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- 2nd：11 June, 2019

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【添付資料－1】調査団員・氏名

調査団員一覧

氏 名	担 当	所 属
田中　顕士郎	総括／計画管理	国際協力機構
仁藤　健	協力企画	国際協力機構
土田　貴之	業務主任／道路・橋梁計画1	建設技研インターナショナル
渡邉　正俊	副業務主任／道路・橋梁計画2	建設技研インターナショナル
シュレスタ　ロビンソン	橋梁設計	建設技研インターナショナル
小川　淳一郎	道路設計／道路安全診断	建設技研インターナショナル
鈴木　裕介	交通量調査・需要予測	建設技研インターナショナル （補強：首都高技術）
緒方　博充	調達事情／施工計画／積算	建設技研インターナショナル
白　彬	自然条件調査	建設技研インターナショナル
小沼　崇史	環境社会配慮／社会状況調査	建設技研インターナショナル
野村　貢	交通安全・設計照査	建設技研インターナショナル （補強：建設技術研究所）
鈴木　泰之	BIM/CIMアドバイザー	建設技研インターナショナル （補強：建設技術研究所）
越智　雅樹	BIM/CIMマネージャー	建設技研インターナショナル
藤田　玲	BIM/CIM照査（自社負担）	建設技研インターナショナル （補強：建設技術研究所）
豊川　祐樹	道路・橋梁設計補助（自社負担）	建設技研インターナショナル

【添付資料－2】調査工程

- **First Field Survey (13 Jan 2019-21 Feb 2019)**

No	Date	Day	Contents of Survey				
			Mr.Tanaka	Dr.Tsuchida	Mr.Watanabe	Mr.Shrestha	Mr.Ogawa
			Team Leader	Chief Consultant/Road and Bridge Planning 1	Deputy Chief Consultant/Road and Bridge Planning 2	Bridge Design	Road Design
1	13-Jan	Sun		Dep. Tokyo		Dep. Tokyo	
2	14-Jan	Mon	Dep. Tokyo	Arr. Accra		Arr. Accra	
3	15-Jan	Tue	Arr. Accra	Courtesy call to JICA		Site Survey	
4	16-Jan	Wed				Meeting with GHA	Preparation Work for 1st Site Survey
5	17-Jan	Thu	Site Visit	Site Visit with JICA			
6	18-Jan	Fri	Explanation/discussion regarding to the Survey	Explanation/discussion on the Inception Report		Explanation/discussion on the Inception Report	
7	19-Jan	Sat	Dep. Accra	Site Survey		Site Survey	
8	20-Jan	Sun		Documentation		Documentation	
9	21-Jan	Mon		Meeting with GHA			Site Survey
10	22-Jan	Tue				Meeting with GHA	Meeting with GHA
11	23-Jan	Wed					
12	24-Jan	Thu		Documentation		Engaged for Other Work (CS of Phase-1)	Work in GHA office
13	25-Jan	Fri					
14	26-Jan	Sat		Internal Meeting			Internal Meeting
15	27-Jan	Sun		Documentation			Documentation
16	28-Jan	Mon		Meeting with GHA	Dep. Tokyo		Study on Road Design
17	29-Jan	Tue			Arr. Accra		Dep. Accra
18	30-Jan	Wed		1st Technical Meeting			Via. Istanbul
19	31-Jan	Thu		Internal Meeting			Arr. Tokyo
20	1-Feb	Fri		Dep. Accra	Site Survey		
21	2-Feb	Sat		Via. Istanbul	Site Survey		
22	3-Feb	Sun		Arr. Tokyo	Documentation		
23	4-Feb	Mon			Visit to Borrow Pit and Quarry Site		
24	5-Feb	Tue			Traffic Survey at Ashaiman Roundabout		
25	6-Feb	Wed			Meeting with a person inchage of Bridge Design in GHA		
26	7-Feb	Thu			Meeting with MOF		
27	8-Feb	Fri			Meeting with EPA		
28	9-Feb	Sat			Work for Bridge Planning		
29	10-Feb	Sun			Documentation		
30	11-Feb	Mon			Work for Bridge Planning	Study on Bridge Design	
31	12-Feb	Tue					
32	13-Feb	Wed			Project Explanation to DUR		
33	14-Feb	Thu			Project Explanation to TDC		
34	15-Feb	Fri			Project Explanation to TMA		
35	16-Feb	Sat			Documentation	Preparation for Technical Note	
36	17-Feb	Sun					
37	18-Feb	Mon			2nd Technical Meeting		
38	19-Feb	Tue			Signing to T/N Dep. Accra	Report to JICA	
39	20-Feb	Wed			Via. Istanbul	Dep. Accra	
40	21-Feb	Thu			Arr. Tokyo	Arr. Tokyo	

* GHA: Ghana Highway Authority
DUR: Department Urban Road
TDC: Tema Development Corporation
TMA: Tema Metropolitan Assembly
JICA: Japan International Cooperation Agency

No	Date	Day	Contents of Survey				
			Mr.Suzuki	Mr.Ogata	Dr.Baik	Mr.Onuma	Mr.Toyokawa
			Traffic Survey / Analysis	Construction Planning/Cost Estimate	Natural Condition Survey	Social Environment Consideration	Assistant of Road and Bridge Design
1	13-Jan	Sun					Dep. Tokyo
2	14-Jan	Mon					Arr. Accra
3	15-Jan	Tue					Site Survey
4	16-Jan	Wed					Preparation for Re-commissioned Survey
5	17-Jan	Thu					
6	18-Jan	Fri					Explanation/discussion on the Inception Report
7	19-Jan	Sat					Site Survey
8	20-Jan	Sun	Dep. Tokyo		Dep. Tokyo		Documentation
9	21-Jan	Mon	Arr. Accra		Arr. Accra		Data Analysis
10	22-Jan	Tue	Site Survey		Site Survey		Meeting with GHA
11	23-Jan	Wed			Evaluation/Contract to Local Company for Soil		
12	24-Jan	Thu	Data Analysis				Data Analysis
13	25-Jan	Fri			Data Collection		Site Survey
14	26-Jan	Sat	Internal Meeting		Internal Meeting		Internal Meeting
15	27-Jan	Sun	Documentation		Documentation		Documentation
16	28-Jan	Mon	Data Analysis	Dep. Tokyo	Site Inspection for Soil Investigation		Site Inspection for Soil Investigation
17	29-Jan	Tue	Meeting with GHA	Arr. Accra	Meeting with GHA		Meeting with GHA
18	30-Jan	Wed	1st Technical Meeting				1st Technical Meeting
19	31-Jan	Thu	Internal Meeting				Internal Meeting
20	1-Feb	Fri	Dep. Accra	Site Survey	Dep. Accra		Engaged for Other Work (CS of Phase-1)
21	2-Feb	Sat	Via. Paris	Site Survey	Via. Paris		
22	3-Feb	Sun	Arr. Tokyo	Documentation	Arr. Tokyo	Dep. Tokyo	
23	4-Feb	Mon		Visit to Borrow Pit and Quarry Site		Arr. Accra	
24	5-Feb	Tue		Visit to Local Construction Company		Site Survey	
25	6-Feb	Wed		Survey and Hearing with the Contractor of Phase-1		Meeting with Environmental Section in GHA	
26	7-Feb	Thu		Meeting with MOF		Site Survey	
27	8-Feb	Fri		Meeting with GHA		Meeting with EPA	
28	9-Feb	Sat		Site Survey		Site Survey	
29	10-Feb	Sun		Documentation		Documentation	
30	11-Feb	Mon		Study on Construction Planning		Meeting with Local Consultant and GHA	
31	12-Feb	Tue					
32	13-Feb	Wed		Visit to Rebar Supplier		Documentation	
33	14-Feb	Thu		Site Survey and Data Analysis		Data Collection	
34	15-Feb	Fri				Dep. Accra	
35	16-Feb	Sat		Documentation		Via. Paris	
36	17-Feb	Sun				Arr. Tokyo	
37	18-Feb	Mon		2nd Technical Meeting			
38	19-Feb	Tue		Dep. Accra			
39	20-Feb	Wed		Via. Istanbul			
40	21-Feb	Thu		Arr. Tokyo			

*	GHA:	Ghana Highway Authority
	DUR:	Department Urban Road
	TDC:	Tema Development Corporation
	TMA:	Tema Metropolitan Assembly
	JICA:	Japan International Cooperation Agency

- **Second Field Survey and 1st Design Review by GHA (23 May 2019-14 June 2019)**

No	Date	Day	Contents of Survey						
			Dr.Tsuchida	Mr.Watanabe	Mr.Shrestha	Mr.Ogawa	Dr.Suzuki	Mr.Fujita	Mr.Ochi
			Chief Consultant/Road and Bridge Planning 1	Deputy Chief Consultant/Road and Bridge Planning 2	Bridge Design	Road Design	BIM/CIM Adviser	BIM/CIM Expert	BIM/CIM Manager
1	23-May	Thu	Dep. Tokyo			Dep. Tokyo			
2	24-May	Fri	Arr. Accra			Arr. Accra		Dep. Tokyo	
3	25-May	Sat	Site Survey			Site Survey		Arr. Accra	
4	26-May	Sun	Internal Meeting	Dep. Tokyo		Internal Meeting			
5	27-May	Mon	Documentation	Arr. Accra		Documentation			
6	28-May	Tue	Meeting with GHA			Site Survey and Discussion with the Contractor of Phase-1			
7	29-May	Wed	Technical Meeting			Technical Meeting			
8	30-May	Thu	Meeting with GHA		Dep. Tokyo	Meeting with GHA			Preparation of SM
9	31-May	Fri	Stakeholder Meeting		Arr. Accra	Stakeholder Meeting			
10	1-Jun	Sat	Documentation, Internal Meeting				Dep. Accra	Dep. Accra	Documentation, Internal Meeting
11	2-Jun	Sun					Via. Istanbul	Via. Istanbul	
12	3-Jun	Mon	Discussion with GHA				Arr. Tokyo	Arr. Tokyo	
13	4-Jun	Tue	Report to JICA, Dep. Accra	Report to JICA		Internal Meeting			
14	5-Jun	Wed	Via. Paris	Dep. Accra	Making Minutes	Site Survey			Photogrammetry by UAV
15	6-Jun	Thu	Arr. Tokyo	Via. Paris	Discussion with GHA	Dep. Accra			
16	7-Jun	Fri		Arr. Tokyo		Via. Paris			
17	8-Jun	Sat			Documetation	Arr. Tokyo			
18	9-Jun	Sun							
19	10-Jun	Mon			Discussion with GHA				
20	11-Jun	Tue			Report to JICA				Dep. Accra
21	12-Jun	Wed			Dep. Accra				Via. Istanubul
22	13-Jun	Thu			Via. Paris				Arr. Tokyo
22	14-Jun	Fri			Arr. Tokyo				
*	GHA:	Ghana Highway Authority							
	JICA:	Japan International Cooperation Agency							

● Third Field Survey (23 Nov 2019-1 Dec 2019)

No	Date	Day	Contents of Survey					
			Mr.Tanaka	Mr.Nito	Dr.Tsuchida	Mr.Watanabe	Mr.Shrestha	Dr.Suzuki
			Team Leader	Planning Coordinator	Chief Consultant/Road and Bridge Planning 1	Deputy Chief Consultant/Road and Bridge Planning 2	Bridge Design	BIM/CIM Adviser
1	23-Nov	Sat			Dep. Tokyo		Dep. Tokyo	Arr.Accra
2	24-Nov	Sun	Dep. Tokyo (Next morning Arr. Accra)		Arr. Accra	Dep. Tokyo	Arr. Accra	Documentation
3	25-Nov	Mon	Meeting with JICA Ghana					
4	26-Nov	Tue	AM: Courtesy call to MRH, MOF and GHA, PM: Site Visit					
5	27-Nov	Wed	Meeting with GHA					
6	28-Nov	Thu	Signature on Minutes of Discussions					
7	29-Nov	Fri	AM: Meeting with EOJ, PM: Dep. Accra		Meeting with EOJ		Documentation	Dep. Accra
8	30-Nov	Sat	Arr. Tokyo		Dep. Accra			
9	1-Dec	Sun			Arr. Tokyo			

*	GHA:	Ghana Highway Authority
	MRH:	Ministry of Roads and Highways
	MOF:	Ministry of Finance
	JICA:	Japan International Cooperation Agency
	EOJ:	Embassy of Japan in Ghana

【添付資料－3】関係者リスト

JICA ガーナ事務所	
小澤　真紀	次長
山本　将史	所員
五所　あゆみ	企画調整員（経済インフラ開発）
中野　聖子	企画調整員（経済インフラ開発）
MABE Biliwi Joshua	Programme Officer

Ministry of Roads and highways	
Mr. Edmund Offei-Annor	Chief Director
Ing. Ohene Sarfoah	Director of Policy and Planning

Ministry of Finance	
Mr. Emmanuel Edumadze Mensah	Principal Budget Analyst
Ms. Vivian Darah	N/A

Ghana Highway Authority	
Ing. Ernest Kingsley Arthur	Chief Executive
Ing. Amin Baba Kassim Nuhu	Deputy Chief Executive (Dev't)
Surveyor Joseph Tengey	Manager of Quantity Surveying
Ing. Pual Duah	Highway Design Manager
Ing. Collins Donkor	Director of Contracts
Ing. Yaqub Koray	Ag. Director of Bridges
Ing. Victor Nyantakyi-Baah	Bridge Design Manager
Ing. Mercy Payne	Strategic Monitoring and Implementation Manager
Ms. Hilda Annan	Senior Environmental Officer
Ms Janice Omari Frimpong	Road Safety Unit Manager

Department of Urban Roads, Tema	
Mr. Stephen Attipoe	Metropolitan Roads Engineer

Tema Development Corporation	
Mr. Emmanuel Kwasi Darkey	Head of Development
Mr. Sam O. Asante	General Manager, Operations

Ghana Metropolitan Authority	
Mr. Hon. Felix Mensah Nii Anang-La	Mayor of Tema

SHIMIZU-DAI NIPPON JV (Contractor of Phase-1)	
Mr. UEMURA Yujin	Project Manager
Mr. NARITA Susumu	Deputy Project Manager
Mr. OKABE Masayoshi	Construction Manager

【添付資料－4】Minutes of Discussion

18 January, 2019

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of the Tema Motorway Roundabout (Phase 2)
in the Republic of Ghana (Outline Design Study)

In response to a request from the Government of the Republic of Ghana (hereinafter referred to as "Ghana"), Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Improvement of the Tema Motorway Roundabout (Phase 2) (hereinafter referred to as "the Project") to Ghana. The Team held series of discussions with the officials of the Government of Ghana (hereinafter referred to as "GoG") and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Accra, January 18, 2019

Kenshiro TANAKA
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Edmund Offei-Annor
Chief Director
Ministry of Roads and Highways
Republic of Ghana

Emmanuel K. Fordjour
Ag. Director
Resource Mobilization and
Economic Relations Division
Ministry of Finance
Republic of Ghana

Ernest Kingsley Arthur
Chief Executive
Ghana Highway Authority
Republic of Ghana

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve the Tema Motorway Roundabout by constructing a flyover, thereby contributing to improved urban mobility and logistics in the Greater Accra Region as well as regional corridors.

2. Title of the Preparatory Survey

Both sides confirmed the title as the Preparatory Survey for the Project for Improvement of the Tema Motorway Roundabout (Phase 2) (hereinafter referred to as "the Survey").

In order to differentiate, the on-going project for the improvement of the Tema Motorway Roundabout is referred to as the "Phase 1 Project".

3. Project site

Both sides confirmed that the site of the Project is in Greater Accra Region, which is shown in Annex 1.

4. Responsible and Executing organisations for the Project

Both sides confirmed the organisations, of which organisation charts are shown in Annex 2, responsible for the Project are as follows:

4-1. The responsible organisation of the Project is the Ministry of Roads and Highways (hereinafter referred to as the "MRH") which shall be responsible for supervising the Executing Agency on behalf of GoG.

4-2. The Ghana Highway Authority (hereinafter referred to as the "GHA") will be the executing agency for the Project. GHA shall coordinate with all the relevant organisations to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant organisations properly and on time.

5. Items requested by the Government of Ghana

5-1. As a result of discussions, both sides confirmed that the items requested by GoG are as follows:

- Construction of a flyover bridge over the Tema Motorway Roundabout after completion of the Phase 1 Project, which is under construction at the same

project site.

5-2. JICA will assess the feasibility of the above requested items through the Survey and will report the findings to the Government of Japan. The final scope of the Project will be approved by the Government of Japan.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Ghanaian side agreed that the procedures and basic principles of Japanese Grant as described in Annex 3, 4 and 5 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires the Ghanaian side to submit the Project Monitoring Report, the form of which is attached as Annex 6.

6-2. The Ghanaian side agreed to take the necessary measures, as described in Annex 7, for the smooth implementation of the Project. The contents of the Annex 7 will be elaborated and refined during the Survey and be agreed during the next mission dispatched to Ghana for explanation of the Draft Survey Report.

The contents of Annex 7 will be updated as the Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

7-1. The Team will proceed with further survey in Ghana until 21st February, 2019.

7-2. JICA will prepare a draft Survey Report in English and dispatch a mission to Ghana in order to explain its contents around the end of August, 2019.

7-3. If the contents of the draft Survey Report is accepted and the undertakings for the Project are fully agreed by the Ghanaian side, JICA will finalize the Survey Report and send it to GoG around December, 2019.

7-4. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Ghanaian side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010).

8-2. The Project is categorized as "B" from the following considerations:

The Ghanaian side confirmed to conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings, Environmental Impact Assessment (EIA) / Initial Environmental Examination (IEE) and

information disclosure, etc.) and make EIA/IEE report of the Project. The EIA/IEE approval shall be received from the responsible authorities and submitted to JICA Ghana Office within 1 month after signing of Grant Agreement. The Ghanaian side shall bear the expenses of the procedures.

8-3. Both sides confirmed that Environmental Permit is necessary for the Project in accordance with the Environmental Assessment Regulations of GoG, and that GHA shall obtain the permit for the Project through the following procedures:

1) GHA shall submit an application to the Environmental Protection Agency (EPA) for screening in line with the Environmental Impact Assessment (EIA) procedure. GHA shall provide to the JICA Ghana Office the result of the screening conducted by EPA.
2) The GHA shall prepare a scoping and a draft EIA report in accordance with the response by EPA.
3) GHA shall submit the draft EIA report to EPA, complete necessary procedures for EIA and obtain the Environmental Permit before the commencement of the Project. GHA shall provide the result of EIA to the JICA Ghana Office.
4) Where renewal of the existing environmental permit is permissible, application procedures as mentioned in 1), 2) and 3) are to be restricted to such renewal in line with EPA guidelines. GHA shall submit necessary renewal documents required by JICA (such as updated EIA report, environmental report and permit) to JICA Ghana Office before commencement of the Project.

9. Other Relevant Issues

9-1. The Team explained a method of the Survey based on an inception report submitted by the Team. The Ghanaian side understood the contents and accepted the method.

9-2. Both sides confirmed that no land acquisition and no relocation of residents shall be undertaken in the Project. All of the roads and structures to be constructed in the Project shall be in the land of the Phase 1 Project. GoG shall be responsible to secure the land for the Project.

9-3. In case design changes of the Phase 1 Project are necessary based on the result of the Survey, the Team shall consult with the Ghanaian side and JICA without delay.

9-4. During the Survey, the Team shall analyse possible effects on traffic at Ashaiman

Intersection, next to Tema Roundabout on northbound, after completion of the Project and propose concepts of countermeasures against possible traffic congestion. The countermeasures shall not be included in the Project.

9-5. The Team will conduct some parts of its survey in the site of the Phase 1 Project, which are under construction. The Team shall consult safety measures with the Ghanaian side and the contractor of the Phase 1 Project before their site survey and the Ghanaian side shall take necessary safety measures for it.

9-6. GHA shall conduct a Design Review under MRH Guidelines for Design Review 2016. The detail of the Design Review is shown as followings;

Objective: To ensure that the design conforms to GHA's design codes and standards, and international best practices.

Responsible Division: Planning Division

Contents:
1) Functional and structural adequacy
2) Geometry and clearances
3) Drainage
4) Road Safety considerations
5) Environmental and Social considerations
6) Aesthetics
7) Selection of construction materials
8) Evaluation of life cycle cost
9) Pavement considerations

Timing and Deadline: 2 weeks after submission of designs

JICA understood the necessity of the Design Review in principle and shall dispatch some members of the Team for the Design Review. JICA requested the Design Review should be concluded by the deadline to keep the schedule of the Survey and the Project and the Ghanaian side understood it.

9-7. The Ghanaian side shall, at its own expense, provide the Team with following items in cooperation with other organisations concerned;

- Security-related information as well as measures to ensure safety of the survey team;
- Counterpart personnel,
- Identification cards if necessary,
- Permissions of conducting field activities, such as a topographic survey, geotechnical investigations, environmental and social considerations, a traffic volume survey, etc. and,
- Support in obtaining other privileges and benefits, if necessary.

9-8. The Ghanaian side agreed to provide the Team with the following information for effective and efficient implementation of the Survey;

Natural Condition Data: geology, topography, hydrology, drainage (road and urban), meteorology, etc.

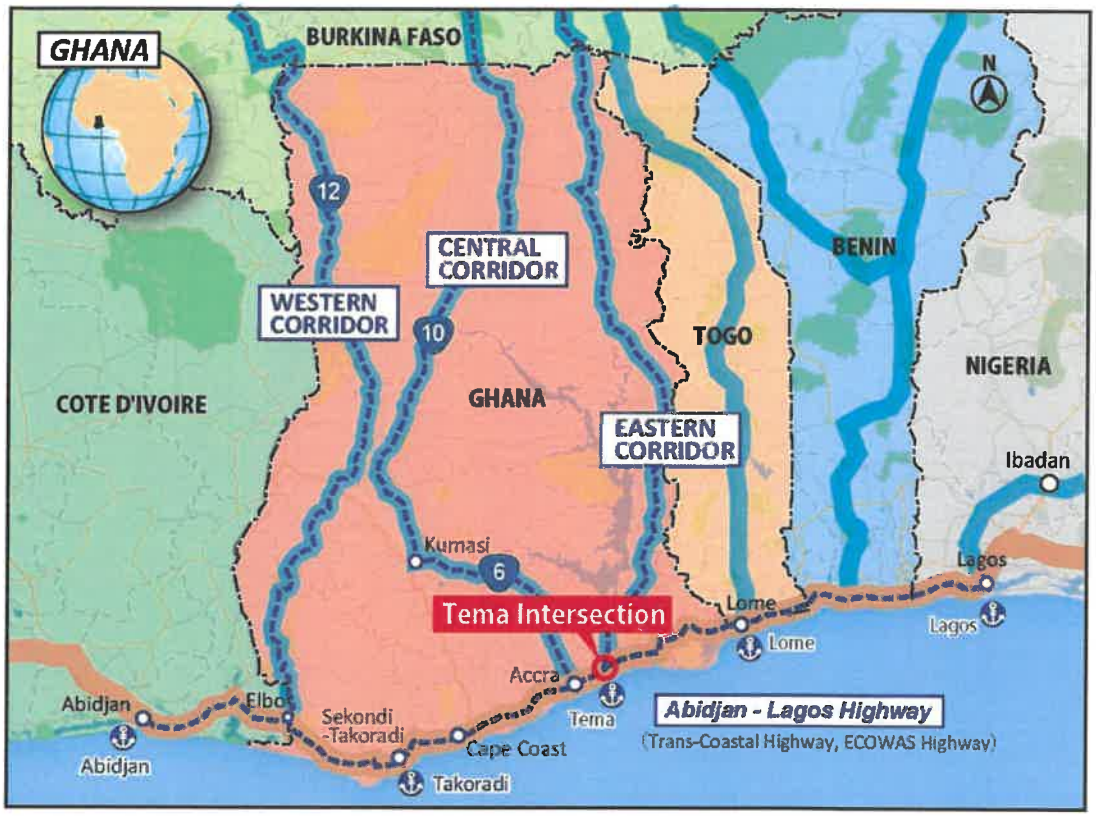
Traffic Condition Data: vehicle registration, logistic statistics, traffic statistics of general roads, toll roads and in/out of ports, traffic facility, traffic regulations and standards, development plans, traffic accident statistics, traffic safety regulations, etc.)

Social Condition Data: demography, commerce and industry, public facilities (schools, hospitals, etc.), gender consideration, etc.

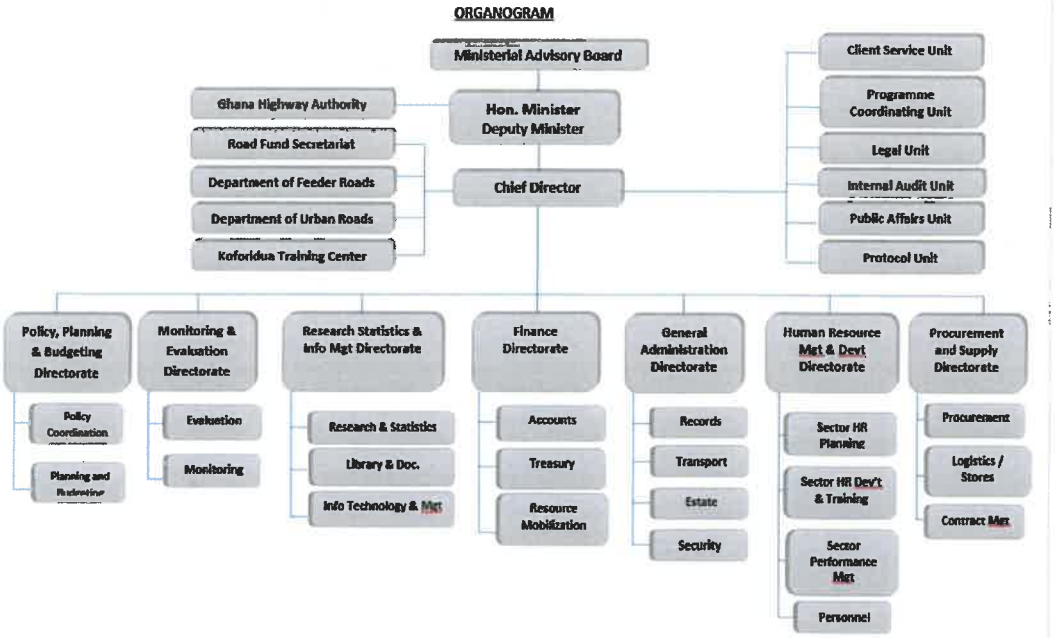
Construction Situation: regulations and standards, construction companies, material procurement, quality control, construction safety, utilizing information and communication technologies, etc.)

Annex 1 Project Site
Annex 2 Organisation Charts
Annex 3 Japanese Grant
Annex 4 Procedures of Japanese Grant
Annex 5 Financial Flow of Grant
Annex 6 Project Monitoring Report (template)
Annex 7 Major Undertakings to be taken by the Government of Ghana

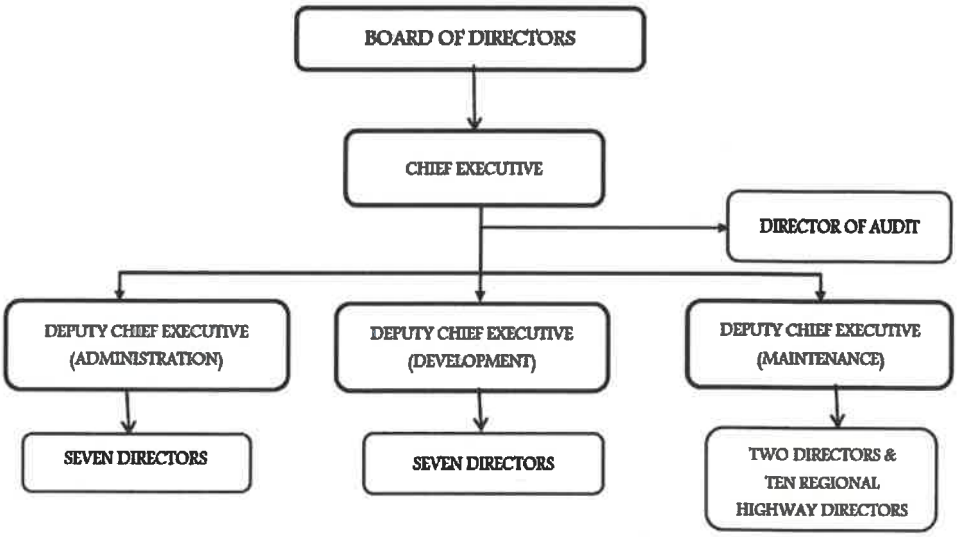
Annex 1 Project Site



Annex 2 Organisation Charts



Organisation Chart of Ministry of Roads and Highways



Organisation Chart of Ghana Highway Authority

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or 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. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal

-Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")

-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")

-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

-Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

-Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the 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 necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant 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 an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take 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 executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) 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 feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

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 to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) 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 to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as

followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2)Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3)Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

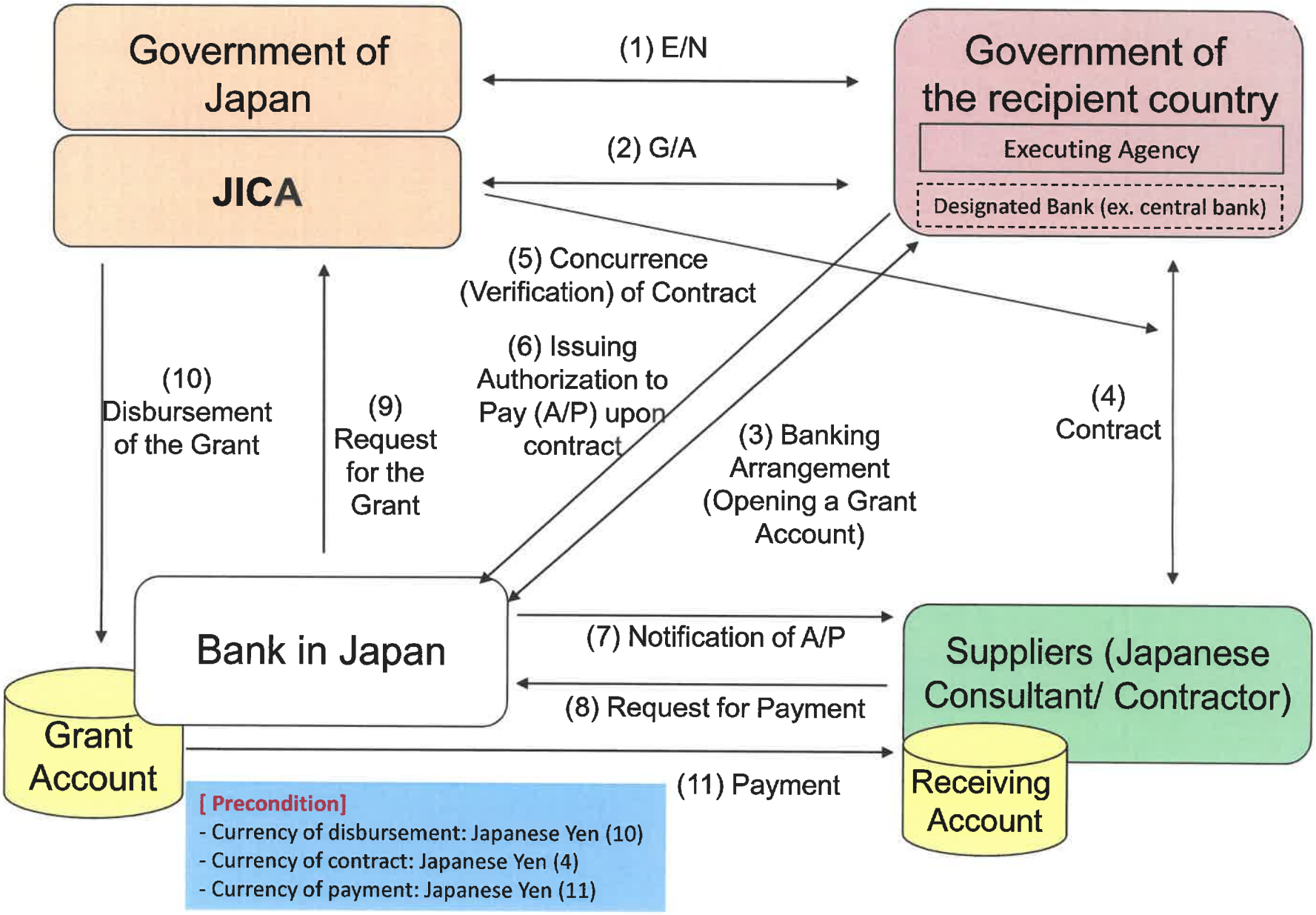
notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.

2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

Annex 5

Financial Flow of Japanese Grant (A/P Type)



Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:
Executing Agency	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:
Line Ministry	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks *(at the time of outline design)*

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

Attachment 6

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

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-

-

添付資料4－25

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

		Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost		(A/D%)	(B/D%)	(C/D%)	
	Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
	others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost		(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost		(A/D%)	(B/D%)	(C/D%)	
Total		(A/D%)	(B/D%)	(C/D%)	

Annex 7

Major Undertakings to be taken by the Government of Ghana

1. Specific obligations of the Government of Ghana which will not be funded with the Grant

(1) Before the Bidding

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To open bank account (B/A)	within 1 month after signing of G/A			
2	To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract			
3	To approve IEE/EIA (Conditions of approval should be fulfilled, if any) and secure necessary budget for implementation	within 1 month after the signing of G/A			
4	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	till land acquisition and resettlement complete			
5	To secure and clear the following land 1) the Project sites 2) temporary constructions yard and stock yards near the Project sites 3) borrow pits and disposal sites near the Project sites	before notice of the bidding document			
6	To clear, level and reclaim the sites, which will be confirmed in the draft final report.	before notice of the bidding document			
7	To obtain the planning, zoning, building permit	before notice of the bidding document			
8	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding document			

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after signing of the contract			
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract			
	2) Payment commission of A/P	every payment			
3	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country and to assist the Supplier with internal transportation therein.				
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work.	during the Project			
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the Services be exempted;	during the Project			
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project.	during the Project			
7	1) To submit Project Monitoring Report	every month			
	2) To submit Project Monitoring Report (final)	within 1 month after signing of Certificate of Completion for the works under the contract			
8	To submit a report concerning completion of the Project	within 6 months after completion of the Project			
9	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)				
	1) Electricity The distributing line to the site	before start of the construction			
	2) Water Supply The city water distribution main to the site	6 months before completion of the construction			
	3) Drainage The city drainage main (for storm, sewer and others) to the site	6 months before completion of the construction			
10	To take necessary measure for safety construction - traffic control	during the construction			
11	To implement EMP and EMoP	during the construction			
12	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the construction			

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP			
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between MTP and JICA.	for 3 years after the Project			
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction			

2. Major Undertakings to be covered by the Grant Aid

NO	Items	Deadline	Amount (Million Japanese Yen)
1	Construction of a bridge and approach roads		
2	To implement detailed design, bidding support and construction supervision (Consulting Service)		
3	Contingencies		
	Total		XXX

*The Amount is provisional. This is subject to the approval of the Government of Japan.

28 November, 2019

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of the Tema Motorway Roundabout (Phase 2)
in the Republic of Ghana
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed among Ministry of Roads and Highways (hereinafter referred to as "MRH"), Ghana Highway Authority (hereinafter referred to as GHA"), Ministry of Finance (hereinafter referred to as "MOF") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 18th January, 2019, and in response to the request from the Government of Republic of Ghana (hereinafter referred to as "GOG"), JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Improvement of the Tema Motorway Roundabout (Phase 2) (hereinafter referred to as "the Project").

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

Accra, 28th November, 2019

Kenshiro TANAKA
Leader
Preparatory Survey Team
Japan International Cooperation Agency

Edmund OFFEI-ANNOR
Chief Director
Ministry of Roads and Highways
Republic of Ghana

Yvonne QUANSAH
Director
Resource Mobilisation and Economic
Relations Division
Ministry of Finance
Republic of Ghana

Nicholas Dome BROWN
Acting Chief Executive
Ghana Highway Authority
Republic of Ghana

ATTACHMENT

1. Objective of the Project

   The objective of the Project is to improve the Tema Motorway Roundabout by constructing a flyover, thereby contributing to improved urban mobility and logistics in the Greater Accra Region as well as regional corridors.

2. Title of the Preparatory Survey

   Both sides confirmed the title as the Preparatory Survey for the Project for Improvement of the Tema Motorway Roundabout (Phase2) (hereinafter referred to as "the Survey").

   In order to differentiate, the on-going project for the improvement of the Tema Motorway Roundabout is referred to as the "Phase 1 Project".

3. Responsible Authority for the Project

   Both sides confirmed the organizations responsible for the Project are as follows:

   3-1. The responsible organization of the Project is MRH, which shall be responsible for supervising the Executing Agency on behalf of GOG.

   3-2. GHA will be the Executing Agency for the Project. GHA shall coordinate with all the relevant organizations to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant organizations properly and on time.

4. Contents of the Draft Report

   After the explanation of the contents of the Draft Report by the Team, the GOG side agreed to its contents. JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the GOG side around March 2020.

5. Cost Estimate

   Both sides confirmed that the cost estimate including the contingency explained by the Team is provisional and will be examined further by the Government of Japan (hereinafter referred to as "GOJ") for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

6. Confidentiality of the Cost Estimate and Technical Specifications

Both sides confirmed that the cost estimate, as attached in Annex 1, and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

7. Timeline for the Project Implementation

The Team explained to the GOG side that the expected timeline for the Project implementation is as attached in Annex 2.

8. Expected Outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. The GOG side will be responsible for the achievement of agreed key indicators targeted in year 2026 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative Indicators]

Index	Basic Value (Actual Record of 2015)	Target Value in 2026 (3 years after the Project Completion)
Passenger Volume	86.6 mil. passengers/year	185.7 mil. passengers/year
Freight (Cargo) Volume	44.3 mil. tons/year	91.5 mil. tons/year
Travel Time per minute (AM peak hour at Accra-Aflao 2.0km)	8.2 minutes	2.0 minutes
(AM peak hour at Akosombo-Harbour 2.0km)	15.6 minutes	2.0 minutes

[Qualitative Indicators]

- Moderate traffic congestion and to provide uninterrupted traffic flow.
- Facilitate and grade up transit system in the West African Region.
- Stabilize carrier-transit time and effectiveness in logistics leaving and arriving at the Tema Port will be improved.
- Improve traffic safety of pedestrians and vehicles at the intersection.
- Reduce future emission of transport related greenhouse effect.
- Connect links between Coastal Highways (Coastal Corridor) and East Highways (East Corridor) will be enhanced.

9. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the Project completion, in principle, with respect to five evaluation criteria (Relevance,

Effectiveness, Efficiency, Impact and Sustainability). The result of the evaluation will be publicized. The GOG side is required to provide necessary support for the data collection.

10. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 3. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 1. (2) 5 of Annex 3, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by GHA during the implementation stage of the Project.

The GOG side assured to take the necessary measures and coordination including allocation of the necessary budget, which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that the Annex 3 will be reviewed and attached to the G/A. The revision of Annex 3 will be concluded among JICA, Embassy of Japan, MOF and Ministry of Foregn Affairs and Regional Integration before G/A signing.

Both sides confirmed that GHA shall take necessary measures to ensure and maintain the security of the Project site and the persons related to the implementation of the Project, in cooperation with relevant authorities during the Project period. Such security measures shall reasonably reflect needs of the Consultant/the Contractor engaging in the Project, as shown in Annex 3.

Both sides agreed that in case the additional security cost would be necessary for the implementation of the Project, such cost shall be borne by the Recipient without using the Grant.

11. Monitoring during the Implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 4. The timing of submission of the PMR is described in Annex 3.

12. Project Completion

Both sides confirmed that the Project will be deemed completed when all the facilities constructed and equipment procured by the Grant are in operation. The completion of the Project will be reported to JICA promptly, but in any event not later than six months after completion of the Project.

13. Items and Measures to be considered for the Smooth Implementation of the Project

Both sides confirmed the items and measures to be considered for the smooth implementation of the Project as follows.

- Tax exemption described in 1. (2) 5 of Annex 3 is approved by the Parliament.
- Construction safety secured with reference to the "Guidance of the Management of Safety for Construction Works in Japanese ODA Projects".

14. Environmental and Social Considerations

14-1 General Issues

14-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as B because the Project is not considered as a large-scale road and bridge project, is not located in a sensitive area, and has none of the sensitive characteristics under the Guidelines, it is not likely to have significant adverse impact on environment.

14-1-2 Environmental Checklist

Measures for the Project are summarized in the Environmental Checklist attached as Annex 5. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the GOG side shall submit the modified version to JICA in a timely manner.

14-2 Environmental Issues

14-2-1 Environmental Permit

Both sides confirmed the Environmental Permit report will be renewed by Environmental Protection Agency (EPA) in June 2020.

14-2-2 Environmental Monitoring Plan

Both sides confirmed Environmental Monitoring Plan (EMoP) of the Project is indicated in Annex 6. Both sides agreed that environmental mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

14-3 Environmental and Social Monitoring

14-3-1 Environmental Monitoring

Both sides agreed that the GOG side will submit results of environmental monitoring to JICA by using the monitoring form attached as Annex 7. The timing of submission of the monitoring form is described in Annex 3.

14-3-2 Information Disclosure of Monitoring Results

Both sides confirmed that the GOG side will disclose results of environmental and social monitoring to local stakeholders through their website / in their field offices. The GOG side agreed JICA will disclose results of environmental and social monitoring submitted by the GOG side as the monitoring forms attached as Annex 7 on its website.

15. Other Relevant Issues

15-1 Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

15-2 Effects of the Widening of Tema Motorway on the Project

Both sides comfirmed that the Project and the Widening of Tema Motorway will not interfere with each other. Both sides will exchange the information of the projects to avoid any conflicts of their works.

15-3 Maintenance of Tema Motorway Interchange

Both sides confirmed that GOG will maintain Tema Motorway Interchange after the completion of the construction works. The maintenance cost shall be borne by GOG.

15-4 Construction Period of the Project

The GOG side requested to shorten the construction period, which is shown in the Preparatory Survey Report, 29 months. JICA assured GOG that the possibility of shortening the construction period shall be considered in the detailed design stage.

15-5 3-Dimensional Modeling

In response to the Teams' explanation on the composite frame structure that applies steel pier connected by means of an anchor frame to a concrete foundation, GHA

requested the Team to consider furnishing 3-dimensional models showing the details of the structure for better understanding of the design as well as during the construction, as this type of structure is first of its kind in Ghana.

Annex 1 Project Cost Estimation
Annex 2 Project Implementation Schedule
Annex 3 Major Undertakings to be taken by the Government of the Republic of Ghana
Annex 4 Project Monitoring Report (template)
Annex 5 Environmental Check List
Annex 6 Environmental Monitoring Plan
Annex 7 Environmental and Social Monitoring Form
Annex 8 Tax Exemption Letter from MOF (Ref:No. RMERD/TPU/JICA/019)

Annex 1 Project Cost Estimation

CONFIDENTIAL

(1) Cost Borne by GOJ

Total: JPY3,839 million

- Civil Work: JPY3,378 million
- Detailed Design and Construction Supervisory Service: JPY283 million
- Contingency: JPY178 million

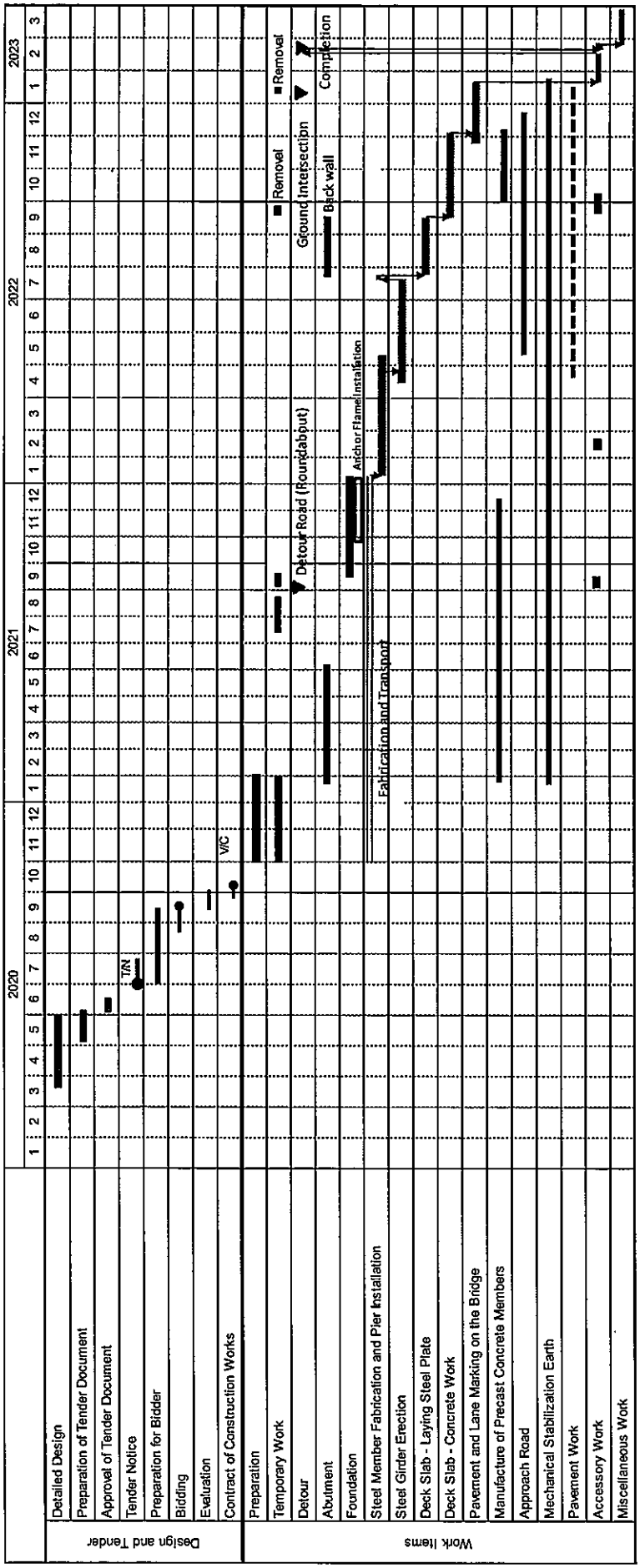
(2) Cost Borne by GOG

- Bank Charges: GH¢300,000

(3) Conditions of Cost Estimation

- Estimated timing: February 2019
- Exchange rates: USD 1.00 = JPY 112.67
  GH¢ 1.00 = JPY 23.04
- Others: The project is implemented in accordance with the system of Japan's Grant Aid. The above cost estimation does not assure the ceiling cost on the E/N and shall be reviewed by GOJ before signing of the E/N between the two Governments.

Annex 2 Project Implementation Schedule



Annex 3

Major Undertakings to be taken by the Government of Ghana

1. Specific obligations of the Government of Ghana which will not be funded with the Grant

(1) Before the Bidding

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To open bank account (B/A)	within 1 month after signing of G/A	GHA MOF		
2	To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract	GHA MOF	2,400 GH¢	
3	To renew the Environmental Permit issued by EPA and secure necessary budget for implementation	within 1 month after the signing of G/A	GHA	Not disclosed	
4	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	till land acquisition and resettlement complete	GHA		
5	To secure and clear the following land 1) the Project sites 2) temporary constructions yard and stock yards near the Project sites 3) facilitate for the contractor to secure borrow pits and disposal sites near the Project sites	before notice of the bidding document	GHA		
6	To obtain the planning, zoning, building permit	Not applicable			
7	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding document	GHA		

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after signing of the contract	GHA		
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract	GHA	118,200 GH¢	
	2) Payment commission of A/P	every payment	GHA	179,400 GH¢	
3	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country and to assist the Supplier with internal transportation therein.	during the Project	GHA		
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work.	during the Project	GHA		
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the Services be exempted;	during the Project	To Be Decided		RME RD/TPU/JICA/019 (Annex 8)
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project.	during the Project	GHA		
7	1) To submit Project Monitoring Report	every month	GHA		
	2) To submit Project Monitoring Report (final)	within 1 month after signing of Certificate of Completion for the works under the contract	GHA		
8	To submit a report concerning completion of the Project	within 6 months after completion of the Project	GHA		
9	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)				
	1) Electricity The distributing line to the site	before start of the construction	GHA		
	2) Water Supply The city water distribution main to the site	6 months before completion of the construction	GHA		
	3) Drainage The city drainage main (for storm, sewer and others) to the site	6 months before completion of the construction	GHA		

NO	Items	Deadline	In charge	Estimated Cost	Ref.
10	To take necessary measure for safety construction - traffic control	during the construction	GHA		
11	To implement EMP and EMoP	during the construction	GHA		
12	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the construction	GHA		
13	To renew the Environmental Permit issued by EPA and secure necessary budget for implementation	during the construction	GHA	Not disclosed	
14	To secure and clear the following land 1) the Project sites 2) temporary constructions yard and stock yards near the Project sites 3) facilitate for the contractor to secure borrow pits and disposal sites near the Project sites	during the construction	GHA		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	GHA		
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between GHA and JICA.	for 3 years after the Project	GHA		
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	GHA		

2. Major Undertakings to be covered by the Grant Aid

NO	Items	Deadline	Amount (Million Japanese Yen)
1	Construction of a bridge and approach roads		
2	To implement detailed design, bidding support and construction supervision (Consulting Service)		
3	Contingencies		
	Total		XXX

*The Amount is provisional. This is subject to the approval of the Government of Japan.

