000		0.5-3.0		< 10			63			
NBH 07	29+300	Bogena	0.6-3.9		10			43	31		
NBH 08	29+390	Bogena	1.0-3.9		5-6			70	61		
NPT 18	30+000		1.1-3.0		< 10			59			

Note; BCS: Black cotton soil, Eex: Expansiveness

Table-3: Sub-grade condition between Lumame and Debre Markos

Boring or Pit	Chainage	Location	BCS	Red. / Brn	N value	CBR	Swell %	PI	NMC	S.L.	Eex
NTP 19	32+000		-	Red		9	1	43	35	14	81
NTP 20	34+500		-	Brn				46			
NBH 09	35+670	Getla									
NTP 21	36+000		0.0-1.3		< 10			50			
NTP 22	37+500		0.0-1.4		< 10			54			
NTP 23	38+500		0.5-2.7		< 10			32			
NTP 24	40+500		-	Red				28			
NTP 25	42+500		-	Red		9	1.2	28	31	17	33
NTP 26	43+500		-	Red				25			
NBH 10	44+060		-	Red	> 12			21	35	15	
NTP 27	45+500		-	L/Brn				24			
NTP 28	46+500		-	D/Brn				40			
NBH 11	47+420	Yeda	0.0-5.5		4-10			57	35	6.8	
NTP 29	48+000	Yeda	> 4.0		< 10			58			
NBH 12	48+900	Yeda	0.0-10		5-10			40	43	7.8	
NBH 13	49+200	Yeda	0.0-10		1-9			32	49	10.7	
NTP 30	49+500	Yeda	> 4.0		< 10	2	7.9	43	36	14	81
NBH 13-2	50+200	Yeda	0.0-2.4		4-10			54	37	2.5	
NTP 31	50+500	Yeda	0.0-2.7		< 10			44	46	13	85
NTP 32	51+500		-	Red				37			
NTP 33	53+000		-	L/Brn				22			
NBH 15	53+500	Ambesh	-	D/Brn							
NTP 34	55+000		-	Red				38			
NTP 35	56+500		-	D/Brn		4	3.8	31	41	14	49
NTP 36	57+500		-	Red				39			
NBH 16	57+890	Chemoga	-	L/Brn	2-8			31	45		
NBH 17	58+020	Chemoga	-	L/Brn	> 11			40	35		
NTP 37	59+000		-	Red				36			
NTP 38	60+500		-	Red				23			
BH 19	61+000	Wiseta	-	Red	2			27	44		

Note; Red; Reddish silty clay, L/Brn; Light brown silty clay, D/Brn; Dark brown silty clay

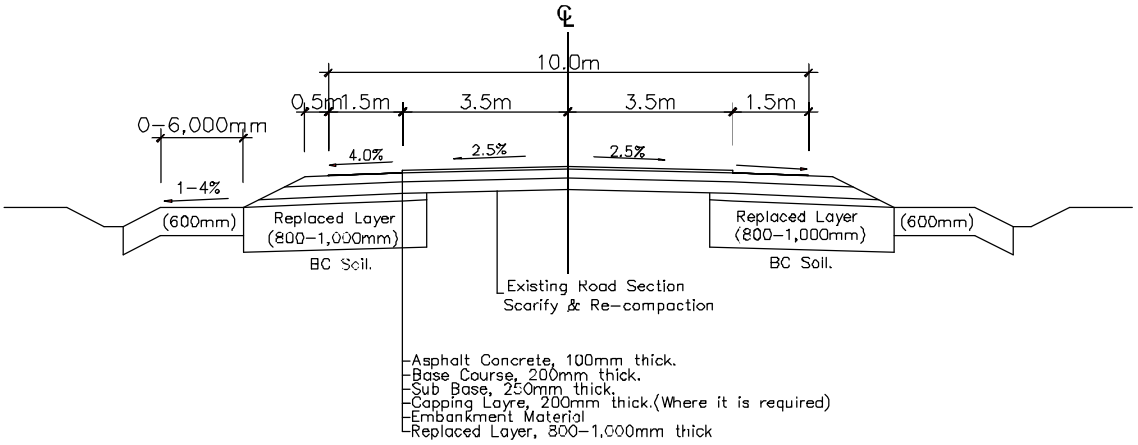
5. Alternative replacement procedures

Three alternative replacement procedures are presented.

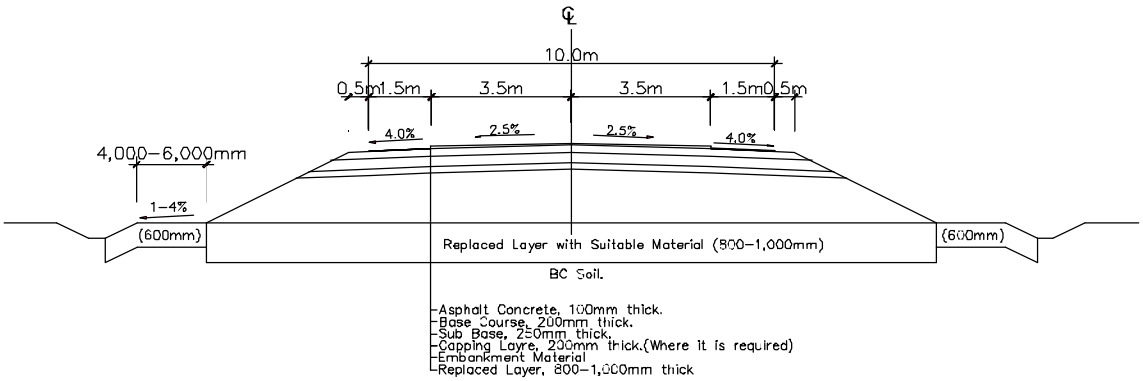
Alternative-1 (Figure-2) is proposed based on standard concept of some manual in which replacement thickness of 1.0m under road embankment and thickness of 0.6m horizontal blanket with width 0.0m-6.0m outside both embankment toes are designed. The replacement backfill with thickness of 0.6m on both sides functions to prevent the change of moisture content through the ground surface.