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	Person in Charge (Designation) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Line Ministry	Person in Charge (Designation) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant (Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc.,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spare parts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks *(at the time of outline design)*

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

○onitoring sheet on price of specified materi○

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

-
-
-

Attachment 7

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Annex 5 Environmental Checklist

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) The EIA report is preparing and will be submitted to Environmental Protection Agency in March 2017. (b)(c) If the amendment of the EIA report is not required, the report will be approved within 50 days after the submission. (d) The other permissions related to environmental management are not required.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) A stakeholder meeting was conducted in May 2019 and the understanding has been obtained from local stakeholders. (b) The results of interview surveys to the local people and stakeholder meetings with the other relevant organizations were reflected in the design policy and mitigation measures for environmental impacts during construction phase.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Several alternative plans on the structure of the intersection have been examined with social and environmental considerations at the preparatory study.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken? (b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	(a) - (b) -	(a)(b) Because the project site is located in industrial area, considerable air pollution is feared. However, continuous monitoring of the air quality is not conducted. It is unknown whether the air quality exceeds the environmental standards or not. In the future, total amount of air pollutant caused by vehicle exhaust gas will increase. However, because of improved traffic efficiency, the amount may be reduced compared to without project.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? (c) Do effluents from various facilities, such as 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 not to comply with the country's ambient water quality standards?	(a) N (b) N (c) N	(a) Turbid water will generate in the construction works. The turbid water will be disposed into existing drainage ditches along the roadside and not drain into the surrounding area. There are no intake facilities in and down the site. (b) Because drainage facilities have been constructed along the road, impact on water resources of runoff from road surface will not occur. (c) Development of parking or service areas, which generate wastewater in operation phase, are not included in the project.
	(3) Wastes	(a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations?	(a) N	(a) Development of parking or service areas are not included in the project.
	(4) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) N	(a) The noise level on the borderline of the right of way exceed the environmental standards at present. However, because the project site is located in commercial or industrial area, the impact on general population will not be serious. In the future, noise level caused by vehicle driving will increase. However, because flyover bridges will be installed in central part of the right of way as main driving lanes, the level on roadside may be reduced compared to without project. To prevent increase in noise and vibration level, GHA should maintain favorable road surface condition.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) There are no protected areas in the site and project affected areas.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of 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? (f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	(a) N (b) N (c) N (d) N (e) N (f) N	(a) There are no ecological valuable habitats in and around the site. (b) The habitats of endangered species have not been identified in and down the site. (c) Significant ecological impact will not occur. (d) Wild animals migrating through the site have not been identified. (e)(f) The project will not cause destruction of forest and poaching because of construction works along existing road in urban area.
	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a) N	(a) Alteration of topographic features and tunnel construction are not included in the project.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered	(a) N (b) N (c) N	(a)(b) Small-scale cutting and filling works are included in the construction. However, there are no steep slope areas to occur slope failures or landslides in and around the site. (c) Adequate cutting and filling prevent accidental and sufficient soil runoff.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?		
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?(d) Are the compensations going to be paid prior to the resettlement?(e) Are the compensation policies prepared in document?(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?(g) Are agreements with the affected people obtained prior to resettlement?(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?(i) Are any plans developed to monitor the impacts of resettlement?(j) Is the grievance redress mechanism established?	(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	There is no involuntary resettlement because all the project site of Phase-2 is inside of the area of Phase-1.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Living and Livelihood	(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? (b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)? (e) Is there any possibility that roads will impede the movement of inhabitants? (f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	(a) N (b) N (c) N (d) Y (e) Y (f) N	(a) Because of improvement project of existing arterial road in developed area, the project will not cause significant adverse changes and impacts on the livelihood of the local people and road traffic in operation phase. (b) Residents have already done resettlement before the start of Phase-1. (c) Because of improvement project of existing arterial road in developed area, mass immigration from other areas is unlikely to occur. (d) Traffic congestion and control, and relocation of bus stops will be inevitable in construction phase. The proper construction planning and traffic management will mitigate the impact. (e) Due to the improvement of the intersection structure, the project is likely to impede the movement of local inhabitants. Installation of pedestrian bridges will be included in the project. (f) Because the distance between newly constructed bridges and roadside is too long and there are no residents around the project site, impact on sun shading and radio interference will not occur.
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There is no heritage in the site and project affected areas.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape?	(a) N	(a) There are no valuable landscape sites in and around the project sites.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		Are necessary measures taken?		
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a) N (b) N	(a)(b) The project site is not area where ethnic minorities and indigenous people having unique culture and lifestyle are living.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country, which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment, which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) Y (b) Y (c) Y (d) Y	(a) Construction works will comply with the laws and ordinances associated with the working conditions. (b) Because construction works on higher ground are included, tangible safety considerations to prevent labor accidents will be involved in the project. (c)(d) Because the construction works are conducted along existing arterial road in urban area, health program and safety training to construction workers and considerations to local residents will be included in the environmental management plan.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) Y (c) Y	(a) The adequate mitigation measures including coordination of construction time and methods and monitoring plans to reduce impacts of pollution during the construction will be prepared. (b) The construction activities will not adversely affect the natural environment. (c) Because the construction works are conducted along existing arterial road in urban area, countermeasures against traffic jam will be included in the execution scheme.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) Y (d) Y	(a) The monitoring plans mentioned in the EIA report will be implemented during the construction and operation phase. (b)(c)(d) Because the EIA report is in progress, the specific monitoring plans have not been prepared yet. JICA survey team has submitted the draft monitoring plan to GHA.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).(b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) N(b) N	(a) Deforestation is not included in the project.(b) Relocation of existing power transmission lines will be limited in the right of way and has no serious environmental impacts.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) Impacts to transboundary or global environmental issues will not occur.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made. In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

Annex 6 Environmental Monitoring Plan

Category	Environmental Item	Monitoring Item/ Parameter	Responsible Person and Organization	Location	Method	Frequency
Pollution	Air pollution	**Construction Phase:** ・ Dust ・ PM10, PM2.5, NOx, SOx	Supervising Consultant Contractor	Construction site	Visual observation and interview to pedestrians Instrumental analysis	Visual observation: Daily Interview: Monthly or as needed Instrumental analysis: Pre-Construction Phase 1 time Construction Phase 5 times Total 6 times
		Operation Phase: ・ PM10, PM2.5, NOx, SOx	GHA	Around Tema intersection.	Instrumental analysis	1 time in dry season and 1 time in rainy season per year for 2 years after completion Total 4 times
	Water pollution	**Construction Phase:** ・ Turbid water and drainage conditions	Supervising Consultant Contractor	Construction site	Visual observation	During rainfall
	Waste	**Construction Phase::** ・ Disposal methods of construction and general waste	Supervising Consultant Contractor	Construction site and disposal site	Visual observation and meeting with contractor	Visual observation: Daily Meeting: Monthly or as needed
	Noise and vibration	**Construction Phase:** ・ Noise level ・ Vibration level	Supervising Consultant Contractor	Construction site	Interview to local residents and pedestrians Instrumental measurement	Interview: Monthly or as needed Instrumental measurement: Pre-Construction Phase 1 time Construction Phase 5 times Total 6 times
		Operation Phase: ・ Noise level ・ Vibration level	GHA	In and around Tema intersection	Instrumental measurement	1 time per year for 2 years after completion Total 2 times
Social Environment	Resettlement/ Land Acquisition	**Pre-Construction Phase:** ・ Progress of resettlement action plan	GHA	Around Tema intersection and relocation sites	Site survey and meeting with PAPs	Monthly or as needed
	Poor people	**Construction Phase:** ・ Activity conditions of street venders	Supervising Consultant Contractor	Construction site	Visual observation	Daily

Category	Environmental Item	Monitoring Item/ Parameter	Responsible Person and Organization	Location	Method	Frequency
	Local economies, such as employment, livelihood, etc.	**Pre-Construction Phase:** ・ Progress of resettlement action plan	GHA	Around Tema intersection and relocation sites	Site survey and meeting with PAPs	Monthly or as needed
		Construction Phase: ・ Business activity around construction site ・ Employment situation of unskilled labor	Supervising Consultant Contractor	Construction site	Site survey and interview to local people and unskilled labors	Monthly or as needed
	Land use and utilization of local resources	**Pre-Construction Phase:** ・ Progress of resettlement action plan	GHA	Around Tema intersection and relocation sites	Site survey and meeting with PAP	Monthly or as needed
		Operation Phase: ・ Condition of land use ・ Condition of business activity	GHA TDC	In and around Tema intersection	Site survey and interview to local people	Monthly or as needed for 2 years after completion
	Existing social infrastructures and services	**Pre-Construction Phase:** ・ Relocation status of existing infrastructure facilities	GHA	In and around Tema intersection	Site survey and meeting with facility owners	Monthly or as needed
		Construction Phase: ・ Condition of traffic congestion around construction site	Supervising Consultant Contractor	Construction site	Visual observation	Daily
		Operation Phase: ・ Crossing conditions of pedestrians	GHA	In and around Tema intersection	Site survey and interview to local people	Monthly or as needed for 2 years after completion
	Misdistribution of benefits and damages	**Pre-Construction Phase:** ・ Progress of resettlement action plan	GHA	Around Tema intersection and relocation sites	Site survey and meeting with PAPs	Monthly or as needed

Category	Environmental Item	Monitoring Item/ Parameter	Responsible Person and Organization	Location	Method	Frequency
		Operation Phase: ・ Living situations of Project Affected Persons (PAPs)	GHA	Around Tema intersection and relocation sites	Site survey and meeting with PAPs	Monthly or as needed for 2 years after relocation
	Local conflicts of interest	**Pre-Construction Phase:** ・ Progress of resettlement action plan	GHA	Around Tema intersection and relocation sites	Site survey and meeting with PAPs	Monthly or as needed
		Operation Phase: ・ Living situations of Project Affected Persons (PAPs)	GHA	Around Tema intersection and relocation sites	Site survey and meeting with PAPs	Monthly or as needed for 2 years after relocation
	Landscape	**Construction Phase:** ・ Status of tree felling ・ Status of Planting works	Supervising Consultant Contractor	Construction site	Visual observation and meeting with contractor	Daily
	Working conditions (including occupational safety)	**Construction Phase:** ・ Workplace situations ・ Implementation status of accident prevention measures	Supervising Consultant Contractor	Construction site	Visual observation and meeting with contractor	Daily
Other	Accidents	**Construction Phase:** ・ Implementation status of accident prevention measures	Supervising Consultant Contractor	Construction site	Visual observation and meeting with contractor	Daily
		Operation Phase:: ・ Number of traffic accident	GHA	In and around Tema intersection	Site survey and traffic accident data	Monthly or as needed for 2 years after completion

Annex 7　Environmental Monitoring Form

Draft Environmental Monitoring Form

Item	Parameter	Location	Frequency	Responsible Agency	Result
Construction Stage					
Air quality	PM10, PM2.5, NO, SOx	Construction site	1 time/half year	Supervising Consultant Contractor	
Noise and Vibration	Noise level Vibration Level	Construction site	1 time/half year	Supervising Consultant Contractor	
Water Quality	Turbid water	Construction site	Rainfall time	Supervising Consultant Contractor	
Waste	Waste disposal	Construction site	Every day	Supervising Consultant Contractor	
Operation Stage					
Air quality	PM10, PM2.5, NO, SOx	Tema Intersection	2 times/year	GHA	
Noise and Vibration	Noise level Vibration Level	Tema Intersection	2 times/year	GHA	

In case of reply, the number and date of this letter should be quoted

REPUBLIC OF GHANA

MINISTRY OF FINANCE

Our Ref: RMERD/TPU/JICA/019
Tel No: 0302-747197 Ext. 6122

23rd October, 2019

EXEMPTION OF LOCAL TAXES FOR THE PROJECT FOR REHABILITATION OF NATIONAL TRUNK ROAD N8 (PHASE 2) AND TAX EXEMPTION RELATED PROVISIONS IN GRANT AGREEMENTS BETWEEN THE GOVERNMENT OF GHANA AND JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Please refer to your letter dated 27th August, 2019 referenced JICA (GL) 8-27001/TPU/GEN/019 and subsequent discussions held on the subject matter above with the Honourable Minister of Finance and His Excellency the Japanese Ambassador to Ghana.

2. The Japan International Cooperation Agency (JICA) has been a valued partner to the Government of Ghana, and we have entered into numerous Exchange of Notes and Grant Agreements in pursuit of various developmental projects for which Ghana is thankful.

3. However, there has been an impasse between this Ministry and the Japan International Cooperation Agency (JICA) regarding the interpretation of tax related provisions in these Exchange of Notes and Grant Agreements.

4. This Ministry wishes to state that in order not to jeopardize the cordial relationship that already exist between the Governments 'of Ghana and Japan, we would use our best endeavours to ensure that all pipeline projects including the yet to be bided National Trunk Road N8 and the Tema Motorway Interchange Phase II projects, which are to be implemented with Japanese grant, receives Parliamentary approval for total tax exemption which shall include VAT, Personal Income and Corporate taxes, the main bone of contention between this Ministry and JICA

5. We count on your usual cooperation in this matter.

KWAKU KWARTENG, MP
DEPUTY MINISTER
FOR: MINISTER

THE DIRECTOR-GENERAL
FINANCIAL COOPERATION
IMPLEMENTATION DEPARTMENT
JAPAN INTERNATIONAL COOPERATION AGENCY

cc: Minister, MoF
Hon. Minister, MoFARI
Hon. Minister, Roads & Highways
Hon. Deputy Ministers, MoF
Chief Director, MoF
CEO, Roads & Highways Authority
Director, RMERD, MoF
Commissioner-General, GRA
Commissioners (Customs Div. & DTRD), GRA
Central Consultant Inc.
JICA Ghana Office

【添付資料－5】Technical Notes

第 1 回：2019 年 2 月 19 日

第 2 回：2019 年 6 月 11 日

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TECHNICAL NOTES
ON
THE PREPARATORY SURVEY ON THE PROJECT FOR IMPROVEMENT OF TEMA MOTORWAY ROUNDABOUT (PHASE 2)

The Preparatory Survey Team commissioned to undertake the Outline Design (hereinafter referred to as "The Team") under Japan International Cooperation Agency (JICA) conducted field surveys and review of existing documents and held several discussions on the scope and basic policies with the Ghana Highway Authority (GHA), the executing agency and others concerned on the technical and other relevant aspects of "The Project for Improvement of Tema Motorway Roundabout (Phase 2), in the Republic of Ghana".

This note is signed between The Team, Ministry of Roads and Highways (MRH) and Ghana Highway Authority GHA) to share mutual understandings and agreement on the matters mentioned in Appendix-1.

Accra, 19 February 2019

Mr. Ernest Arthur
Chief Executive
Ghana Highway Authority (GHA)
Ministry of Roads and Highways

Dr. Takayuki Tsuchida
Chief Consultant
JICA Preparatory Survey Team

WITNESS:

Mr. Edmund Offei-Annor
Chief Director
Ministry of Roads and Highways

1. Project Background

The construction for the Project for Improvement of Ghanaian International Corridors (Grade Separation of Tema Intersection in Tema), hereinafter referred to as "Phase 1", commenced in February 2018 and the construction works are currently under progress. The completion is scheduled in June 2020. Major scopes of the Phase 1 covers widening and improvement of Accra – Tema Motorway and Aflao Road in the East-West direction (underpass), construction/widening of at-grade carriageway in the North-South direction, connecting ramps (slip roads) for right turning vehicles at all directions, at-grade traffic signal controlled intersection, and provision of pedestrian bridges.

According to the study conducted during Phase 1 outline design stage, the outcome of phase 1 improvement is effective until year 2023. Beyond 2023, the capacity of the intersection will start to decrease as it becomes saturated due to the increase of traffic volume and the intersection will start getting congested. In order that the intersection continues to enjoy safe and smooth flow, implementation of Phase 2, which plans to provide a fly-over in the north-south direction for the through traffics, needs to be completed before the intersection becomes saturated.

To ensure the intersection functions efficiently beyond 2023, the Government of Ghana (GOG) made a request to the Government of Japan (GOJ) for a Grant Aid Assistance to implement Phase 2. The GOJ decided to conduct the preliminary survey and examine the viability of the project and entrusted the Survey to Japan International Cooperation Agency (JICA).

2. General Items

2.1 Inception Report

The Team distributed and explained the contents of the Inception Report of the Project during the meetings held on January 15 and 16. MRH and GHA basically agree on its contents as also indicated in sub-clause 9-1 of the Minutes of Discussions signed between Ghana side and Japan side on January 18, 2019.

2.2 Project Scopes, Survey Objectives and Objective Section

1) Project Scopes

The requests made by the GOG are to construct a flyover at the Tema Motorway Roundabout and carry out the detailed design and construction supervision.

2) Survey Objective

The objective of the survey work is to:

- Understand the background, purpose, and scope of project under the Grand Aid Assistance Scheme of Japan,
- Study the feasibility of the project in terms of effectiveness, technical and economic justification,

for achieving the outcome of the assistance,

- Estimate project cost, and
- Propose the contents, implementation and maintenance plan as well as critical points to be undertaken by the GOG in order to achieve the outcome and targets set for the project

3. Technical Items Discussed and Agreed

3.1 Standards and Guidelines to be applied

Standards/guidelines applied during phase 1 and mentioned hereunder shall apply.

i) Highway Design: Ghana Road Design Guideline, Survey & Design Division, 1991

(Items not covered in the guideline will be referred from and in the order of " A Policy on Design of Highways and Streets, 2004" (AASHTO: American Association of State Highway and Transportation Officials) or Japan Road Structure Ordinance (Japan Road Association)

ii) Pavement Design: AASHTO Guide for Design of Pavement Structure, 1993

iii) Bridge/Structural Design: Specifications for Highway Bridges (Japan Road Association) or equivalent (wind speed/load will be based on Ghana standard, for live load refer to 3.5)

iv) Retaining Walls: Japanese Standard or equivalent

3.2 Road Geometric Design Condition

In order to secure consistency with Phase 1, the same design condition which was agreed during Phase 1 applies. The major conditions are given in Table 3-1.

Table 3-1 Road Geometric Design Condition

Item		Design Data
Design Speed		80 km/h (transition from NH to Urban Roads)
Design Vehicle Type		WB-20
Clearance Limit		Vertical 5.5 m (4.8 acceptable during construction) Horizontal 0.45m
Transverse Section Dimension	Carriageway Width	3.65 m
	Road Shoulder Width	Inner (0.5 m), Outer (2.5 m)
	Median Width	4.0 m (2.0m along flyover section)
No. of Lanes		2 lanes on each direction
Horizontal Alignment		Minimum Curve Radius : R=520 m Transition Curve Parameter: A=190
Minimum Curve Length		170 m (Minimum Transition Curve Length = 56 m)
Maximum Grade of Vertical Curve		Max 4.0 %
Radius of Vertical Curve		K-value on Crest Curve (64), K-value on Sag Curve (28)
Crossfall		2.5 % (Maximum Superelevation: 6.0 %)

3.3 Alignments

Construction of Phase 1 is based on the horizontal and the vertical alignments designed for the ultimate stage of improvement (3-tier intersection) during phase 1. Therefore, the alignments of Phase 2 are fixed and shall not be subject to significant change.

3.4 Number of Lanes

Number of lanes proposed during Phase 1 will be maintained, except at the at-grade intersection in the Aflao-Tema direction where it will be reduced to 2 lanes, given that the reduction can still be justified in terms of traffic capacity of the intersection.

3.5 Bridge/Structure Type of Elevated Section

- The elevated section on the north-south direction will consist of bridges and retaining walls.
- Cross section of the bridge (one direction) will be as shown in the figure below.

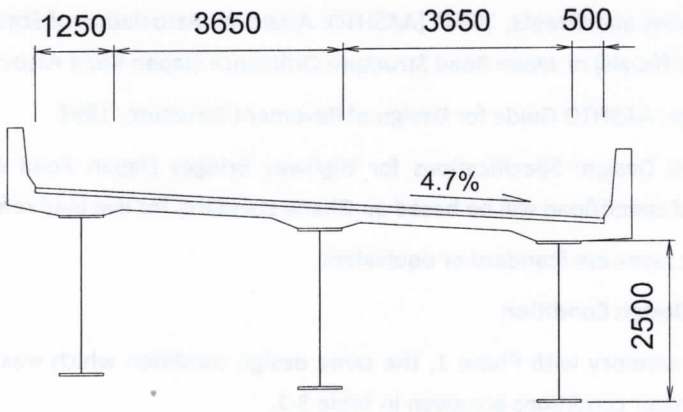

Figure 3-1 Cross section of Bridge (One direction)

- Bridge type and the layout of the fly-over are derived from the result of the comparative study. The Team explained on the configuration of the flyover that applies 3-column pier and 2-column pier. GHA and the Team agreed on the latter as it reduces the bridge spans and contributes to the cost.
- The Team also pointed out that the constraints (box culvert location, required vertical clearance, allowable vertical grades, minimization of impact to roads constructed in Phase 1 etc.) confines to application of steel type girders for superstructure and steel outer-rigger (gantry/gate) frame with concrete pier and caisson foundation. GHA has no objection with regards to application of such structures.
- The Team explained that the design calculation will be based on Japanese Standards as the steel plate girder or steel box girder is planned to be fabricated and procured from Japan.
- GHA understands and agrees to using the Japanese Standards for the bridge design, but GHA and The Team will agree on a safety factor that will not make the results of Japanese Standards inferior to the results of BS 5400 Code.

3.6 Pavement Design

- Asphalt concrete pavement will be planned both on standard section and on the elevated section including the bridges.

- Performance period for Phase 2 will tie into that of Phase 1 (2035).
- Performance period of the roundabout (final configuration of Phase 1) will be 2020.

4. Environmental and Social Consideration

- The EIA/IEE permit covers the overall improvement of Tema Motorway Roundabout (3-tier intersection) and not just the scopes of Phase 1 improvement works. Ghana`s prevailing environmental related laws do not require a separate EIA/IEE for projects implemented in phases, given that there is no drastic change in the existing conditions of the project site and/or in the plans/design in the phases.
- The existing permit`s validity is till June 4, 2019. GHA will take all necessary initiatives for the renewal of the permit until the completion of implementation of Phase 2.
- GHA will provide to the Team a carbon copy of letter(s) submitted for the renewal and the renewed permit immediately after obtaining the renewed permit.
- GHA will conduct stakeholders meeting in accordance with JICA Guidelines on environmental and social consideration.

5. Construction Planning and Procurement

- Vertical clearance of 4.8m is acceptable during construction period.
- A roundabout is one of the possible detours during construction that is deemed to minimize the impact to the roads constructed under Phase 1. The area within the roundabout can also be exclusively used for construction of the flyover.
- If the roundabout is to be applied for the detour, it will have sufficient or equal capacity as that of the signal-controlled intersection to control traffic until the commencement of Phase 2 construction. Should a roundabout is to be applied, GHA agrees on its application.
- Candidate locations for borrow pit and quarry sites are shown in Figure 7-1.
- Construction debris will be disposed at the disposal area designated by GHA. GHA is requested to provide information of the disposal area by the end of February, 2019.

6. Design Change

- Should a roundabout is to be applied for detour, GHA understands that change of final configuration of Phase 1 at-grade signal-controlled intersection into a roundabout needs a design change. In such case, GHA will submit the request for review of the modification accordingly.

7. Others

- GHA will furnish The Team with available data and information requested by the Team in the attachment (revised and submitted to GHA on February 13, 2019) of the Inception Report by its earliest possible convenience, but not later than March 31, 2019.

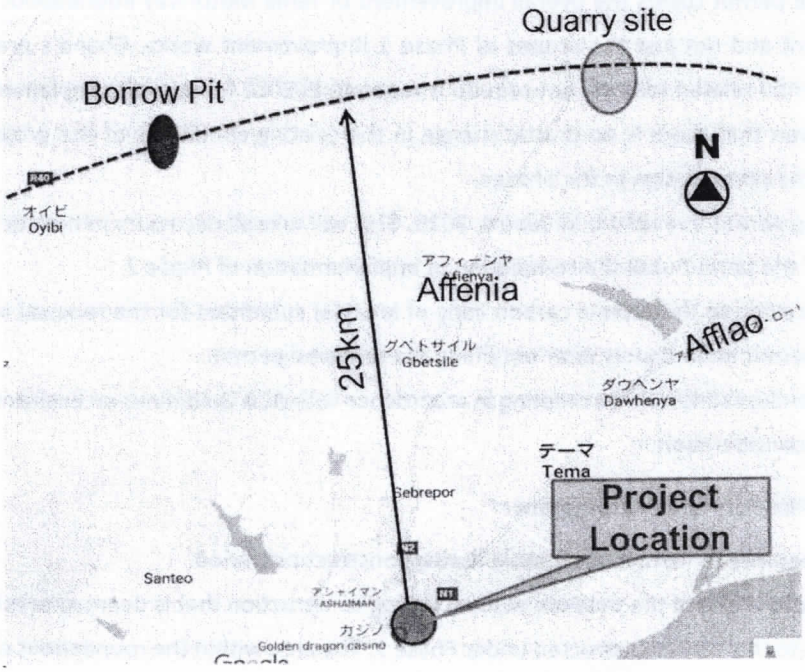

Figure 7-1 Candidate Location of Borrow Pit and Quarry Sites

添付資料5-6

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TECHNICAL NOTES (2)
ON
THE PREPARATORY SURVEY ON THE PROJECT FOR
IMPROVEMENT OF
TEMA MOTORWAY ROUNDABOUT (PHASE 2)

The Preparatory Survey Team commissioned to undertake the Outline Design (hereinafter referred to as "The Team") under Japan International Cooperation Agency (hereinafter referred to as "JICA") submitted outline design output and made presentations and held discussions with the Ghana Highway Authority (hereinafter referred to as "GHA"), the executing agency and others concerned as a part of the Design Review of the Ministry of Roads and Highways (hereinafter referred to as "MRH")/GHA on the technical and other relevant aspects of "The Project for Improvement of Tema Motorway Roundabout (Phase 2), in the Republic of Ghana" (hereinafter referred to as "The Project").

This note is signed between The Team, MRH and GHA on items discussed and agreed on the matters mentioned in Appendix-1.

Accra, June 11, 2019

Mr. Amin Baba Kassim Nuhu
Ag. Chief Executive
Ghana Highway Authority (GHA)
Ministry of Roads and Highways

ROBINSON SHRESTHA
for **Dr. Takayuki Tsuchida**
Chief Consultant
JICA Preparatory Survey Team

WITNESS:

Mr. Edmund Offei-Annor
Chief Director
Ministry of Roads and Highways

Appendix-1

1. Project Background

The construction for the project for Improvement of Ghanaian International Corridors (Grade Separation of Tema Intersection in Tema), hereinafter referred to as "Phase 1", commenced in February 2018 and the construction works are currently under progress. The completion is scheduled in June 2020. Major scopes of the Phase 1 cover widening and improvement of sections of Accra-Tema Motorway and Aflao Road in the East-West direction (underpass), construction/widening of at-grade carriageway in the North-South direction, connecting ramps (slip roads) for right turning vehicles at all directions, at-grade traffic signal controlled intersection, and provision of pedestrian bridges.

According to the study conducted during Phase 1 outline design stage, the outcome of phase 1 is effective until year 2023. Beyond 2023, the capacity of the intersection will become saturated due to the increase of traffic volume and the intersection will start getting congested. In order that the intersection continues to enjoy safe and smooth flow, implementation of Phase 2, which plans to provide a fly-over in the North-South direction for the through traffics, needs to be completed before the intersection becomes saturated.

To ensure the intersection functions efficiently beyond 2023, the Government of Ghana (GOG) made a request to the Government of Japan (GOJ) for a Grant Aid Assistance to implement Phase 2. The GOJ through JICA decided to conduct the preliminary survey and examine the viability of the Project.

JICA dispatched a mission to Ghana in January 2019 (first field survey) to conduct a preliminary survey of Phase 2. During the course, JICA Survey Team (the Team) carried out surveys and meetings with GHA and mutually agreed on the design conditions for the outline design of the road and bridge design in the Technical Notes signed on February 19, 2019.

2. General Items

2.1 Design Review

The Team made presentations explaining the purpose of visit to Ghana, which was followed by an explanation on the output of the draft outline design, construction planning, traffic safety measures applied, importance of Building and Construction Information Modelling/Management (BIM/CIM) and a virtual simulation of the entire project.

2.2 Project Scopes, Survey Objectives and Objective Section

1) Project Scopes

The requests made by the GOG are to construct a flyover at the Tema Motorway Roundabout and carry out the detailed design and construction supervision.

2) Survey Objective

The objective of the survey work is to:

- Understand the background, purpose, and scope of project under the Grand Aid Assistance Scheme of Japan,
- Study the feasibility of the Project in terms of effectiveness, technical and economic

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justification,

- Conduct outline design for minimum but optimal scope and scale of the project required for achieving the outcome of the assistance,
- Estimate project cost, and
- Propose the contents, implementation and maintenance plan as well as critical points to be undertaken by the GOG in order to achieve the outcome and targets set for the Project

3. Technical Items

3.1 1st Technical Note

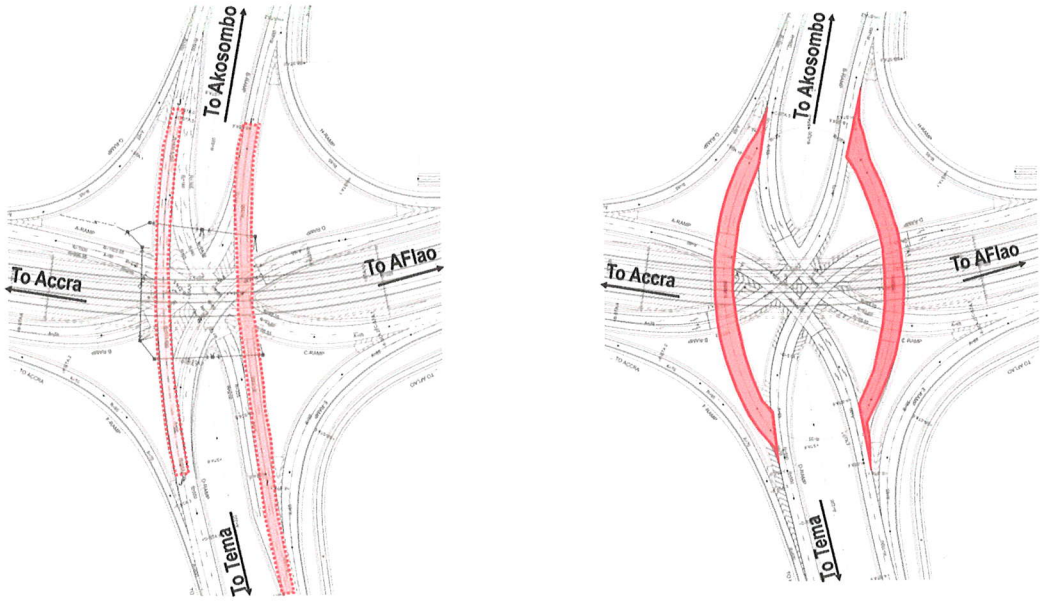
All items agreed in the 1st Technical Note signed on 19 February 2019, except for those covered in this technical note, still applies.

3.2 Response to Comments from GHA on Outline Design and Traffic Safety

GHA basically agreed on the contents of the output of the outline design and traffic safety plans presented by the Team during the technical meeting held on May 29, 2019, except for some concerns, which were compiled in the form of comments and provided to the Team on June 6, 2019. The response to the comments were furnished by the Team on June 7, 2019.

3.3 Design Change of Phase 1 Intersection Configuration

GHA has no objection on the changes proposed by the Team with regards to the configuration of the at-grade intersection of Phase-1 as illustrated in Figure-1 below.



Original Plan **Modified Plan**

Figure -1 Configuration Change of At-grade Intersection

3.4 Bridge Design Condition (Shoulder Width at Bridge Section)

GHA expressed concerns regarding 1.25m width for outer shoulders proposed by the Team at bridge section and demanded to increase to a minimum of 2.0m citing safety reasons, E.g. breakdown of vehicles.

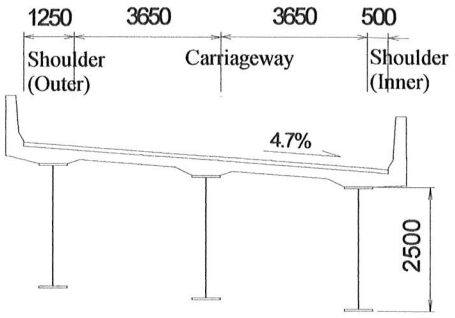


Figure-2 Cross section of Bridge Section

(Excerpt from Technical Note)

The Team explained 1.25m is the minimum width recommended in the Japanese Standard across longer bridges over 50m while AASHTO recommends 1.2m across bridges longer than 60m. This 1.25m width in combination with the proposed carriageway widths can secure enough space (2-lanes) to cater traffic smoothly and safely without being obstructed by a broken-down vehicle. This justification for application of 1.25m from safety and economic aspects was already provided and mutually agreed in the Technical Notes signed on February 19, 2019.

Subsequently, GHA agreed application of a 1.25m wide outer shoulder as proposed by the Team.

3.5 Bridge Design Condition (Live load)

GHA recommended to select the loading option that provided the worse effect as the loading selected by the Consultant gives a lesser load effect. The loading condition of live load, GHA recommends requires adding one lane with UDL fully loaded gives the load effect to approximately 8% higher than the Japanese B-Live Load. Previously the value was 6%. The Team will modify the value to be considered from 6% to 8%.

3.6 Bridge Material

GHA suggested the Team use concrete bridge pier instead of steel because of its durability and for easy maintenance. The Team explained that the steel girder and pier provided will be durable and its maintenance will not be a problem as a special type of steel (CORSPACE STEEL) will be used for construction that will require maintenance (painting) only in every 40 years. GHA agreed on the Material Choice for construction.

3.7 Seismic Design

GHA requested seismic design against large scale earthquake as required by the Building Code of Ghana in addition to the seismic coefficient 0.1. The Team will check on the necessity of the design and consult with JICA.

3.8 Others

- GHA requested the Team to provide a guideline for the maintenance of the proposed bridge. Preparation of a guideline is not under the present scope of this preparatory survey. The topic will be discussed with JICA.
- GHA assured the Team to provide land area sufficient for fabrication of steel girder for the construction of Phase 2.

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END

【添付資料－6】概略設計図面

GHANA HIGHWAY AUTHORITY
MINISTRY OF ROADS AND HIGHWAYS
REPUBLIC OF GHANA

THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)

JUNE 2019

CTI ENGINEERING INTERNATIONAL CO.,LTD.

DRAWING LIST

No.	DRAWING TITLE	SHEET NO.	No. of Sheets
1.	**GENERAL**	**GN - 01 ~ 09**	**9**
	GENERAL NOTES(1)~(3)	GN - 01 ~ 03	3
	PROJECT LOCATION MAP	GN - 04	1
	KEY PLAN	GN - 05	1
	ALIGNMENT LAYOUT(1)~(4)	GN - 06 ~ 09	4
2.	**PLAN(1)~(6)**	**PL - 01 ~ 06**	**6**
3.	**PROFILE(1)~(3)**	**PR - 01 ~ 03**	**3**
4.	**TYPICAL CROSS SECTION**	**TP - 01**	**1**
5.	**CROSS SECTION(1)~(36)**	**CR - 01 ~ 36**	**36**
6.	**PAVEMENT STRUCTURE**	**PS - 01**	**1**
7.	**INTERSECTION PLAN**	**IP - 01**	**1**
8.	**DRAINAGE PLAN(1)~(6)**	**DP - 01 ~ 06**	**6**
9.	**DETAIL OF DRAINAGE(1)~(5)**	**DR - 01 ~ 05**	**5**
	SIDE DITCH	DR - 01	1
	CATCH BASIN	DR - 02 ~ 03	2
	CROSS DRAINAGE	DR - 04	1
	SCHEDULE OF DRAINAGE	DR - 05	1
10.	**REINFORCED EARTH WALL(1)~(9)**	**RE - 01 ~ 09**	**9**
11.	**ROAD ANCILLARIES**	**RA - 01 ~ 37**	**37**
	ANCILLARY PLAN(1)~(6)	RA - 01 ~ 06	6
	LAYOUT OF REFLECTOR(1)~(6)	RA - 07 ~ 12	6
	MEDIAN BLOCK,KERB AND EDGE BLOCK	RA - 13	1
	CRASH BARRIER	RA - 14 ~ 15	2
	REFLECTOR	RA - 16	1
	LAYOUT OF PAVEMENT MARKINGS(1)~(8)	RA - 17 ~ 24	8
	PAVEMENT MARKINGS(1)~(2)	RA - 25 ~ 26	2
	TYPICAL TRAFFIC SIGNS(1)~(2)	RA - 27 ~ 28	2
	DIRECTION SIGNS(1)~(7)	RA - 29 ~ 35	7
	DETAIL OF NOSE(1)~(2)	RA - 36 ~ 37	2
12.	**TRAFFIC SIGNAL LIGHT(1)~(8)**	**SL - 01 ~ 08**	**8**
13.	**ROAD LIGHT(1)~(18)**	**RL - 01 ~ 18**	**18**
14.	**BRIDGE**		**29**
	GENERAL ARRANGEMENT OF BRIDGE	**GB - 01**	**1**
	GENERAL ARRANGEMENT OF SUPERSTRUCTURE(1)~(2)	**SP - 01 ~ 02**	**2**
	SECTIONAL FORCES AND PROPERTIES(1)~(12)	**SF - 01 ~ 12**	**12**
	GENERAL ARRANGEMENT OF SUBSTRUCTURE(1)~(2)	**SB - 01 ~ 02**	**2**
	CROSS SECTION OF PIER 1	**P1 - 01**	**1**
	CROSS SECTION OF CAISSON PILE OF PIER 1	**P1 - 02**	**1**
	CROSS SECTION OF PIER 2	**P2 - 01**	**1**
	CROSS SECTION OF CAISSON PILE OF PIER 2	**P2 - 02**	**1**
	CROSS SECTION OF ANCHOR FRAME	**AF - 01**	**1**
	REINFORCED REBAR ARRANGEMENT OF CAISSON PILE OF PIER	**PC - 01**	**1**
	GENERAL ARRANGEMENT OF ABUTMENT 1	**A1 - 01**	**1**
	REINFORCED REBAR ARRANGEMENT OF ABUTMENT 1	**A1 - 02**	**1**
	REINFORCED REBAR ARRANGEMENT OF COLUMN OF A1	**A1 - 03**	**1**
	REINFORCED REBAR ARRANGEMENT OF CAISSON PILE OF A1	**A1 - 04**	**1**
	GENERAL ARRANGEMENT OF ABUTMENT 2	**A2 - 01**	**1**
	REINFORCED REBAR ARRANGEMENT OF ABUTMENT 2	**A2 - 02**	**1**
15.	**REFERENCE DRAWINGS**	**RD - 01 ~ 06**	**6**
	STRUCTURE REMOVAL PLAN(1)~(6)	RD - 01 ~ 06	6
	Total number of sheets		175

GENERAL NOTES(1)

GENERAL

1. SCALE
   ATTENTION IS DIRECTED TO THE FACT THAT THE SCALES INDICATED IN THE DRAWINGS ARE FOR A1-SIZE. WHEN PRINTED ON OTHER SIZES, THE SCALES SHALL BE READ ACCORDINGLY.
2. UNIT
   ALL DIMENSIONS SHOWN IN THE DRAWINGS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
   ALL ELEVATIONS SHOWN IN THE DRAWINGS ARE IN METERS, AND ARE LOCALLY ESTABLISHED BASED ON TEMPORARY BENCH MARK OF THIS PROJECT.
3. COORDINATE SYSTEM
   ALL COORDINATE VALUES IN THE DRAWINGS ARE CONFORMITY WITH "GHANA GRID" AND "WGS84 UTM ZONE 30N".
   ALL COORDINATES AND LEVELS ARE GIVEN IN METRES.
4. TECHNICAL STANDARDS
   - ROAD DESIGN GUIDE(GHA,1991)
   - A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS (AASHTO,2011)
   - ROAD DESIGN ORDINANCES(JAPAN ROAD ASSOCIATION,2015)
   - GUIDE FOR DESIGN OF PAVEMENT STRUCTURES(AASHTO,1993)
   - PAVEMENT DESIGN MANUAL(MRH-GHA,1998)
   - DESIGN GUIDELINE FOR CULVERT(JAPAN ROAD ASSOCIATION,2010)
   - DESIGN GUIDELINE FOR RETAINING WALL(JAPAN ROAD ASSOCIATION,2012)
   - HIGHWAY CAPACITY MANUAL(TRANSPORTATION RESEARCH BOARD,2010)
   - ROAD LIGHTNING INSTALLATION GUIDELINES AND EXPLANATION(JAPAN ROAD ASSOCIATION,2007)
   - LED ROAD AND LIGHTNING INSTALLATION(DRAFT)(MINISTRY OF LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM,2011)
5. SHOP DRAWING
   THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE CONSULTANT PRIOR TO COMMENCEMENT OF THE WORK.
6. THE CONTRACTOR SHALL CONSTRUCT AND MAINTAIN DETOURS WHERE NECESSARY DURING CONSTRUCTION TO ACCOMMODATE EXISTING TRAFFIC. DETOURS SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO APPROVAL BY THE CONSULTAT. CONSULTANT DESIGN IS ATTACHED FOR REFERENCE.
7. ALL FALSE WORK AND TEMPORARY STRUCTURES SHALL BE DESIGNED BY THE CONTRACTOR AND SHALL BE SUBJECTED TO THE APPROVAL BY THE CONSULTAT.

MATERIAL

1. REINFORCING BAR
   - REINFORCING STEEL SHALL BE DEFORMED HIGH YIELD BARS GRADE 60 IN COMPLIANCE WITH BS 4449 OR ASTM A615M OR EQUIVALENT.
   - REINFORCING FABRIC SHALL COMPLY WITH BS 8666.
   - ALL REINFORCING BARS SHALL HAVE DEFORMED SURFACES. REINFORCING STEEL SHALL BE FREE OF MILL SCALES, OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH CONCRETE.

2. CONCRETE

CLASS	CHARACTERISTIS		MAXIMUM WATER/CEMENT CONCRETE		MINIMUM CEMENT CONCRETE (Kg/m3)
	CYLINDER STRENGTH (N/mm2)	CUBE STRENGTH (N/mm2)	A	B	
C20/25	20	25	0.70	0.60	260
C25/30	25	30	0.60	0.55	280
C30/37	30	37	0.55	0.50	300
C35/45	35	45	0.50	0.45	320
C40/50	40	50	0.45	0.40	340
C45/55	45	55	0.45	0.40	360
C50/60	50	60	0.45	0.40	360

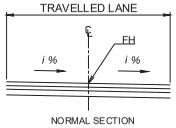
NOTE: UNDER WATER/CEMENT RATIO,COLUMN A APPLIES TO MODERATE AND INTERMEDIATE EXPOSURE, AND COLUMN B TO SEVERE EXPOSURE.

CLASS C20/25 CONCRETE - BLINDING CONCRETE, BASE CONCRETE OF BOX CULVERTS, PIPE BEDDING, AND ALL STRUCTURES WITHOUT REINFORCEMENT INCLUDING REINFORCEMENT STRUCTURES INDICATED IN THE BASIN, KERB STONE, MEDIAN STRIP BLOCK, TRAFFIC ISLAND BLOCK, EDGE BLOCK ETC.

CLASS C25/30 CONCRETE - ALL MAJOR REINFORCED CONCRETE STRUCTURES INDICATED IN

ROAD

1. FORMATION HEIGHT(FH)
   DESIGN ELEVATION STIPULATED AS "FORMATION HEIGHT" IN THE DRAWINGS SHALL BE DEFINED BY FOLLOWING POINTS.



NORMAL SECTION

IN BETWEEN THE LANES ON EACH DIRECTION AND NOT AT MIDDLE OF ROAD.

CONSTRUCTION

CONSTRUCTION SHALL MEET THE SPECIFICATIONS UNDER ITEMS OF TECHNICAL STANDARDS.

1. REINFORCED CONCRETE
   THE SETTING OUT AND THE ELEVATIONS OF THE DIFFERENT COMPONENTS OF THE STRUCTURE SHALL BE APPROVED BY THE CONSULTAT PRIOR TO THE START OF ANY CONSTRUCTION WORK.

2. REINFORCED CONCRETE

a. CONCRETE MIX AND PLACING

(1) DESIGN OF CONCRETE MIX SHALL MEET THE DESIGN CONCRETE STRENGTH GIVEN IN THE SPECIFICATION.
CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE
(2) WITH THE SPECIFICATIONS
THE CONTRACTOR SHALL SUBMIT TO THE CONSULTANT FOR APPROVAL
(3) PLACING SEQUENCES FOR ALL CONCRETE WORK.

b. BAR BENDING, SPLICING, AND PLACING

(1) THE CONTRACTOR SHALL SUBMIT TO THE CONSULTAT FOR APPROVAL OF SHOP DRAWINGS INDICATING THE BENDING, CUTTING, SPLICING AND INSTALLATION OF ALL REINFORCING BARS.
(2) BARS SHALL BE BENT COLD. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE CONSULTANT.
(3) BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APPROVAL OF THE CONSULTAT.
(4) UNLESS OTHERWISE SHOWN ON DRAWINGS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN LAYER SHALL BE MORE THAN 40mm OR 4/3 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE OR SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL DIAMETER OF THE BAR.

c. CONCRETE COVER TO THE SURFACE OF REINFORCEMENT
MINIMUM CONCRETE COVER TO THE SURFACE OF REINFORCEMENT SHALL BE 40mm IN THE ATMOSPHERE, 70mm UNDER EARTH UNLESS SHOWN OTHERWISE ON DRAWINGS.

d. CONSTRUCTION JOINT
THE POSITION AND FORM OF ANY CONSTRUCTION JOINT SHALL BE AS INSTRUCTED BY THE CONSULTAT.

e. FALSE WORK
ALL FALSE WORK SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO PRIOR THE APPROVAL BY THE CONSULTANT.

f. FORMWORK
FORMWORKS SHALL BE CONSTRUCTED SUCH THAT IT WILL NOT YIELD UNDER THE LOAD AND SHALL BE SUCH AS TO AVOID THE FORMATION OF FINE. ALL CORNERS OF CONCRETE MEMBERS SHALL BE CHAMFERED TO 20mm UNLESS NOTED OTHERWISE ON DRAWINGS. STRIPPING OF FORMS AND SHORES SHALL BE AS DESIGNATED BY THE CONSULTANT. THE FOLLOWING MAYBE USED AS A GUIDE :

g. PROTECTION AND CURING OF CONCRETE
CONCRETE SURFACES SHALL BE PROTECTED FROM HARMFUL EFFECTS OF SUN. WIND AND RUNNING WATERS SHALL BE KEPT DAMP FOR AT LEAST 7 DAYS.

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: GENERAL NOTES(1)	SCALE:(A1size) NONE	DRAWING NO. GN-01

GENERAL NOTES(2)

BRIDGE

1. TECHNICAL STANDARDS
   - A GUIDE FOR BRIDGE DESIGN (GHANA HIGHWAY AUTHORITY, 1991)
   - DESIGN MANUAL FOR ROADS AND BRIDGES (BD 37/01, BS5400: PART2, 2001)
   - SPECIFICATIONS FOR HIGHWAY BRIDGES (JAPAN ROAD ASSOCIATION, 2012)

MATERIAL

1. STEEL

TYPE OF STEEL	STRUCTURAL MEMBERS	CLASS	STANDARD
STRUCTURAL STEEL	SUPER AND SUB STRUCTURE	SM570, SM520C, SM490Y, SM400	JIS G 3106
		SS400	JIS G 3101
REINFORCING BAR		SD345	JIS G 3112

2. CONCRETE

STRUCTURAL MEMBERS	28-DAY CYLINDER STRENGTH
DECK SLAB OF BRIDGE	24 (N/mm2)
ABUTMENT, COLUMN, CAISSON PILE	24 (N/mm2)
CAISSON PILE OF PIER	40 (N/mm2)
BASE CONCRETE OF PIER	21 (N/mm2)
LEVELING CONCRETE	18 (N/mm2)

CONSTRUCTION

1. ERECTION
   ALL DRAWINGS REGARDING THE GIRDER ERECTION FOR THE BRIDGE ARE FOR REFERENCE ONLY. THE CONTRACTOR SHALL PROPOSE THE MOST EFFECTIVE ERECTION METHOD TO MINIMIZE CONSTRUCTION PERIOD AND NEGATIVE IMPACT ON EXISTING TRAFFIC AND ENVIRONMENT.
2. BEARING CAPACITY TEST FOR FOUNDATION
   THE CONTRACTOR SHALL CARRY OUT BEARING TESTS FOR CIP CONCRETE PILE FOUNDATION TO CONFIRM THE BEARING CAPACITY AT TWO LOCATIONS. PLAN AND SCHEDULE FOR THE TEST SHALL BE SUBMITTED BY THE CONTRACTOR TO BE APPROVED BY THE CONSULTANT PRIOR TO COMMENCEMENT OF THE TESTS.
   THE BOTTOM OF CAISSON TYPE PILE FOUNDATION SHALL BE EMBEDDED INTO HARD STRATA WITH AN N-VALUE OF AT LEAST 50 CAPABLE OF DEVELOPING THE REQUIRED FACTORED BEARING RESISTANCE.
   IF THE ABOVE CONDITION CANNOT BE MET DURING CONSTRUCTION, THE CONSULTANT SHALL BE NOTIFIED FOR ADJUSTMENT OF FOOTING DEPTH IF NECESSARY.
3. PAINTING
   PAINTING SYSTEM C-5 WHICH IS STIPULATED IN "PAINTING MANUAL FOR STEEL HIGHWAY BRIDGES (JAPAN ROAD ASSOCIATION, 2005)", SHALL BE APPLICED TO STEEL MEMBER OF GIRDER AND PIERS.
4. RIGID STEEL FRAME STRUCTURE WITH STEEL PIERS
   THE CONTRACTOR SHALL CONTROL THE AMOUNT OF VERTICAL DEFLECTION OCCURRING IN HORIZONTAL STEEL BEAM DURING CONSTRUCTION, NOT TO VIOLATE THE RANGE OF THE VERTICAL CLEARANCE, 5.5m, SPECIFIED IN THE DESIGN CRITERIA.
5. ANCHOR FRAME INSTALLATION
   THE CONTRACTOR SHALL CONTROL THE ACCURACY OF ANCHOR FRAME INSTALLATION, PAYING ATTENTION TO ANCHOR BOLT AND BEAM NOT TO BUCKLE IN CONCRETING CAISSON PILE FOUNDATION.