Alternative-2 (Figure-2*) is the same concept of replacement but with a thickness of 1.5m under road embankment and thickness of 0.6m on both sides of embankment toes.

Alternative-3 (Figure-3) has replacement thickness 1.0m under road embankment and vertical barriers on both sides which function to prevent the change of moisture content and confine it instead of horizontal blanket employed in Alternative-1 and -2. Vertical barrier depth of 3.0m is planned by considering fluctuation area of water content (refer to Figure-1). This vertical barrier depth of 3.0m is planned to be adopted for Abeya and Yeda river area. Depth of vertical barrier will be varied depending on BCS thickness in other locations.



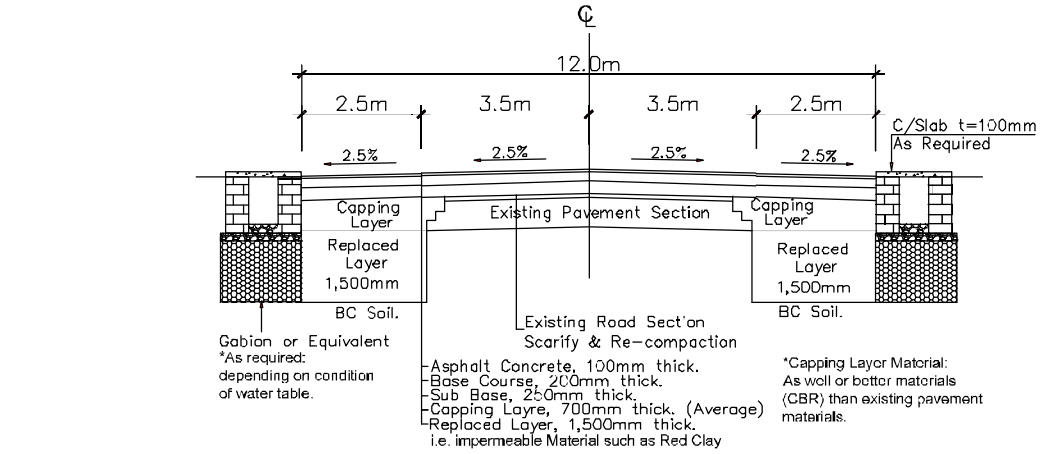
Existing Pavement Section in Rural Area



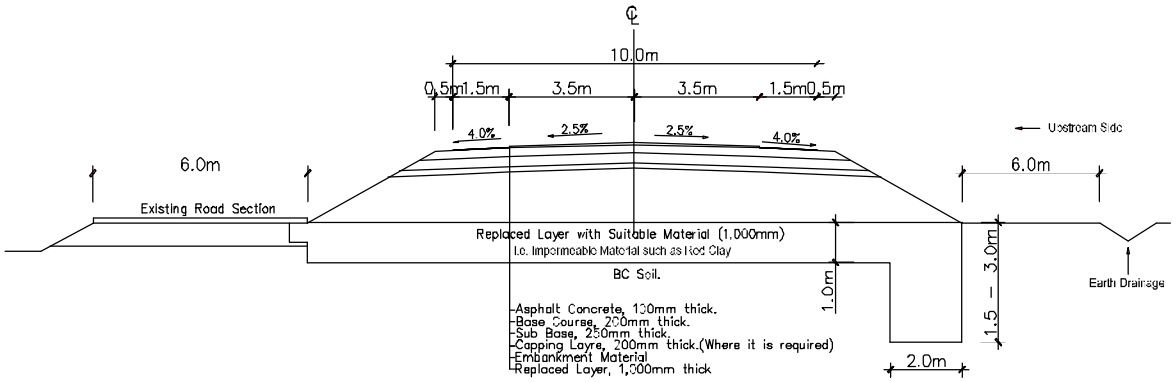
New Road Section (Bypass) in Rural Area

Figure-2: Countermeasure Concepts based on ERA Design Manual

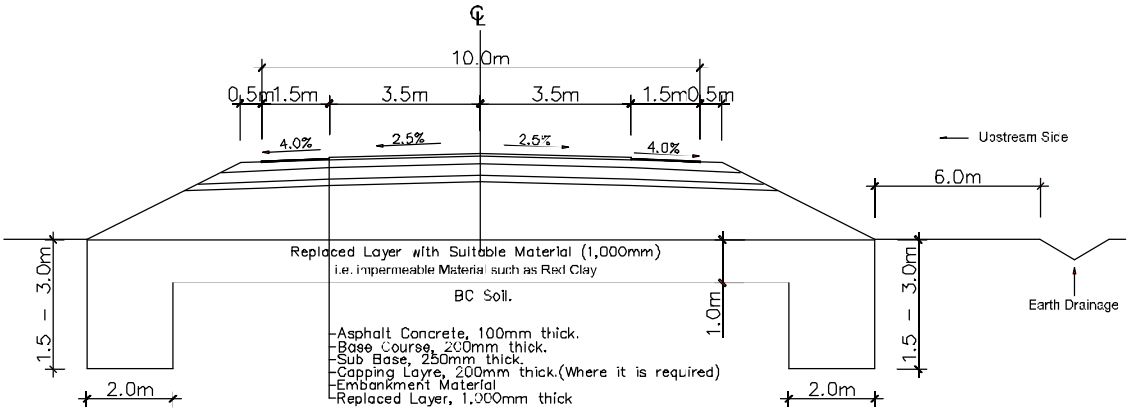
*Alternative 2, the replacement thickness is changed from 1.0 to 1.5 in Figure-2.



Existing Road Section in Town Area



Existing Road Section in High Embankment (Rural) Area



New Road Section (Bypass) in Rural Area

Figure-3 Countermeasure Concepts Proposed by the Study Team

6. Recommendation

Table-4 shows advantages and disadvantages of the three Alternatives. Only Alternative-3 can be applied for countermeasure to expansive soils in Abeya and Yeda river area, therefore Alternative-3 is recommended as the most appropriate procedure on the project road.

Table-4: Comparison of replacement methods and recommendation

No	Section	Replacement thickness			Application to Abeya & Yeda	Measures to gap between existing road and widened part	Side protection to moisture change	Recommendation
		Under embankment		Slope protection				
		Carriage way	Toe					
1	Realignment	1m		0.6m (L; ~6m)	Not suitable	—	Enough	
	Rehabilitation of existing road	—	1.0m	0.6m (L; ~6m)	—	Not enough	Enough	
2	Realignment	1.5m		By thickness	Not suitable	—	Enough	
	Rehabilitation of existing road	—	1.5m	By thickness	—	Enough	Enough	
3	Realignment	1.0m	~ 3.0m	By thickness	Suitable	—	Enough	Recommendable
	Rehabilitation of existing road	—	1.5m	By thickness	—	Enough	Enough	

Note: The maximum thickness of soil replacement is 1.5m according to many Manuals and experiences.

Ref. No.ERA/ADM/101126/PO

Date: 26 November 2010

Ms Hiwot Mossisa
Central Region Directorate, Acting Director
Ethiopian Roads Authority (ERA)
Addis Ababa

Dear Madam,

RE: PROPOSED ROAD ALIGNMENT AT CHEMOGA AND CROSS SECTIONS WITHIN DEBRE MARKOS
ON
THE PROJECT FOR REHABILITATION OF TRUNK ROAD, PHASE IV

We would like to draw your attention to the aforementioned project and previous meetings we have held in October, 2010 in your office at Alemgena on the subject matter referenced above. We also would like to refer to our previous letter with Ref. No. ERA/ADM/101022/PO dated 22nd October, 2010. In the letter some pending issues were listed in a table form No. 1 to No.5. Issues No. 1 and No. 5 were tackled in our letter with Ref. No. ERA/ADM/101025/PO dated 25th October, 2010.

But issues No. 2, No. 3 and No. 4 were still pending as we were waiting for the conclusion of detail topographic survey. The detail topographic survey was completed on 5th November, 2010 and now we present our study results and proposals based on the acquired topographical survey data.

Our explanation aims at resolving the issues of Road Alignment at Chemoga (Sta. 58+000 ~ 58+700) and Applicable cross sections in Debre Markos Town (Sta. 60+800 ~ 65+400), including road width and median width.

For details please refer to the attached document titled *"Discussion for the Design Conditions and Concepts"*

We therefore request for your evaluation and approval of our proposals made in this letter for the expeditious progress of the design work.

Yours sincerely,

Masaaki TATSUMI Dr. Eng
Oriental Consultants Company Limited
JICA Study Team, Chief Consultant

Cc: Mr. Abdo Mohammed,
DDG Engineering & Regulatory Department,
Ethiopian Roads Authority.

Discussion for the Design Conditions and Concepts

In a series of previous meetings, following matters were left as pending issues.

- Road alignment at Chemoga
- Applicable cross sections in Debre Markos Town

We hereby report results of the study based on the data of the detail topographic survey completed on 5th of November.

1. Alignment Change at Chemoga

(1) Outline of Alignment Change

Design Condition: Urban/Peri-urban

- Design speed: 50km/h
- Min. Radius: 85m
- Transition curve: not required
- Max. Grade: 8.0%
- Min. Stopping Sight Distance: 55m

Table-1

Location	Reasons & Interferences
	Chemoga Area 58.0 – 59.4km (L=1.4km) **Reason** - To reduce the number of affected houses **Interference** - Some houses

(2) Recommendation

New road construction would mean a commensurate increment of affected area and houses. Although horizontal alignment is improved by new construction road, it makes vertical alignment worse. On the other hand, existing route provided gentler grade in comparison to new road alignment. In addition, stopping sight distance for design speed of 50km/h is also satisfied. Thus upgrading of existing route (proposed new alignment) is recommended as much as possible.

(3) Result of the Study based on Detail Topographic Data

Table-2

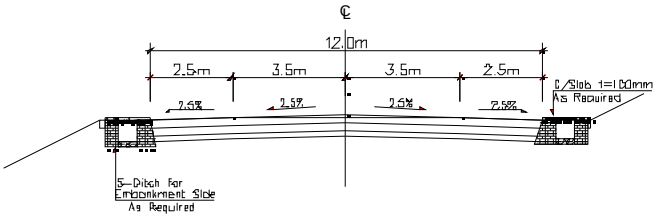
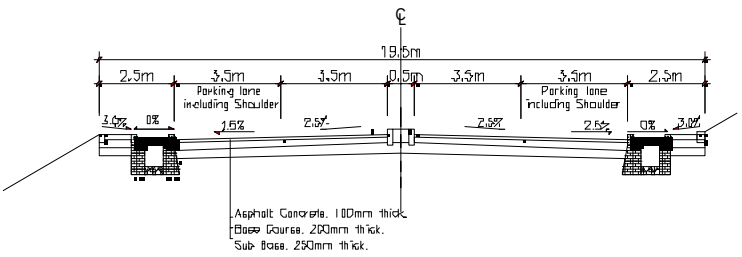
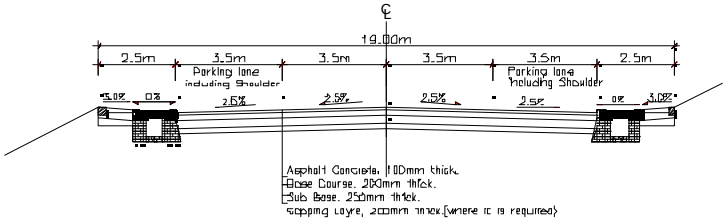
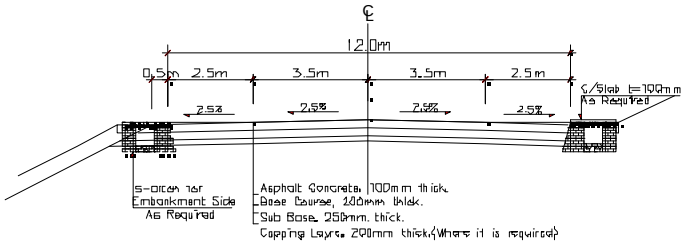
		HEC Alignment	New Alignment
Geometric	Min. Radius	270m	100m
	Max. Grade	8.0%	5.8%
	Applicable design speed	50km/h	50km/h
	Regulatory Speed	30 – 50km	
	Calculated Sight Distance	111m > 55m	68m > 55m
Applicable Cross Section			
No. of affected houses		3	0
Land required	Road reserve	New land is required because of new road construction	Width of upgraded road will be within existing road reserve area.
	Diversion during construction stage	It is not required because of new construction road.	Diversion with 6m will be provided by use of a part of ERA's land.