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: GENERAL NOTES(2)	SCALE:(A1size) NONE	DRAWING NO. GN-02

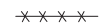
GENERAL NOTES(3)

ABBREVIATION

ITEM	DESCRIPTION
BP	Beginning Point
EP	End Point
BC	Beginning of Curve
EC	End of Curve
IP	Intersection Point
IA	Angle of Intersection
TL	Tangent Length
SL	Secant Length
CL	Curve Length
DL	Datum Line
H	Hight
V	Vertical
VCL	Vertical Curve Length
K	Rate of Vertical Curvature
BM	Bench Mark

ITEM	DESCRIPTION
STA.	Station
FH	Formation Height
GH	Ground Height
R	Radius of Curve
A	Relaxation curve length
L	Length
t	Thickness
i	Inclination
fb	Bending Stress of Concrete
∞	Straight
HWL	High Water Level

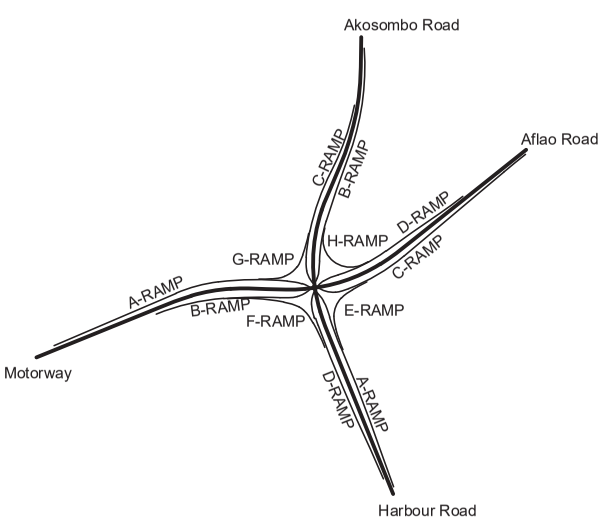
SYMBOLS

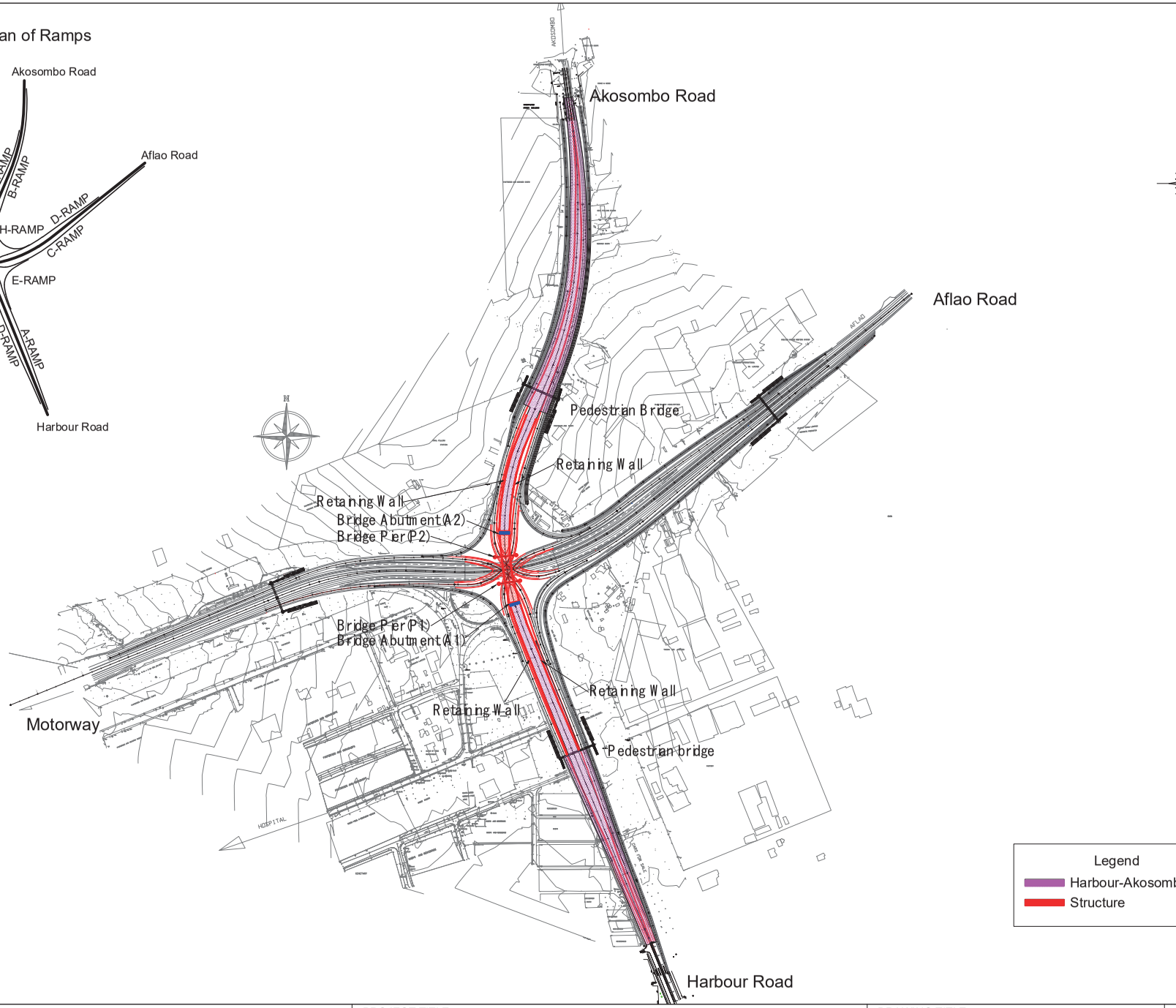
SYMBOL	DESCRIPTION
	Road
	Road Centerline
	Access Road
	North Direction Sign
	Tree
	Bench Mark
	Fence

添付資料6－7

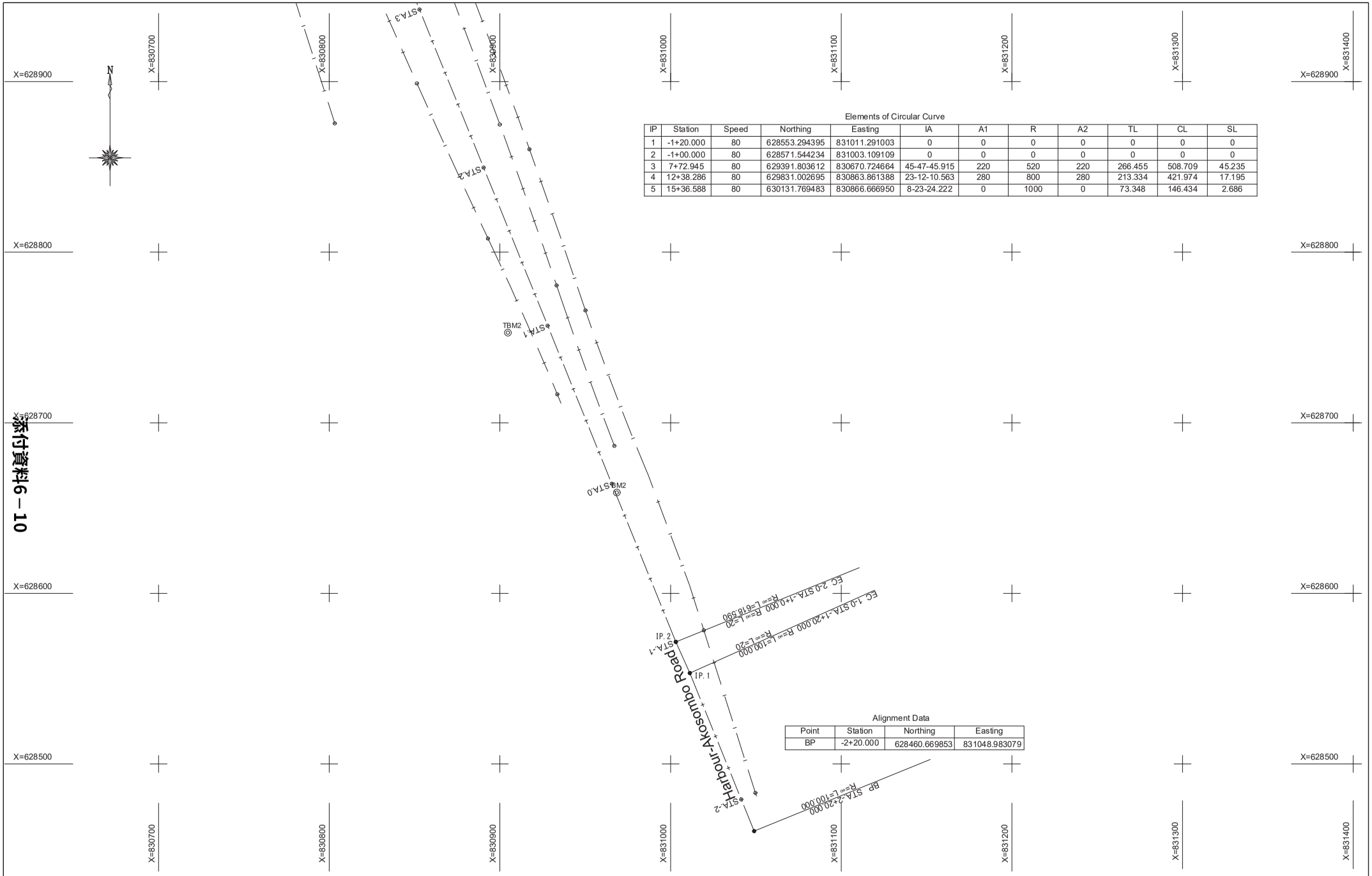
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: GENERAL NOTES(3)	SCALE:(A1size) NONE	DRAWING NO. GN-03

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PROJECT LOCATION MAP	SCALE:(A1size) 1:400,000	DRAWING NO. GN-04





GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: KEY PLAN	SCALE:(A1size) 1:2,500	DRAWING NO. GN-05



Elements of Circular Curve

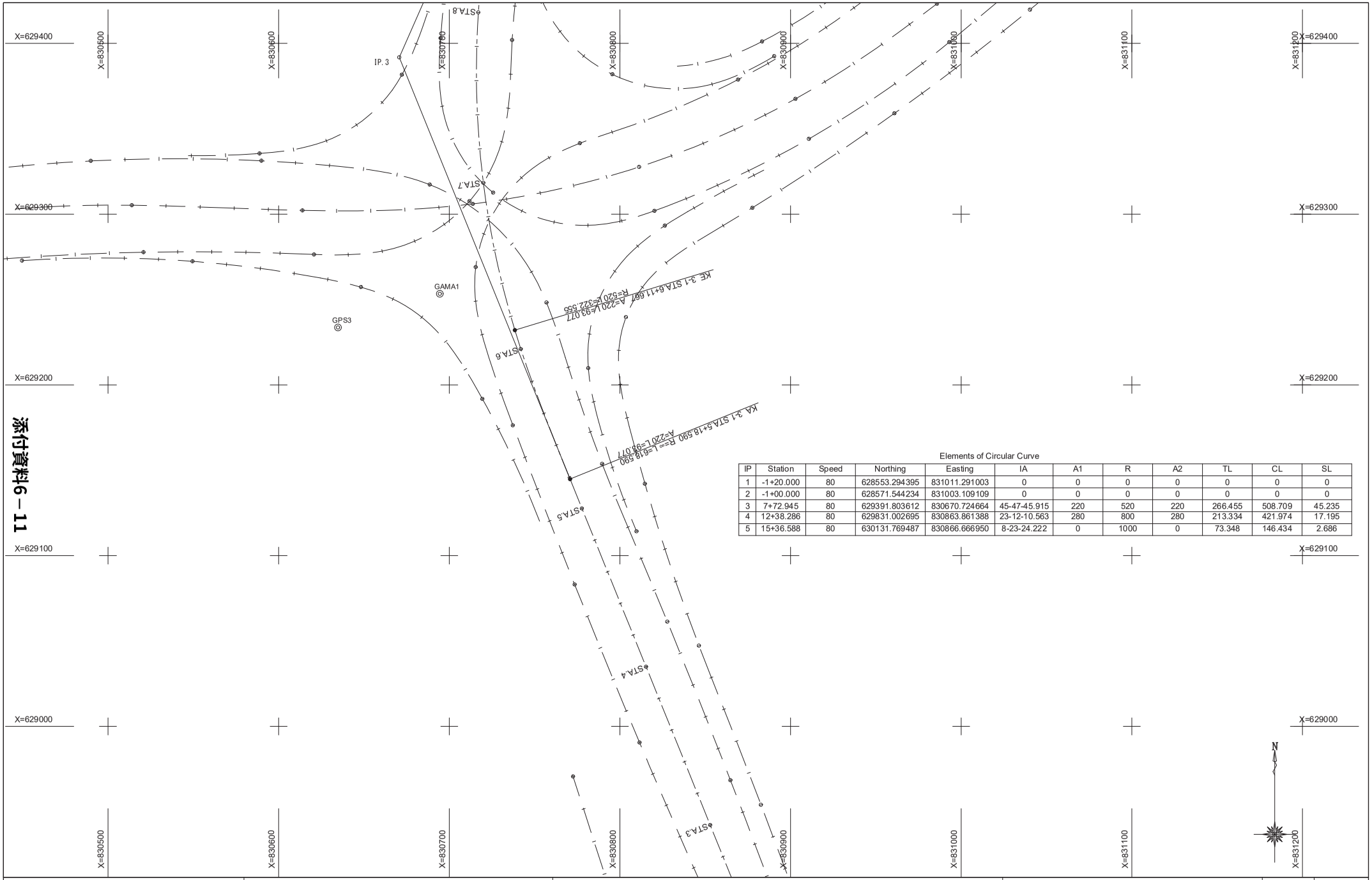
IP	Station	Speed	Northing	Easting	IA	A1	R	A2	TL	CL	SL
1	-1+20.000	80	628553.294395	831011.291003	0	0	0	0	0	0	0
2	-1+00.000	80	628571.544234	831003.109109	0	0	0	0	0	0	0
3	7+72.945	80	629391.803612	830670.724664	45-47-45.915	220	520	220	266.455	508.709	45.235
4	12+38.286	80	629831.002695	830863.861388	23-12-10.563	280	800	280	213.334	421.974	17.195
5	15+36.588	80	630131.769483	830866.666950	8-23-24.222	0	1000	0	73.348	146.434	2.686

Alignment Data

Point	Station	Northing	Easting
BP	-2+20.000	628460.669853	831048.983079

添付資料6－10

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ALIGNMENT LAYOUT(1)	SCALE:(A1size) 1:1,000 / DRAWING NO. GN-06



Elements of Circular Curve

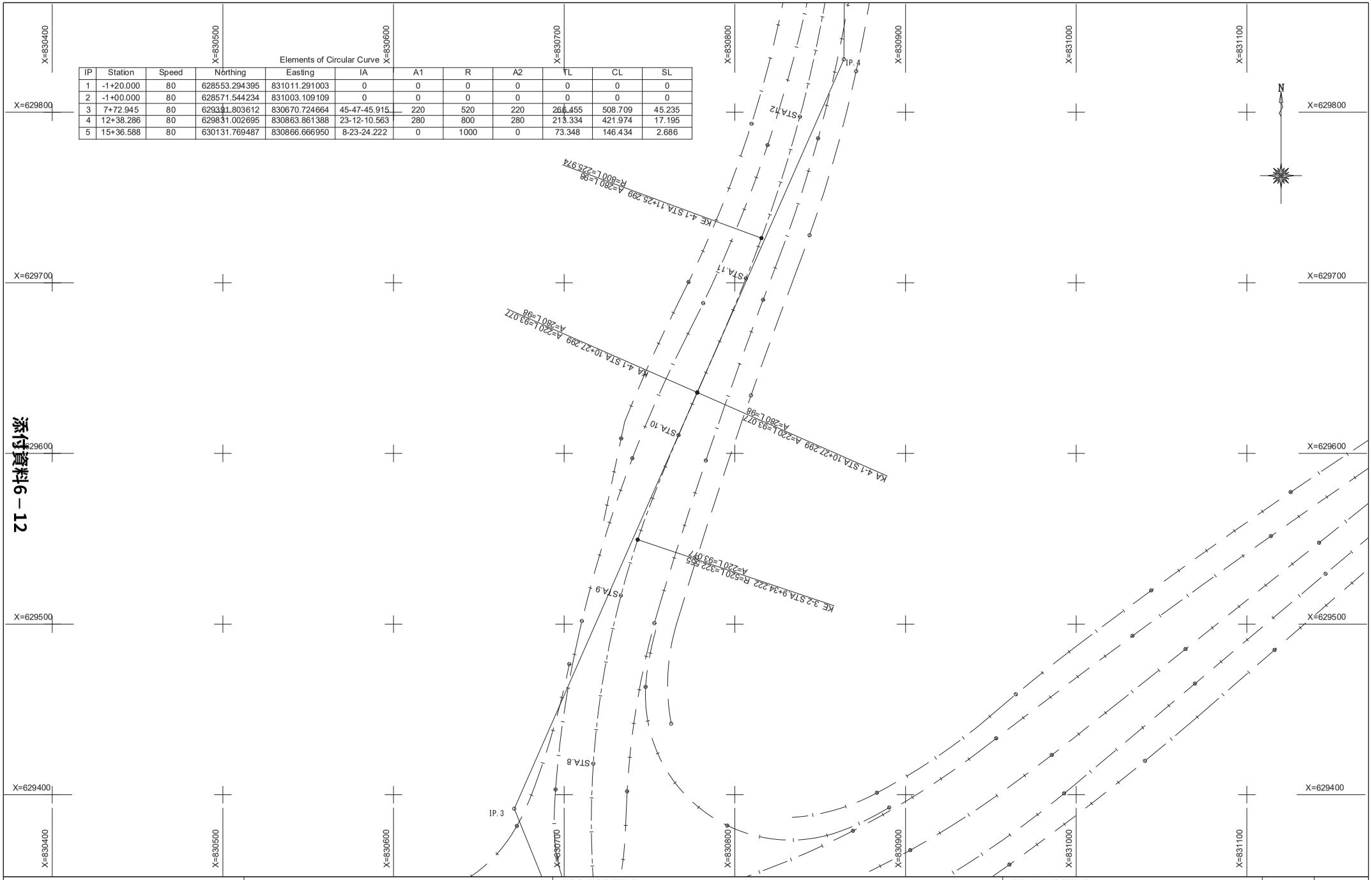
IP	Station	Speed	Northing	Easting	IA	A1	R	A2	TL	CL	SL
1	-1+20.000	80	628553.294395	831011.291003	0	0	0	0	0	0	0
2	-1+00.000	80	628571.544234	831003.109109	0	0	0	0	0	0	0
3	7+72.945	80	629391.803612	830670.724664	45-47-45.915	220	520	220	266.455	508.709	45.235
4	12+38.286	80	629831.002695	830863.861388	23-12-10.563	280	800	280	213.334	421.974	17.195
5	15+36.588	80	630131.769487	830866.666950	8-23-24.222	0	1000	0	73.348	146.434	2.686

添付資料6－11

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ALIGNMENT LAYOUT(2)	SCALE:(A1size) 1:1,000	DRAWING NO. GN-07

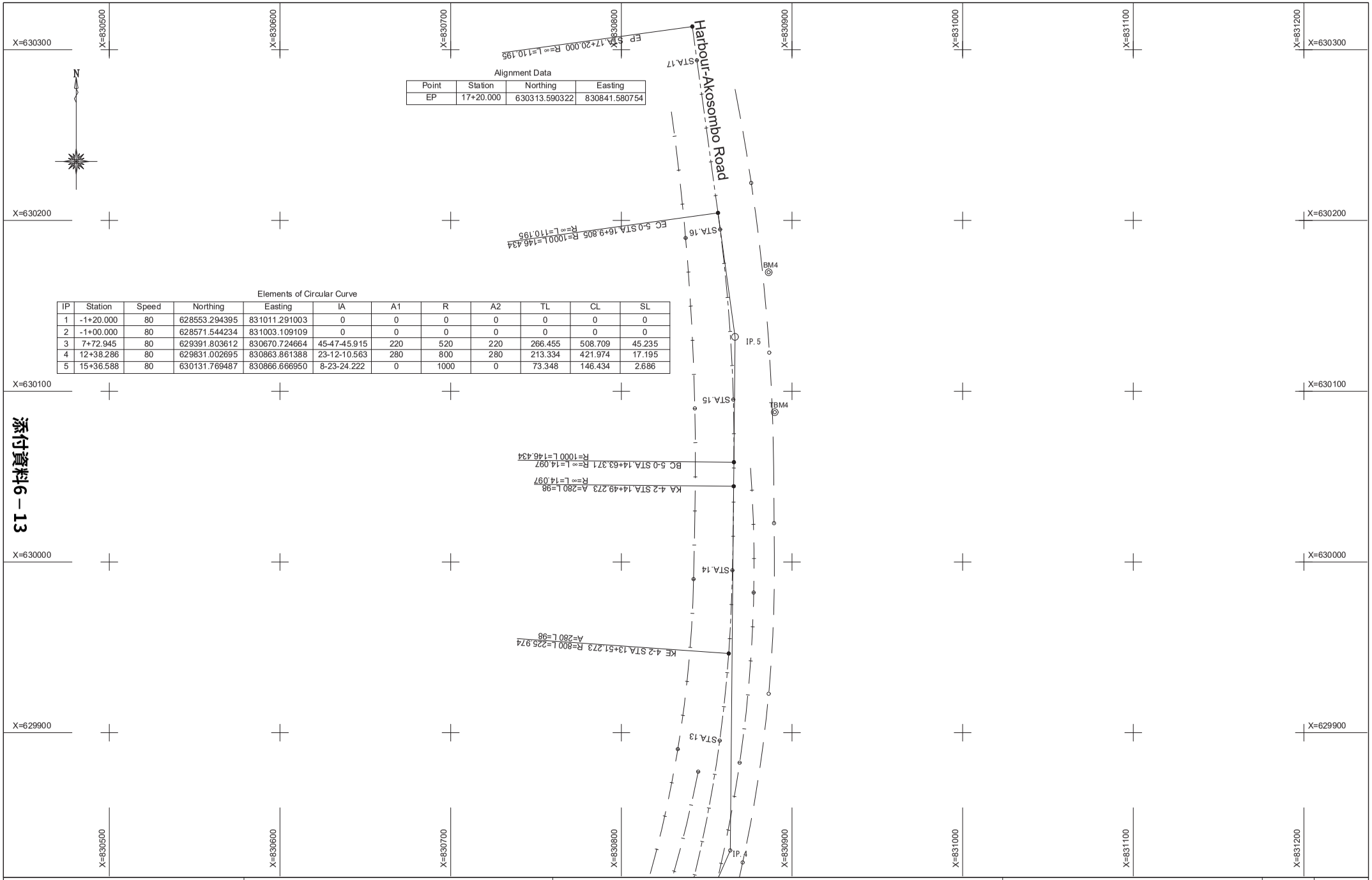
Elements of Circular Curve

IP	Station	Speed	Northing	Easting	IA	A1	R	A2	TL	CL	SL
1	-1+20.000	80	628553.294395	831011.291003	0	0	0	0	0	0	0
2	-1+00.000	80	628571.544234	831003.109109	0	0	0	0	0	0	0
3	7+72.945	80	629391.803612	830670.724664	45-47-45.915	220	520	220	266.455	508.709	45.235
4	12+38.286	80	629831.002695	830863.861388	23-12-10.563	280	800	280	213.334	421.974	17.195
5	15+36.588	80	630131.769487	830866.666950	8-23-24.222	0	1000	0	73.348	146.434	2.686



添付資料6－12

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ALIGNMENT LAYOUT(3)	SCALE:(A1size) 1:1,000 / DRAWING NO. GN-08



Alignment Data

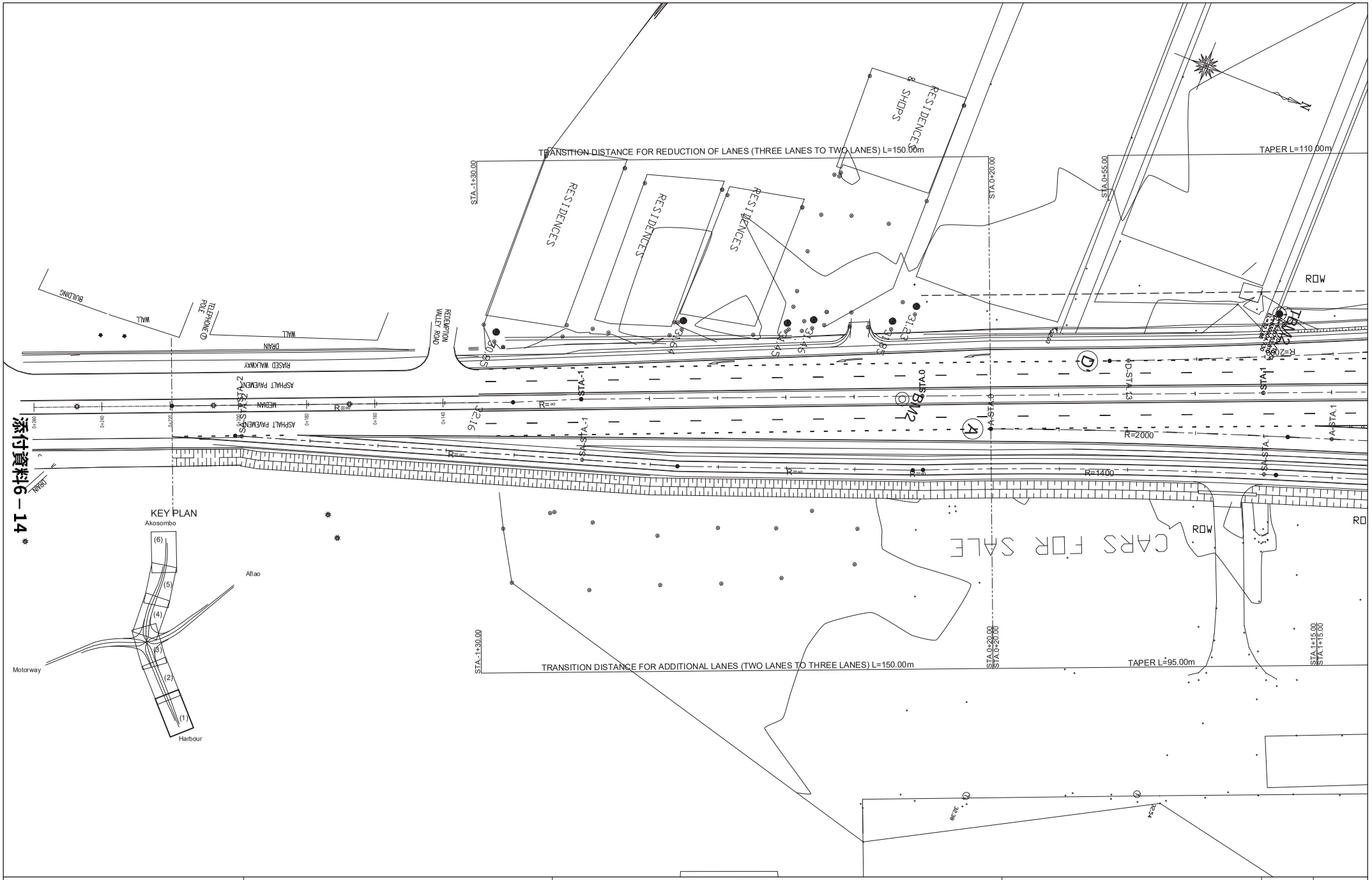
Point	Station	Northing	Easting
EP	17+20.000	630313.590322	830841.580754

Elements of Circular Curve

IP	Station	Speed	Northing	Easting	IA	A1	R	A2	TL	CL	SL
1	-1+20.000	80	628553.294395	831011.291003	0	0	0	0	0	0	0
2	-1+00.000	80	628571.544234	831003.109109	0	0	0	0	0	0	0
3	7+72.945	80	629391.803612	830670.724664	45-47-45.915	220	520	220	266.455	508.709	45.235
4	12+38.286	80	629831.002695	830863.861388	23-12-10.563	280	800	280	213.334	421.974	17.195
5	15+36.588	80	630131.769487	830866.666950	8-23-24.222	0	1000	0	73.348	146.434	2.686

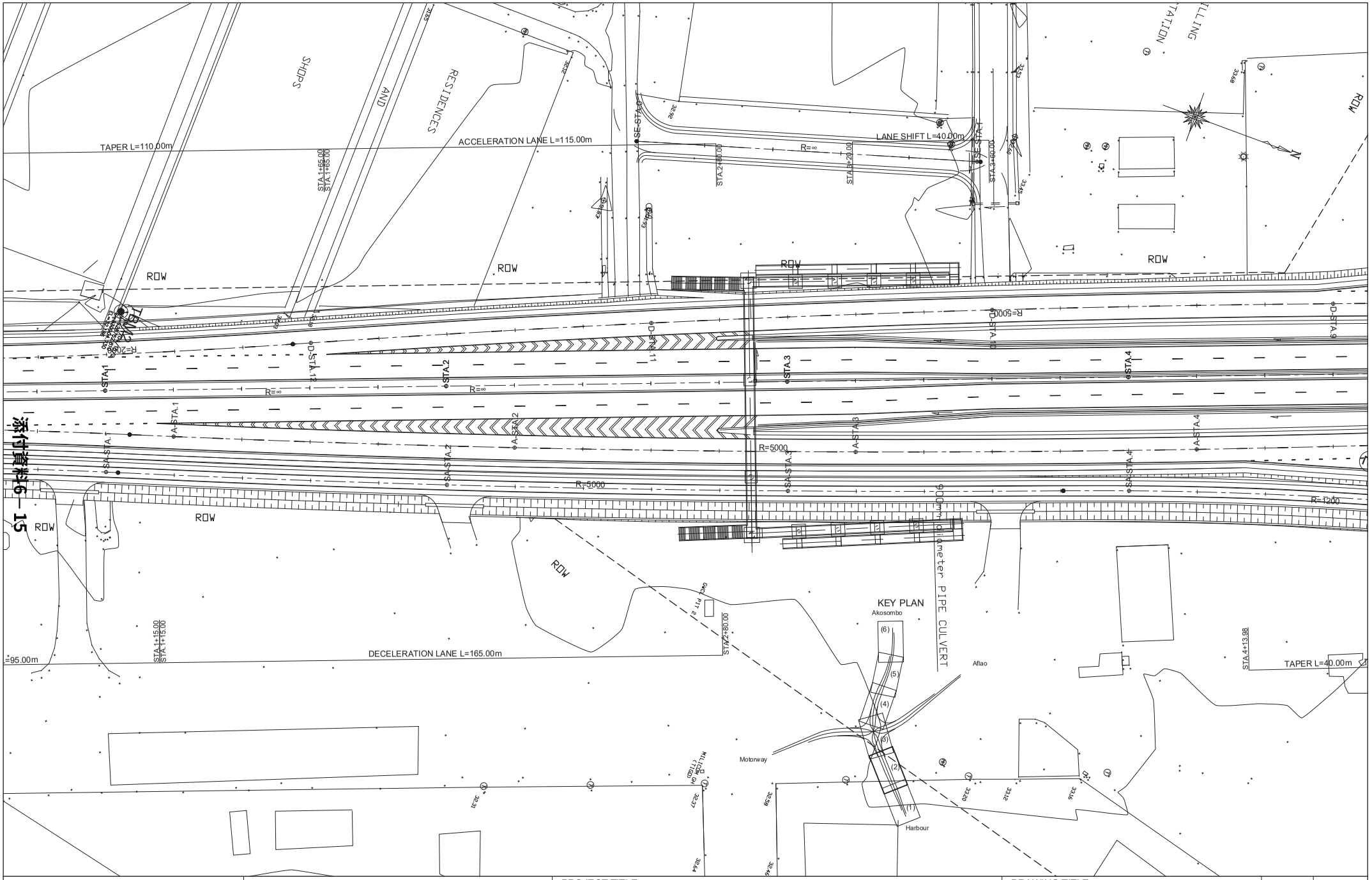
添付資料6－13

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ALIGNMENT LAYOUT(4)	SCALE:(A1size) 1:1,000	DRAWING NO. GN-09



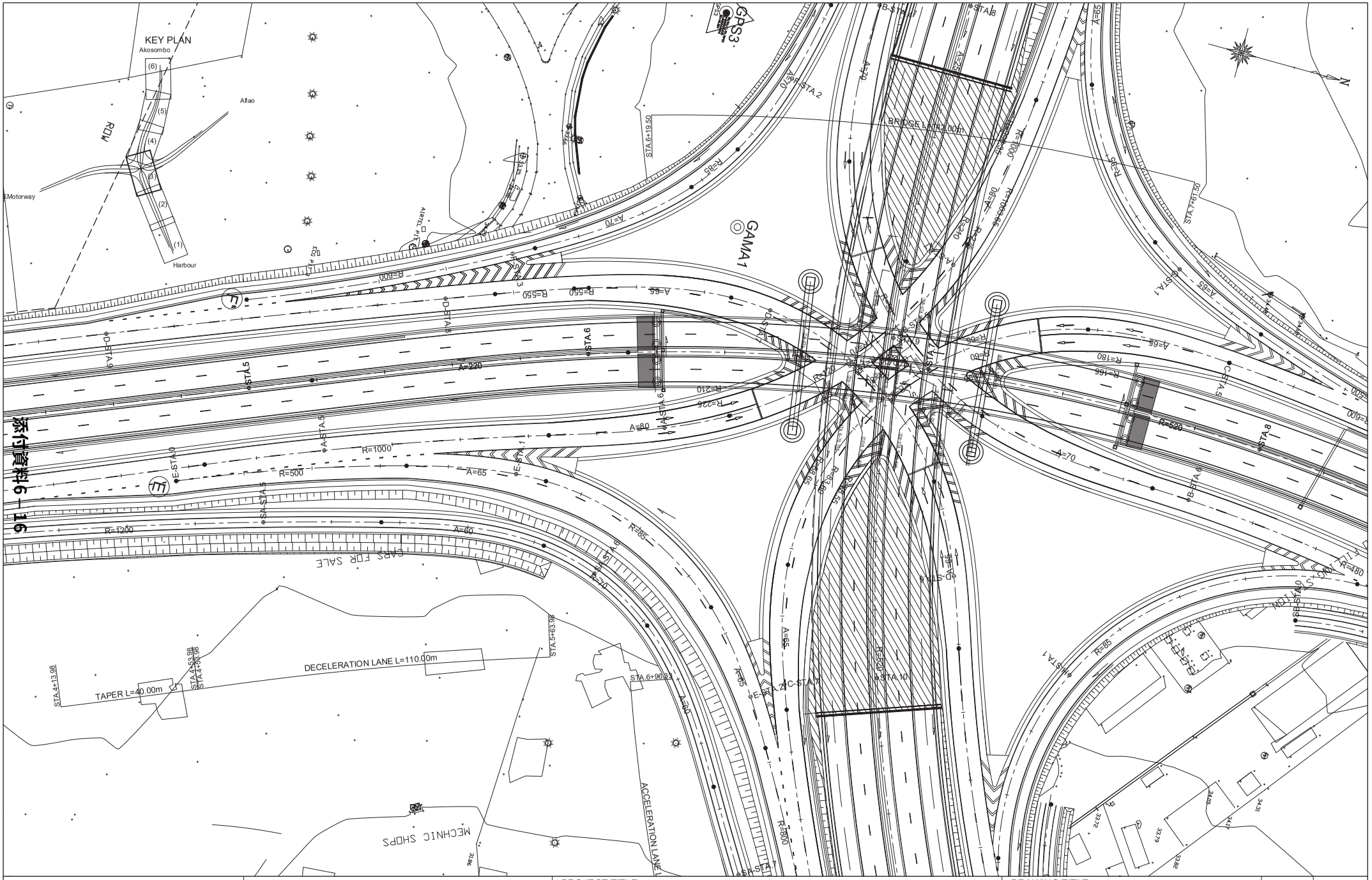
添付資料6－14

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PLAN(1)	SCALE:(A1size) 1:500	DRAWING NO. PL-01



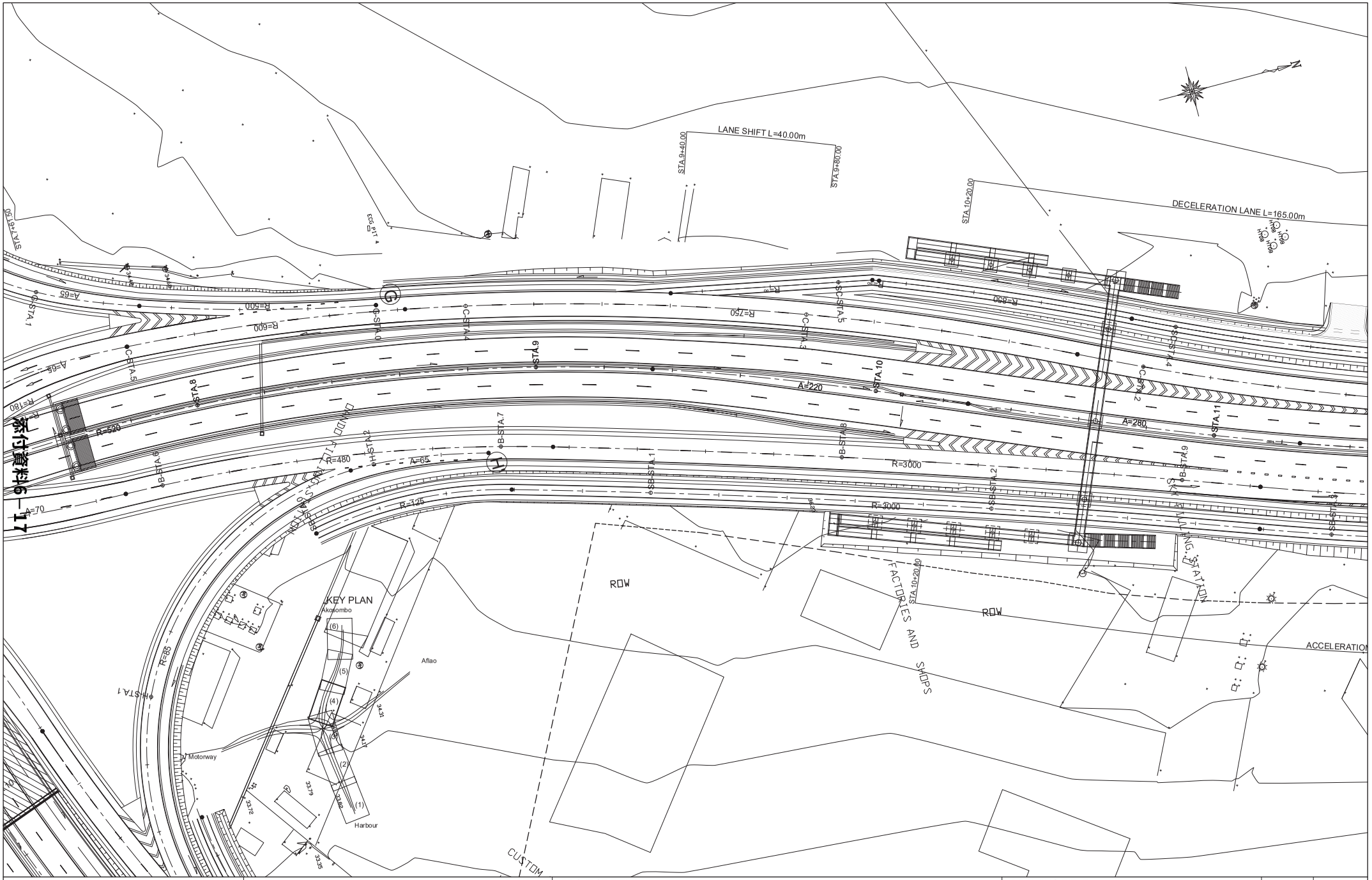
添付資料6－15

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PLAN(2)	SCALE:(A1size) 1:500	DRAWING NO. PL-02



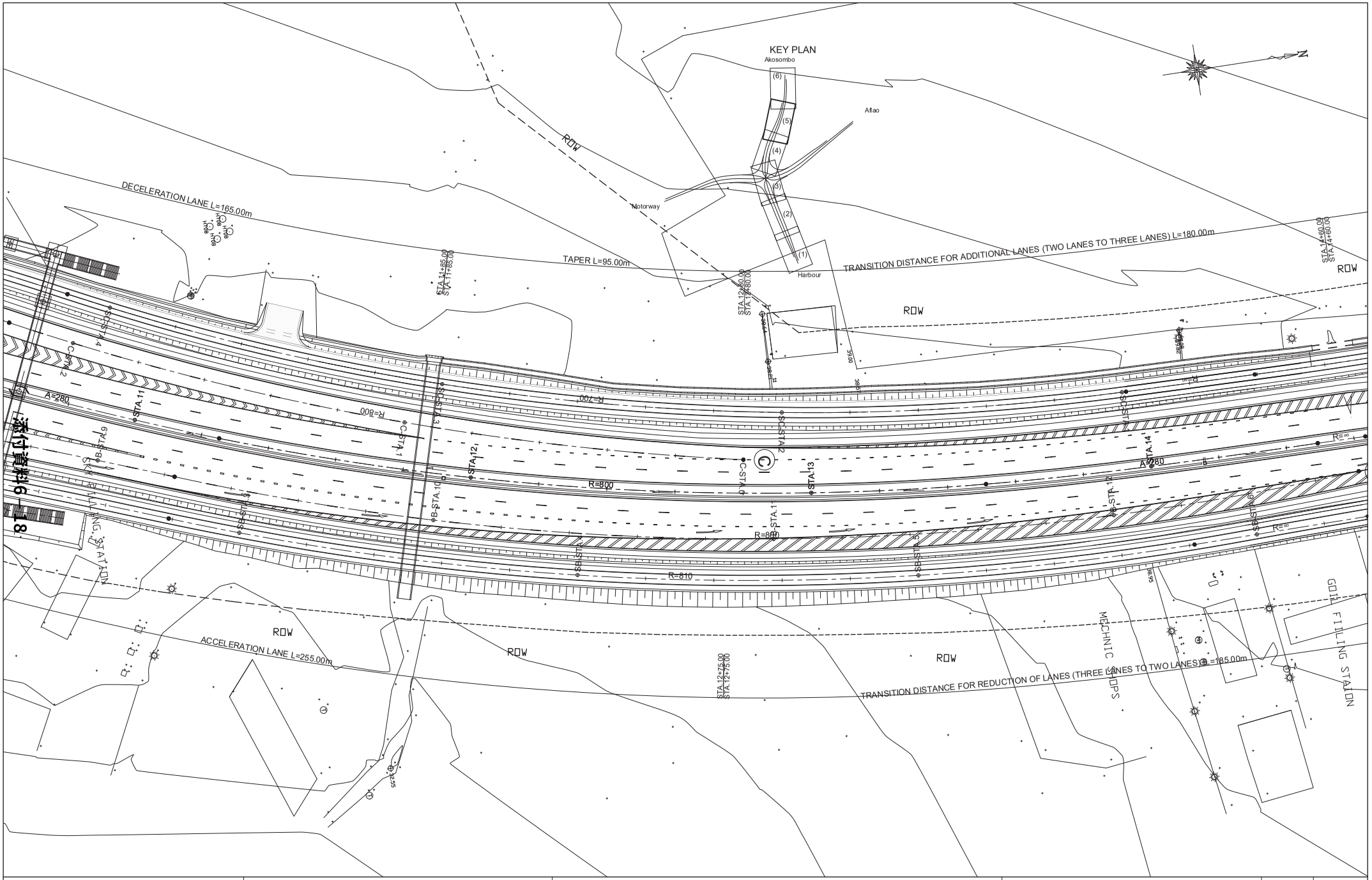
添付資料6－16

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PLAN(3)	SCALE:(A1size) 1:500	DRAWING NO. PL-03

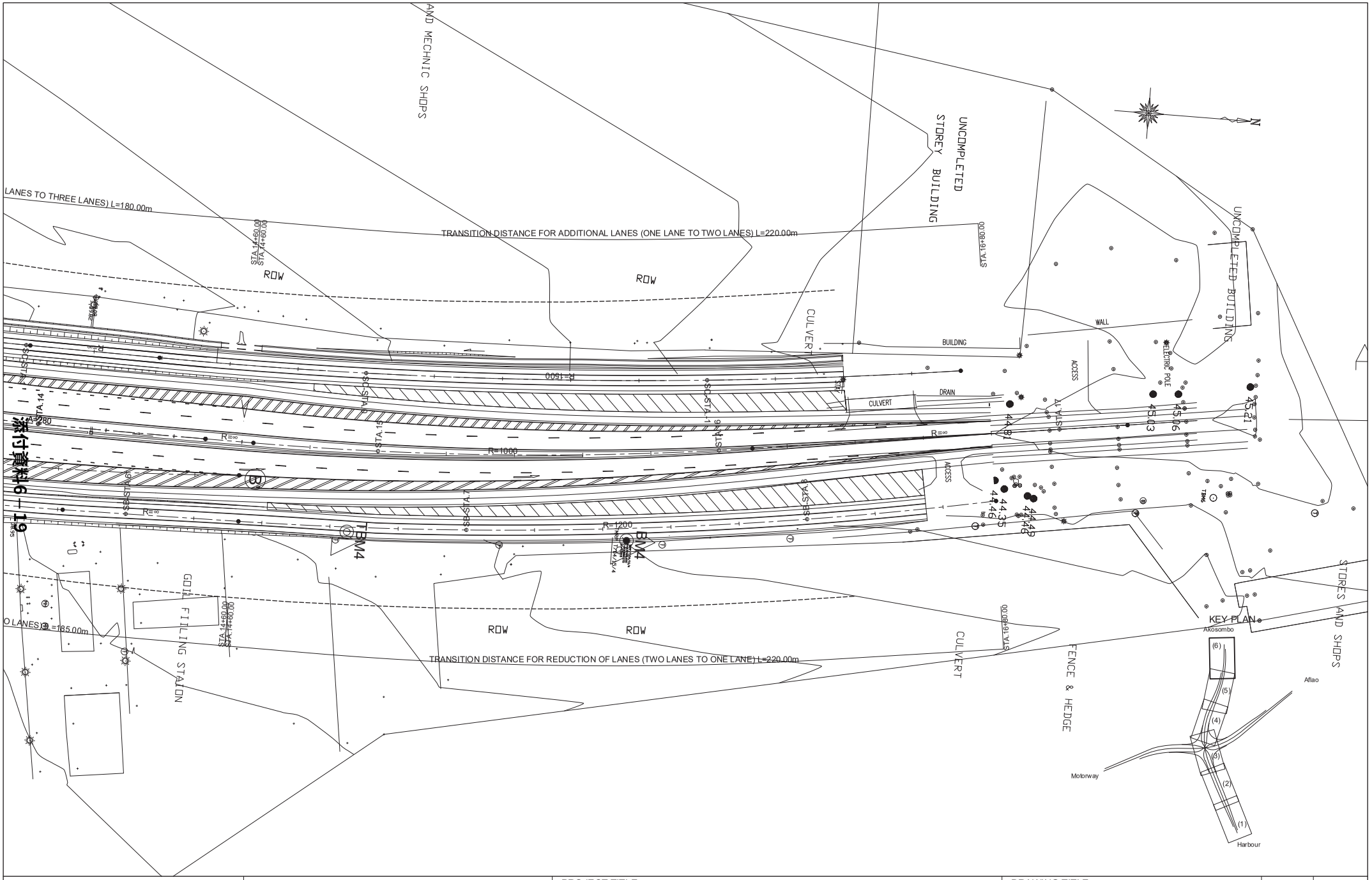


添付資料6－17

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PLAN(4)	SCALE:(A1size) 1:500	DRAWING NO. PL-04



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PLAN(5)	SCALE:(A1size) 1:500	DRAWING NO. PL-05



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PLAN(6)	SCALE:(A1size) 1:500	DRAWING NO. PL-06