Figure-1 Comparative Illustration at Chemoga

2. Applicable Cross Sections in Debre Markos

(1) Recommended Cross Section on Previous Meeting

Table-3

Section Plan for A3 in Debre Markos	Applicable Cross Sections
	64.2km – 65.4km (End)  62.4km – 64.2km  61.3km – 62.4km 

(2) Result of the Study

In report of previous meeting, beginning point of D/Markos was set at diverging point of A3 and city road proposed by HEC. However beginning point of D/Markos was specified to be at the entrance of small village (see Table-4 in next page) in the meeting. Thus length of D/Markos section is extended from 4.1km (Sta.61.3-65.4) to 4.6km (Sta.60.8-65.4).

Table-4 Relation of Number of Affected Houses and Road Width

Section Plan for A3 in Debre Markos	Number of Affected Houses: W=*				
	12.0m	19.0m	19.5m	20.0m	21.5m
	2	3	3	4	5
	0	4	4	4	9
	0	5	6	10	16
	0	0	0	0	0
	1	1	1	1	1

***W: Total Width of Typical Cross Sections (see Appendix-1)**

(3) Recommendation of Applicable Cross Sections

Cross sections in Debre Markos should be proposed in consideration of following three mattes:

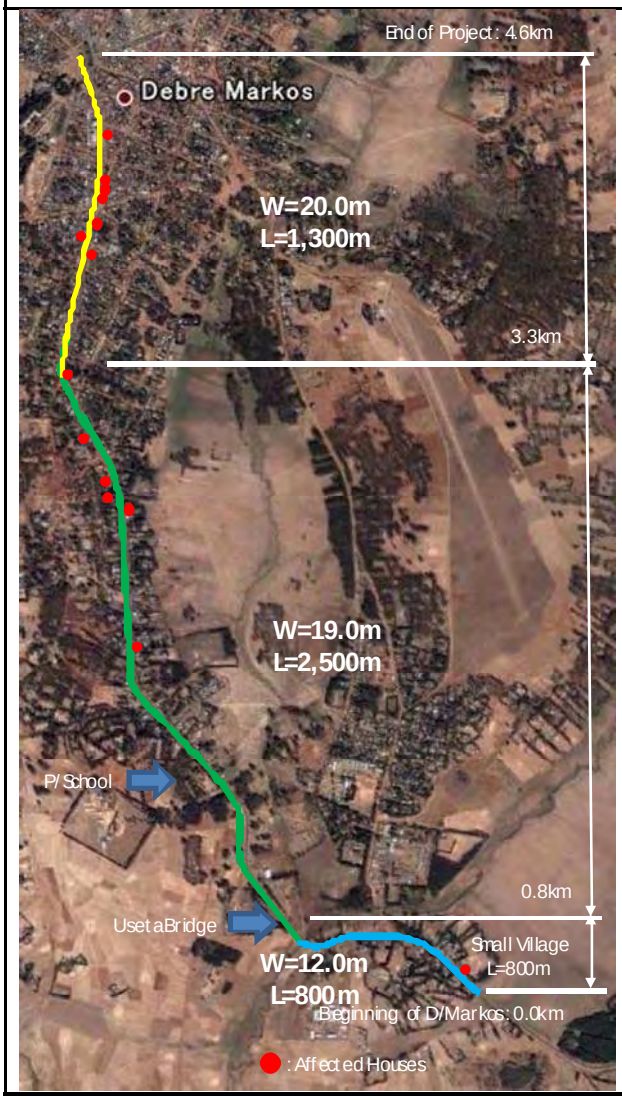
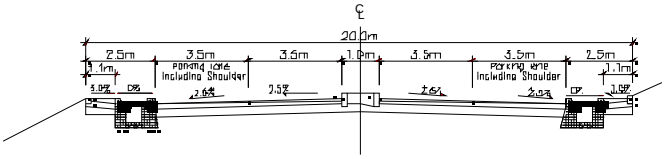
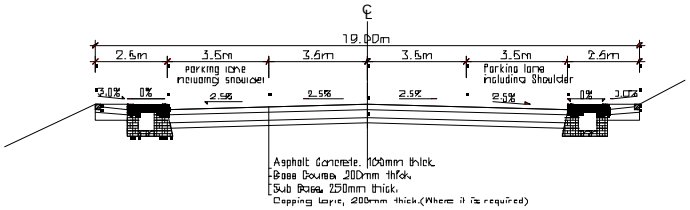
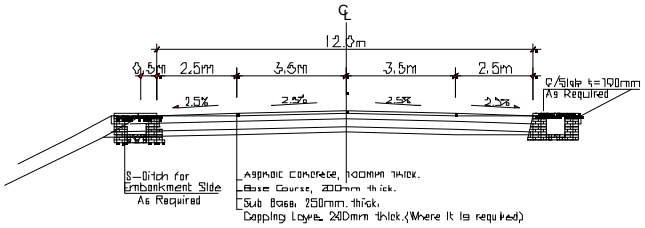
- To minimize the adverse social impacts (minimization of number of affected houses)
- To respond to expansion of the city area
- To respond to parking demand