Harbour-Akosombo Road PROFILE 1

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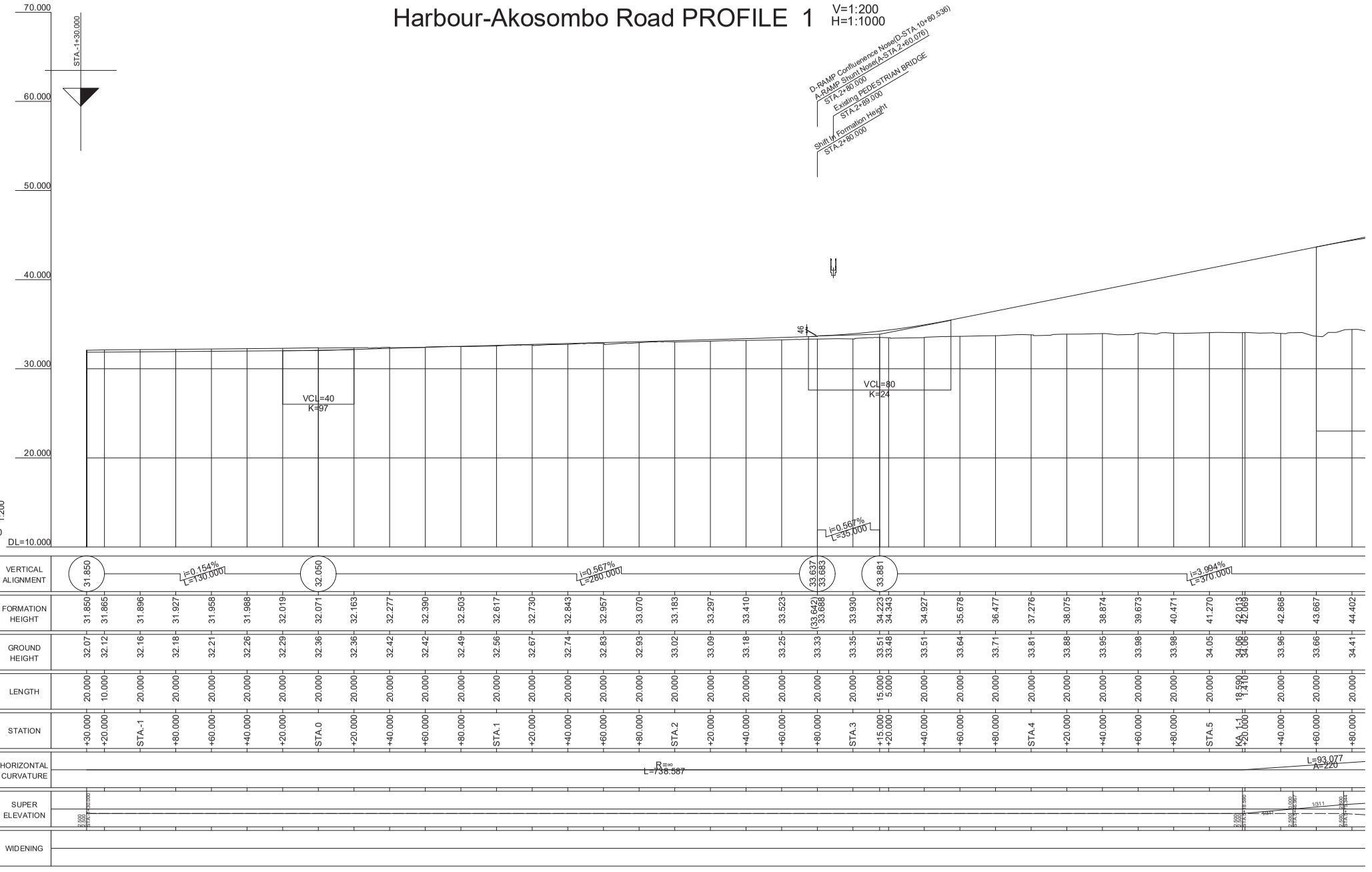


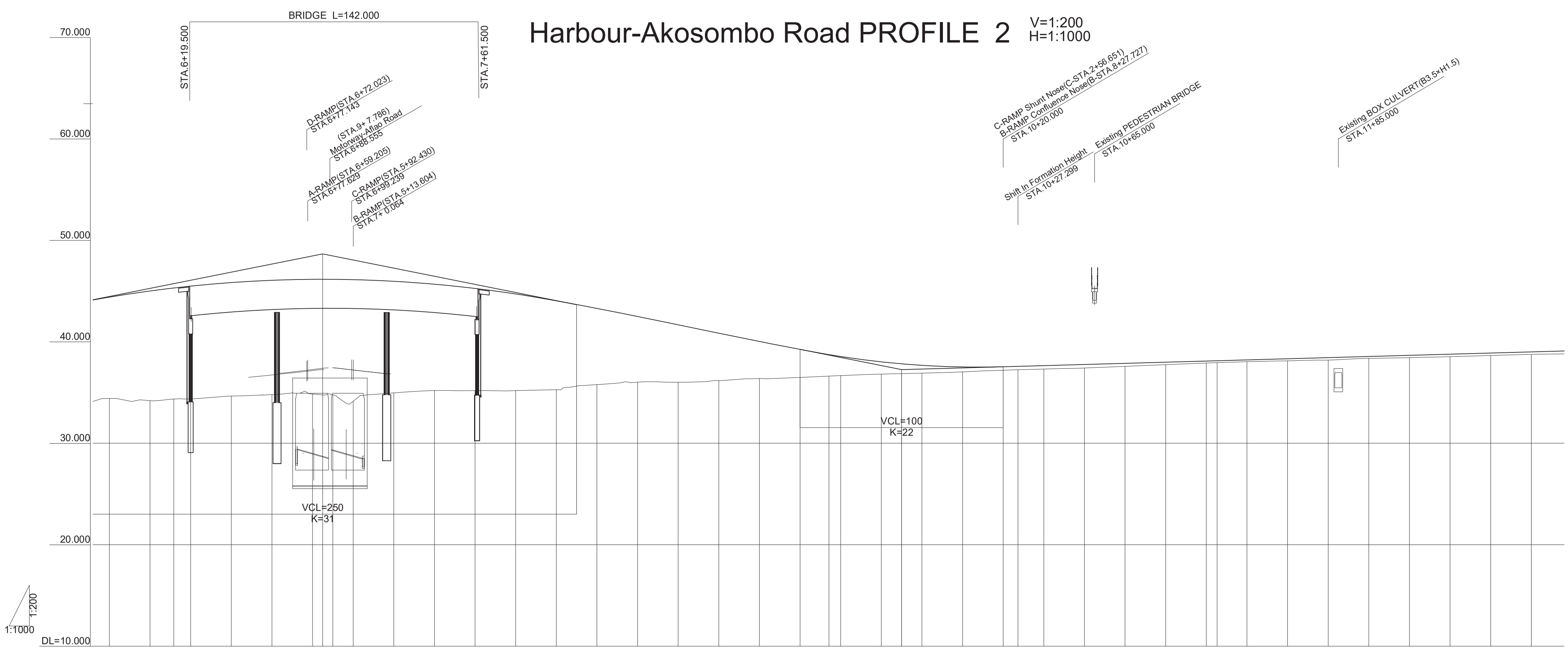
添付資料6－20

NOTE:FORMATION HEIGHT LOCATION REFERENCE POINT CHANGE FROM STA.2+80.00

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: Harbour-Akosombo Road PROFILE(1)	SCALE:(A1size) V=1:200 H=1:1000	DRAWING NO. PR-01

Harbour-Akosombo Road PROFILE 2

V=1:200
H=1:1000



STATION	LENGTH	GROUND HEIGHT	FORMATION HEIGHT
+80.000	20.000	34.41	44.402
STA.6	20.000	34.20	45.009
KE 1-1	11.667	34.36	45.304
+20.000	8.333	34.37	45.488
+40.000	20.000	34.65	45.839
+60.000	20.000	34.79	46.063
+80.000	20.000	34.86	46.158
+85.000	5.000	34.77	46.162
STA.7	15.000	34.14	46.125
+20.000	20.000	34.97	45.965
+40.000	20.000	35.19	45.677
+60.000	20.000	35.19	45.260
+80.000	20.000	35.19	44.716
STA.8	20.000	35.27	44.044
+20.000	20.000	35.78	43.260
+40.000	20.000	36.02	42.460
+60.000	20.000	36.01	41.660
+80.000	20.000	36.17	40.860
STA.9	20.000	36.38	40.060
+20.000	20.000	36.49	39.260
KE 1-2	14.222	36.62	38.737
+40.000	5.778	36.67	38.551
+60.000	20.000	36.82	38.025
+70.000	10.000	36.87	37.830
+80.000	10.000	36.91	37.681
STA.10	20.000	37.04	37.520
+20.000	20.000	37.20	37.542
KA 2-1	7.299	37.25	37.583
+40.000	12.701	37.32	37.655
+60.000	20.000	37.43	37.767
+80.000	20.000	37.58	37.880
STA.11	20.000	37.75	37.993
+20.000	20.000	37.92	38.105
KE 2-1	5.299	37.95	38.135
+40.000	14.701	38.03	38.218
+60.000	20.000	38.13	38.331
+80.000	20.000	38.20	38.444
STA.12	20.000	38.36	38.556
+20.000	20.000	38.44	38.669
+40.000	20.000	38.53	38.782
+60.000	20.000	38.66	38.895
+80.000	20.000	38.75	39.007

VERTICAL ALIGNMENT: 48.660; i=4.000% L=285.000; 37.260; i=0.564% L=57.299; 37.583 / 37.583; i=0.564% L=382.701

HORIZONTAL CURVATURE: L=322.555 R=520; L=93.077 A=220; A=280 L=98; R=800 L=225.974

SUPER ELEVATION: 2.500 STA.5+75.344; 1/452; 4.700 STA.6+11.667; 4.700 STA.9+34.222; 1/757; 2.500 STA.9+85.000; 1/334; 0.447 STA.10+20.000; 1/444; STA.10+27.299; 1/373; 4.800 STA.11+25.299

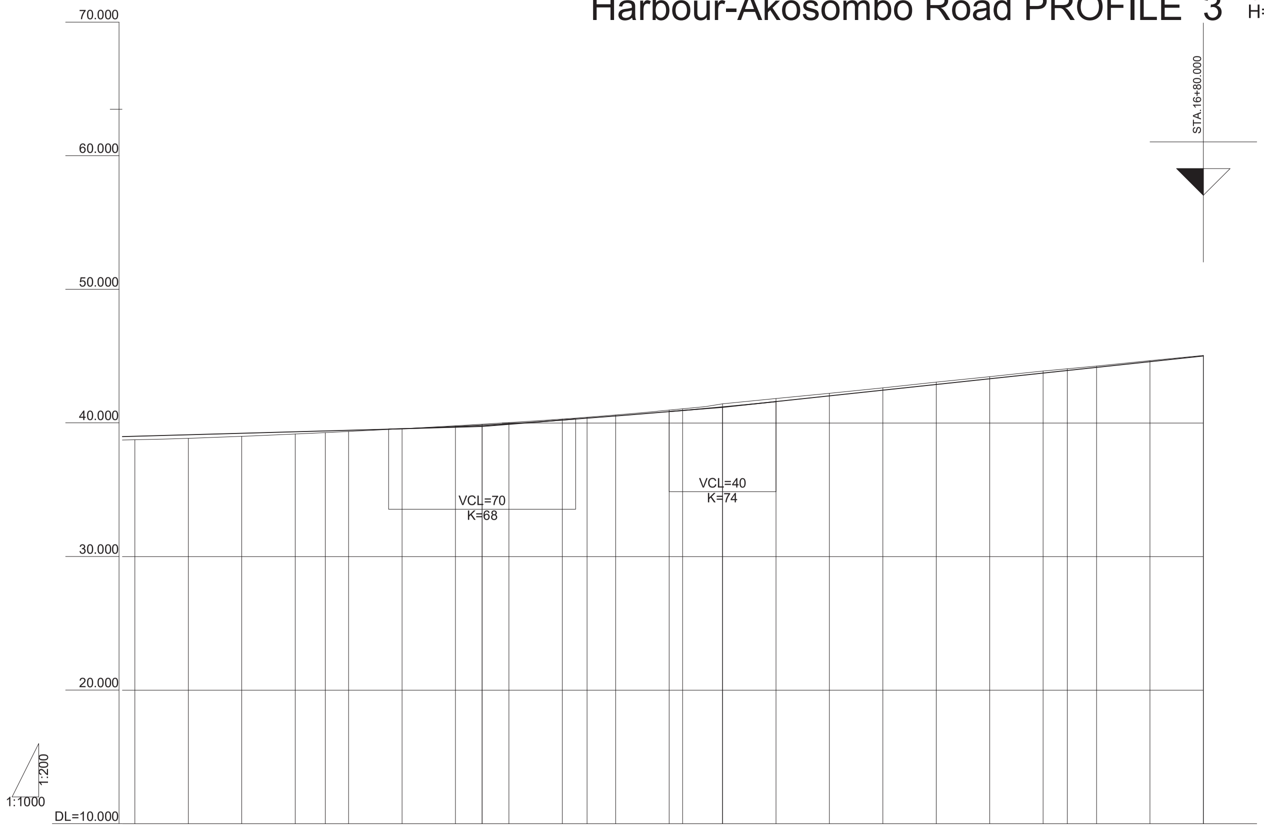
WIDENING

NOTE:FORMATION HEIGHT LOCATION REFERENCE POINT CHANGE FROM STA.2+80.00

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: Harbour-Akosombo Road PROFILE(2)	SCALE:(A1size) V=1:200 H=1:1000	DRAWING NO. PR-02

Harbour-Akosombo Road PROFILE 3

V=1:200
H=1:1000



VERTICAL ALIGNMENT	39.740 (i=1.596%, L=90.000)	41.176 (i=2.136%, L=180.000)	45.020

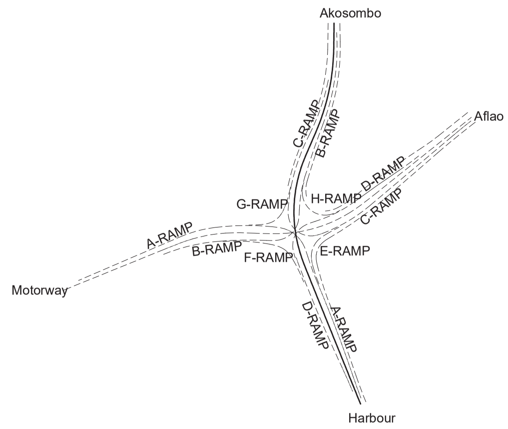
STATION	FORMATION HEIGHT	GROUND HEIGHT	LENGTH
+80.000	39.007	38.75	20.000
STA.13	39.120	38.85	20.000
+20.000	39.233	39.01	20.000
+40.000	39.345	39.18	20.000
KE 2-2	39.409	39.28	11.273
+60.000	39.458	39.36	8.727
+80.000	39.573	39.57	20.000
STA.14	39.730	39.80	20.000
+10.000	39.830	39.91	10.000
+20.000	39.946	40.03	10.000
+40.000	40.221	40.30	20.000
KA 2-2	40.367	40.44	9.273
+60.000	40.538	40.60	10.727
+80.000	40.857	40.97	20.000
BC 3-0	40.939	41.07	5.047
STA.15	41.203	41.44	14.953
+20.000	41.603	41.83	20.000
+40.000	42.030	42.22	20.000
+60.000	42.457	42.63	20.000
+80.000	42.884	43.06	20.000
STA.16	43.312	43.47	20.000
EC 5	43.521	43.68	9.805
+20.000	43.739	43.89	10.195
+40.000	44.166	44.26	20.000
+60.000	44.593	44.67	20.000
+80.000	45.020	45.06	20.000

HORIZONTAL CURVATURE: A=280 L=98; R=∞ L=14.097; R=1000 L=146.434; R=∞ L=87.025

SUPER ELEVATION: 4.800 4.800 STA.13+51.273; 1/245; 2.500 2.500 STA.13+82.150; 1/245; 2.500 0.000 STA.14+15.711; 1/245; 2.500 2.500 STA.14+49.273; 2.500 2.500 STA.14+63.370; 2.500 0.000 STA.14+72.530; 1/203; 2.500 2.800 STA.14+83.370; 2.900 2.900 STA.16+9.805; 1/203; 2.500 0.000 STA.16+20.546; 1/203; 2.500 STA.16+29.805

WIDENING

KEY PLAN

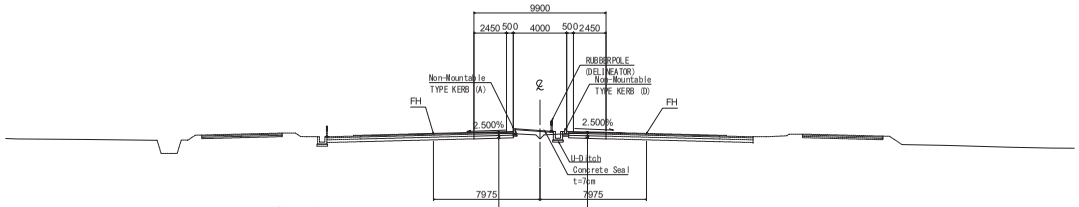


NOTE:FORMATION HEIGHT LOCATION REFERENCE POINT CHANGE FROM STA.2+80.00

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: Harbour-Akosombo Road PROFILE(3)	SCALE:(A1size) V=1:200 H=1:1000	DRAWING NO. PR-03

Harbour-Akosombo

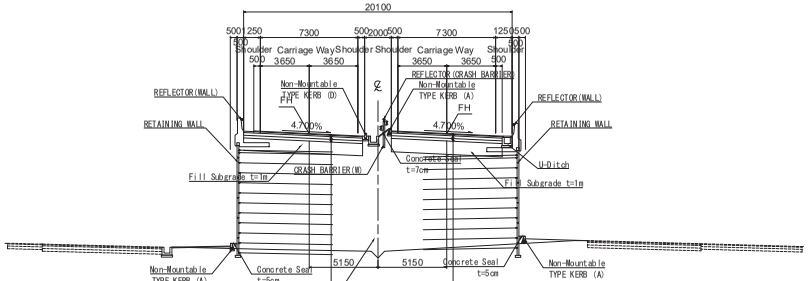
Akosombo Cross Section
STA.10+27.299　STA.16+80



Carriage Way in Akosombo		
Surface Couse : Modified Asphalt Concrete	t=	50mm
Binder Couse : Asphalt Course Grade	t=	80mm
Base : Crushed Stone	t=	150mm
Subbase Sandy Gravel	t=	200mm

Carriage Way in Akosombo		
Surface Couse : Modified Asphalt Concrete	t=	50mm
Binder Couse : Asphalt Course Grade	t=	80mm
Base : Crushed Stone	t=	150mm
Subbase Sandy Gravel	t=	200mm

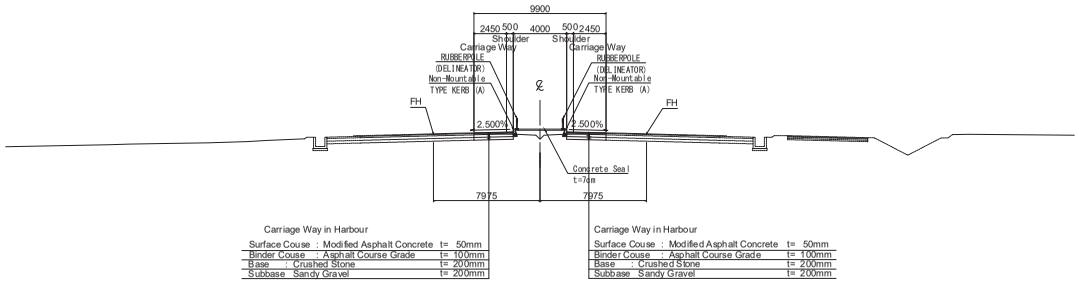
Wall Cross Section
STA.2+80　STA.10+27.299



Carriage Way in Harbour		
Surface Couse : Modified Asphalt Concrete	t=	50mm
Binder Couse : Asphalt Course Grade	t=	100mm
Base : Crushed Stone	t=	200mm
Subbase Sandy Gravel	t=	200mm

Carriage Way in Harbour		
Surface Couse : Modified Asphalt Concrete	t=	50mm
Binder Couse : Asphalt Course Grade	t=	100mm
Base : Crushed Stone	t=	200mm
Subbase Sandy Gravel	t=	200mm

Harbour Cross Section
STA.-1+30　STA.2+80

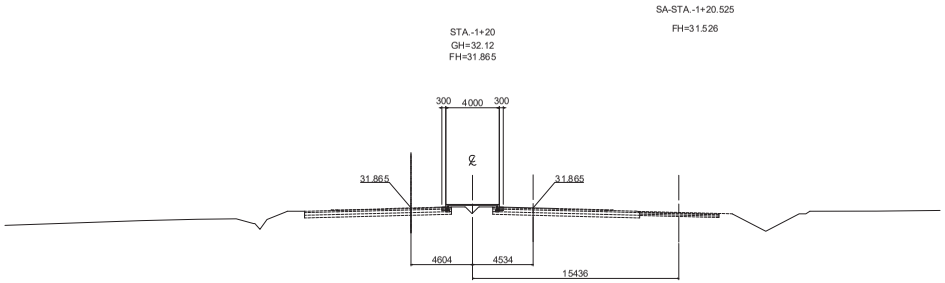


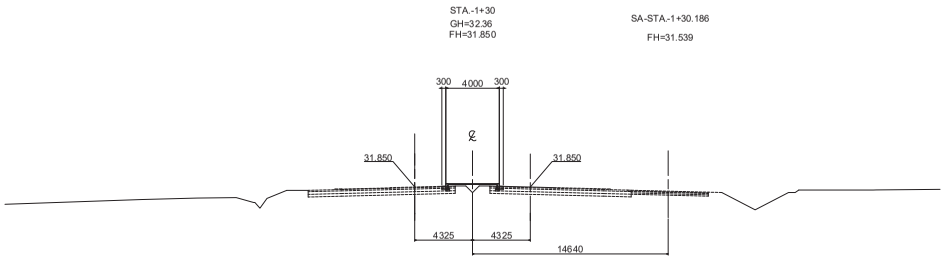
Carriage Way in Harbour		
Surface Couse : Modified Asphalt Concrete	t=	50mm
Binder Couse : Asphalt Course Grade	t=	100mm
Base : Crushed Stone	t=	200mm
Subbase Sandy Gravel	t=	200mm

Carriage Way in Harbour		
Surface Couse : Modified Asphalt Concrete	t=	50mm
Binder Couse : Asphalt Course Grade	t=	100mm
Base : Crushed Stone	t=	200mm
Subbase Sandy Gravel	t=	200mm

添付資料6－23

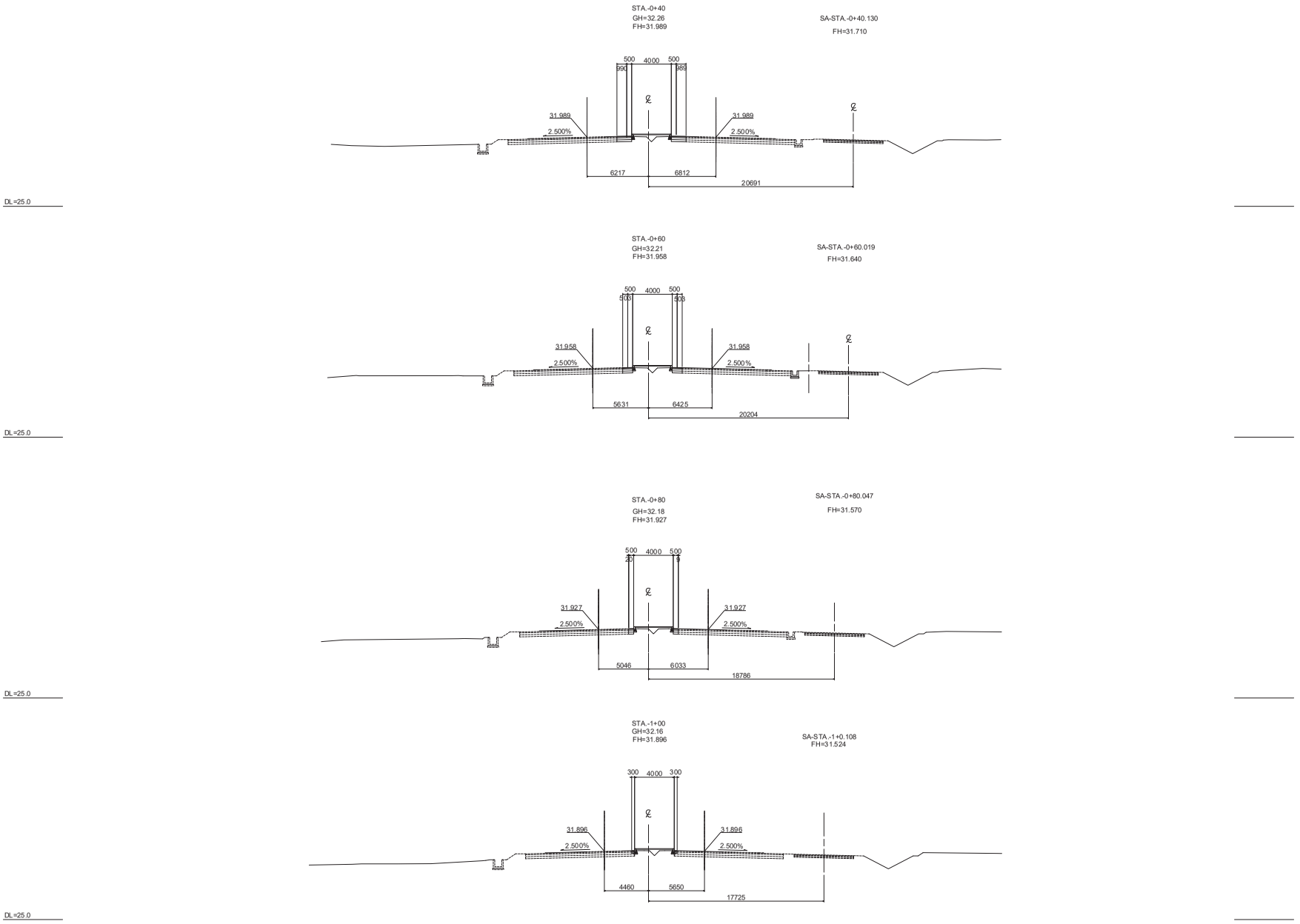
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TYPICAL CROSS SECTION	SCALE:(A1size) 1:200	DRAWING NO. TP-01



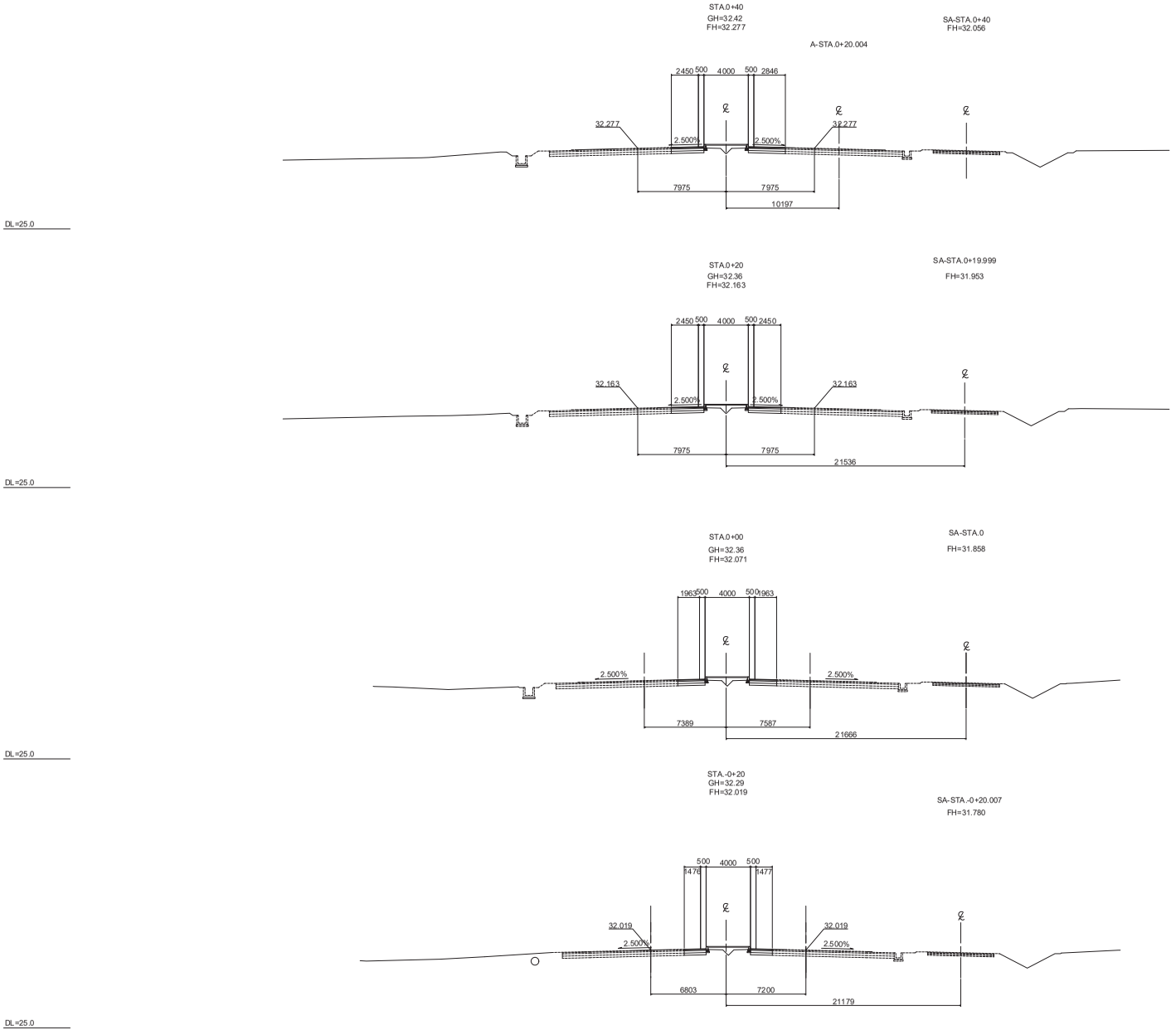


添付資料6－24

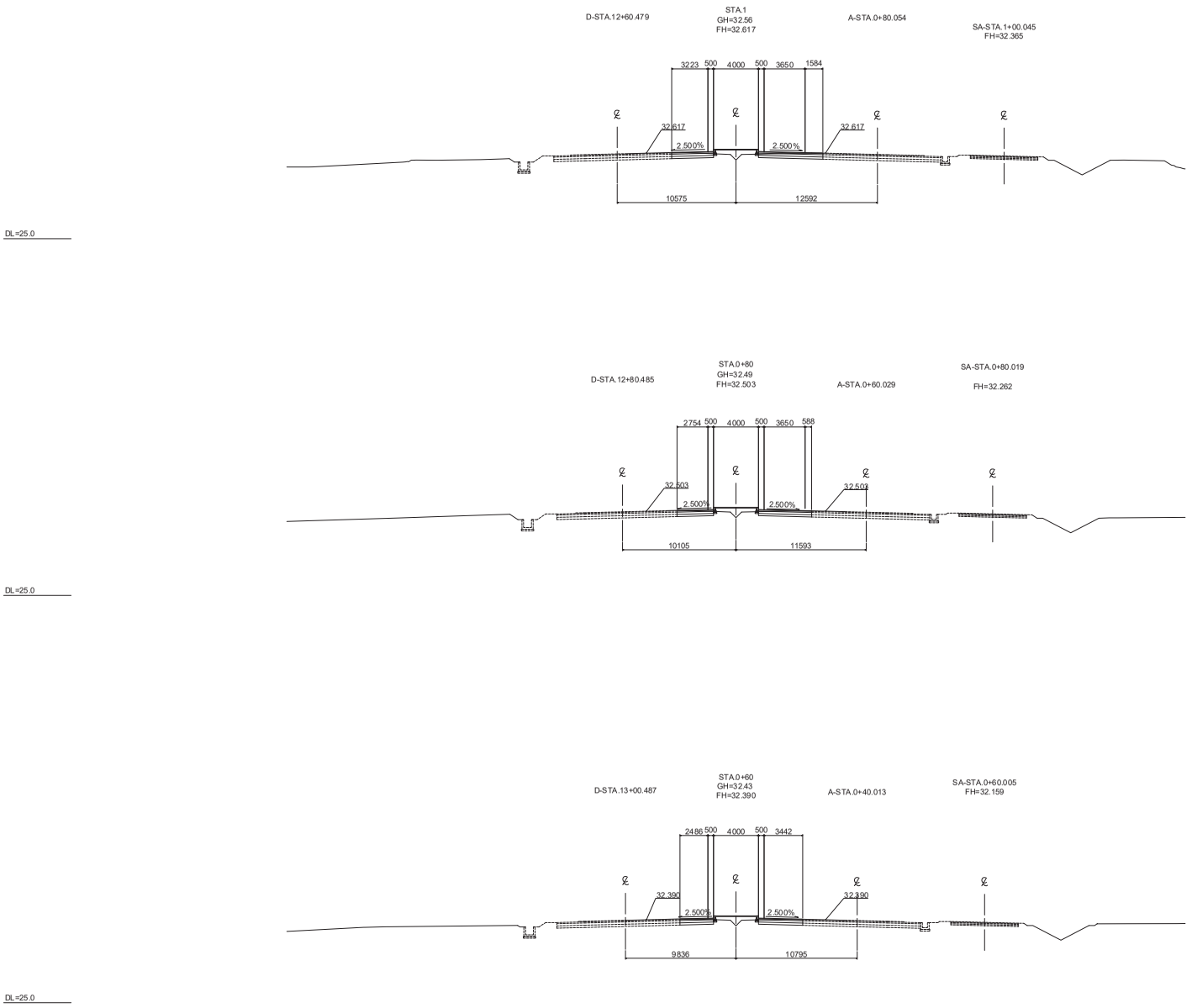
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(1)	SCALE:(A1size) 1:200	DRAWING NO. CR-01



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(2)	SCALE:(A1size) 1:200	DRAWING NO. CR-02

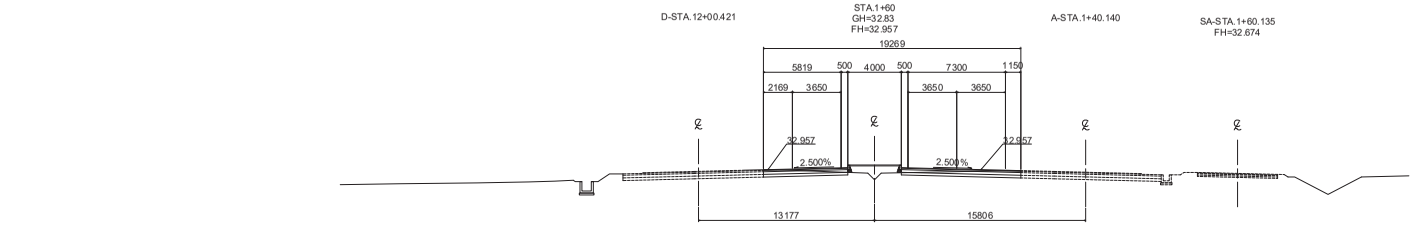


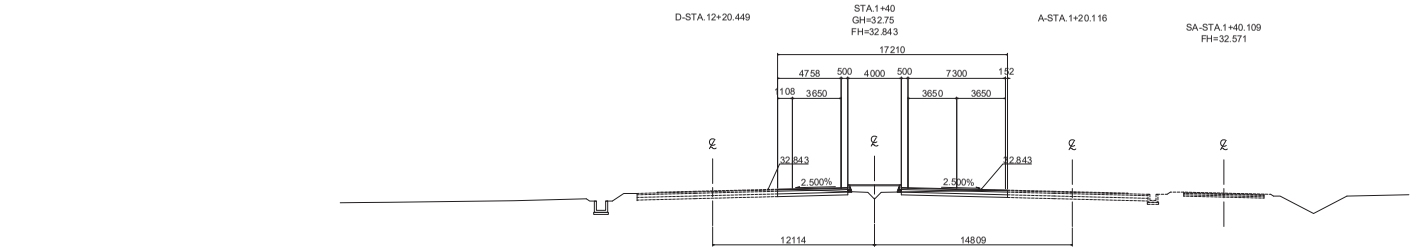
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(3)	SCALE:(A1size) 1:200	DRAWING NO. CR-03

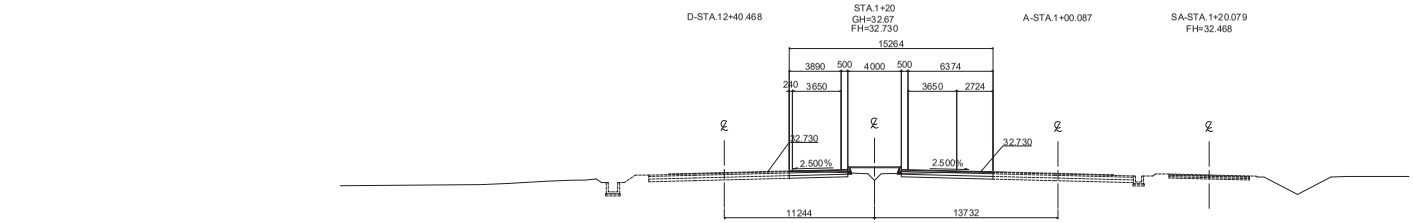


添付資料6－27

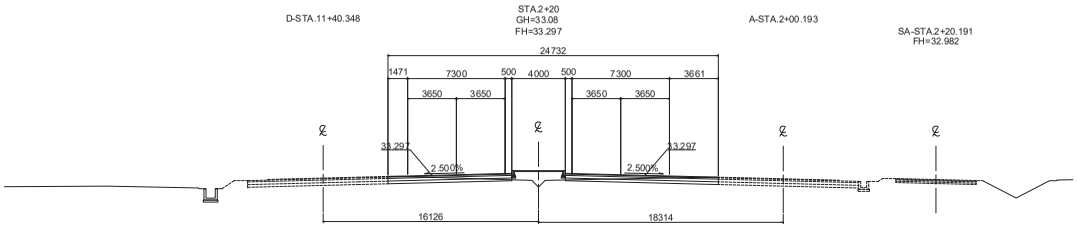
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(4)	SCALE:(A1size) 1:200	DRAWING NO. CR-04







GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(5)	SCALE:(A1size) 1:200	DRAWING NO. CR-05



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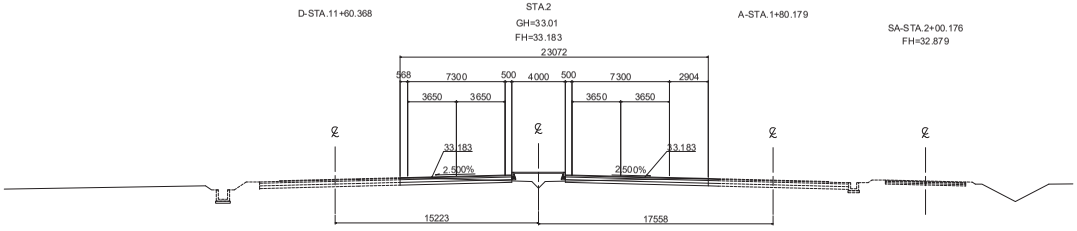

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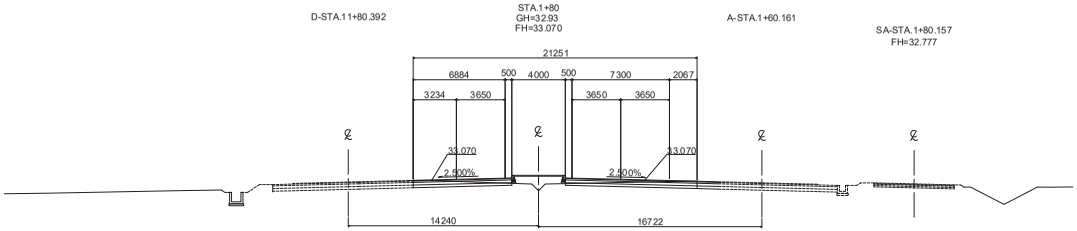

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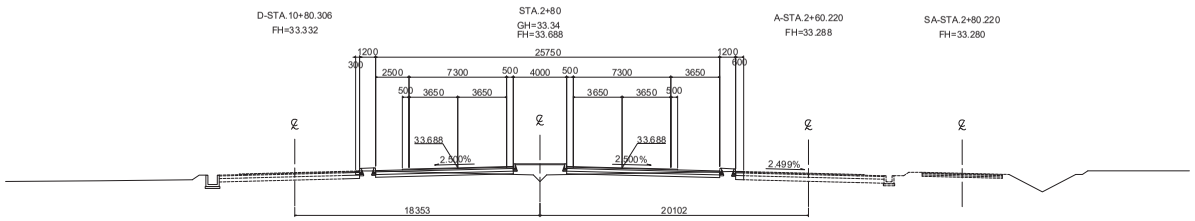
添付資料6－29

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(6)	SCALE:(A1size) 1:200	DRAWING NO. CR-06



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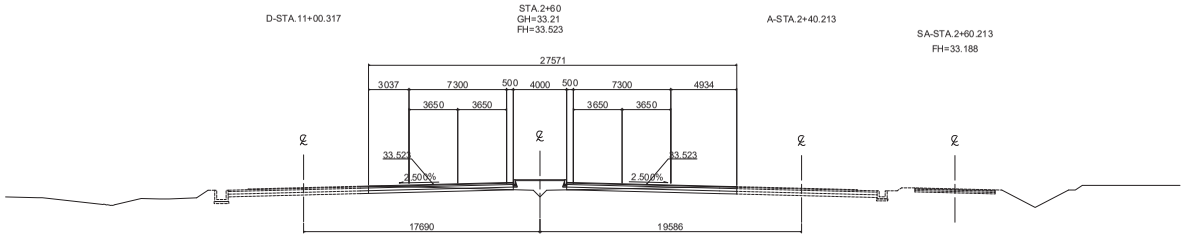

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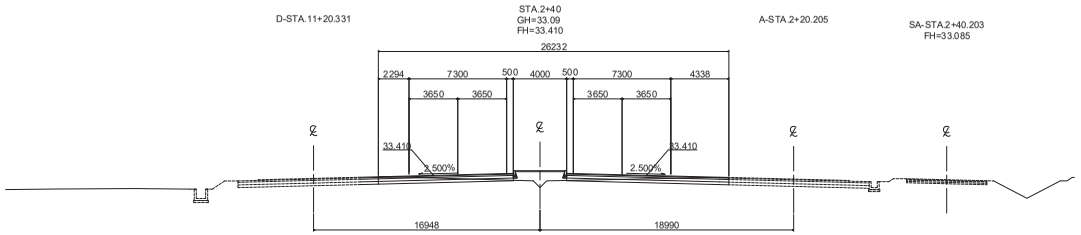

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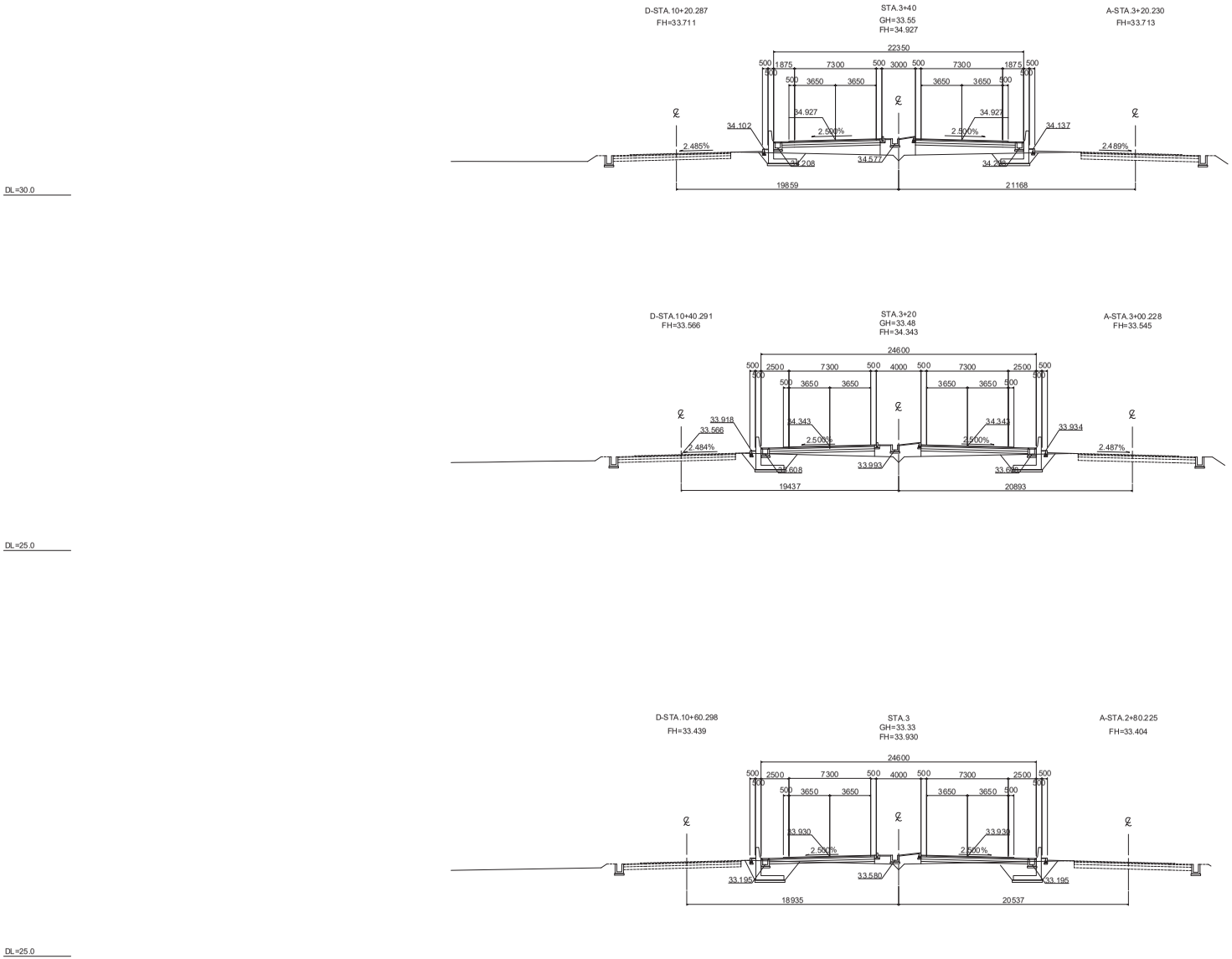
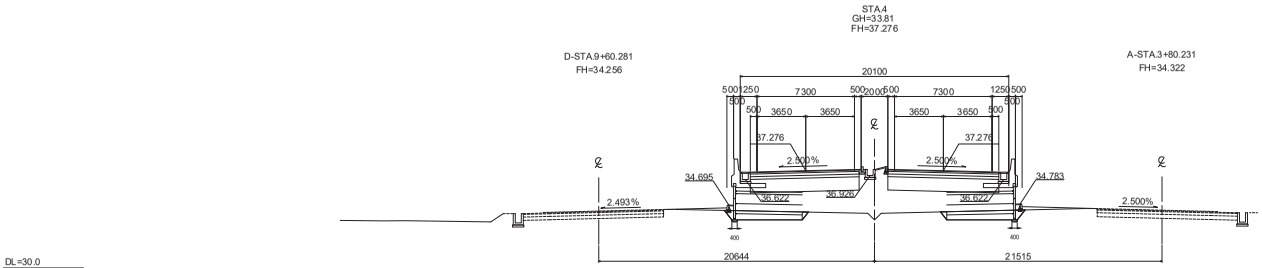
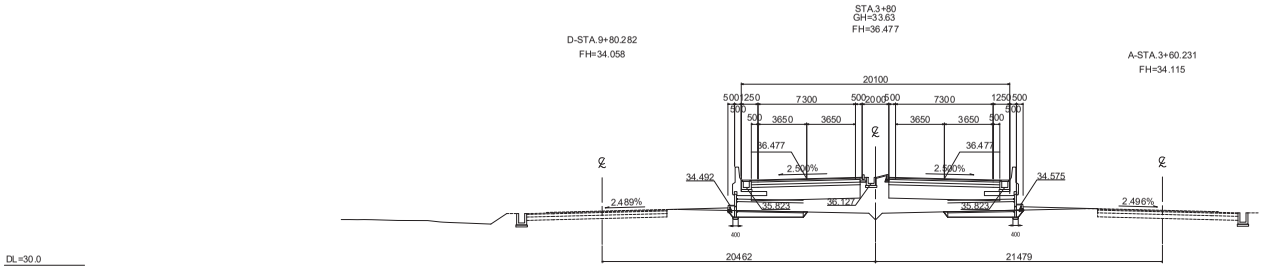
添付資料6－30

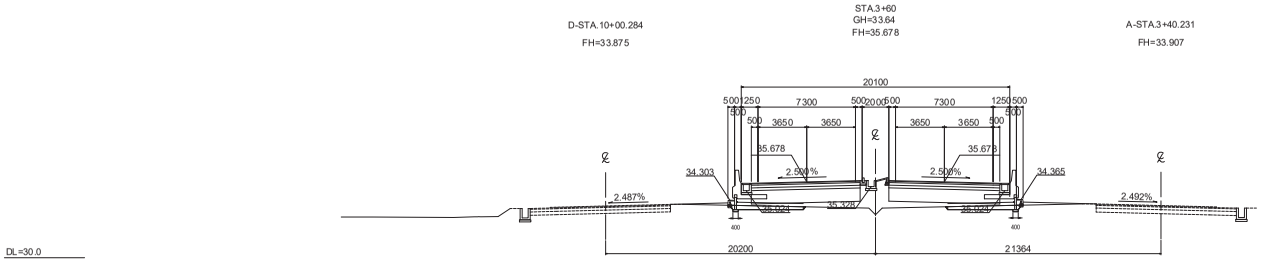
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(7)	SCALE:(A1size) 1:200	DRAWING NO. CR-07



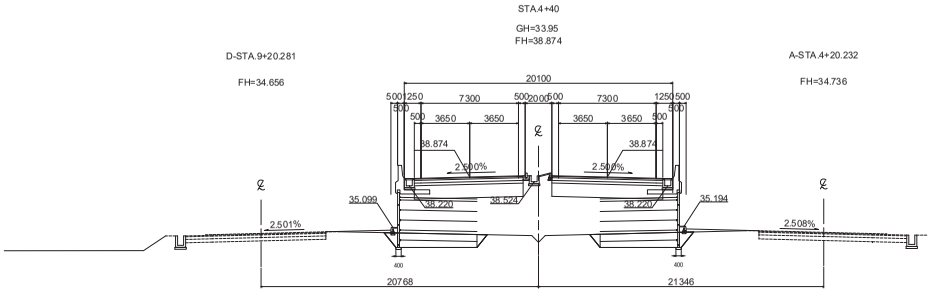
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(8)	SCALE:(A1size) 1:200	DRAWING NO. CR-08

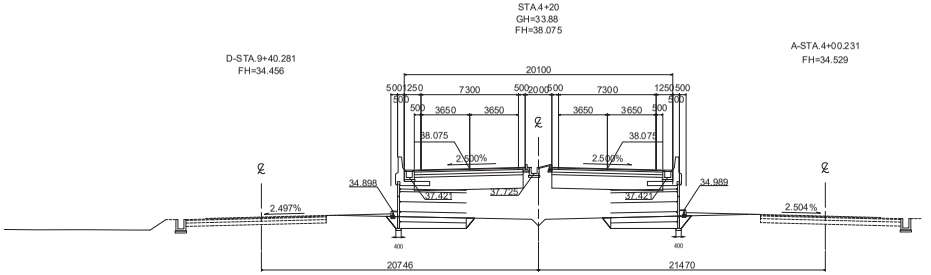






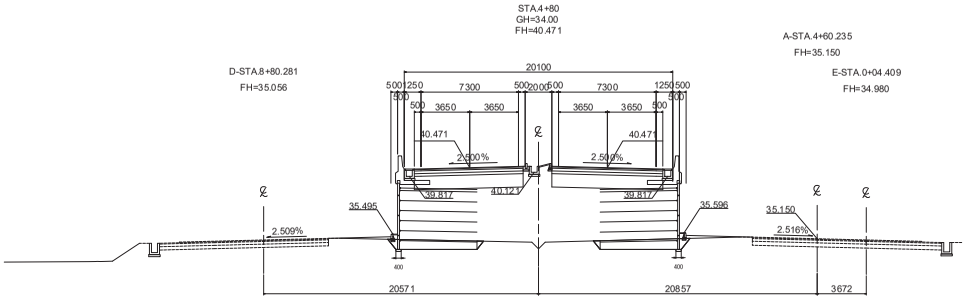
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(9)	SCALE:(A1size) 1:200	DRAWING NO. CR-09

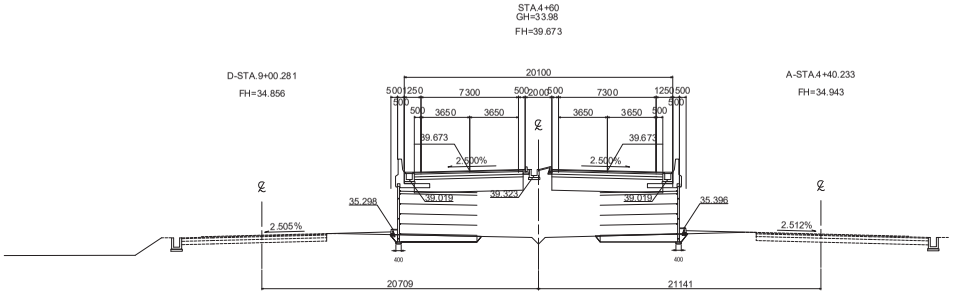




添付資料6－33

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(10)	SCALE:(A1size) 1:200	DRAWING NO. CR-10

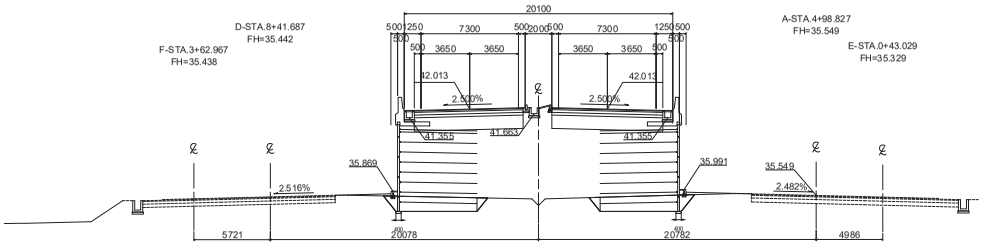




添付資料6－34

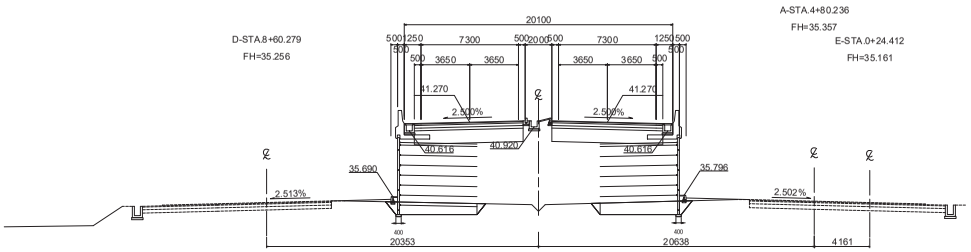
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(11)	SCALE:(A1size) 1:200	DRAWING NO. CR-11

KA 1-1(STA.5+18.590)
GH=34.06
FH=42.013



DL=30.0

STA.5
GH=34.05
FH=41.270



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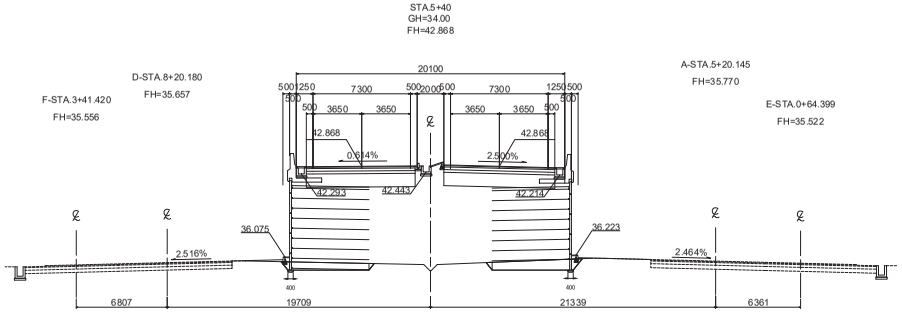
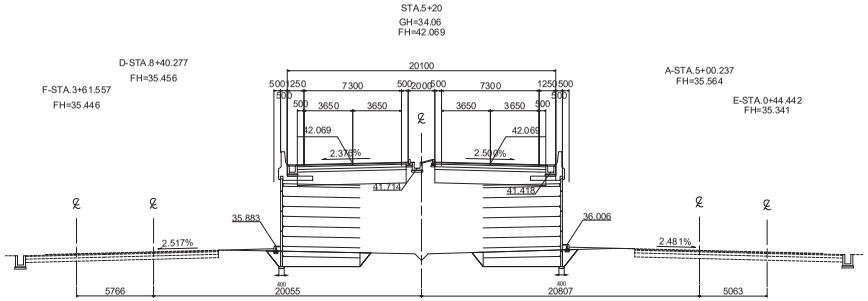
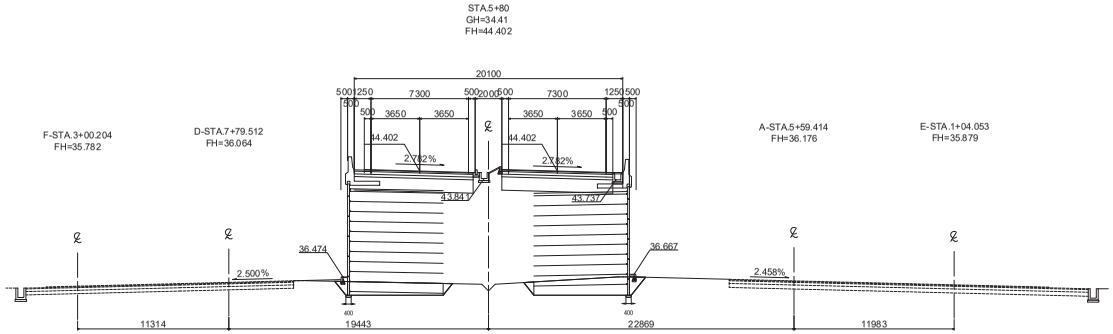
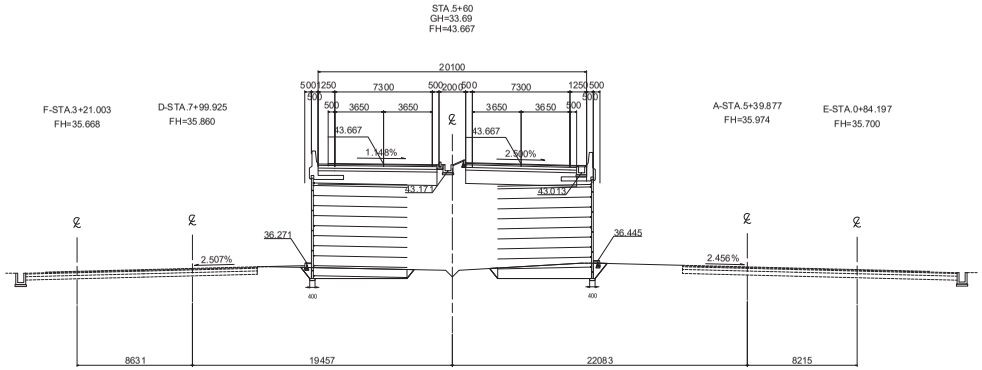
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(12)	SCALE:(A1size) 1:200	DRAWING NO. CR-12





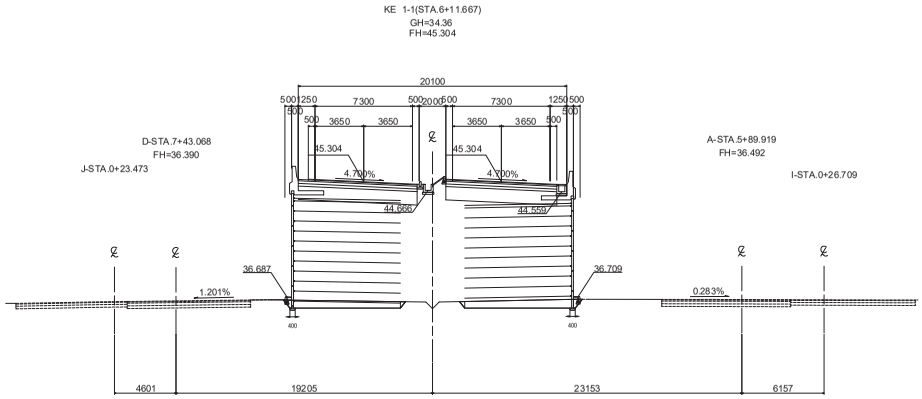
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(13)	SCALE:(A1size) 1:200	DRAWING NO. CR-13

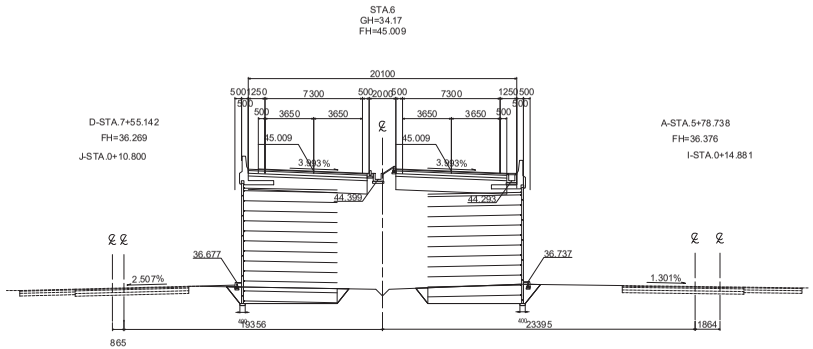




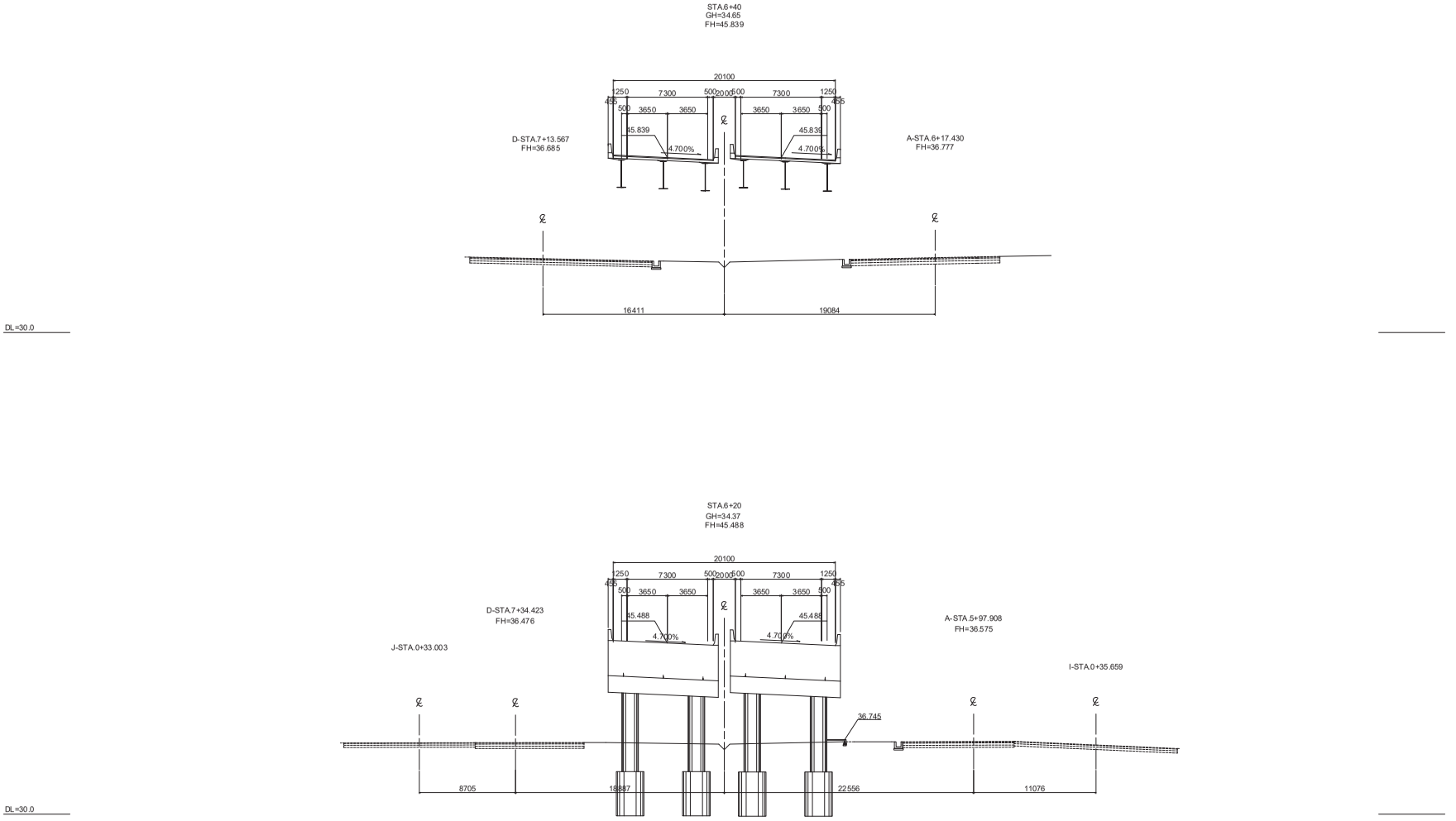
添付資料6－37

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(14)	SCALE:(A1size) 1:200	DRAWING NO. CR-14

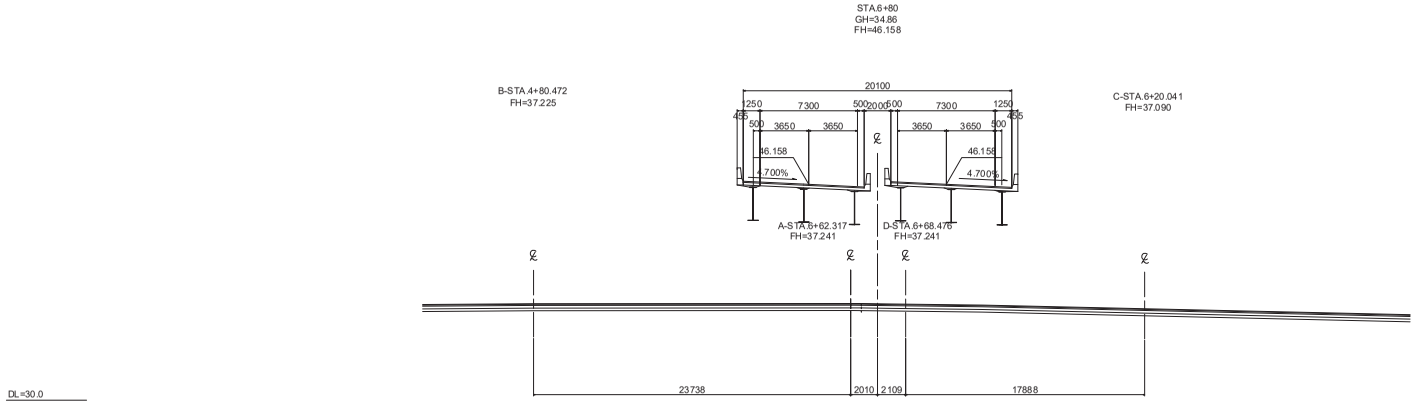


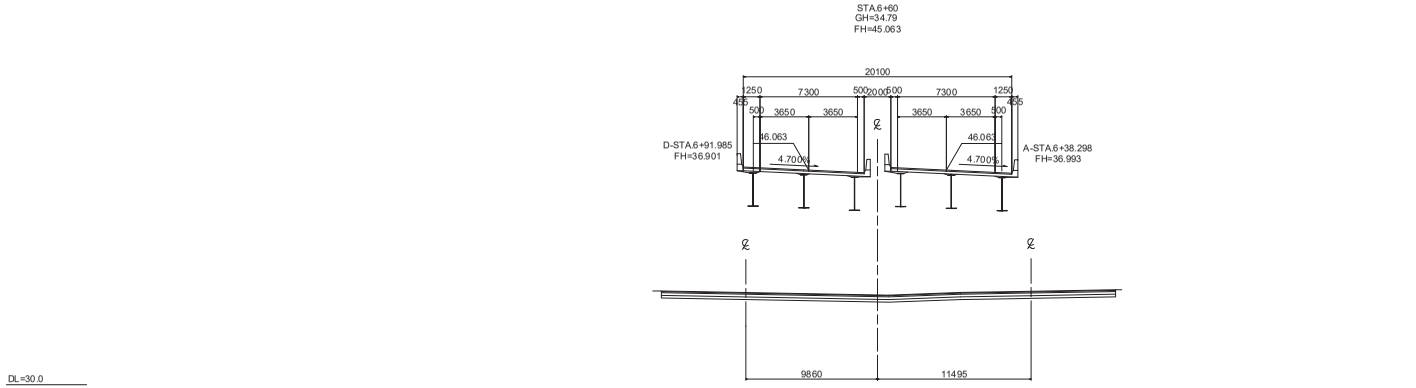


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(15)	SCALE:(A1size) 1:200	DRAWING NO. CR-15

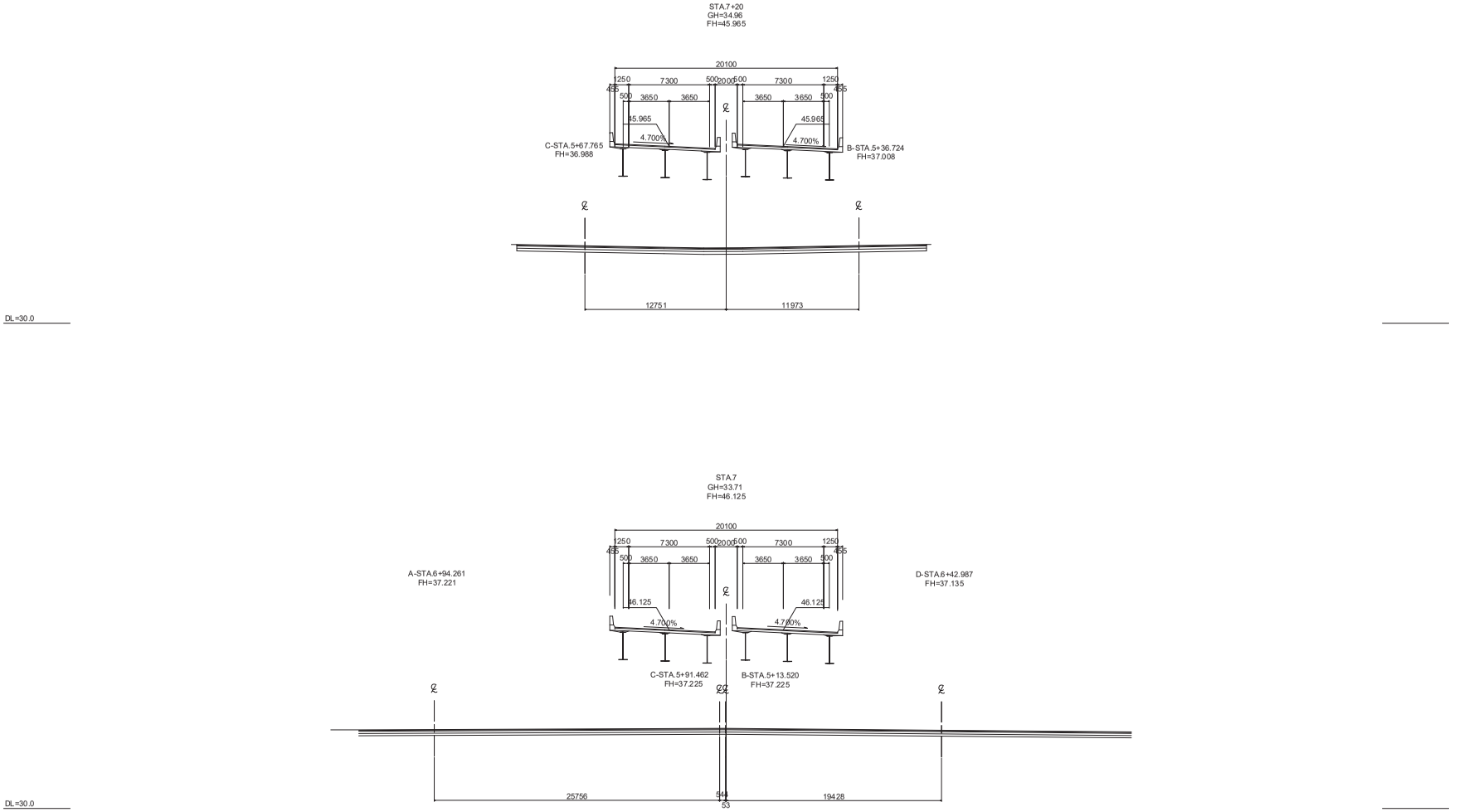


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(16)	SCALE:(A1size) 1:200	DRAWING NO. CR-16

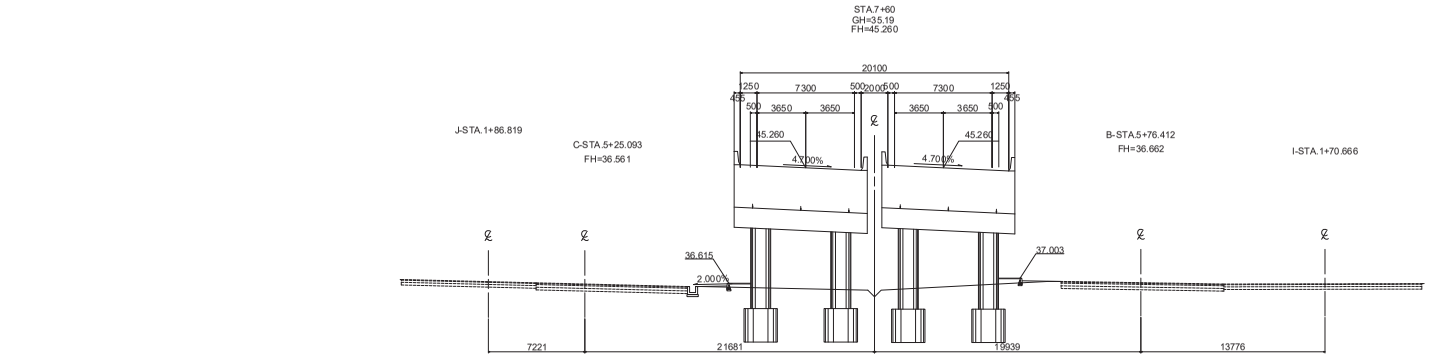


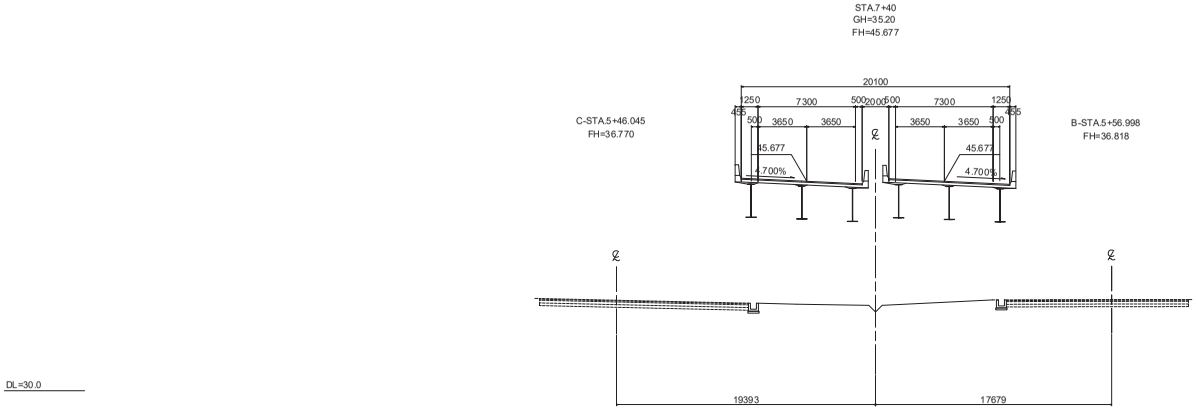


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(17)	SCALE:(A1size) 1:200	DRAWING NO. CR-17

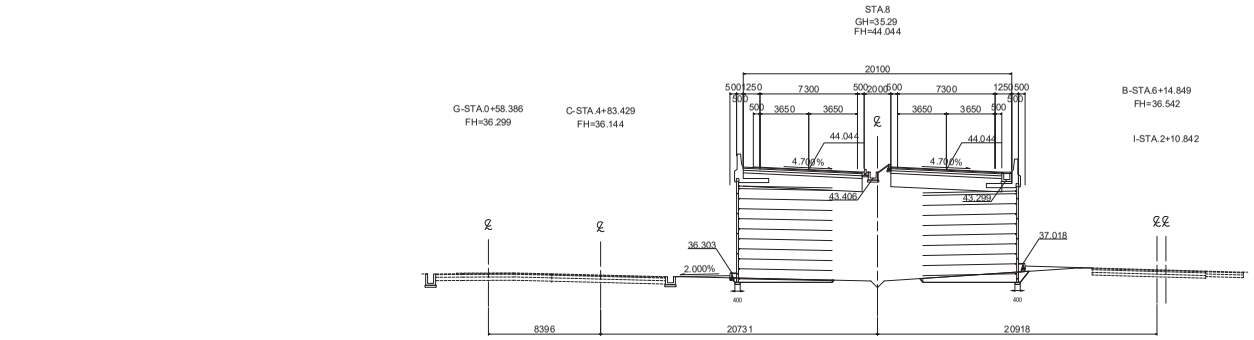


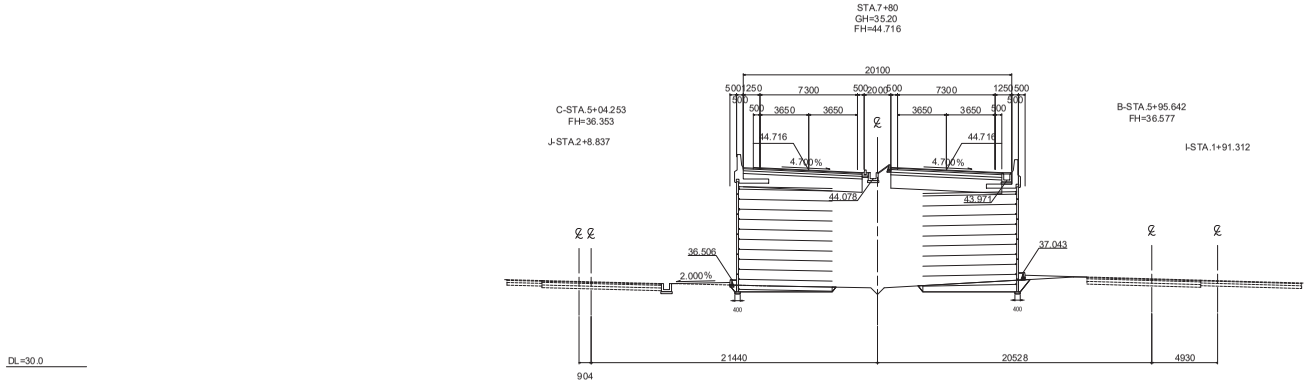
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(18)	SCALE:(A1size) 1:200	DRAWING NO. CR-18



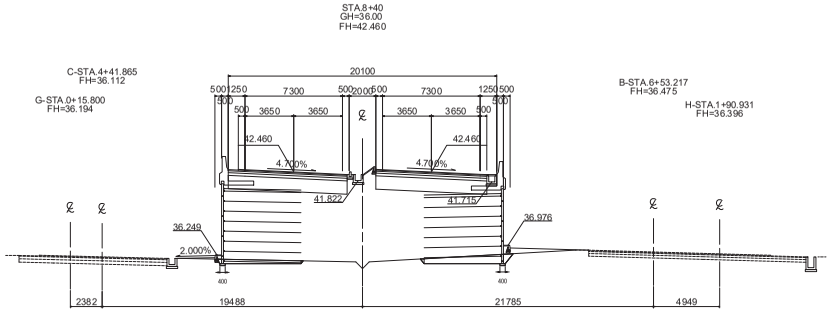


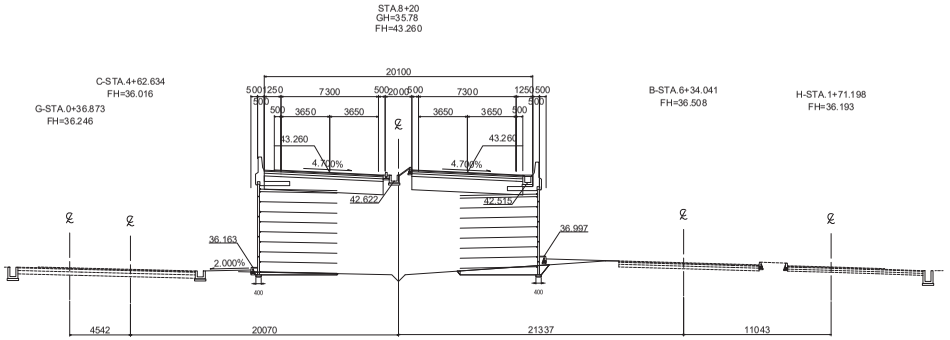
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(19)	SCALE:(A1size) 1:200	DRAWING NO. CR-19



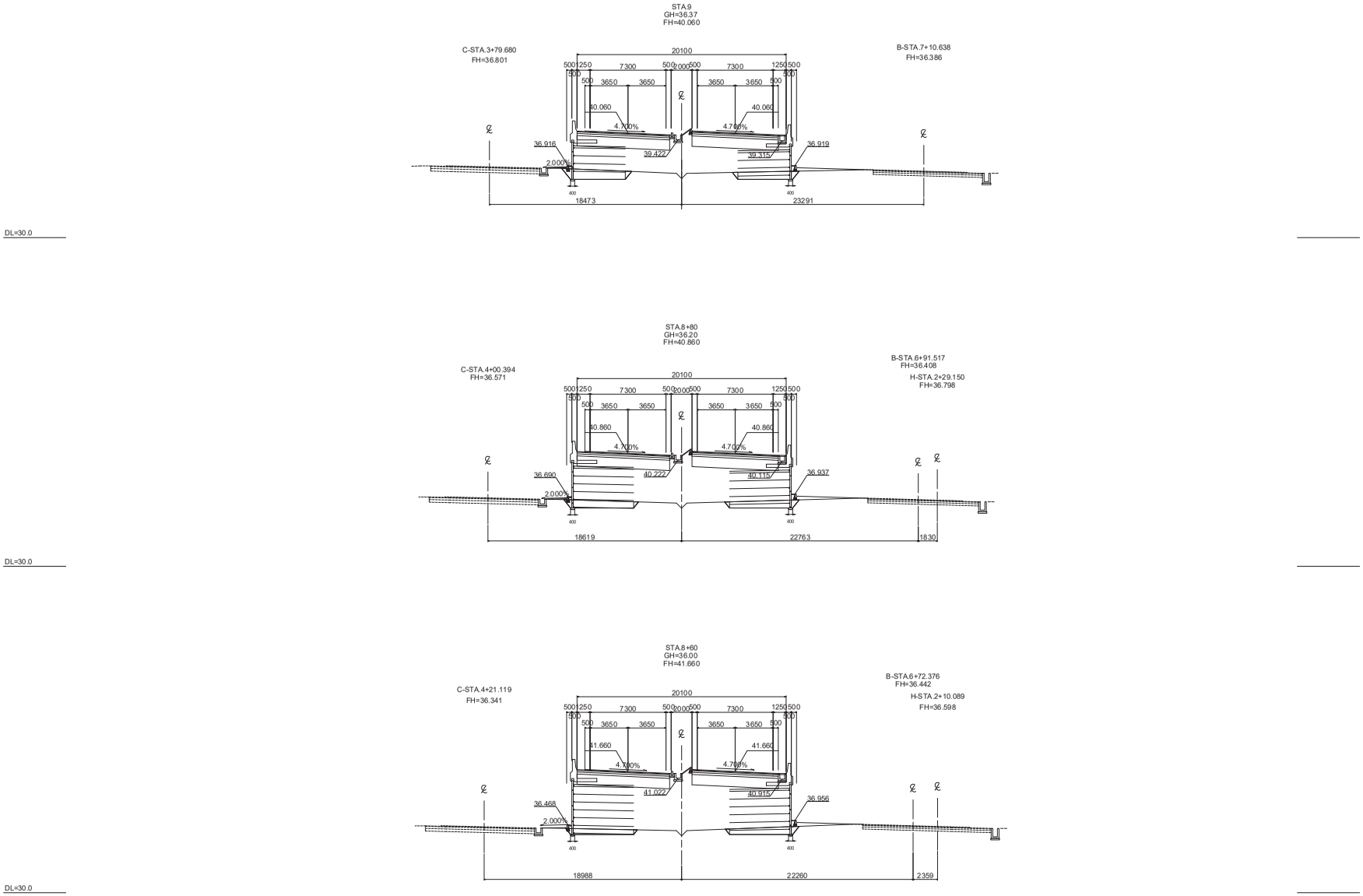


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(20)	SCALE:(A1size) 1:200	DRAWING NO. CR-20

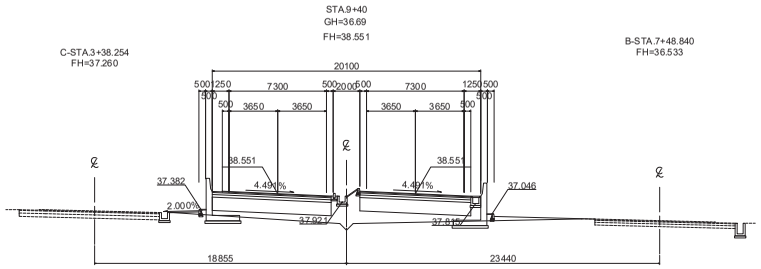




GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(21)	SCALE:(A1size) 1:200	DRAWING NO. CR-21



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(22)	SCALE:(A1size) 1:200	DRAWING NO. CR-22



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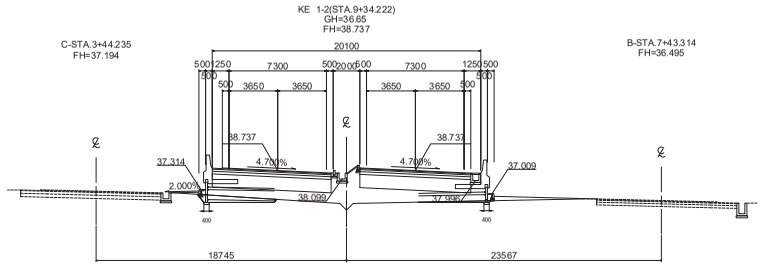

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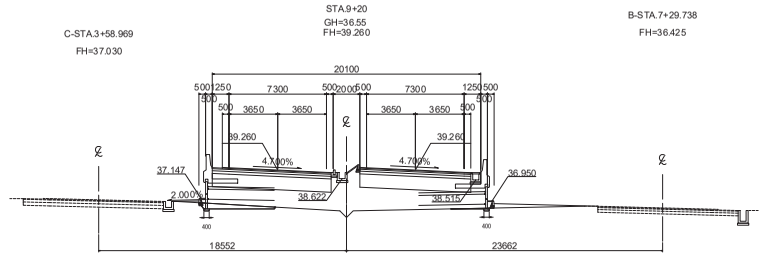

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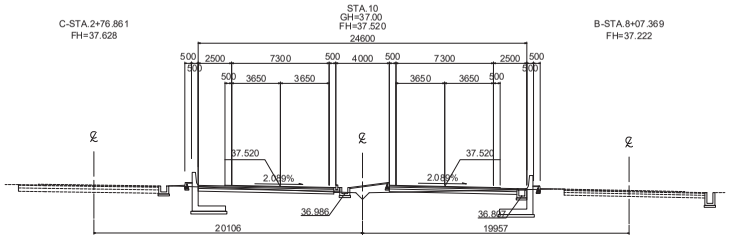
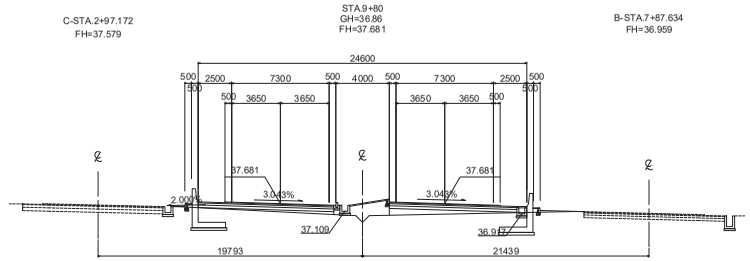
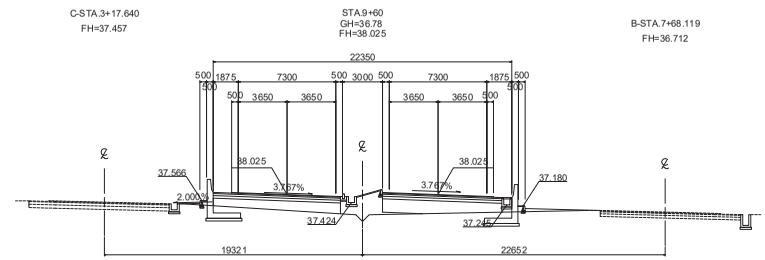
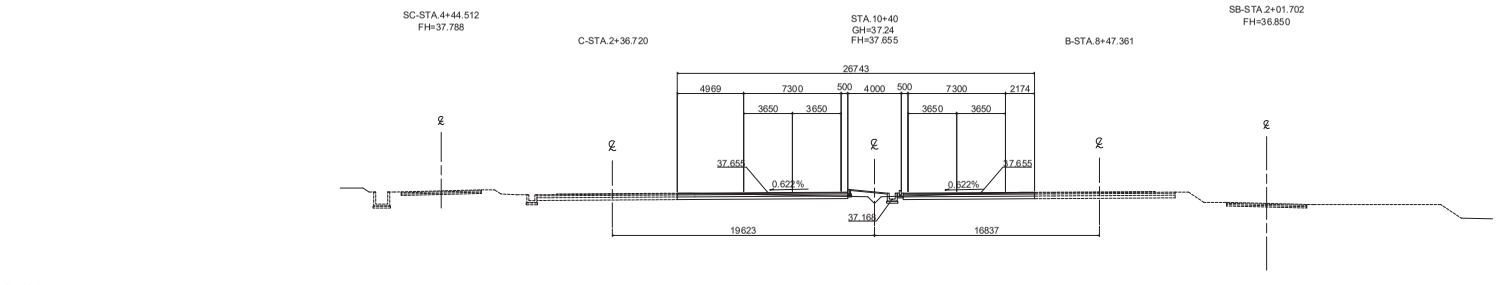
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(23)	SCALE:(A1size) 1:200	DRAWING NO. CR-23

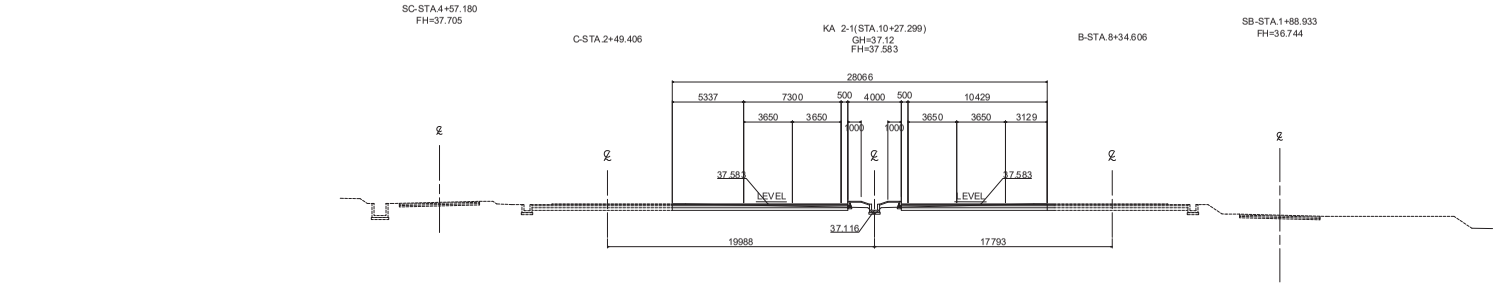


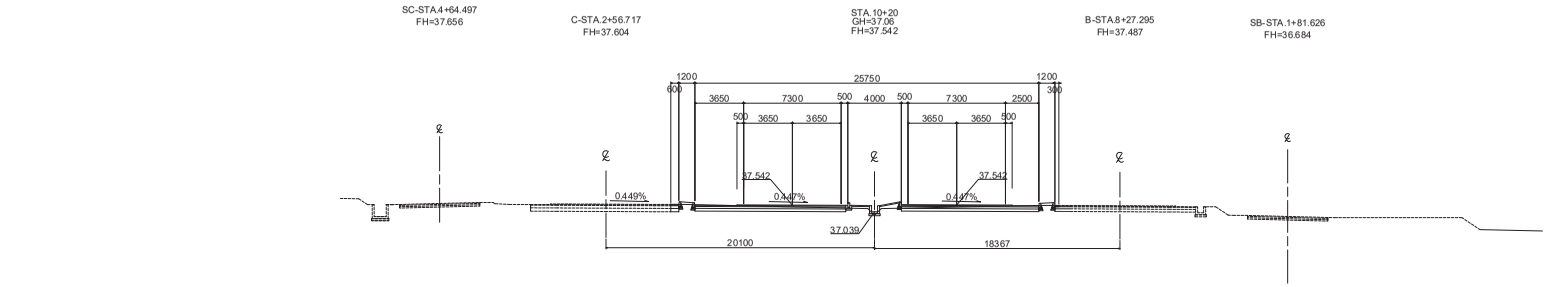




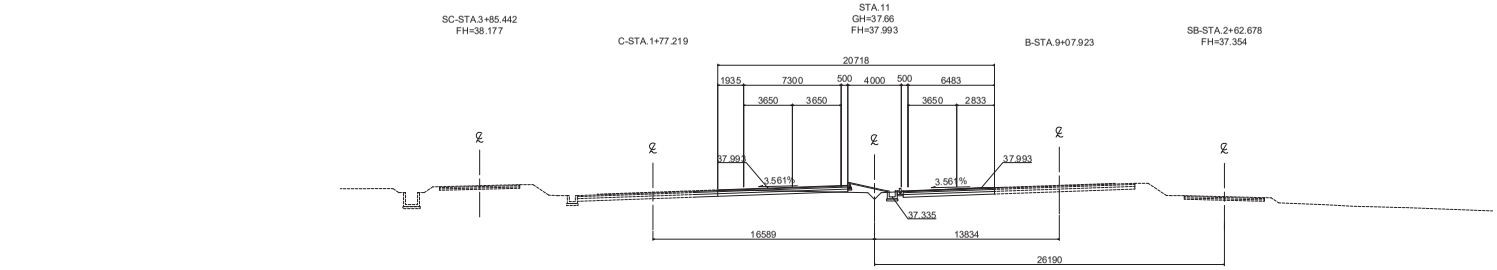
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(24)	SCALE:(A1size) 1:200	DRAWING NO. CR-24

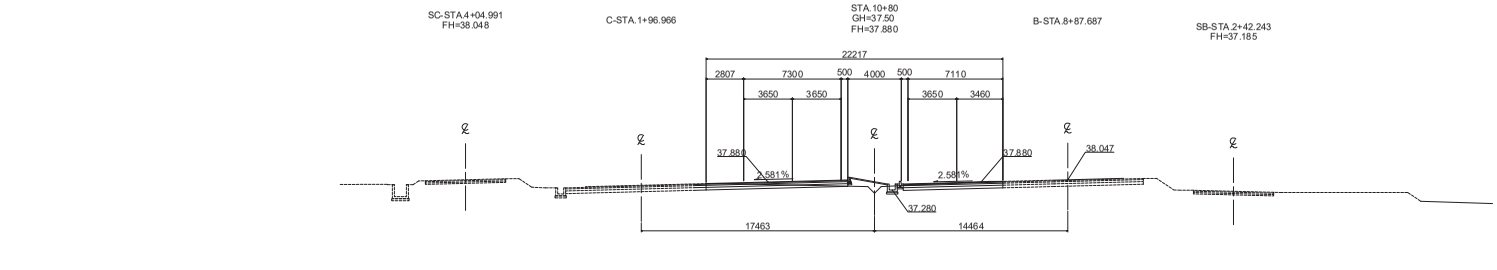


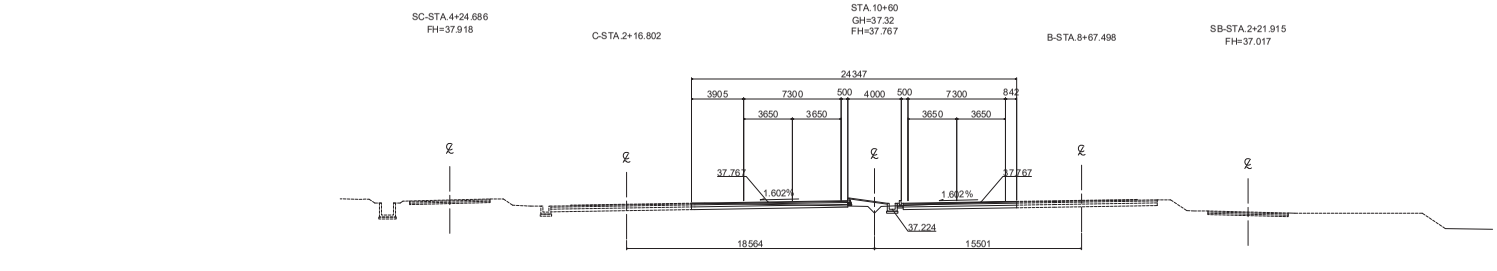




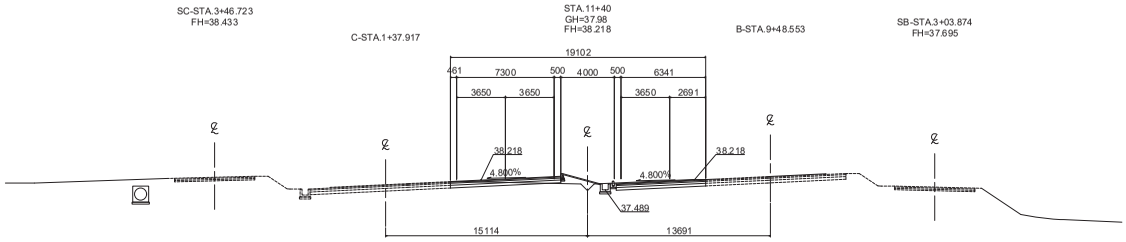
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(25)	SCALE:(A1size) 1:200	DRAWING NO. CR-25