Of issues listed above, considerable expansion area of the city in the immediate future will be up to Wiseta River. For these reasons, following cross sections are

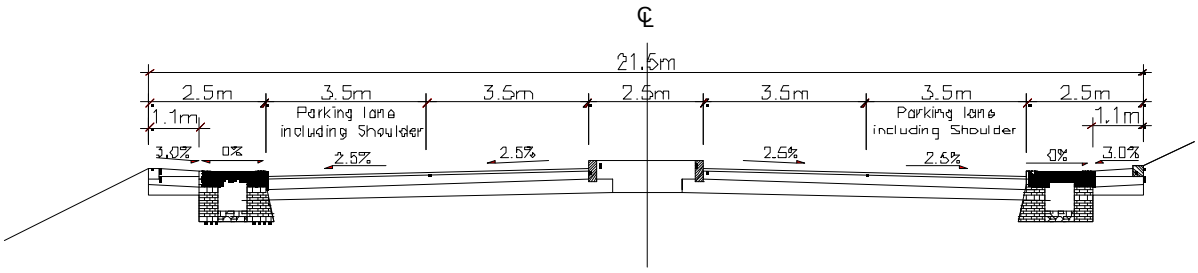
recommended to be applied in Debre Markos (refer Table-5)

.

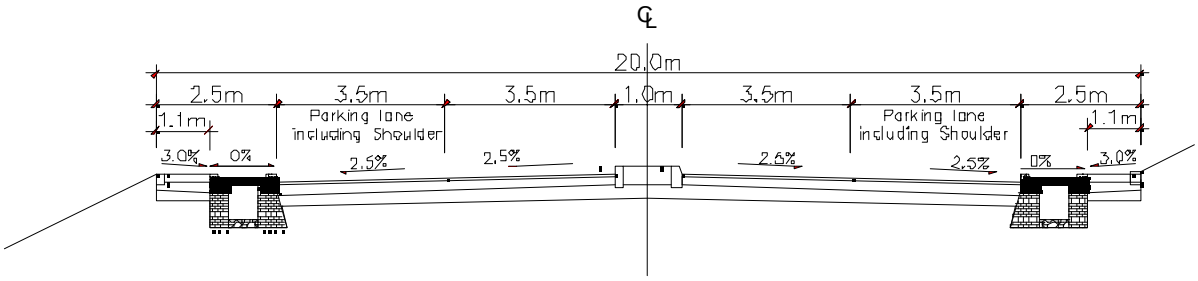
Table-5 Recommendation of cross sections and in Debre Markos

Section Plan for A3 in Debre Markos	Applicable Cross Sections
	64.1km – 65.4km (End): L=1.3km  61.6km – 64.1km: L=2.5km  60.8km – 61.6km: L=0.8km 

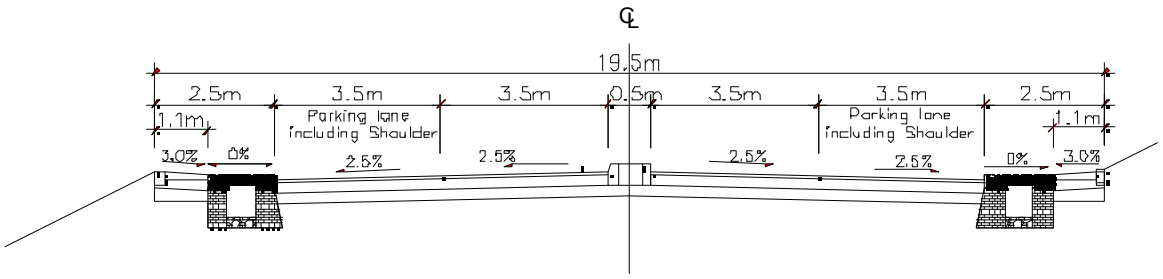
Appendix-1



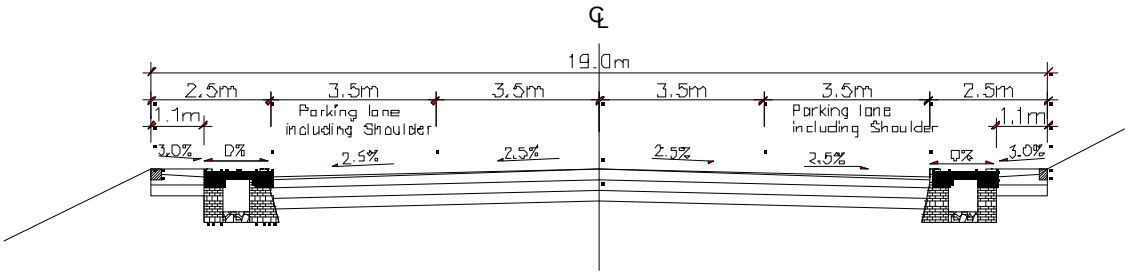
W=21.5m (Proposed by HEC DD)



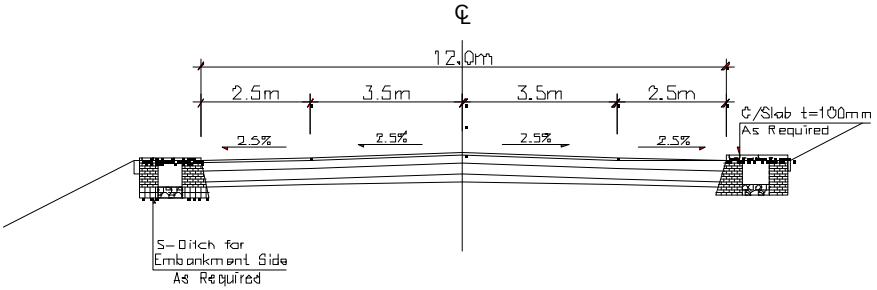
W=20.0m (Median Strip: 1.0m)



W=19.5m (Median Strip: 0.5m)



W=19.0m (No Median Strip)



W=12.0m

Appendix-2

Table: Number of Affected Houses (Whole Sections)