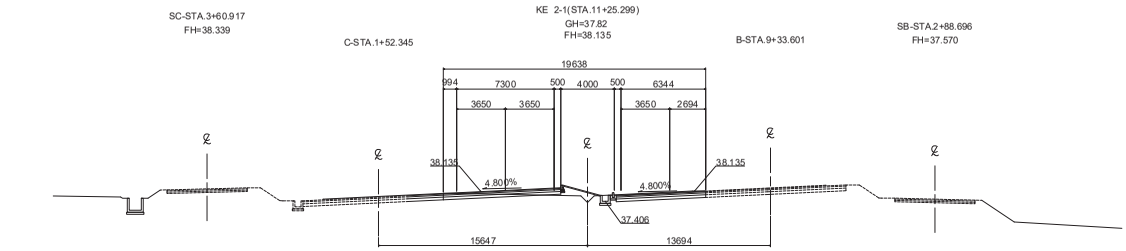


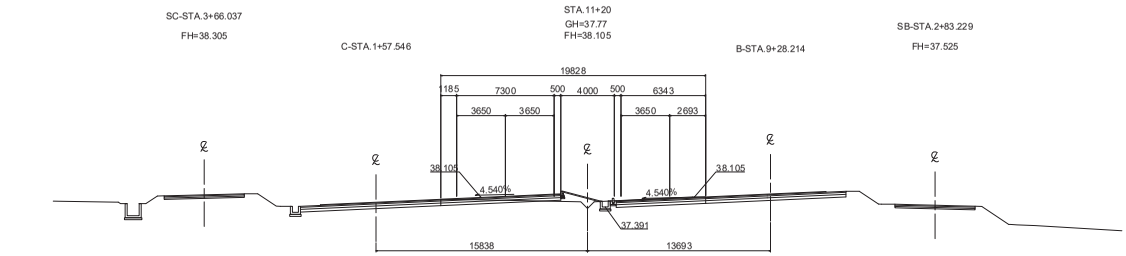




GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(26)	SCALE:(A1size) 1:200	DRAWING NO. CR-26

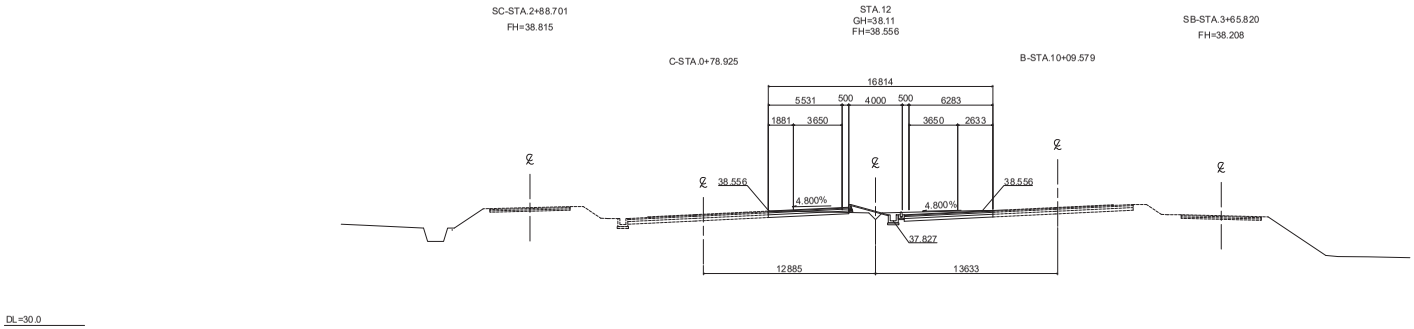


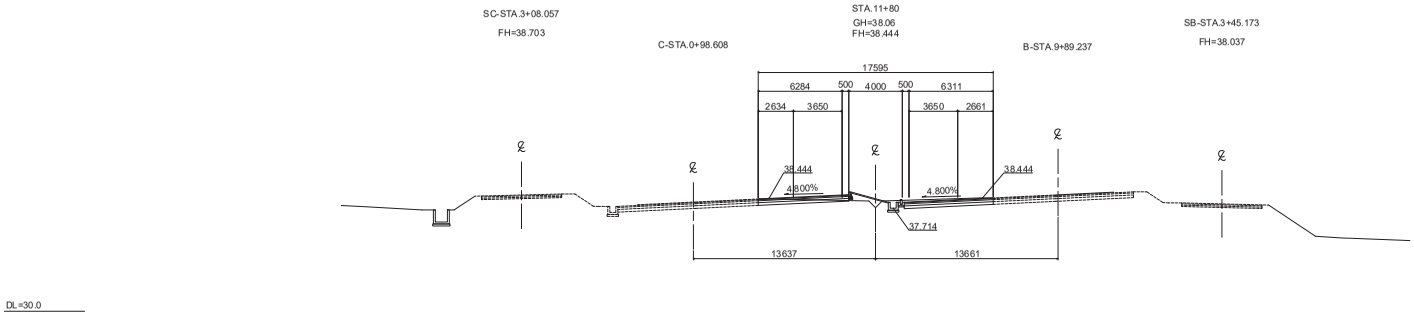


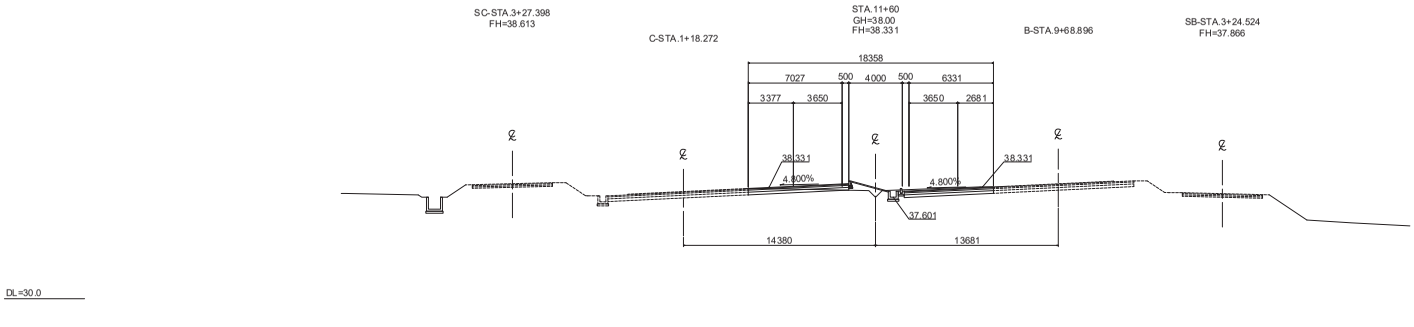


添付資料6－50

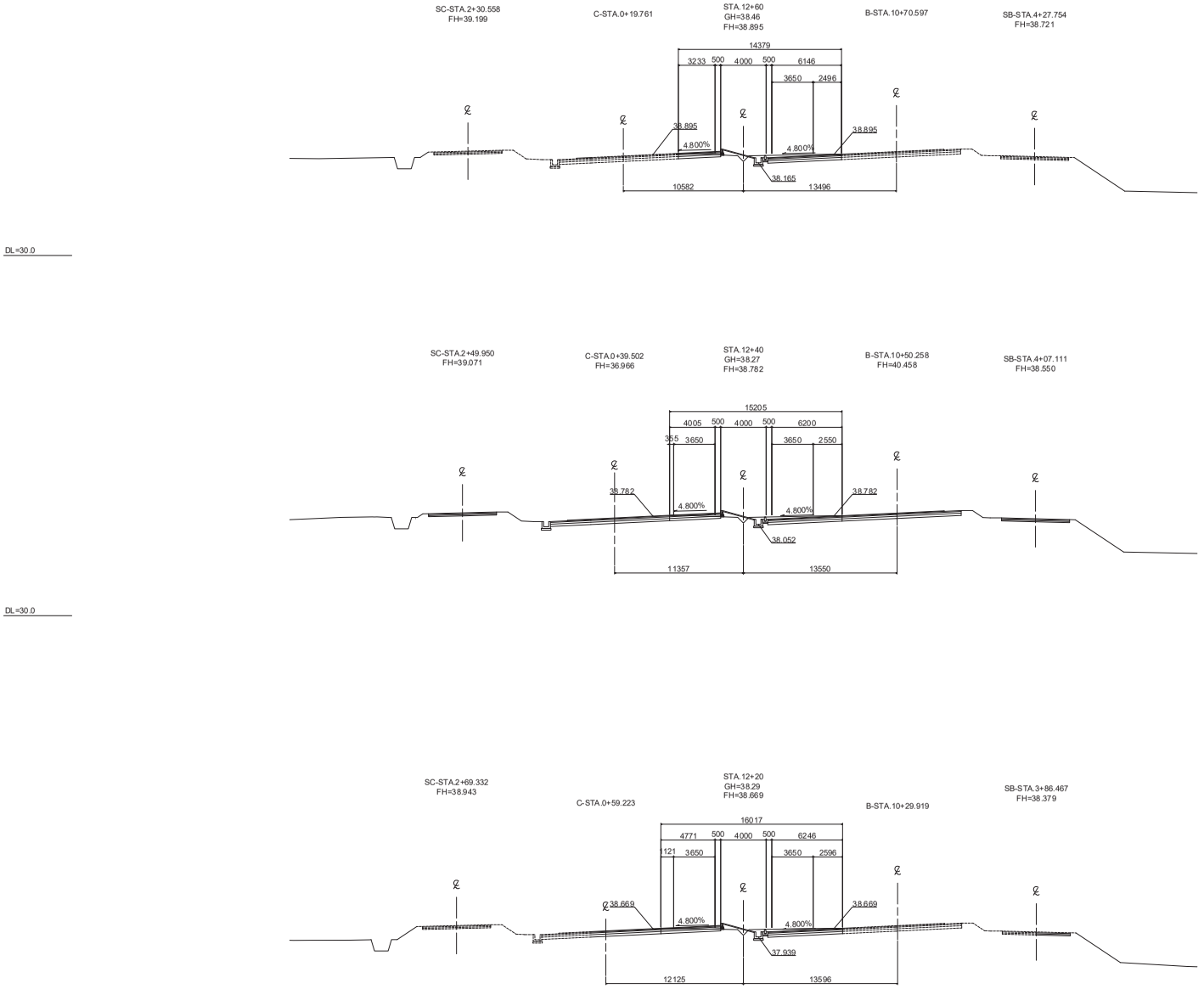
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(27)	SCALE:(A1size) 1:200	DRAWING NO. CR-27





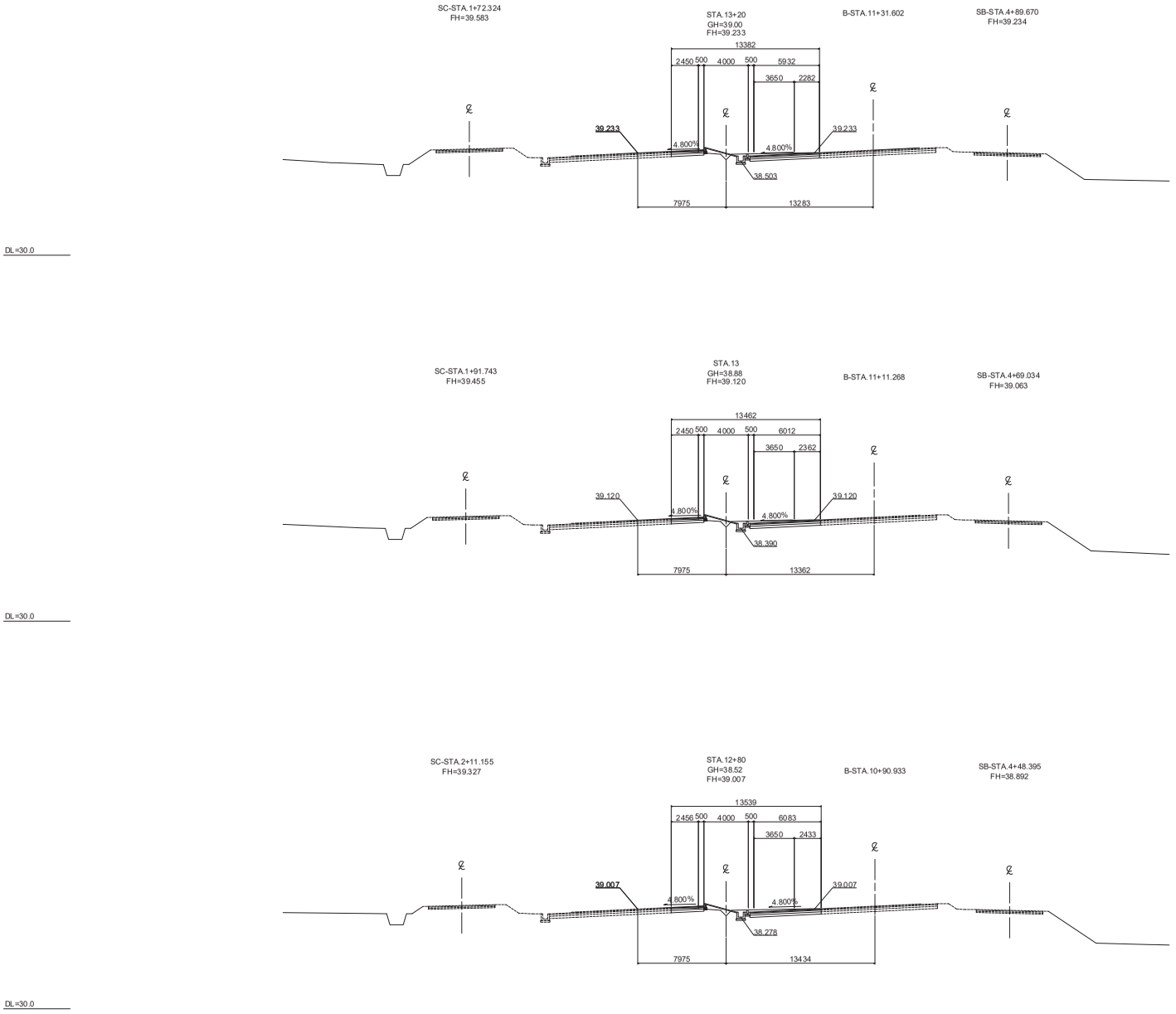


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(28)	SCALE:(A1size) 1:200	DRAWING NO. CR-28



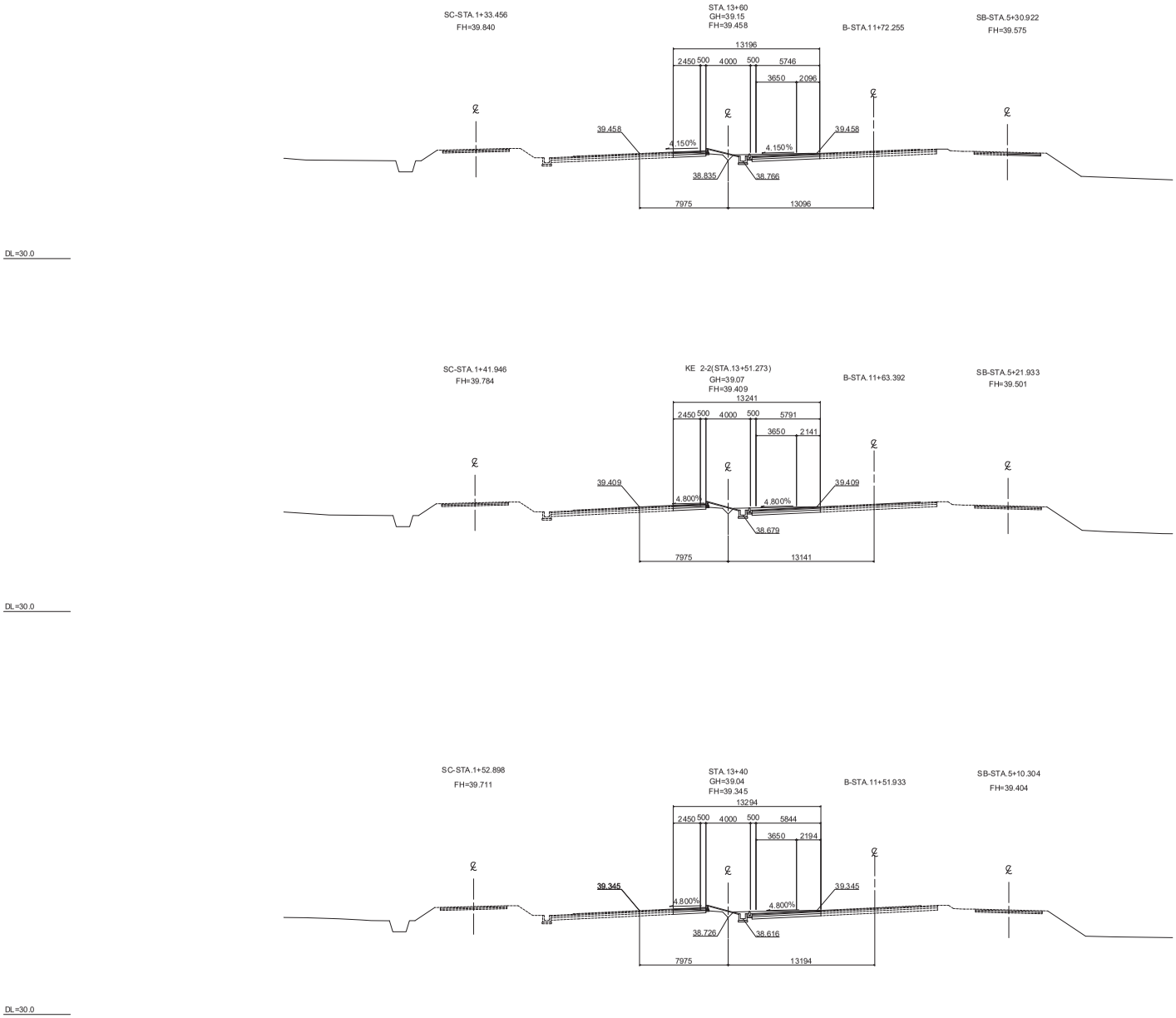
添付資料6－52

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(29)	SCALE:(A1size) 1:200	DRAWING NO. CR-29

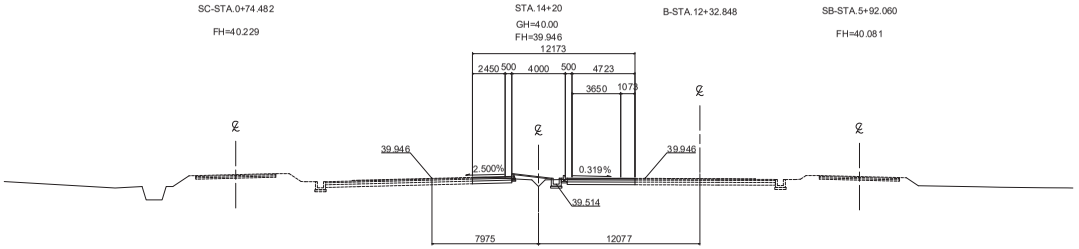


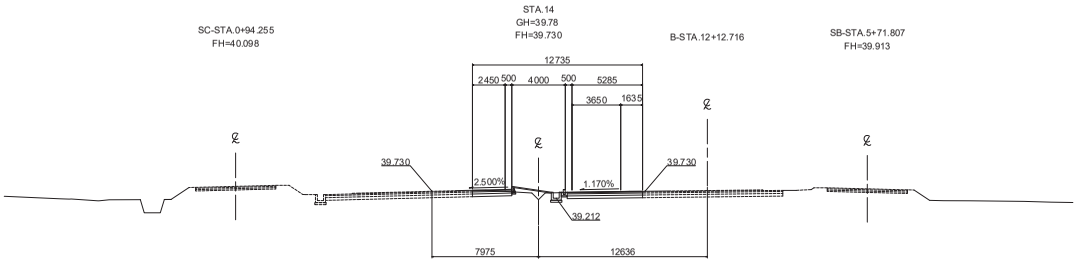
添付資料6－53

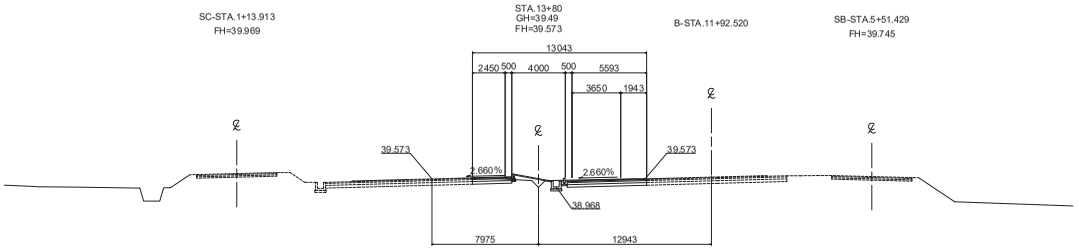
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(30)	SCALE:(A1size) 1:200	DRAWING NO. CR-30



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(31)	SCALE:(A1size) 1:200	DRAWING NO. CR-31

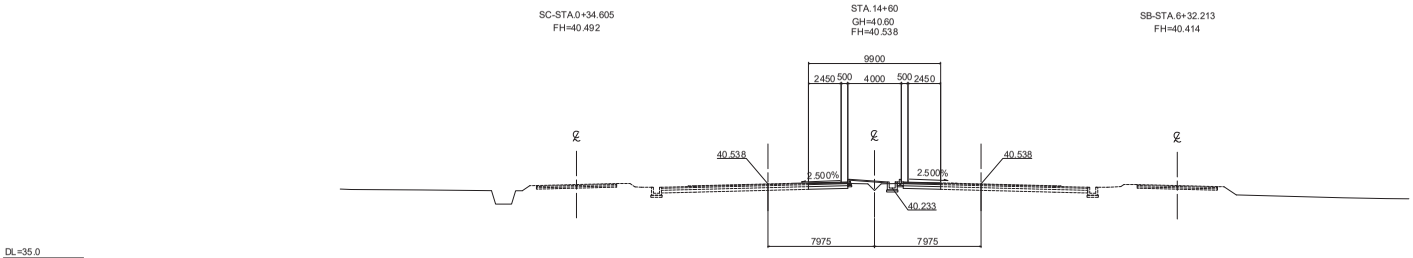


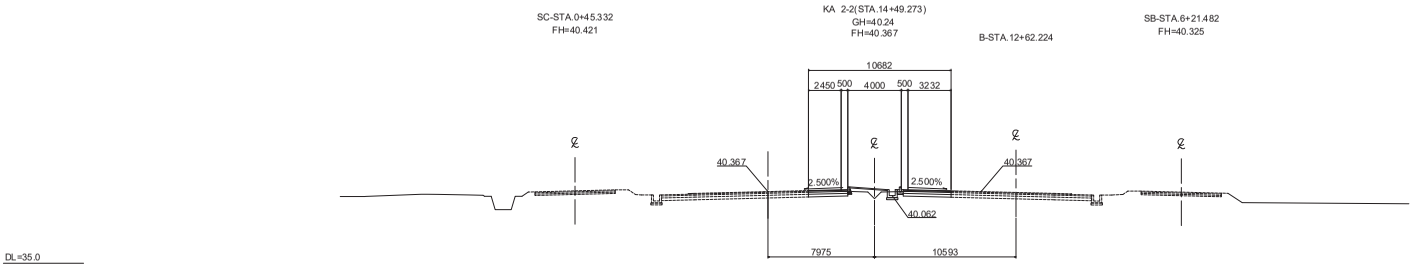


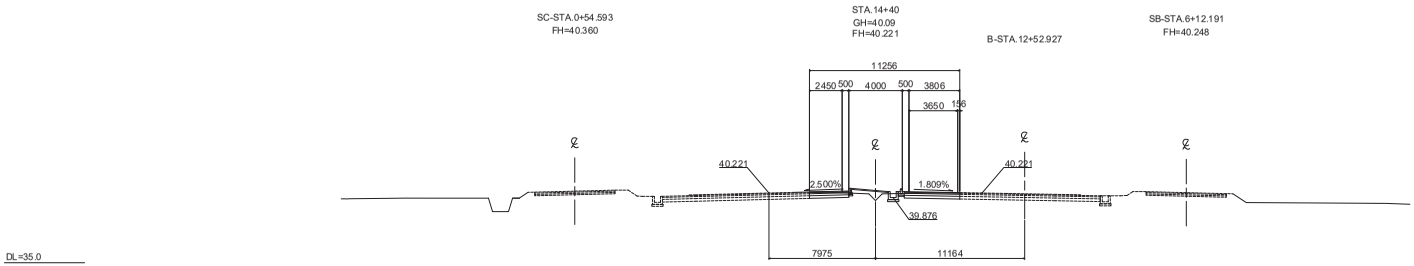


添付資料6－55

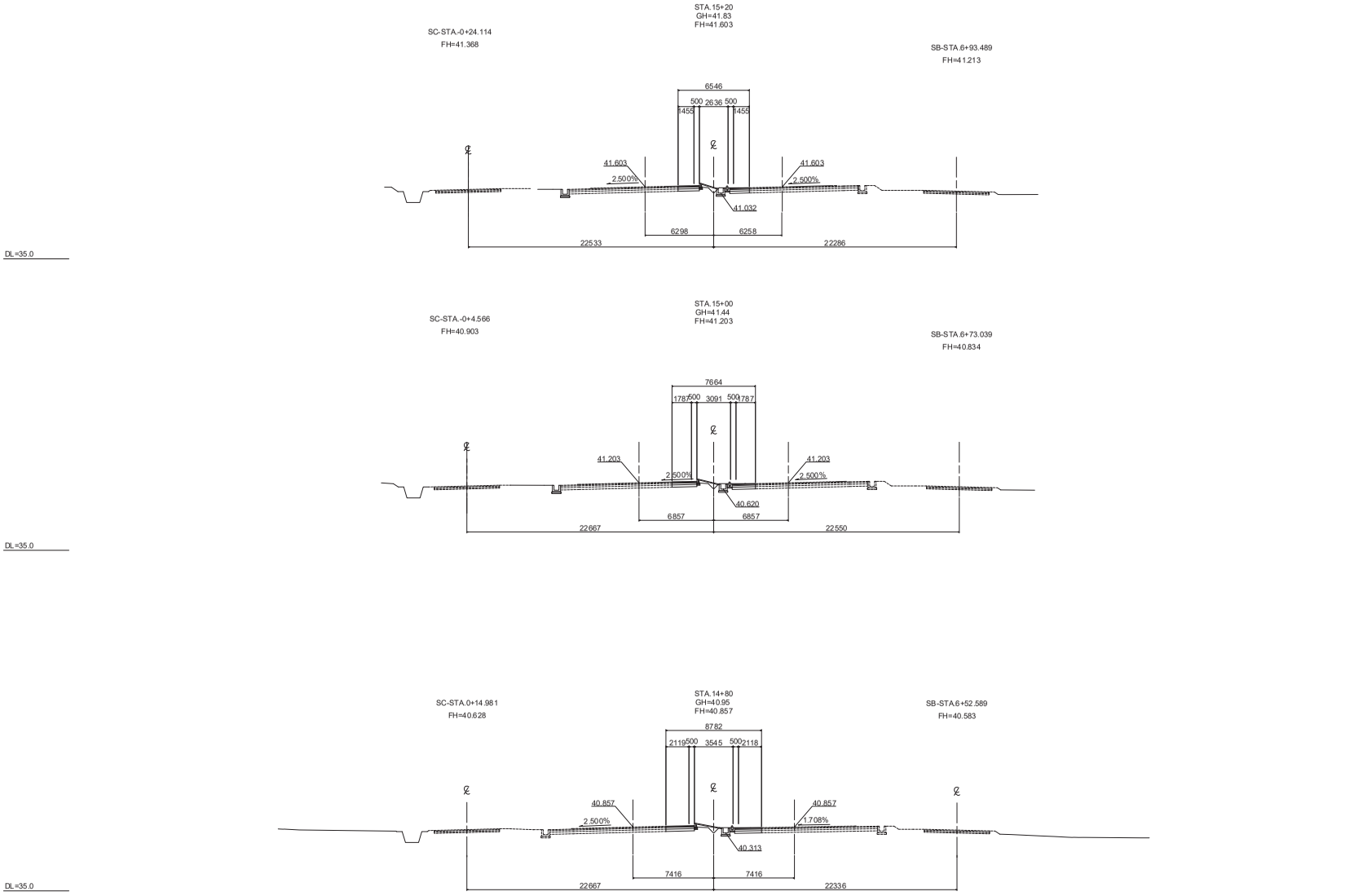
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(32)	SCALE:(A1size) 1:200	DRAWING NO. CR-32





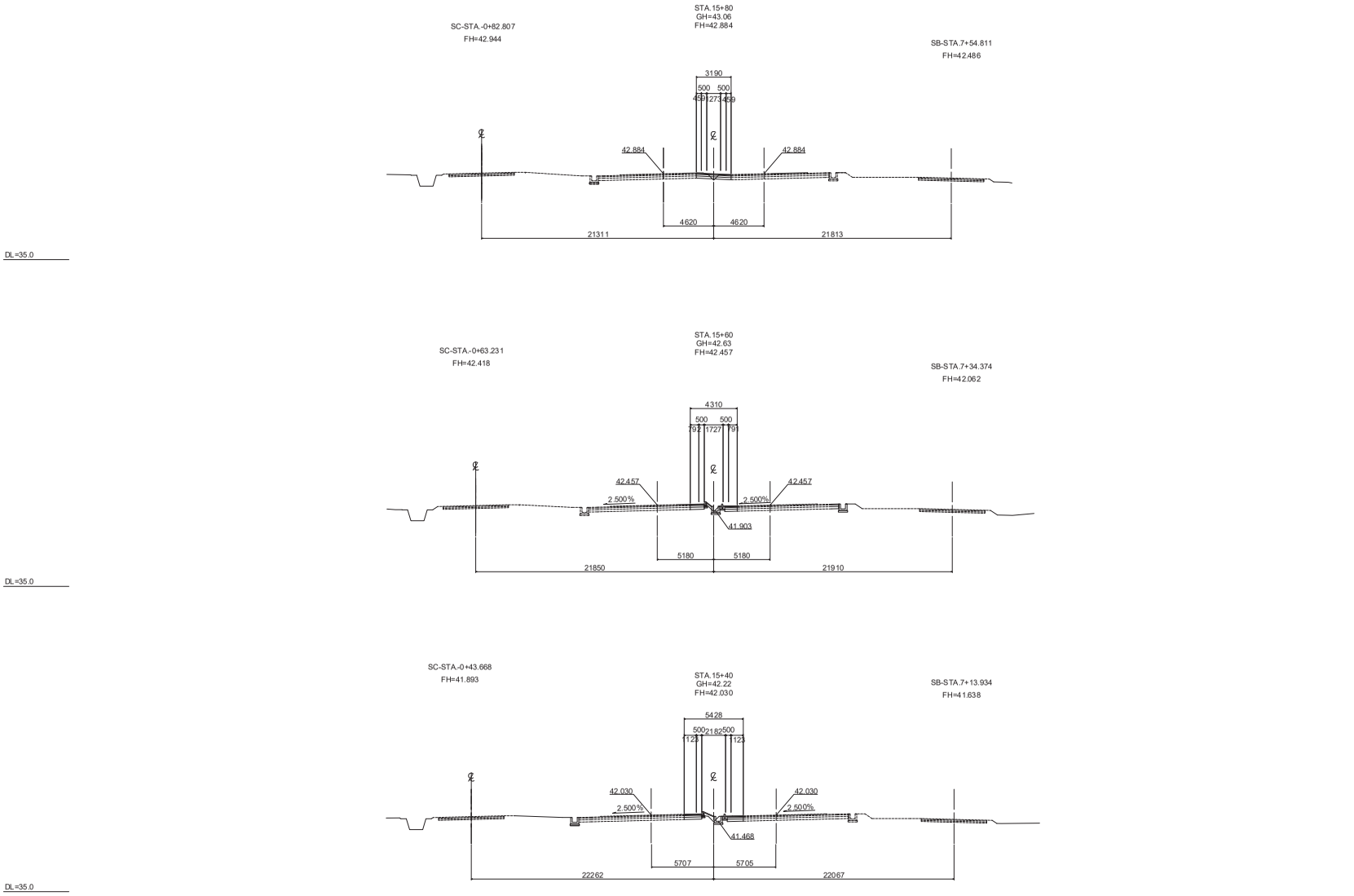


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(33)	SCALE:(A1size) 1:200	DRAWING NO. CR-33



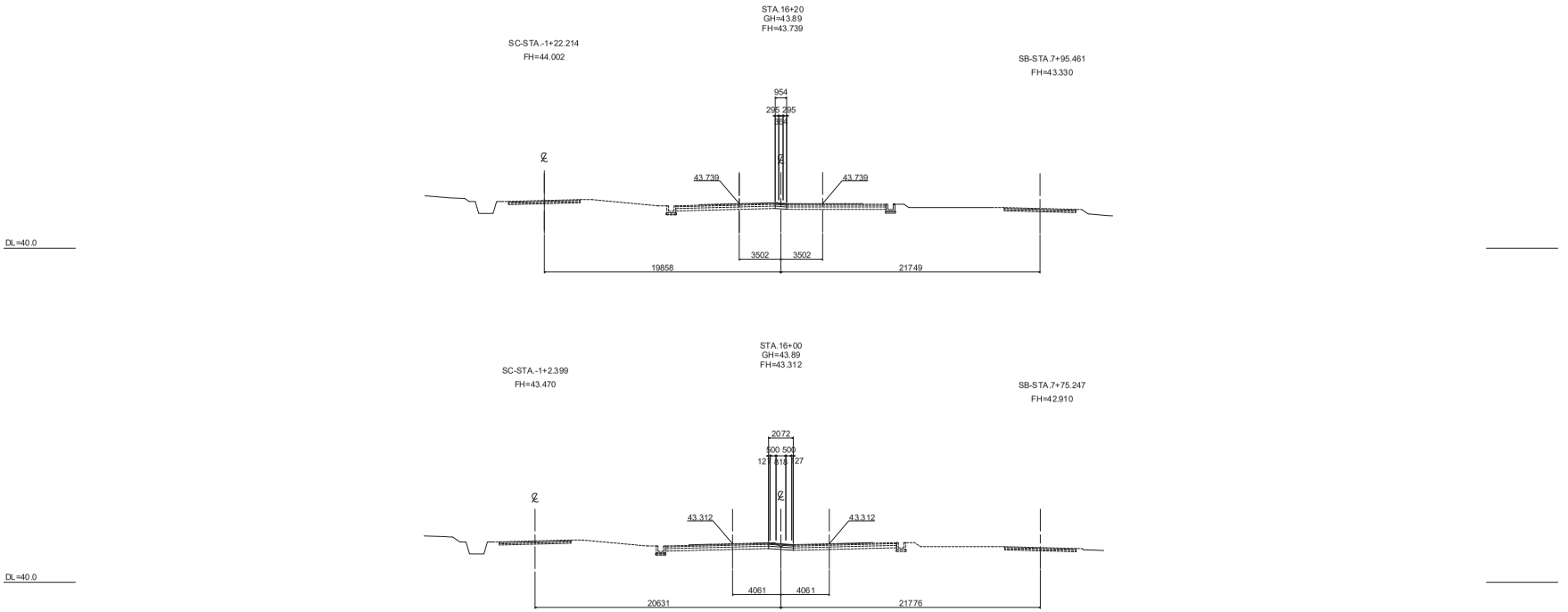
添付資料6－57

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA 01 本線 縦断変更 APPROVED AUG.2018	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(34)	SCALE:(A1size) 1:200	DRAWING NO. CR-34



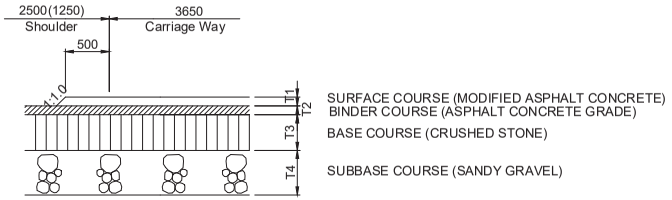
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(35)	SCALE:(A1size) 1:200	DRAWING NO. CR-35

添付資料6－59



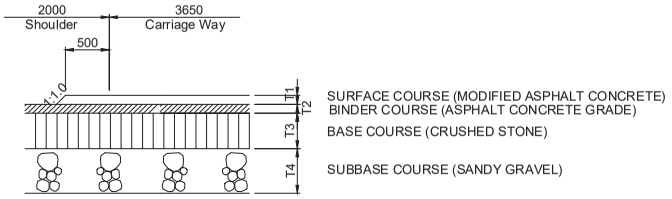
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: HARBOUR-AKOSOMBO ROAD CROSS SECTION(36)	SCALE:(A1size) 1:200	DRAWING NO. CR-36

MAIN ROAD PAVEMENT COMPOSITION S=1:10
(PHASE2)



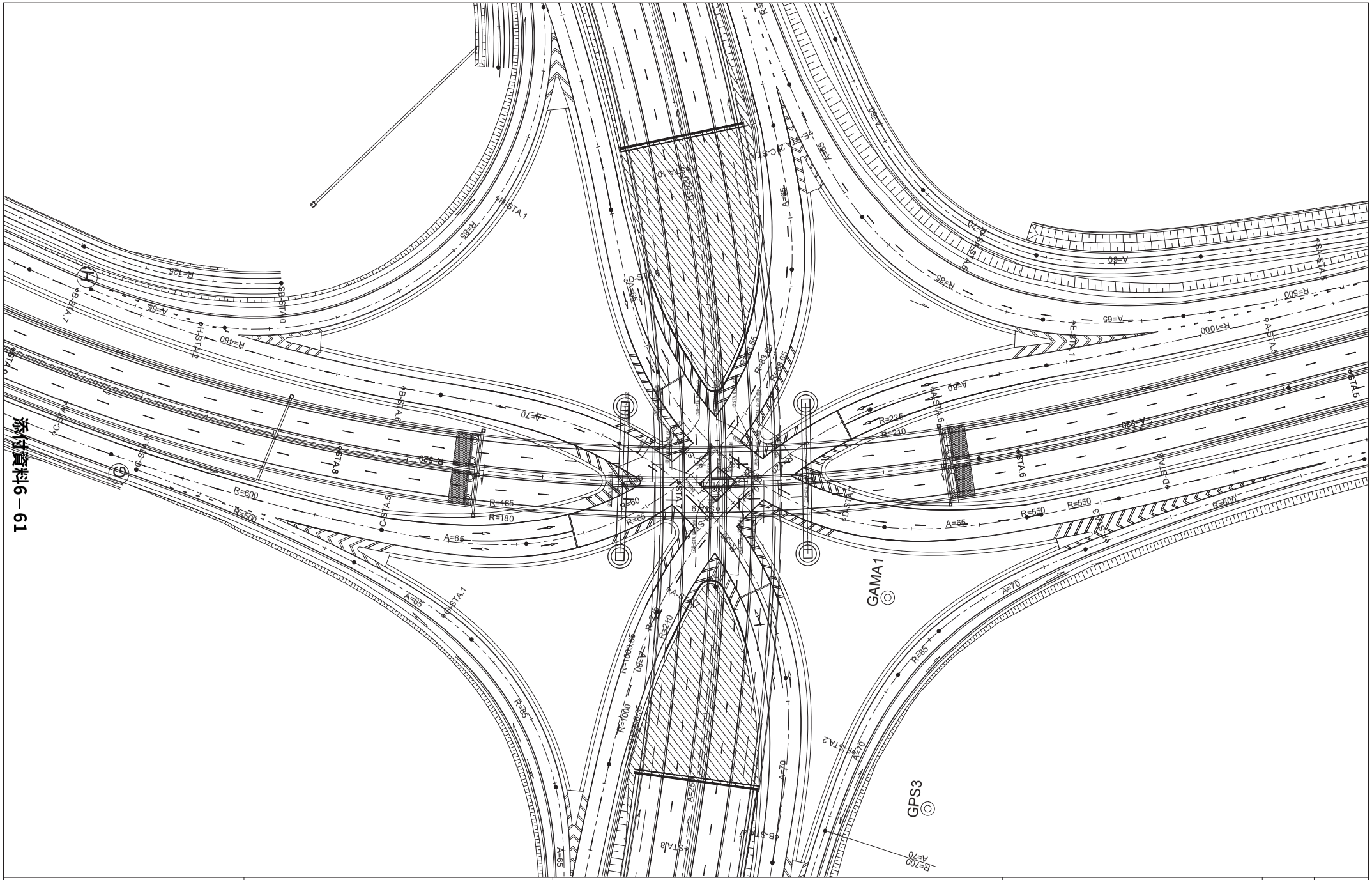
PAVEMENT COMPOSITION	SECTION		LENGTH COURSE	T1 SURFACE COURSE	T2 BINDER COURSE	T3 BASE COURSE	T4 SUB BASE COURSE
	FROM	TO					
HARBOUR ROAD	-1 + 30.0	6 + 14.0	744m	50	100	200	200
	6 + 14.0	6 + 19.0	5m	80	-	-	-
BRIDGE	6 + 19.5	7 + 61.5	142m	80	-	-	-
AKOSOMBO ROAD	7 + 62.0	7 + 67.0	5m	80	-	-	-
	7 + 67.0	16 + 80.0	913m	50	80	150	200

RAMP ROAD PAVEMENT COMPOSITION S=1:10



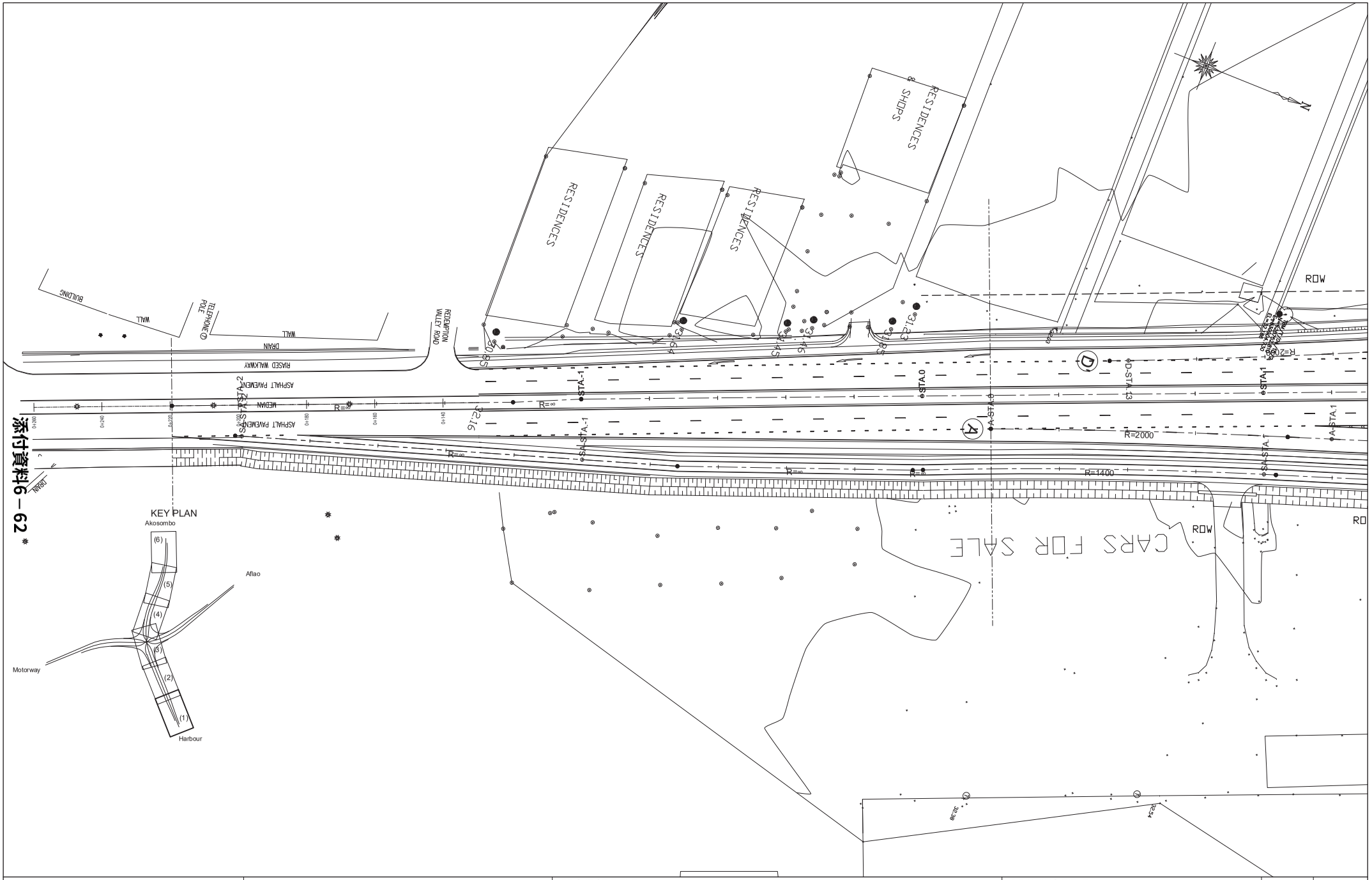
PAVEMENT COMPOSITION	SECTION	AREA COURSE 2	T1 SURFACE COURSE
INTERSECTION	A B C D-Ramp	8073m2	30

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PAVEMENT STRUCTURE	SCALE:(A1size) 1:10 / DRAWING NO. PS-01



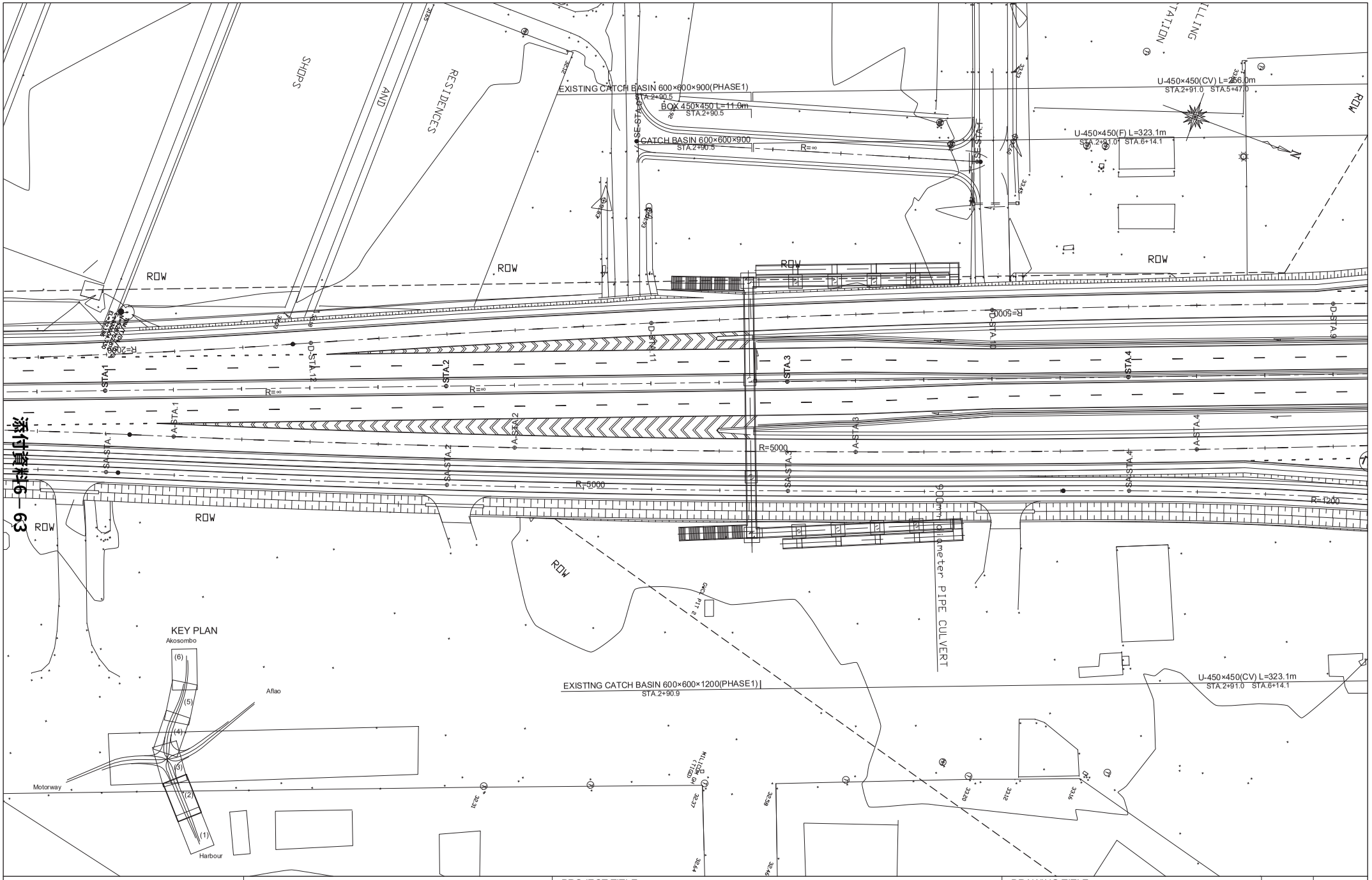
添付資料6－61

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: INTERSECTION PLAN	SCALE:(A1size) 1:500	DRAWING NO. IP-01