Sections		Width	DD Route by HEC	Proposed New Alignment	
			PAHs	PAHs	PAPs
Sta.00+000-00+500	Dejen	12.0m	8	0	0
Sta.06+800-09+100	Yetnora	12.0m	9	0	0
Sta.18+600-20+200	Wejel	19.0m	24	1	5
Sta.28+700-30+400	Lumame	19.0m	9	5*1	0
Sta.30+400-39+300	Unpopulated Area	10.0m	3	2	8
Sta.39+300-39+900	Gudalema	12.0m	1	0	0
Sta.45+720-46+800	Amber	19.0m	ND	16	70
Sta.46+800-52+000	Unpopulated Area	10.0m	1	2	10
Sta.52+000-52+900	Filiklik	12.0m	ND	0	0
Sta.58+000-59+400	Chemoga	12.0m	11	0	0
Sta.59+400-60+900	Unpopulated Area	10.0m	9	0	0
Sta.60+900-61+700	D/Markos	12.0m	84	1	5
Sta.61+700-64+200		19.0m		5	24
Sta.64+200-65+500		20.0m		8	37
Total			159	40	159

＊1: Kiosk

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ቴሌክስ 211880 የስልክ ቁጥር 551-71-70/79
ፋክስ 251-11-5514866

ቁጥር _____

አዲስ አበባ _____ ዘመ _____ ዓ.ም.

THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

ETHIOPIAN ROADS AUTHORITY

Post Office Box 1770 Addis Ababa Ethiopia
Cable Address Highways Addis Ababa
Telex 211880 Tel. No. 551-71-70/79
Fax 251-11-5514866

Ref. No. CR/mm3/13-3

Addis Ababa 27/12/2010

To: The Consortium of Oriental Consultants Co., Ltd. and
Eight-Japan Engineering Consultants inc.
Addis Ababa, Ethiopia

Re: The Project for Rehabilitation of Trunk Road, Phase IV
Dejen – Debre Markos

Subject: **Proposed Road Alignment at Chemoga and Cross Sections within Debre - Markos Town**

Dear Sir,

This is in reference to your letter Ref. No.. ERA/ADM/101126/PO dated November 26, 2010 through which you have forwarded your recommendation on the proposed road alignment at Chemoga and cross sections within Debre Markos town for our comment and subsequent endorsement.

Having reviewed your proposal, we have found that the proposed alignment at Chemoga is acceptable. However, we have noted the following comments to be incorporated in the proposal for the cross section in Debre Markos town.

- Provision of median strip is essential to minimize traffic accident by separating traffic movement in each direction and providing space at the mid of carriage way for pedestrian crossing the road. Considering the density of population for section 2 (0.8 km to 3.3 km) and the number of affected houses as per your proposal, we suggest to increase the typical section from 19.0m to 19.5m.

- In table 4, it is stated that the affected house with 19.5m width will be 3 and 4 for section 1 and section 2 respectively. Does it take into consideration the width of the side slope?

- For the beginning of Debre Markos town section, 800m, 2.5m parking lane have been recommended. However, if 0.7m clearance is provided for moving vehicles on both sides, total width which can accommodate two vehicles simultaneously will be 6.6m (taking on average 2.6m of vehicle width). Hence, providing 2.5m parking lane shall not be functional and thus we recommend the parking lane to be at least 3m from safety point of view.

- In most cases, there is a problem of proper design of junctions and vehicular crossings at town sections. Hence, please be advised to include detail junctions and vehicular crossings in the town sections.

.../2

In connection with the above, we have learnt from other ERA's projects across the country that the above listed shortfalls had created complaints from the local residents during the construction period. For that reason, we are of the view that it is better to entertain the aforementioned problems at the design stage which would help us to meet the demands of the local residents. Therefore, we would like to advise you to consider the cited comments in your subsequent submission of revised proposal for our endorsement.

Sincerely Yours,

Hiwot Mosisa
Central Region Directorate
P/ Director

Ref. No.ERA/ADM/110117/PO

Date: 17 January 2011

Ms Hiwot Mossisa
Central Region Directorate, Director
Ethiopian Roads Authority (ERA)
Addis Ababa

Dear Madam,

RE: PROPOSED ROAD ALIGNMENT AT CHEMOGA AND CROSS SECTIONS WITHIN DEBRE MARKOS
ON
THE PROJECT FOR REHABILITATION OF TRUNK ROAD, PHASE IV

This is in reference to your letter with Ref. No. CR/MM3/1/3-3 dated 27th December, 2010 through which you have noted the comments for the cross section in Debre Markos town.

Having studied and discussed your requests and comments with JICA headquarter, we would like to reflect them to the project as follows:

1. Cross section
- Section 1 (3.3 – 4.6km, 64km+100 – 65km+400, L=1.3km) ; W=20m with median strip 1.0m
- Section 2 (0.8 – 3.3km, 61km+600 – 64km+100, L=2.5km) ; W=19.5m with median strip 0.5m
- Section 3 (0.0 – 0.8km, 60km+800 – 61km+600, L=0.8km) ; W=13.0m with parking lane 3.0m

Please refer to the attached figure.

2. The width of the side slope was taken into consideration for cross section 20.0m of Section 1 and 19.5m of Section 2.

3. A left-turn lane will be incorporated at the intersection 61km+300 & 64km+750 for vehicular crossing at town sections, and the concept plan will be drawn in the report prepared in March.

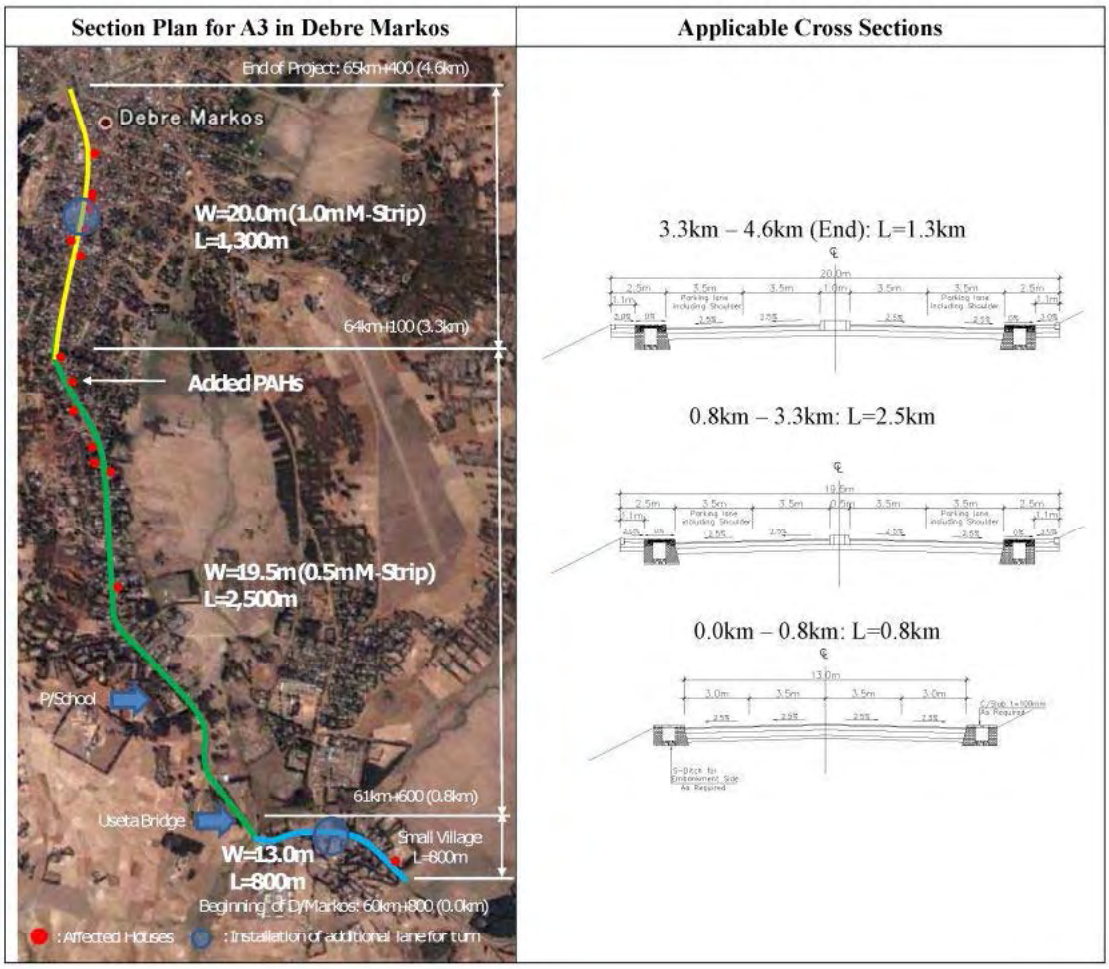
We would like to request for your approval of our proposals for the project.

Yours sincerely,

Masaaki TATSUMI Dr. Eng
Oriental Consultants Company Limited
JICA Study Team, Chief Consultant

Cc: Mr. Abdo Mohammed,
DDG Engineering Operations Department,
Ethiopian Roads Authority.

Appendix ;



Cross section of Debre Markos Town

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የኢትዮጵያ መንገዶች ባለሥልጣን

ፖስታ ሣጥን ቁጥር 1770 አዲስ አበባ ኢትዮጵያ
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ቴሌክስ 211880 የስልክ ቁጥር 551-71-70/79
ፋክስ 251-11-5514866

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አዲስ አበባ _____ ቀን _____ ዓ.ም.

THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

ETHIOPIAN ROADS AUTHORITY

Post Office Box 1770 Addis Ababa Ethiopia
Cable Address Highways Addis Ababa
Telex 211880 Tel. No. 551-71-70/79
Fax 251-11-5514866

Ref. No. CE/MMB/1/16-3

Addis Ababa 26/1/2011.

To: The Consortium of Oriental Consultants Co., Ltd. and
Eight-Japan Engineering Consultants inc.
Addis Ababa, Ethiopia

Re: The Project for Rehabilitation of Trunk Road, Phase IV
Dejen – Debre Markos

Subject: **Approval for the Proposed Road Alignment at Chemoga and Cross Sections within Debre - Markos Town**

Dear Sir,

We have made a reference to your letter Ref. No. ERA/ADM/110117/PO dated January 17, 2011 whereby you have sought our endorsement for the proposed road alignment at Chemoga and typical cross sections within Debre Markos town that incorporates our comments.

Accordingly, we have reviewed the revised proposal and found it acceptable. Hence, we have no objection for the proposed road alignment at Chemoga and typical cross sections within Debre Markos town.

Sincerely Yours,

Hiwot Mosisa
Central Region Directorate
Director

EFDR ERA Central Region Directorate

6.2 RAP 関連協議議事録

Ref.No.ŋ3-138/00-16
Date 4/11/2009

From: The Amhara National Regional State Debre Markos
City Administration Mayer Office
To : Highway Engineering Consultants
Addis Ababa

Subject : Road Construction Works

We refer to our letter addressed to Ethiopia Road Authority of the engineering regulatory division 19/5/2009 with Ref.No.2526/ŋአ/00-18.In the letter we address ERA of the direction of the new road construction in Dejen town.
Currently, we understand that HEC is contracted for the consultancy service of the project by a letter sent to us with Ref.No. HEC/1991/09 and dated 02/11/2009.
Therefore, we request the route for the new road construction in the direction of Debre Markos district to Tekle-haimanot Square (old road).
Attached here with please find a minute signed by City Mayer Committee concerning the dicision of the road al/ Route in the Debre Markos town.