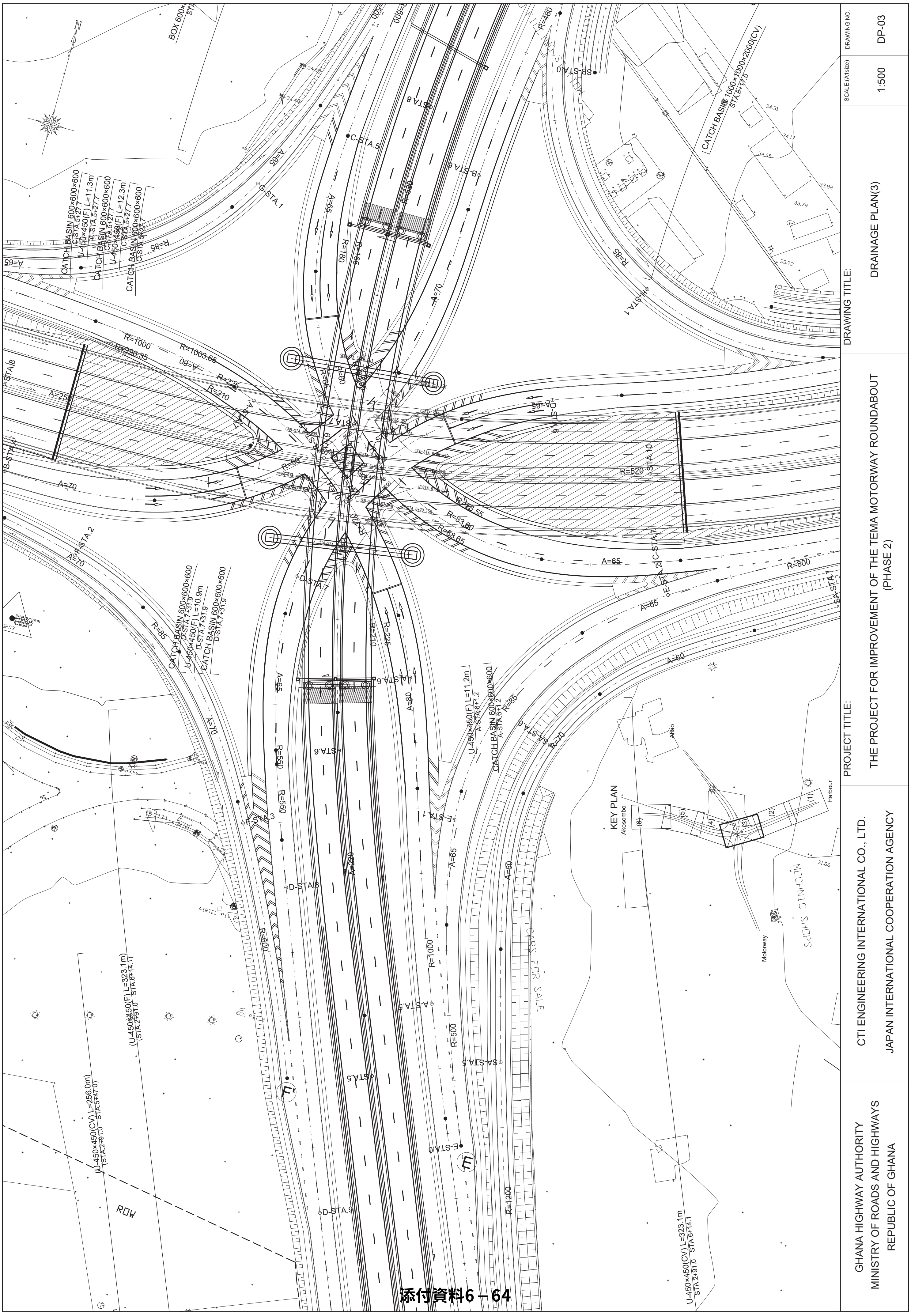
添付資料6－62

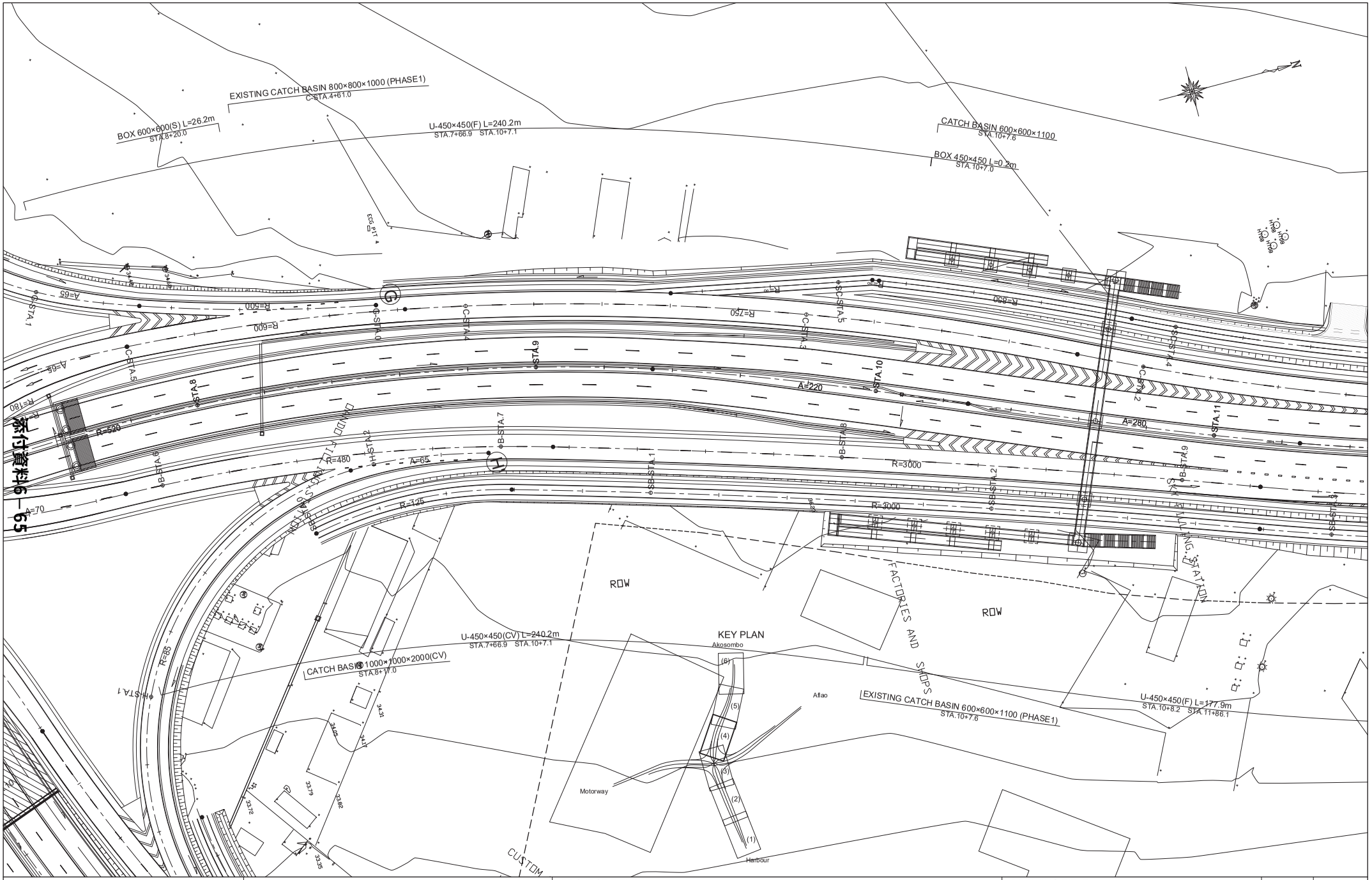
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DRAINAGE PLAN(1)	SCALE:(A1size) 1:500	DRAWING NO. DP-01



添付資料6－63

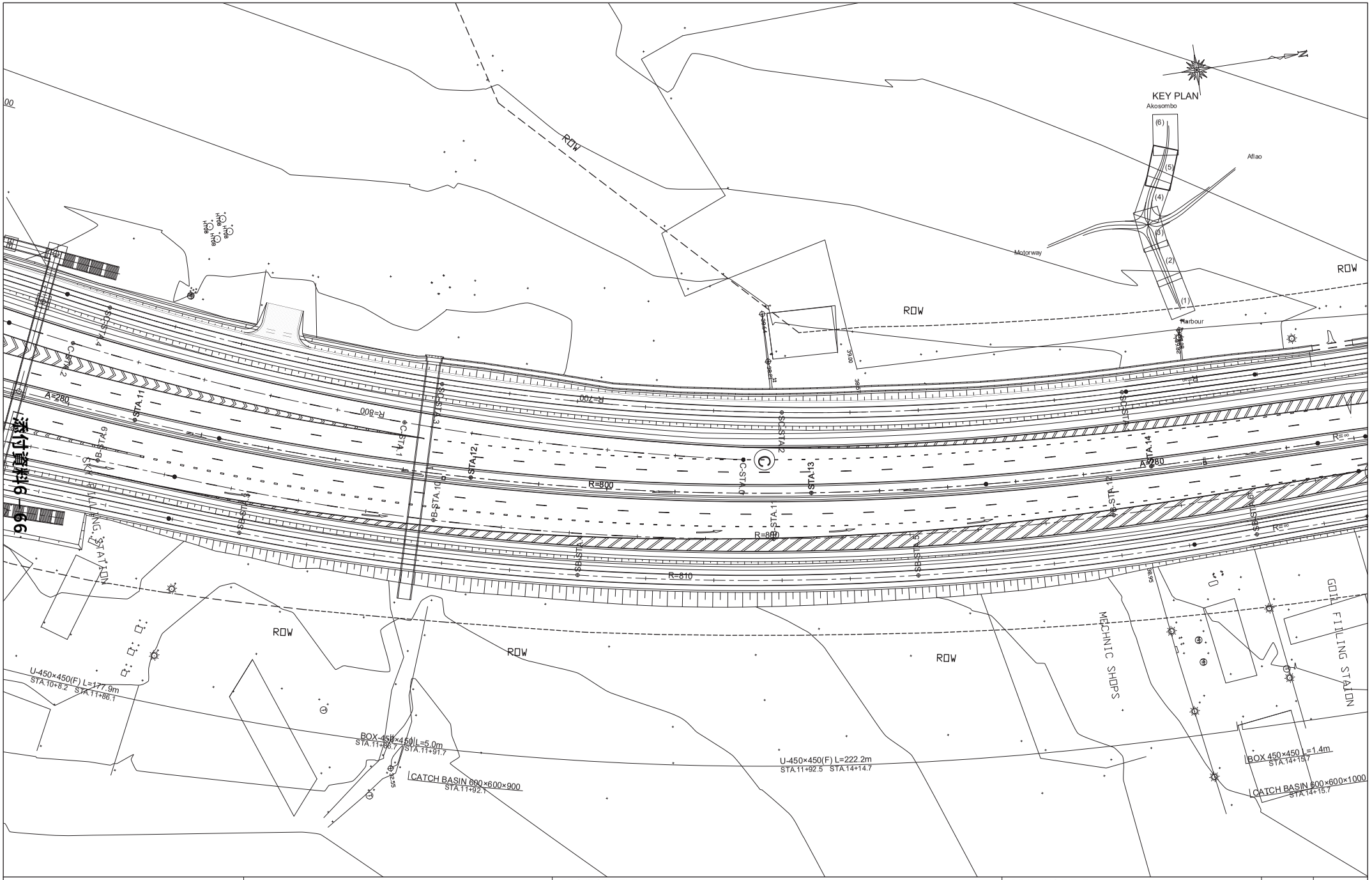
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DRAINAGE PLAN(2)	SCALE:(A1size) 1:500	DRAWING NO. DP-02


DRAWING NO.
DP-03
SCALE (A1size)
1:500
DRAWING TITLE:
DRAINAGE PLAN(3)
PROJECT TITLE:
THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT
(PHASE 2)
CTI ENGINEERING INTERNATIONAL CO., LTD.
JAPAN INTERNATIONAL COOPERATION AGENCY
GHANA HIGHWAY AUTHORITY
MINISTRY OF ROADS AND HIGHWAYS
REPUBLIC OF GHANA
KEY PLAN
Akosombo
Harbour
Motorway
CATCH BASIN 1000×1000×2000(CV)
STA.8+17.0
CATCH BASIN 600×600×600
C-STA.5+27.7
U-450×450(F) L=11.3m
CATCH BASIN 600×600×600
U-450×450(F) L=12.3m
CATCH BASIN 600×600×600
D-STA.7+31.9
U-450×450(F) L=10.9m
U-450×450(F) L=11.2m
A-STA.6+1.2
CATCH BASIN 600×600×600
U-450×450(F) L=323.1m
STA.2+91.0 STA.6+14.1
U-450×450(CV) L=256.0m
STA.2+91.0 STA.5+47.0
U-450×450(CV) L=323.1m
STA.2+91.0 STA.6+14.1
ROW
MECHNIC SHOPS
CARS FOR SALE
AIRTEL PIT
ECG PIT

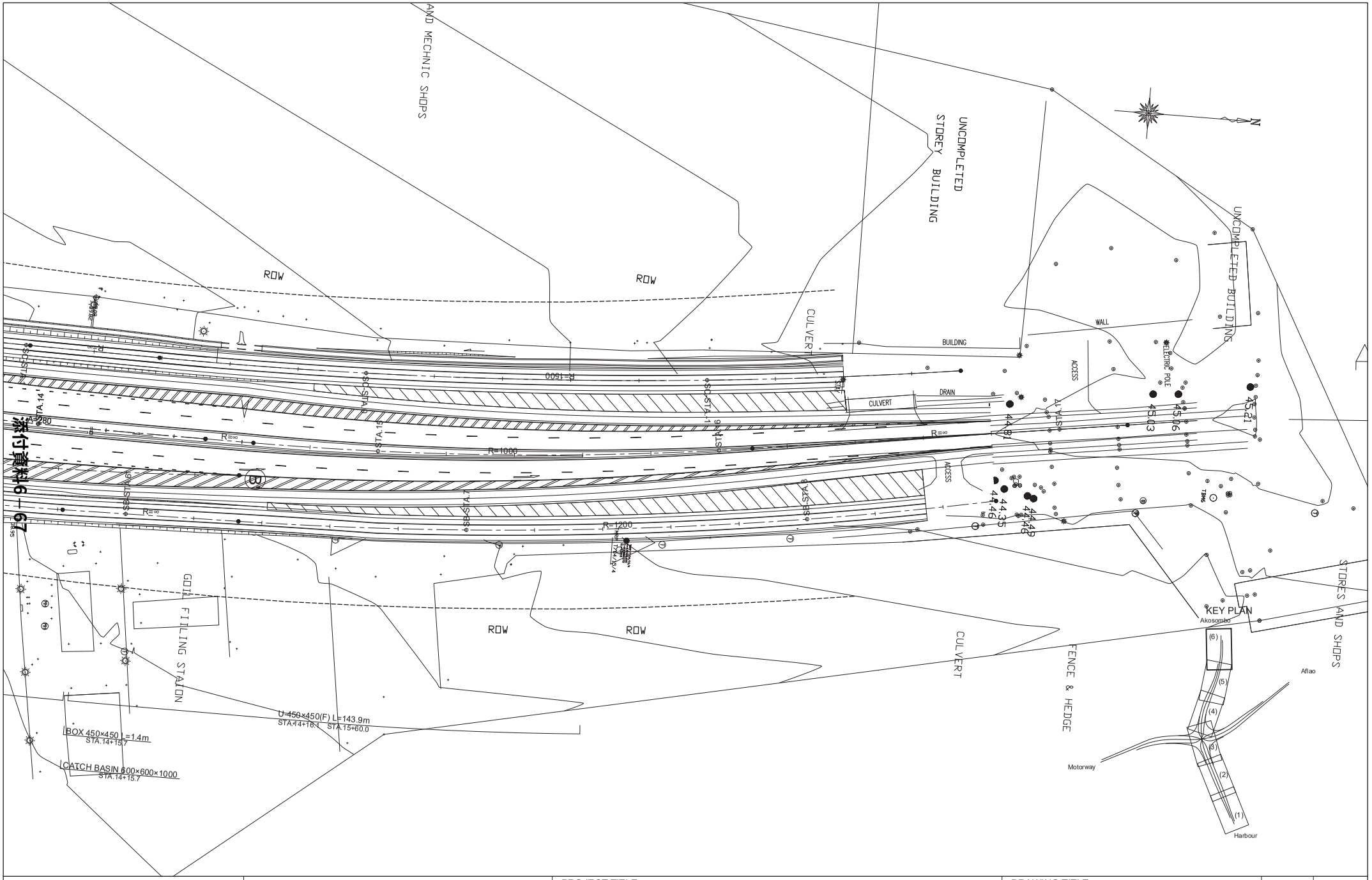


添付資料6－65

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DRAINAGE PLAN(4)	SCALE:(A1size) 1:500	DRAWING NO. DP-04

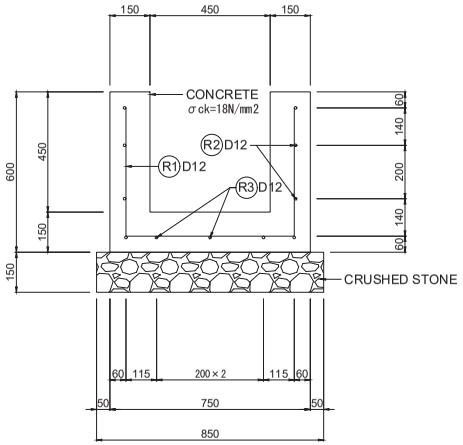


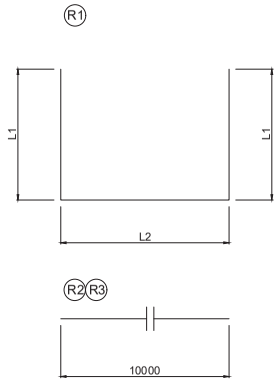
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DRAINAGE PLAN(5)	SCALE:(A1size) 1:500	DRAWING NO. DP-05



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DRAINAGE PLAN(6)	SCALE:(A1size) 1:500	DRAWING NO. DP-06

DETAIL OF DRAINAGE(1)
SIDE DITCH

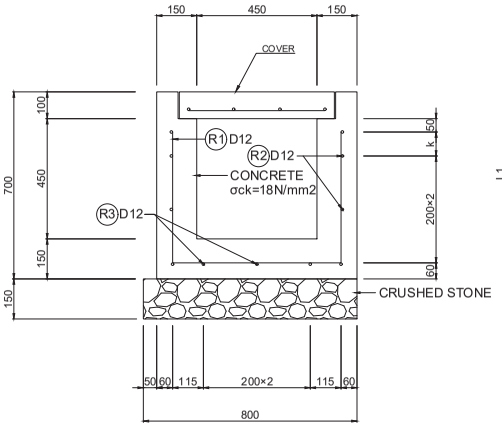


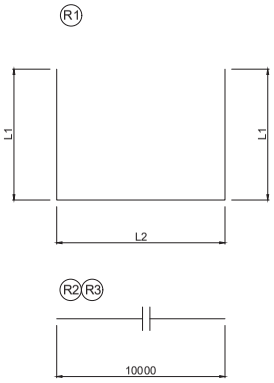


U-DITCH S=1:10
U-450×450(F)

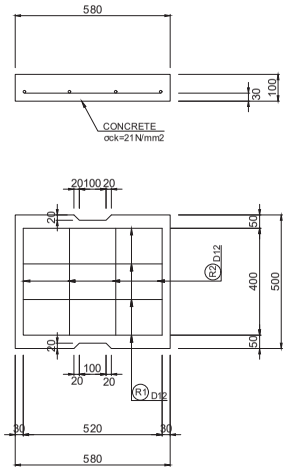
LIST OF REINFORCEMENT mm PER 10.0m

Type	L1	L2	R1	R2	R3	REMARKS
U-450×450 (F)	480	630	50-D12×1590	6-D12×10000	5-D12×10000	R1 ctc.200





U-DITCH S=1:10
U-450×450(CV)



COVER

LIST OF REINFORCEMENT mm PER 10.0m

Type	k	L1	L2	R1	R2	R3	REMARKS
U-450×450(CV)	90	490	630	50-D12×1610	6-D12×10000	5-D12×10000	R1 ctc.200

LIST OF REINFORCEMENT mm PER ONE

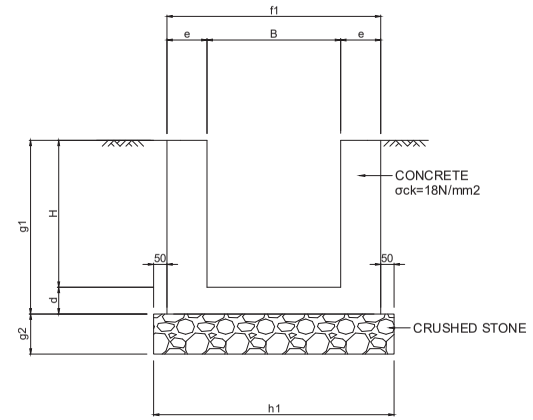
Type	R1	R2	REMARKS
COVER-580×500	(4-D12×520)	(4-D12×400)	

NOTE :
U-B×H(F) indicates U-Ditch with foundation(crushed stone).

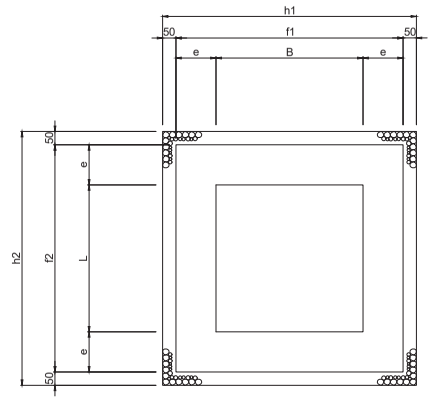
添付資料6－68

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF DRAINAGE(1) SIDE DITCH	SCALE:(A1size) 1:10	DRAWING NO. DR-01

DETAIL OF DRAINAGE(2)
CATCH BASIN



SECTION



PLAN

CATCH BASIN B×L×H S=1:10

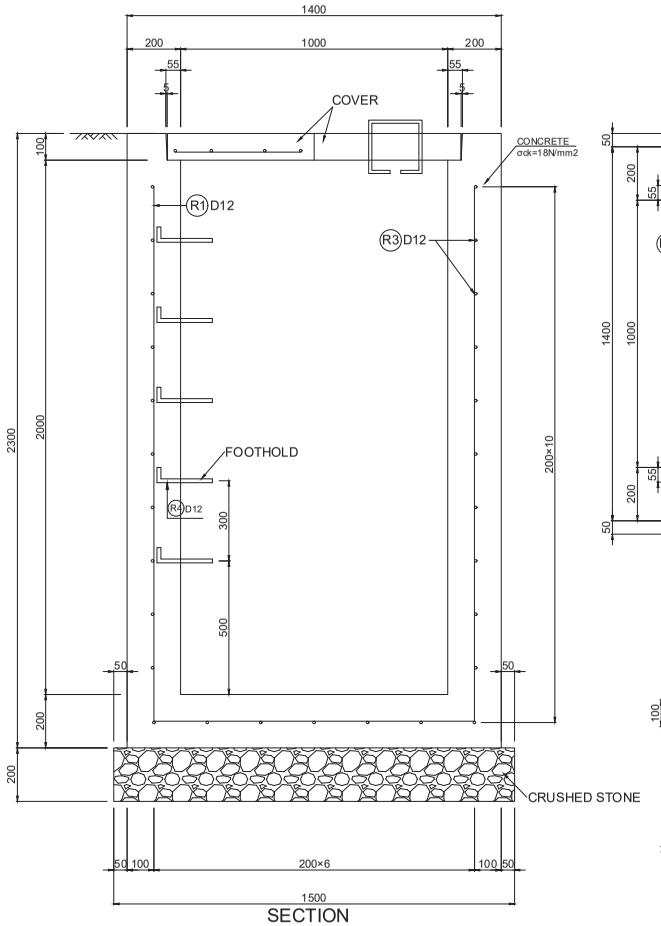
DIMENSION TABLE mm

Type	B	L	H	d	e	f1	f2	g1	g2	h1	h2	REMARKS
600 600 600	600	600	600	150	150	900	900	750	150	1000	1000	
600 600 900	600	600	900	150	150	900	900	1050	150	1000	1000	
600 600 1000	600	600	1000	150	150	900	900	1150	150	1000	1000	
600 600 1100	600	600	1100	200	200	1000	1000	1300	200	1100	1100	

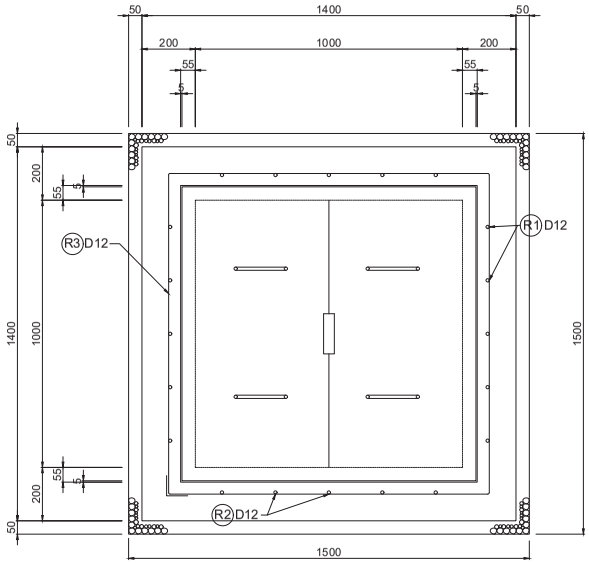
添付資料6－69

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF DRAINAGE(2) CATCH BASIN	SCALE:(A1size) 1:10	DRAWING NO. DR-02

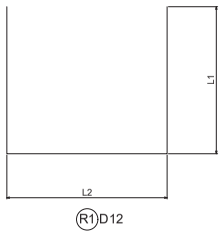
DETAIL OF DRAINAGE(3)
CATCH BASIN(CV)

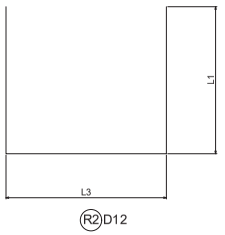


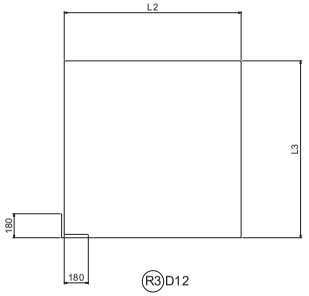
SECTION

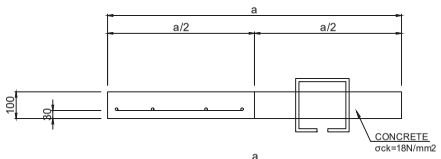


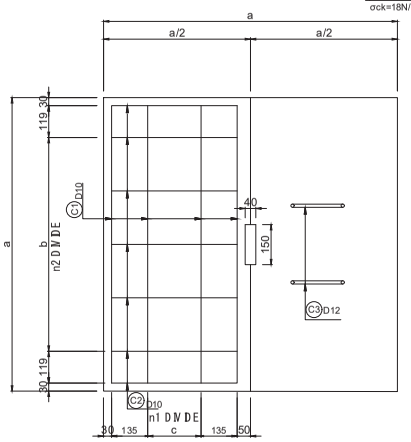
PLAN



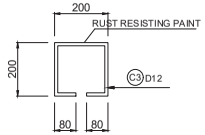








COVER



HANGING DETAIL

CATCH BASIN 1000×1000×2000(CV) S=1:10

LIST OF REINFORCEMENT mm PER ONE

Type	L1	L2	L3	R1	R2	R3	REMARKS
CATCHBASIN 1000×1000×2000(CV)	2000	1200	1200	5-D12×5200	5-D12×5200	10-D12×5160	ctc.200

LIST OF REINFORCEMENT mm PER ONE

Type	R4	REMARKS
CATCHBASIN 1000×1000×2000(CV)	5-D12×250	

LIST OF REINFORCEMENT mm PER ONE

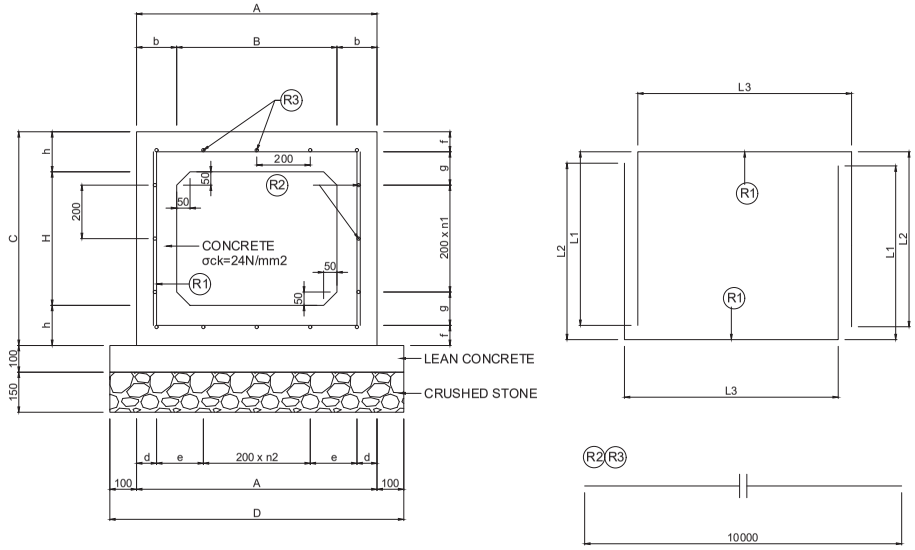
Type	C1	C2	C3	n1	n2	REMARKS
COVER-1100×1100	4-D10×1040	7-D10×470	2-D12×760	1	4	

DIMENSION TABLE mm

Type	a	b	c	REMARKS
COVER-1100×1100	1100	800	470	

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF DRAINAGE(3) CATCH BASIN(CV)	SCALE:(A1size) 1:10	DRAWING NO. DR-03

DETAIL OF DRAINAGE(4)
CROSS DRAINAGE



BOX CULVERT-B×H S=1:10

DIMENSION TABLE mm

Type	B	H	b	h	A	C	D	d	e	f	g	REMARKS
BOX 450×450	450	450	150	150	750	750	950	75	200	75	200	
BOX 600×600(S)	600	600	200	200	1000	1000	1200	100	200	100	200	

LIST OF REINFORCEMENT mm PER 10.0m

Type	n1	n2	L1	L2	L3	(R1)	(R2)	(R3)	REMARKS
BOX 450×450	1	1	600	600	600	50-D12×1800×2	4-D12×10000	8-D12×10000	(R1) ctc.200
BOX 600×600(S)	2	2	800	800	800	50-D16×2400×2	6-D16×10000	10-D16×10000	ctc.200

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF DRAINAGE(4) CROSS DRAINAGE	SCALE:(A1size) 1:10	DRAWING NO. DR-04

DETAIL OF DRAINAGE(5)
SCHEDULE OF DRAINAGE

U-450×450(F)					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	2 + 91.0	6 + 14.1	LEFT	323.1	
2	7 + 66.9	10 + 7.1	LEFT	240.2	
3	10 + 8.2	11 + 86.1	RIGHT	177.9	
4	11 + 92.5	14 + 14.7	RIGHT	222.2	
5	14 + 16.1	15 + 60.0	RIGHT	143.9	
A-RAMP					
1	6 + 1.2		LEFT	11.2	
C-RAMP					
1	5 + 27.7		LEFT	12.3	
2	5 + 27.7		LEFT	11.3	
D-RAMP					
1	7 + 31.9		LEFT	10.9	
			TOTAL	1153.0	

U-450×450(CV)					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	2 + 91.0	6 + 14.1	RIGHT	323.1	
2	2 + 91.0	5 + 47.0	LEFT	256.0	
3	7 + 66.9	10 + 7.1	RIGHT	240.2	
			TOTAL	819.3	

BOX 450×450					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	2 + 90.5		LEFT	11.0	
2	10 + 7.0		LEFT	0.2	
3	11 + 86.7	11 + 91.7	RIGHT	5.0	
4	14 + 15.7		RIGHT	1.4	
			TOTAL	17.6	

BOX 600×600(S)					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	8 + 20.0		LEFT	26.2	
			TOTAL	26.2	

CATCH BASIN 600×600×600								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
A-RAMP								
1	6 + 1.2	LEFT	1			U-450×450(F)		
						36.225		36.075
C-RAMP								
1	5 + 27.7	LEFT	1	U-450×450(F)				
				36.347				36.197
2	5 + 27.7	LEFT	1	U-450×450(F)		U-450×450(F)		
				36.028		36.028		35.878
3	5 + 27.7	LEFT	1		U-450×450(F) Phase1 Completed	U-450×450(F)	U-450×450(F) Phase1 Completed	
					35.921	35.921	35.921	35.771
D-RAMP								
1	7 + 31.9	LEFT	1	U-450×450(F)		U-450×450(F)		
				36.192		36.192		36.042
2	7 + 31.9	LEFT	1		U-450×450(F) Phase1 Completed	U-450×450(F)		
					36.161	36.161		36.011

CATCH BASIN 600×600×900								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
Harbour-Akosombo Road								
1	2 + 90.5	LEFT	1			BOX 450×450	U-450×450(F)	
						33.311	33.561	33.111
2	11 + 92.1	RIGHT	1		U-450×450(F)		BOX 450×450	
					37.783		37.583	37.433

CATCH BASIN 600×600×1000								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
Harbour-Akosombo Road								
1	14 + 15.7 Phase1 Completed	-	1	BOX 450×450 Phase1 Completed	U-450×450(F)	BOX 450×450 Phase1 Completed		
				39.115	39.454	39.115		38.904

CATCH BASIN 600×600×1100								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
Harbour-Akosombo Road								
1	10 + 7.6 Phase1 Completed	-	1		U-450×450(F)	BOX 450×450 Phase1 Completed	U-450×450(F)	
					37.005	36.521	37.005	36.335

CATCH BASIN 1000×1000×2000(CV)								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
Harbour-Akosombo Road								
1	8 + 17.0	LEFT	1	BOX 600×600		BOX 600×600 Phase1 Completed		
				34.907		34.907		34.697

EXISTING CATCH BASIN 600×600×900(PHASE1)								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
Harbour-Akosombo Road								
1	2 + 90.5 Phase1 Completed	LEFT	1	BOX 450×450		BOX 450×450 Phase1 Completed	U-450×450(CV)	
				32.826		32.826	33.013	32.663

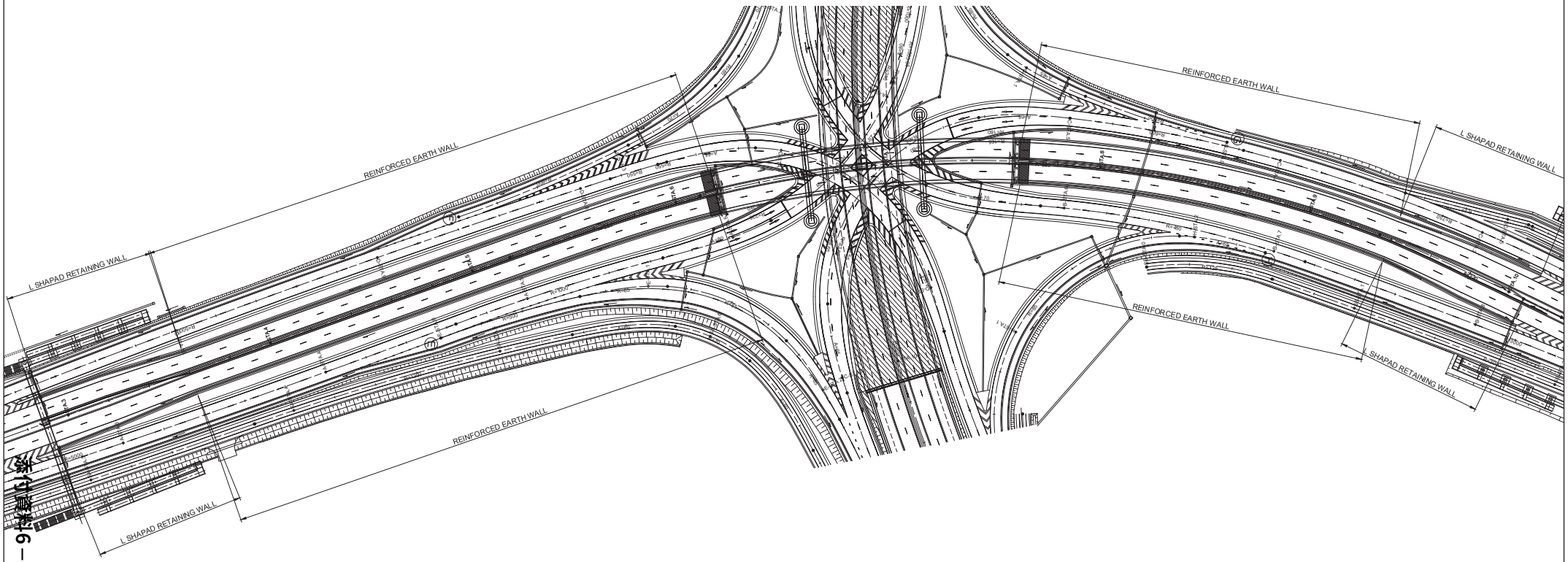
EXISTING CATCH BASIN 600×600×1100(PHASE1)								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
Harbour-Akosombo Road								
1	10 + 7.6 Phase1 Completed	RIGHT	1	BOX 450×450 Phase1 Completed		BOX 450×450 Phase1 Completed	U-450×450(F)	
				36.466		36.466	36.785	36.305

EXISTING CATCH BASIN 600×600×1200(PHASE1)								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
Harbour-Akosombo Road								
1	2 + 90.9 Phase1 Completed	RIGHT	1		U-450×450(F)	BOX 450×450 Phase1 Completed		
					33.013	32.553		32.363

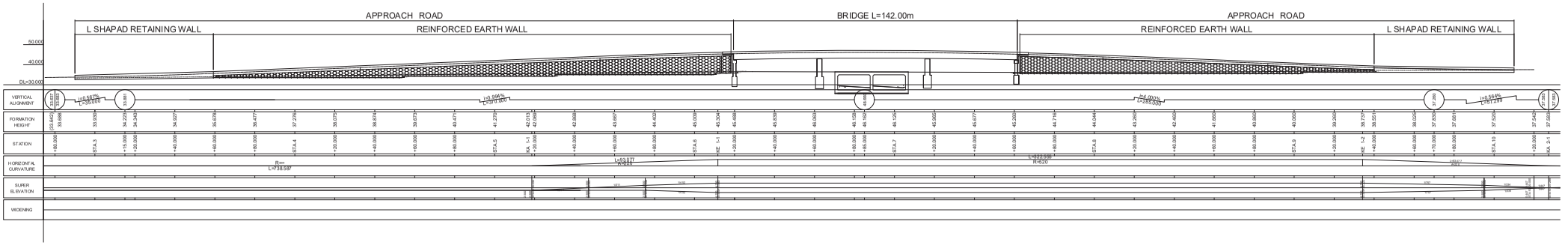
EXISTING CATCH BASIN 800×800×1000(PHASE1)								
NO.	STATION	SIDE	NUMBER	① DRAINAGE CONNECTION / DRAINAGE HEIGHT	② DRAINAGE CONNECTION / DRAINAGE HEIGHT	③ DRAINAGE CONNECTION / DRAINAGE HEIGHT	④ DRAINAGE CONNECTION / DRAINAGE HEIGHT	⑤ / BOTTOM HEIGHT
C-Ramp								
1	4 + 61.0 Phase1 Completed	LEFT	1	BOX 450×450 Phase1 Completed	U-450×450(F) Phase1 Completed	BOX 600×600	U-450×450(F) Phase1 Completed	
				35.164	35.394	34.994	35.394	34.844

添付資料6－72

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF DRAINAGE(5) SCHEDULE OF DRAINAGE	SCALE:(A1size) NONE	DRAWING NO. DR-05

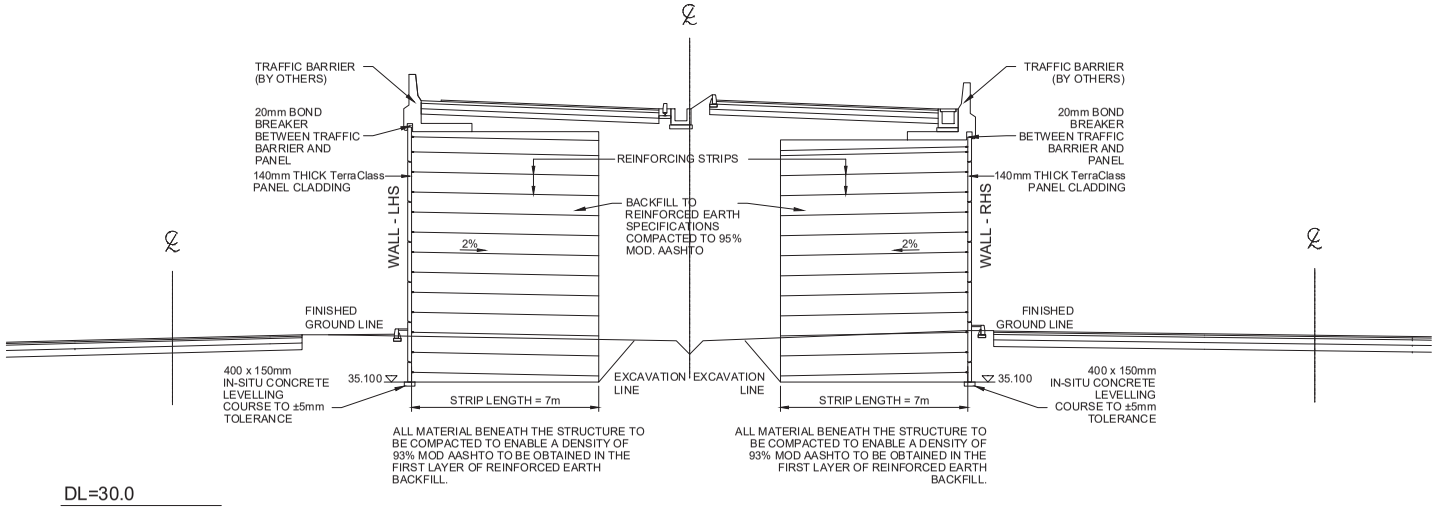


PLAN 1 : 200

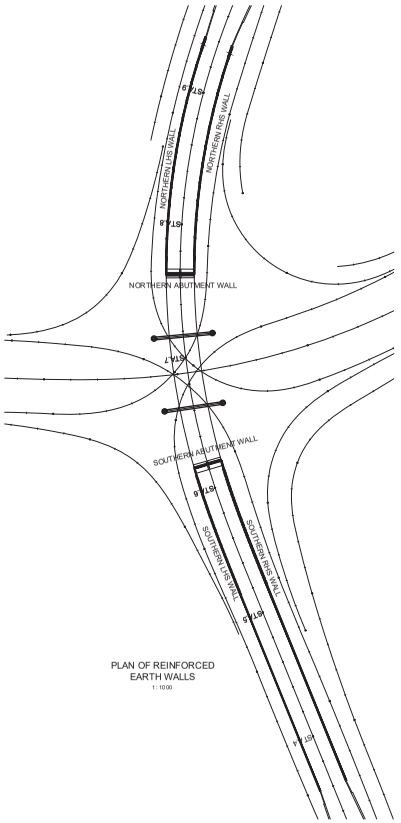


PROFILE 1 : 200

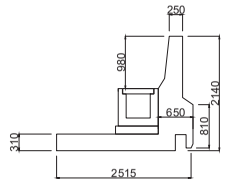
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (1)	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-01



TYPICAL SECTION 1 : 200

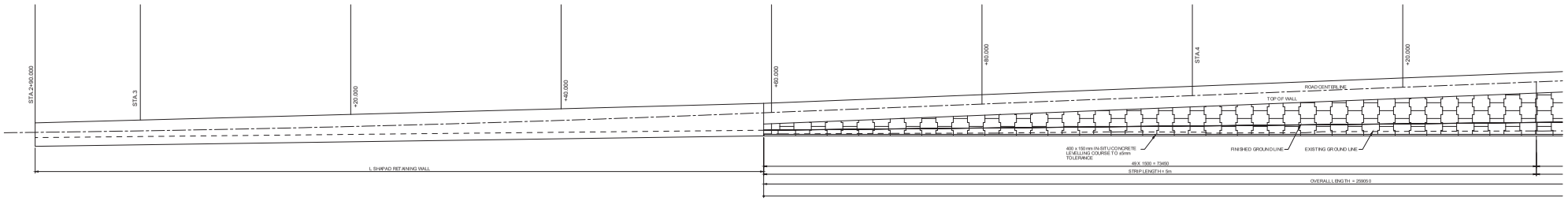


PLAN OF REINFORCED EARTH WALLS
1 : 1000



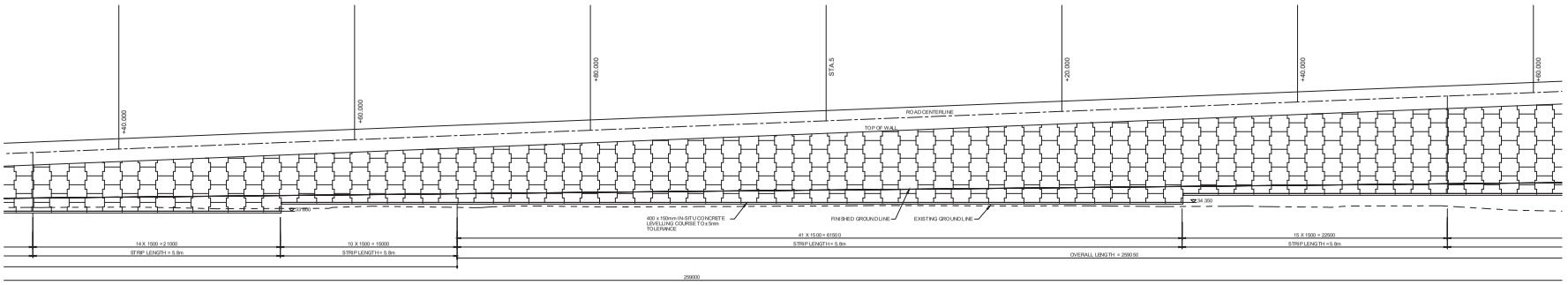
TRAFFIC BARRIER DETAIL 1 50

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (2)	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-02



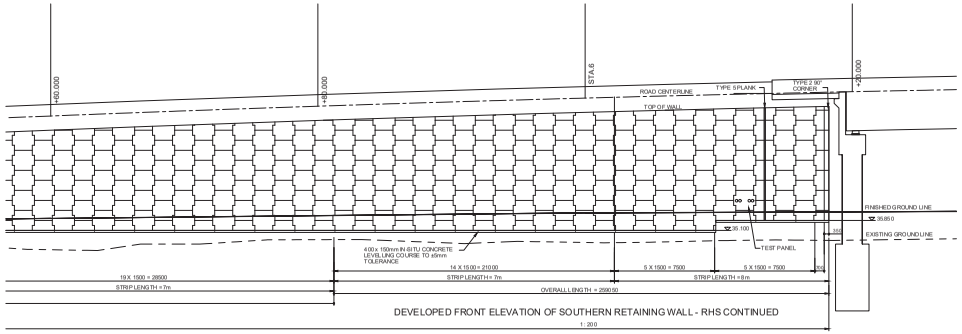
DEVELOPED FRONT ELEVATION OF SOUTHERN RETAINING WALL - RHS

1 : 200



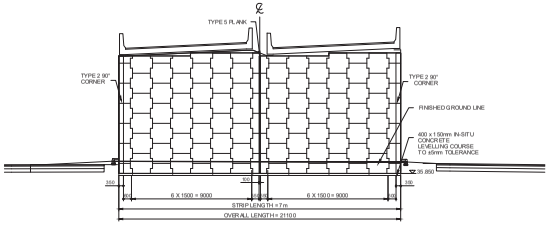
DEVELOPED FRONT ELEVATION OF SOUTHERN RETAINING WALL - RHS CONTINUED

1 : 200



DEVELOPED FRONT ELEVATION OF SOUTHERN RETAINING WALL - RHS CONTINUED

1: 200.0

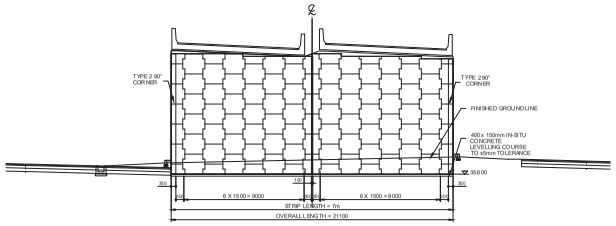


DEVELOPED FRONT ELEVATION OF SOUTHERN ABUTMENT WALL

1: 200

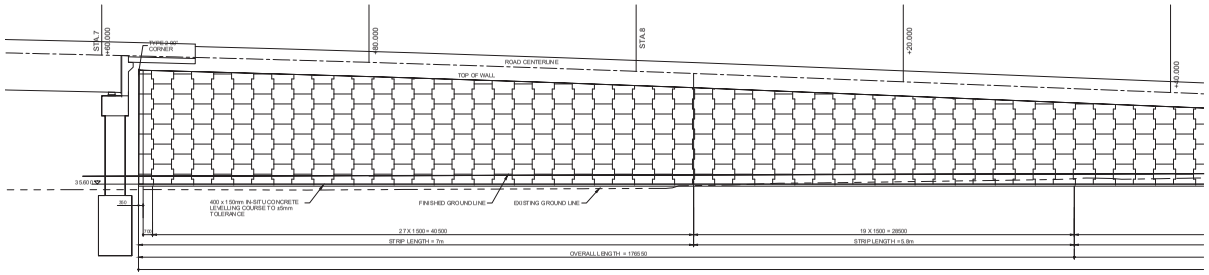
DL=30.0

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (3)	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-03