Signature and Seal
Abebaw Yaynwaga
Debre Markos City Mayor

Date 3/11/2009

Mayor's Committee Minutes of Meeting

Attendants:

1. Mr. Migbaru Kebede Mayor's committee chairperson
2. Mr. Alemahehu Tekeste Committee Member
3. Mr. Abebaw Yaynwaga »
4. Mr. Asmamaw Atnafu »
5. Mr. Tekel Yitayew »
6. Mr. Menberu Mengistu »
7. Mr. Dereje Denekew »
8. Mr. Melesachew Demelash »
9. Mr. Kefale Adinew »
10. Mr. Yohannes Amno »
11. Mr. Belaynew Tsega »
12. Mr. Mesfin Gesesse »

Agenda: Selection of road corridor/route in Debre Markos town

The Mayor's committee has discussed and agreed on the following points:

1. The road segment in Debre Markos town should be wide and median separated and should be in accordance with the master plan.
2. The road should pass along the corridor from the Debre Markos District of ERA and Kebele 07 office and along the Mosque to the Tekle haimanot round about.

The reason for the above decision is as follows:

1. If the existing road is to be rehabilitated, it is going to be costly as there will be big volume of slope cutting and filling works.
2. The existing road horizontal alignment has many curves; therefore, number of accident will be high.
3. There are big building structures along the existing road; therefore, the amount of compensation will be extremely high. In addition, resettlement action will create an immense pressure on the people to be resettled and the city administration.
4. The terrain along the proposed alignment is more suitable for the road construction. In addition the construction of the road will bring an economic growth to all the people living along the road.

Therefore, we recommend the alignment of the road to be as agreed above for the reasons mentioned above. The above decision by the committee should be informed to the Design Firm by the name Highway Engineering Consultants PLC. The committee has already informed of its decision to ERA.

Signature of the committee members

Seal of the Debre Markos Town Administration

Date: 4/11/2009

Discussion to effectively carryout the Road construction Works from Dejen to Debre Markos
Time: 9:30 am
Place: Aneded Woreda Office

Attendants

1. Mr. Abdulahi Mohammed	HEC
2. Mr. Badeg Lake	Representative of Agricultural Office
3. Mr. Abebaw Adane	» »
4. Mr. Yalkibetal Admase	Representative of Aneded Woreda Administration
5. Mr. Aderaw Abitew	Land Administration Office

Agenda: Concerning families that will be affected by the Road Construction Works

Mr. Abdulahi Mohammed: He said that he will make discussion concerning the compensation of farm land and houses with the concerned bodies. If a farm land or house is affected by the road works, we have to pay compensation according to the regulations. The road will have a width of 22m in towns.
Mr. Abebaw Adane: How is the road construction work go along with the Reservoir?
Mr. Badege Lake: Compensation must be paid for those affected by the road work.
Mr. Abebaw Adane: We have to make ready of ourselves anD/Deliver what is expected of us. Eventhough the people and the administration was expecting for long time, it is disappointing that the road is no going to pass through Aneded woreda village. Since the road is not going to pass through the village, the people are not going to benefit from the road construction. Therefore, the people will be disappointed anD/Distance themselves from the government.
Mr. Abdulahi Mohammed: Concerning the above, a discussion has to be made with the Designers, the Zone and Regional Offices of ERA.
Mr. Badege Lake: We have to disscuss with a tangible information and we have to understand that the economic development of the village will be hindered. That is because the road is not passing through the Aneded woreda village.

Signature of the attendants
Seal of the Eastern Gojam Administration Zone
Aneded Woreda Trade & Industry Office

Date 4/11/2009

Preparation for necessary precautions to be taken for the Dejen Debre Markos Road Construction Project

Attendants:

1. Mr. Abdulahi Mohammed HEC (Chairperson)
2. Mr. Abebe Melese Awabel Woreda Administration
3. Mr. Kumilachew Damte Environmental Protection Agency
4. Mr. Edme alem Andualem Revenue Authority Office
5. Mr. Sima Kebede Awabel Woreda Municipality
6. Mr. Azeze Kasahun Women's Associaltion representative

Agenda:

1. Compensation Matter
2. How to consider affected people in urban and rural area

Minutes of meeting are as follows:

Mr. Abdulahi Mohammed: The Government will pay compensation to properties like farm land and houses that are affected by the road construction. He requested if there is any question from the people and administration so that HEC can accommodate the matter in the study.

Mr. Kumilachew Damte: According to government regulation a compensation will be paid for farmers who are affected. However property evaluation and paying the compensation money will take a very long time. So what are you thinking in this regard?

Mr. Abdulahi Mohammed: compensation will be evaluated and will be paid by Ethiopian Roads Authority so it is difficult to answer this question by HEC.

Mr. Azeze Kasahun: Is the road construction going to affect seriously specially the farmlands?

Mr. Abdulahi Mohammed: The road alignment is almost following the existing centerline around this village. Therefore farmlands are not going to be affected seriously.

Sign by the participants

Seal of the Amhara Regional Government, Western Gojam Administration

Awabel Woreda Administration Office

Date: 4/11/2009

Meeting Venue: Dejen Woreda Water Resource Office
Time: 2:00 pm
Attendants:

1. Mr. Abdulahi Mohammod	HEC
2. Mr. Birilew Mossa	Environmental Protection Agency
3. Mr. Melisew Tamiru	Agricultural Office
4. Mr. Abedje Asamirew	General Manager Municipality
5. Mr. Tamir Adam	Land Administration Office

Agenda: Concerning resettlement and compensation for the Dejen Debre Markos Road Project

Minutes of Discussion
Mr. Tamiru: He suggested each and every property that will be affected should be identified with a photo of the property.
Mr. Melisew: For a farm land the type of crop, number of trees and productivity should be considereD/During the property evaluation stage and compensation.
Mr. Birilew: Farmers who have settled recently should be compensated according to the new regulation of the government.
Mr. Abeje: New construction near the road should be prohibited and the people should be informed about this.

Therefore, all participants have reached on agreement on the above issues unanimously.

Signature of the participants
Seal of the Amhara Regional Government, Eastern Gojam Administration
Dejen Town Municipality