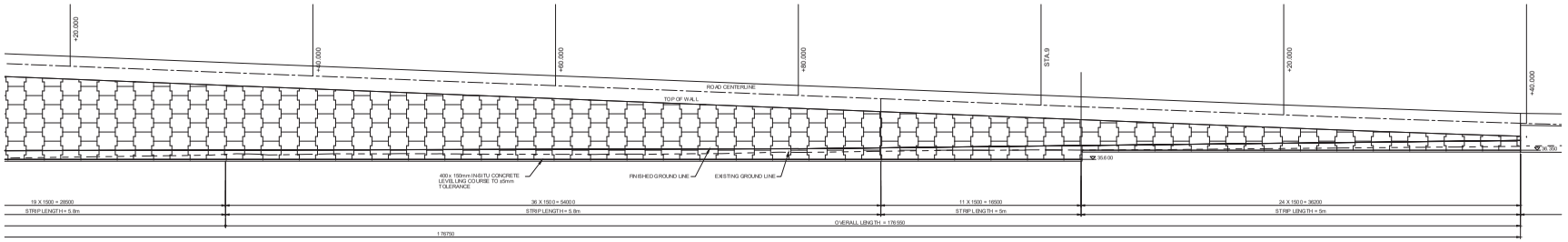
DEVELOPED FRONT ELEVATION OF NORTHERN ABUTMENT WALL

1 : 200



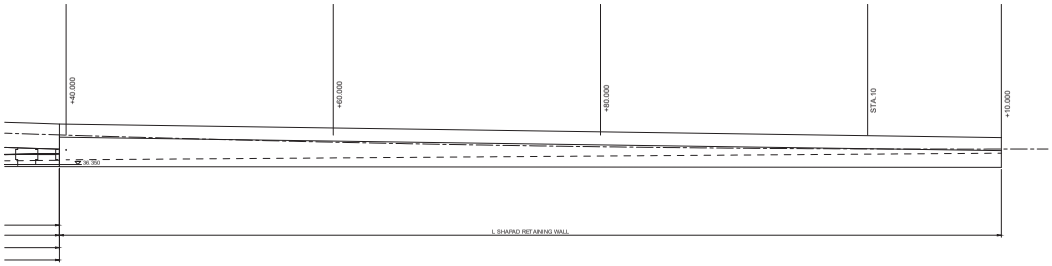
DEVELOPED FRONT ELEVATION OF NORTHERN RETAINING WALL - RHS

1 : 200

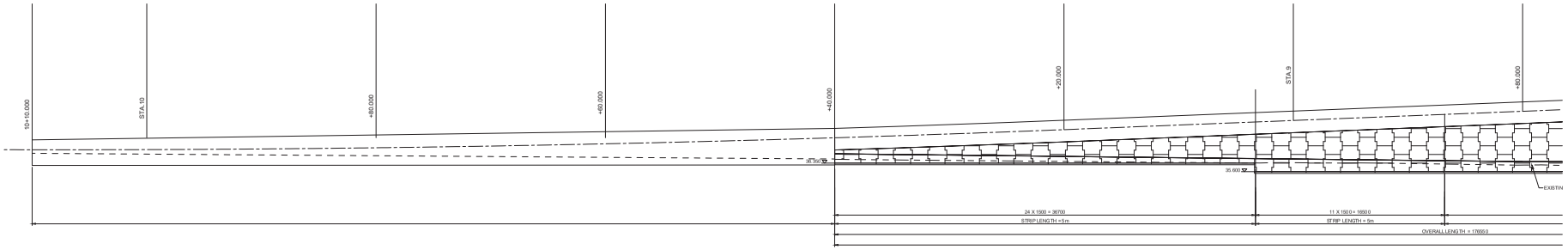


DEVELOPED FRONT ELEVATION OF NORTHERN RETAINING WALL - RHS CONTINUED

1 : 200

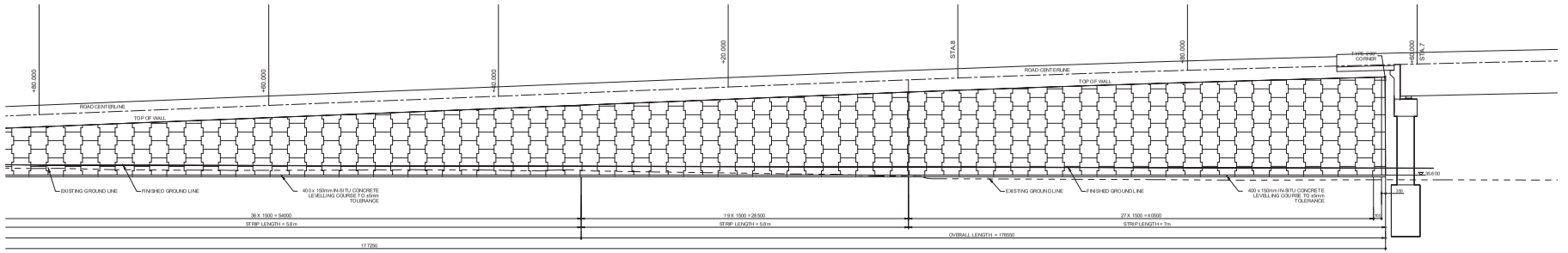


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (4)	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-04



DEVELOPED FRONT ELEVATION OF NORTHERN RETAINING WALL - RHS CONTINUED

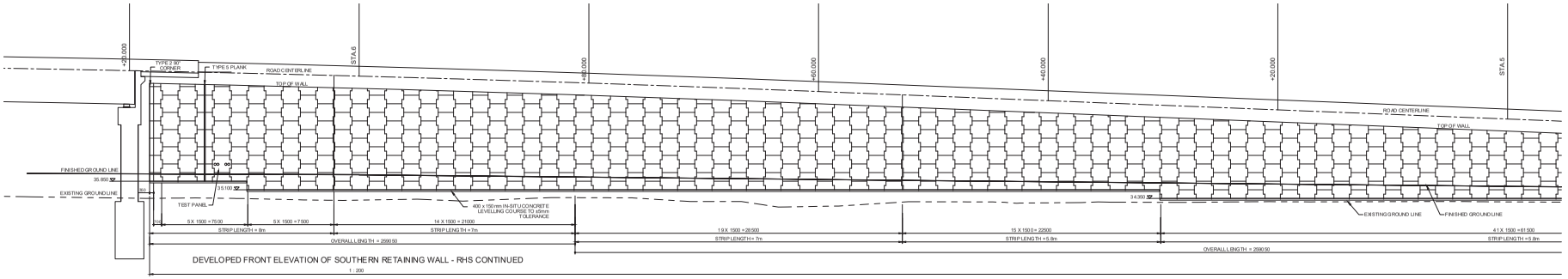
1: 200



DEVELOPED FRONT ELEVATION OF NORTHERN RETAINING WALL - RHS

1: 200

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (5)	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-05

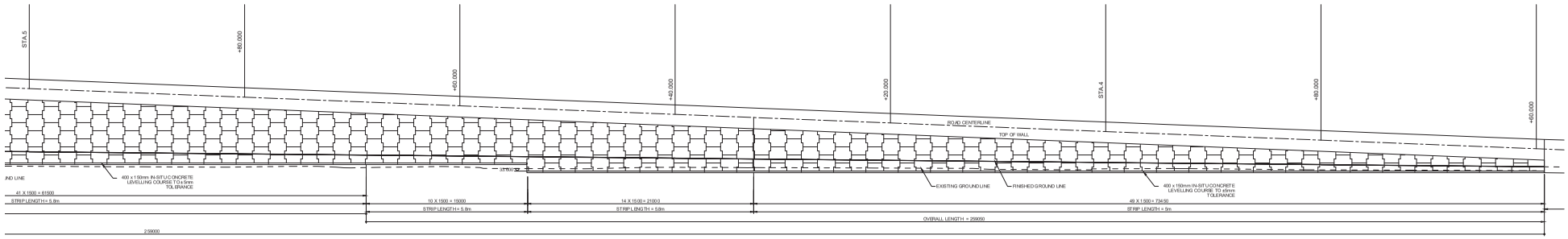


DEVELOPED FRONT ELEVATION OF SOUTHERN RETAINING WALL - RHS CONTINUED

1 : 200

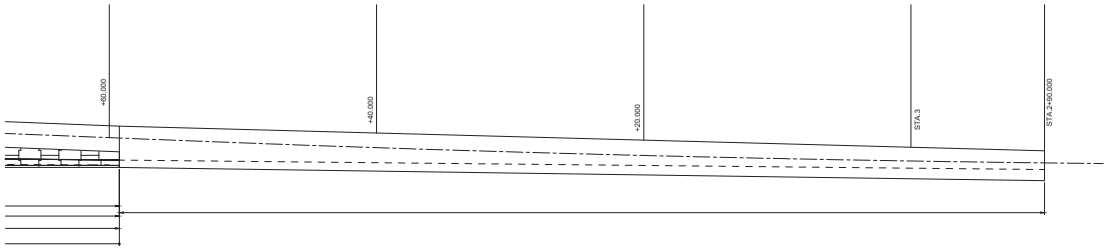
DEVELOPED FRONT ELEVATION OF SOUTHERN RETAINING WALL - RHS CONTINUED

1 : 200

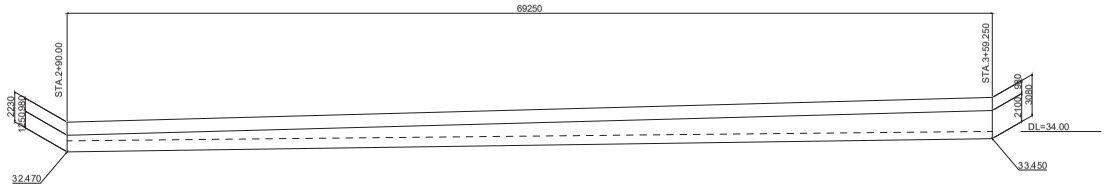


DEVELOPED FRONT ELEVATION OF SOUTHERN RETAINING WALL - RHS

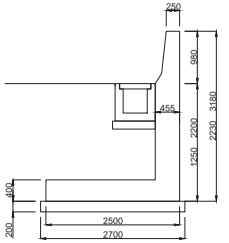
1 : 200



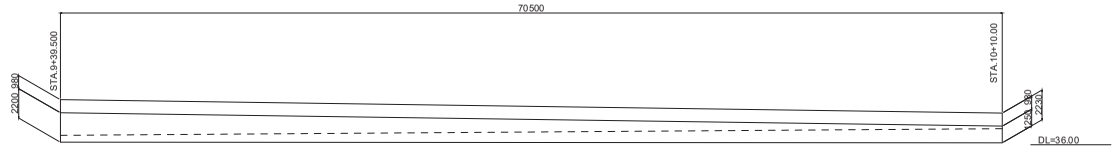
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (6)	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-06



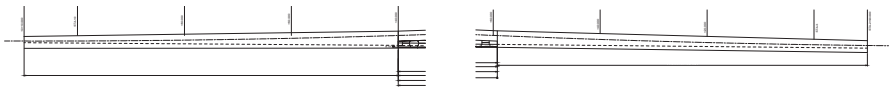
PROFILE S=1 100



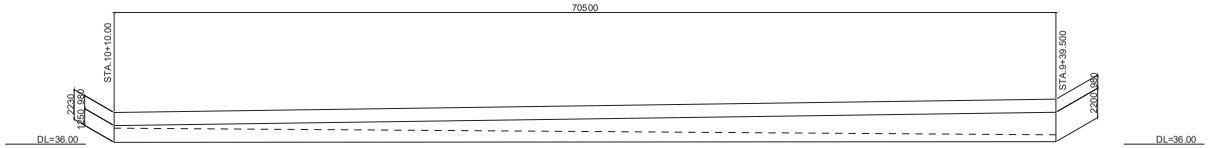
L SHAPAD RETAINING WALL
S=1 50



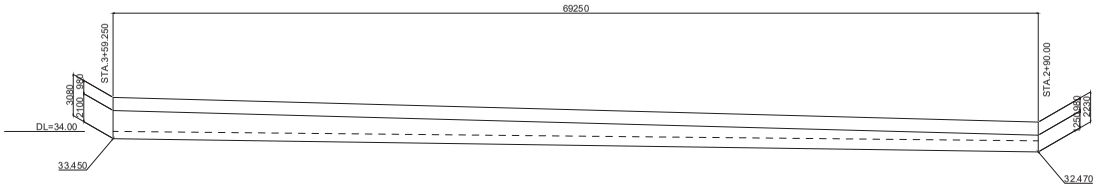
PROFILE S=1 100



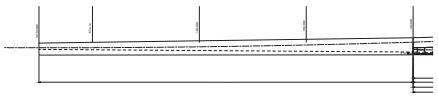
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (7) L SHAPAD RETAINING WALL RIGHT	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-07

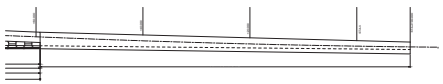


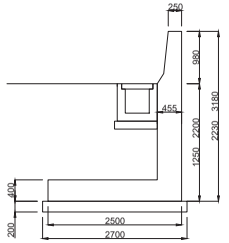
PROFILE S=1 100



PROFILE S=1 100

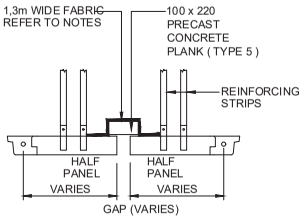






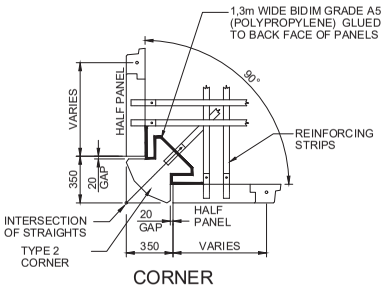
L SHAPAD RETAINING WALL
S=1 50

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (8) L SHAPAD RETAINING WALL LEFT	SCALE:(A1size) AS SHOWN	DRAWING NO. RE-08



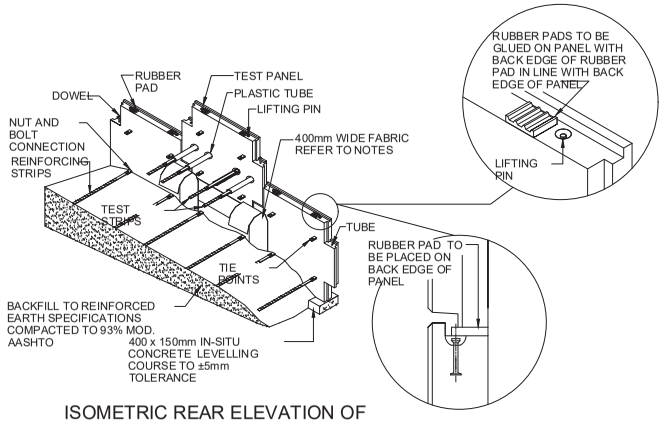
PLANK TYPE
5 SLIP JOINT

1:40



CORNER
TYPE 2

1:40



ISOMETRIC REAR ELEVATION OF PANELS

DESIGN NOTES (CONCRETE FACING)

1. STABILITY

1,1 DESIGNED IN ACCORDANCE WITH RECOMMENDATIONS OF "TERRE ARMEE" INTERNATIONAL (STANDARD SECURITY)

1,2 LOAD FACTORS.
- 1,2.1 DEAD LOADS 1,35
- 1,2.2 LIVE LOADS 1,60

1,3 FACTORS OF SAFETY

1,3,1 INTERNAL STABILITY
- 1,3,1 a) SLIPPAGE OF STRIPS 1,35
- 1,3,1 b) REINFORCING STRIP RESISTANCE 1,5

1,3,2 EXTERNAL STABILITY
- 1,3,2 a) OVERTURNING 1,5
- 1,3,2 b) SLIDING ON THE BASE 1,80 (WORKING STRESS)

1,3,3 REINFORCED EARTH TAKES RESPONSIBILITY FOR INTERNAL STABILITY AND DESIGN OF REINFORCED EARTH STRUCTURE ONLY. GLOBAL STABILITY OF THE STRUCTURES REMAIN THE CONSULTANT'S RESPONSIBILITY.

1,4 DESIGNED FOR A SERVICE LIFE OF 70 YEARS.

1,5 f'o = 1.50 (COEFFICIENT OF FRICTION AT SURFACE)

1,6 DESIGNED FOR 12 kN/m² APPLIED AT TOP OF WALL (RETAINING WALLS).

2. BACKFILL.

2,1 REINFORCED EARTH BACKFILL TO COMPLY TO TAI SPECIFICATIONS IN RESPECT OF MECHANICAL,CHEMICAL AND ELECTRO CHEMICAL PROPERTIES.

2,2 ALL REINFORCED EARTH BACKFILL MATERIAL TO BE TESTED FOR CHEMICAL AND MECHANICAL COMPLIANCE TO SPECIFICATIONS EVERY 500m³ MAX.

2,3 REINFORCED EARTH BACKFILL DESIGN SPECIFICATIONS.
DENSITY : MIN. 18 kN/m³ MAX. 20 kN/m³
COHESION = 0 kPa Ø = 30° (MINIMUM ANGLE OF INT FRICTION).

2,4 FILL ABOVE AND BEHIND THE REINFORCED EARTH MASS.
DENSITY : MIN 18 kN/m³ MAX. 20 kN/m³
COHESION = 0 kPa Ø = 30° (MINIMUM ANGLE OF INT FRICTION).

2,5 FOUNDATION DESIGN SPECIFICATIONS.
COHESION = 0 kPa Ø = 35° (MINIMUM ANGLE OF INT FRICTION).

2,6 GENERAL FILL.

2,6,1 TOE OF SPILL AROUND TO BE SET OUT BEFORE CONSTRUCTION.

2,6,2 SPILL AROUND TO BE COMPACTED LAYERS AS FOR COMMON FILL.

2,6,3 ADEQUATE EROSION PROTECTION AND SURFACE DRAINAGE MEASURES ARE REQUIRED, (AS DETERMINED BY THE ENGINEER)

3. EXCAVATION.

3,1 EXCAVATION FOR REINFORCED EARTH WALL IS TO BE TO THE SAME LEVEL AS TOP OF FOOTING AND EXTEND TO THE SAME LENGTH AS STRIPS.

4. REINFORCING STRIPS.

4,1 MEDIUM TENSILE TO S355JO - SANS 50025 : 2009 / EN 10025 : 2004
50 x 4mm HA (HIGH ADHERENCE)

4,2 GALVANISING TO SANS 121 : 2011/ ISO 1461: 2009 (MIN 85µM)

5. CONCRETE.

5,1 400 x 150mm DEEP 15MPa INSITU CONCRETE LEVELLING COURSE TO ±5mm TOLERANCE.

5,2 CONCRETE PANELS TO BE MANUFACTURED WITH CONCRETE CLASS 30/19.

6. JOINTS.

6,1 GEOTEXTILE FABRIC FIBRETEX F46 (POLYPROPYLENE) GLUED ONTO THE BACKFACE OF PANELS, OVER ALL HORIZONTAL AND VERTICAL JOINTS

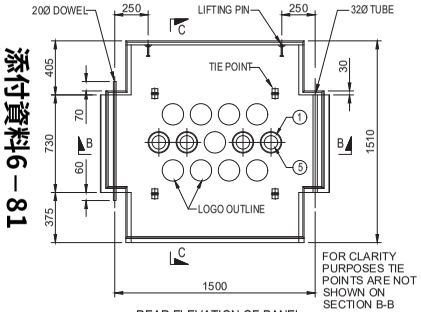
GENERAL NOTES

1. TEST PANEL.

1,1 AN 'AS BUILT' DRAWING IS REQUIRED SHOWING THE POSITION AND MASS OF EACH TEST STRIP PLACED IN STRUCTURE.

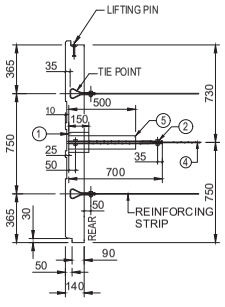
2. AMENDMENTS.

2,1 NO AMENDMENTS ARE TO BE MADE TO THESE DRAWINGS WITHOUT PRIOR APPROVAL OF REINFORCED EARTH (PTY) LTD.



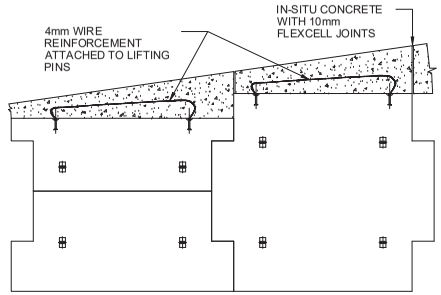
REAR ELEVATION OF PANEL

1 : 20



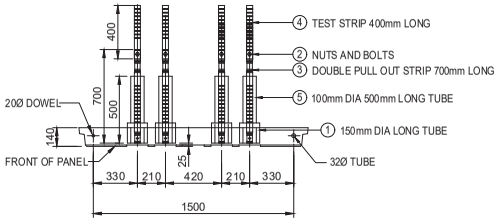
SECTION C-C

1 : 20



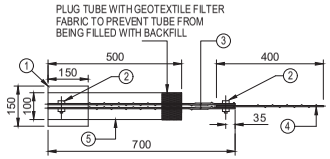
DETAIL OF IN-SITU CONCRETE ON TOP OF PANELS

1:40



SECTION B-B

1 : 20



DETAIL OF ASSEMBLY

1:10

1 4 No 150mm DIA P.V.C. TUBES TO FORM POCKETS ON THE REAR FACE OF PANEL (150mm LONG 4/PANEL)

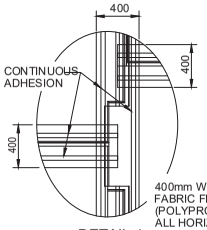
2 8 No NUTS AND BOLTS

3 8 No 45 x 5 x 700mm LONG STRIPS (PULL OUT STRIPS)

4 4 No 45 x 5 x 400mm LONG TEST STRIPS

5 4 No 100mm DIA 500mm LONG P.V.C. TUBES

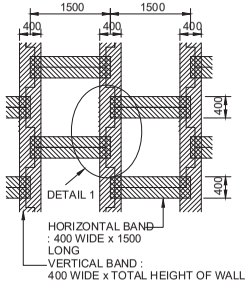
DETAILS OF TEST PANEL



DETAIL 1

REAR PANEL DETAIL SHOWING GLUING OF GEOTEXTILE FILTER FABRIC

1:50

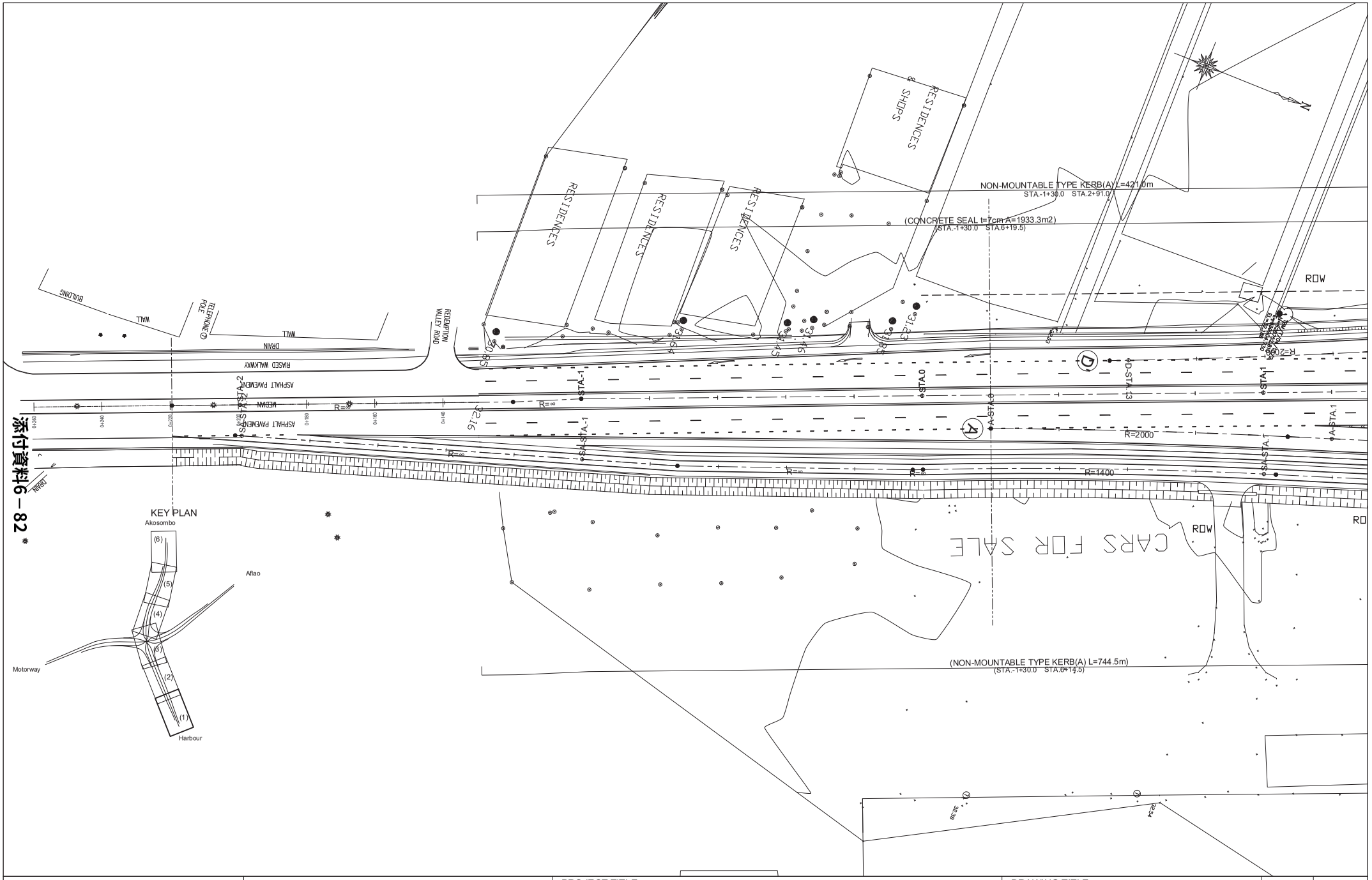


BACK ELEVATION OF GEO-TEXTILE FILTER FABRIC OVER ALL VERTICAL AND HORIZONTAL JOINTS

1:100

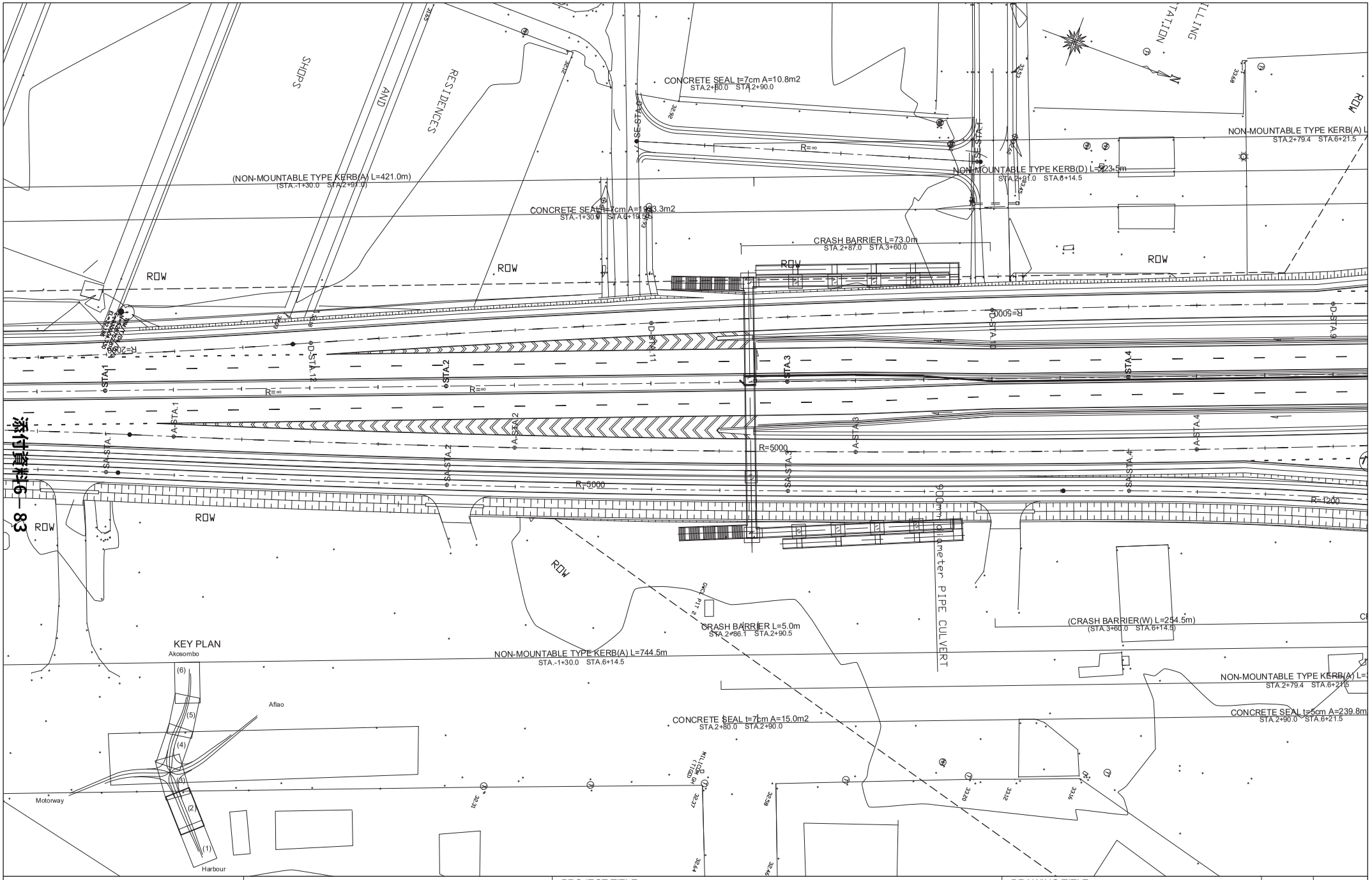
DETAILS OF FILTER FABRIC

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: REINFORCED EARTH WALL (9)	SCALE:(A1size) AS SHOWN DRAWING NO. RE-09

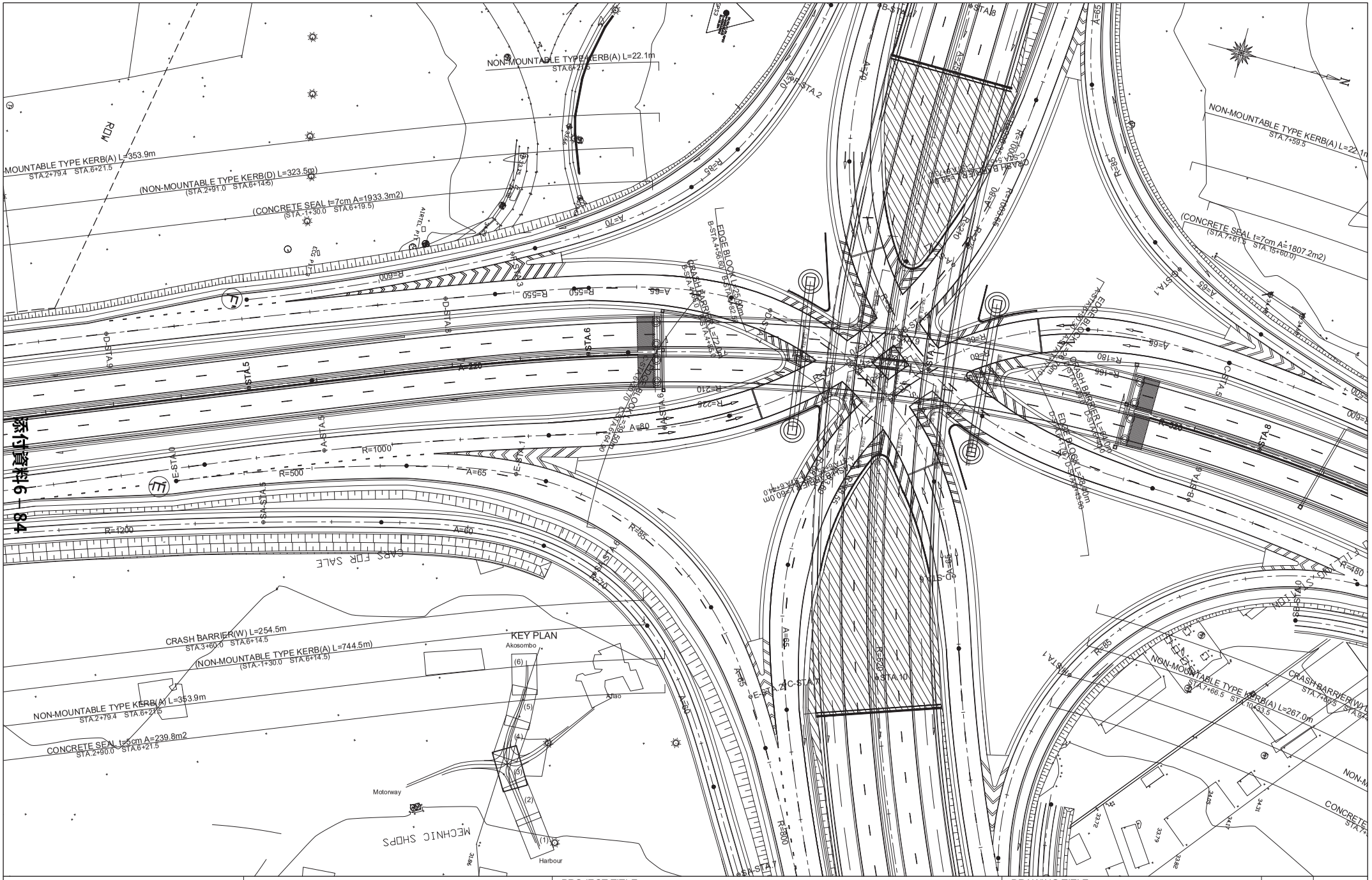


添付資料6－82

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ANCILLARY PLAN(1)	SCALE:(A1size) 1:500	DRAWING NO. RA-01

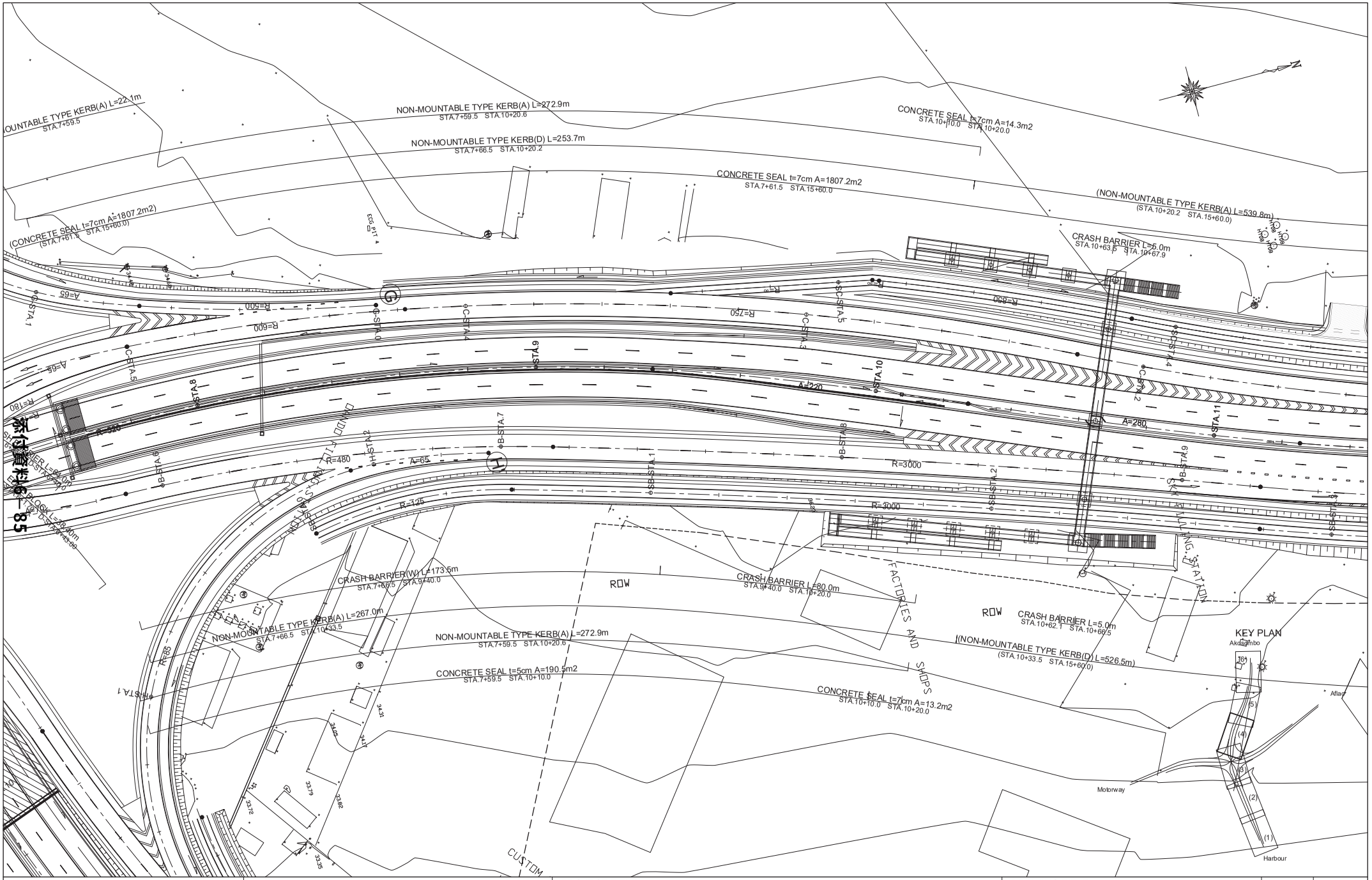


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ANCILLARY PLAN(2)	SCALE:(A1size) 1:500	DRAWING NO. RA-02

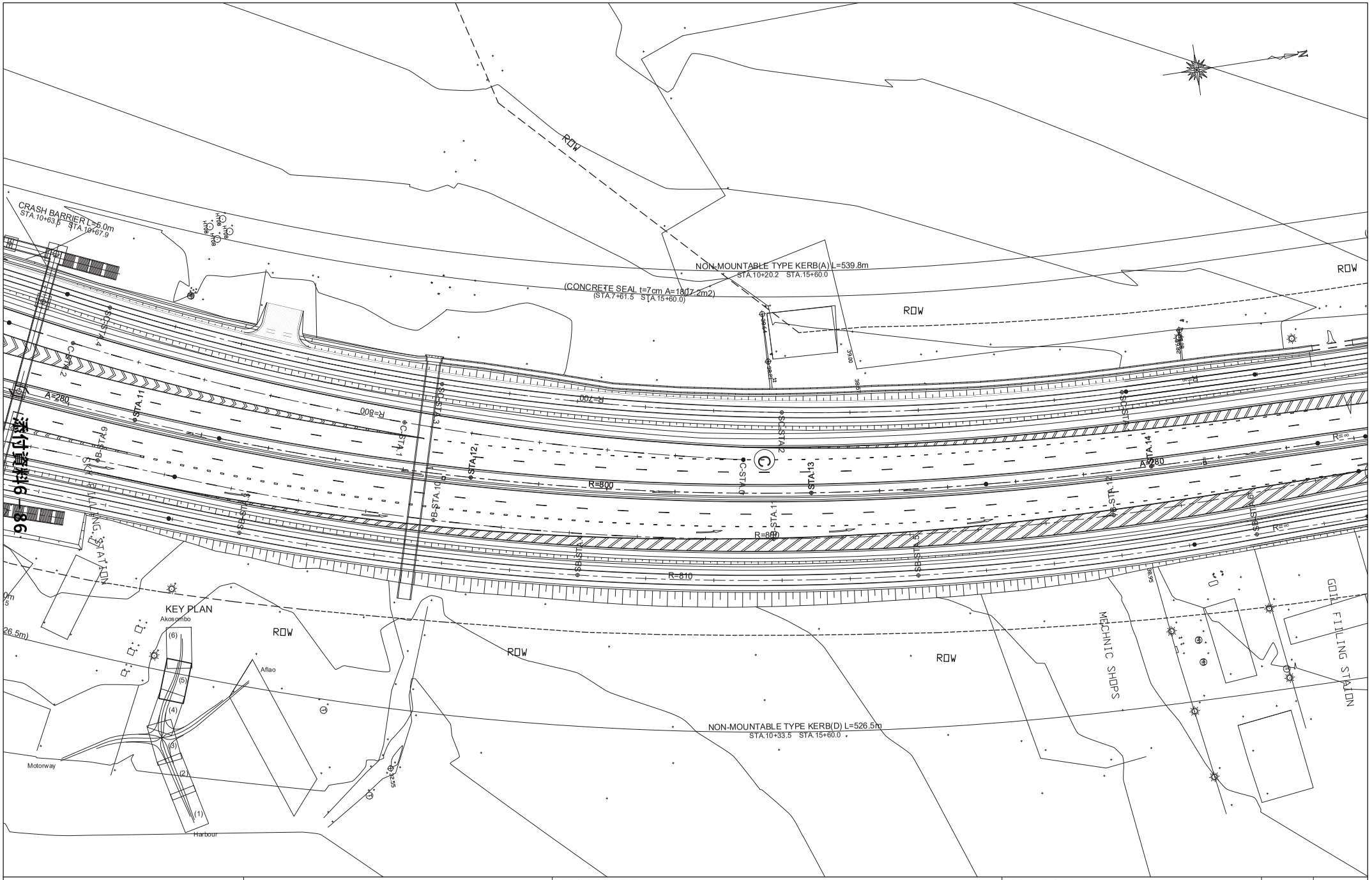


添付資料6－84

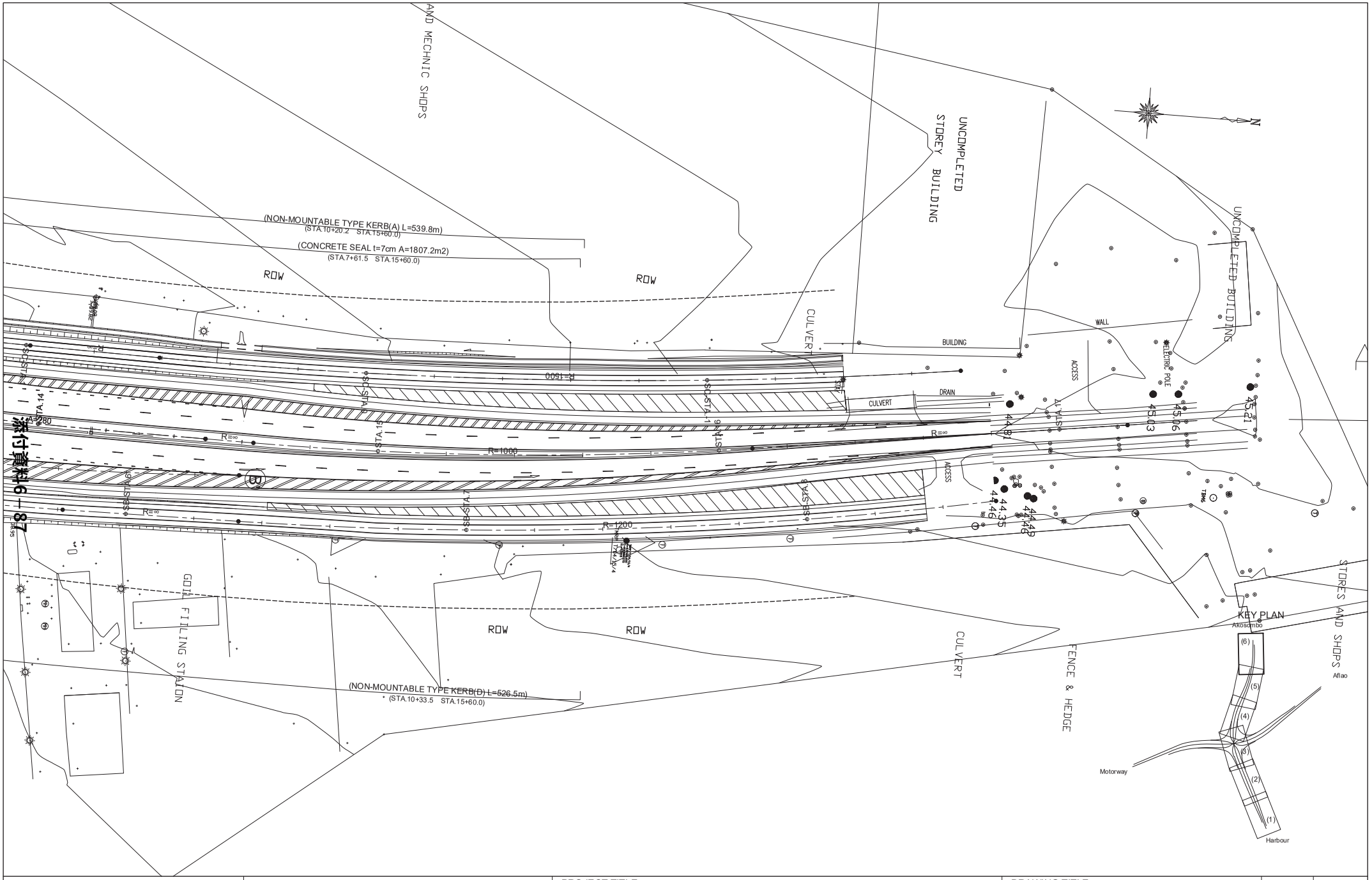
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ANCILLARY PLAN(3)	SCALE:(A1size) 1:500	DRAWING NO. RA-03



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ANCILLARY PLAN(4)	SCALE:(A1size) 1:500	DRAWING NO. RA-04



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ANCILLARY PLAN(5)	SCALE:(A1size) 1:500	DRAWING NO. RA-05



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: ANCILLARY PLAN(6)	SCALE:(A1size) 1:500	DRAWING NO. RA-06

添付資料6－88

LEGEND

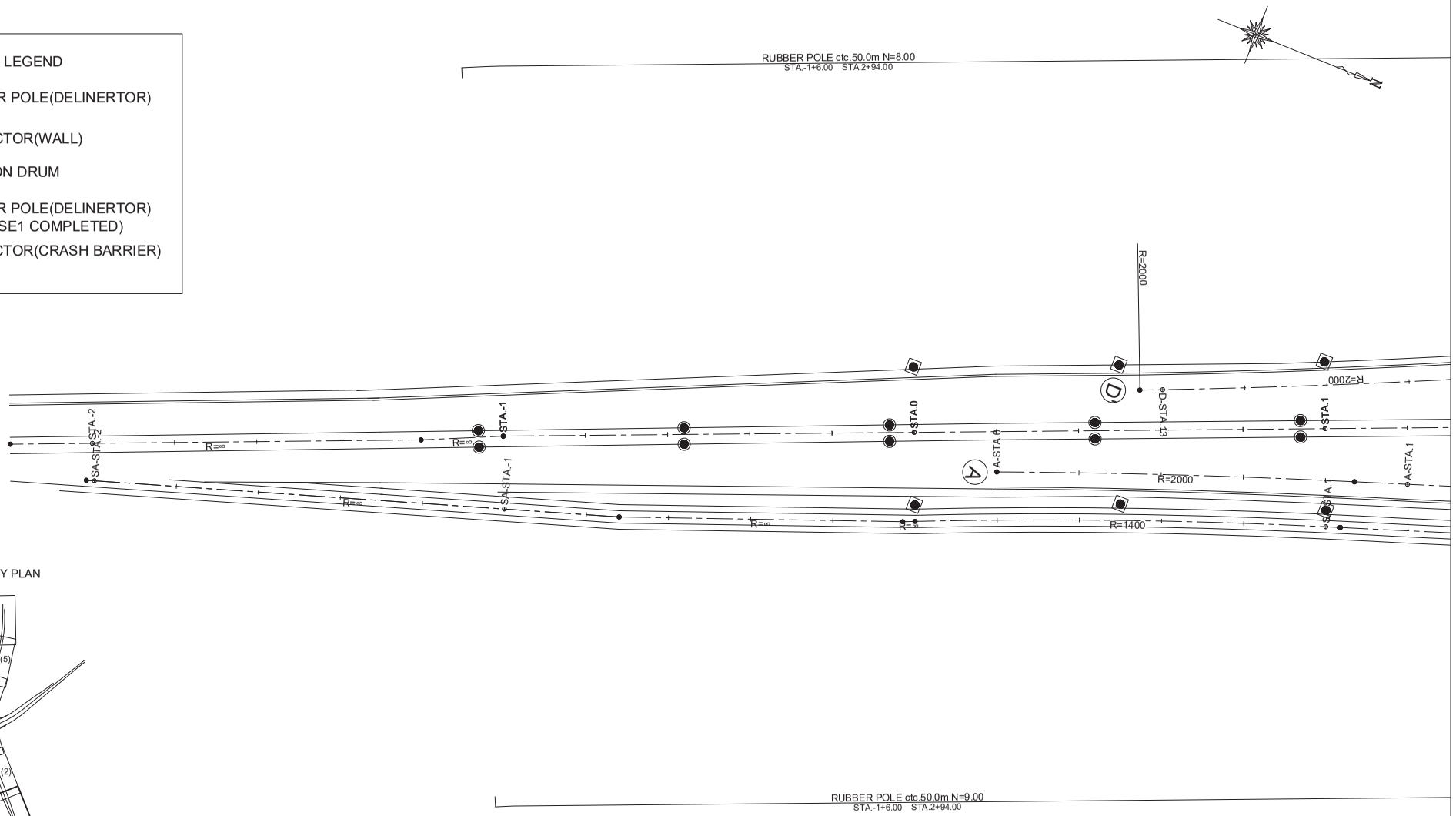
: RUBBER POLE(DELINERTOR)

: REFLECTOR(WALL)

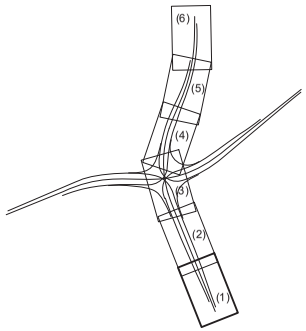
: CUSHION DRUM

: RUBBER POLE(DELINERTOR)
(PHASE1 COMPLETED)

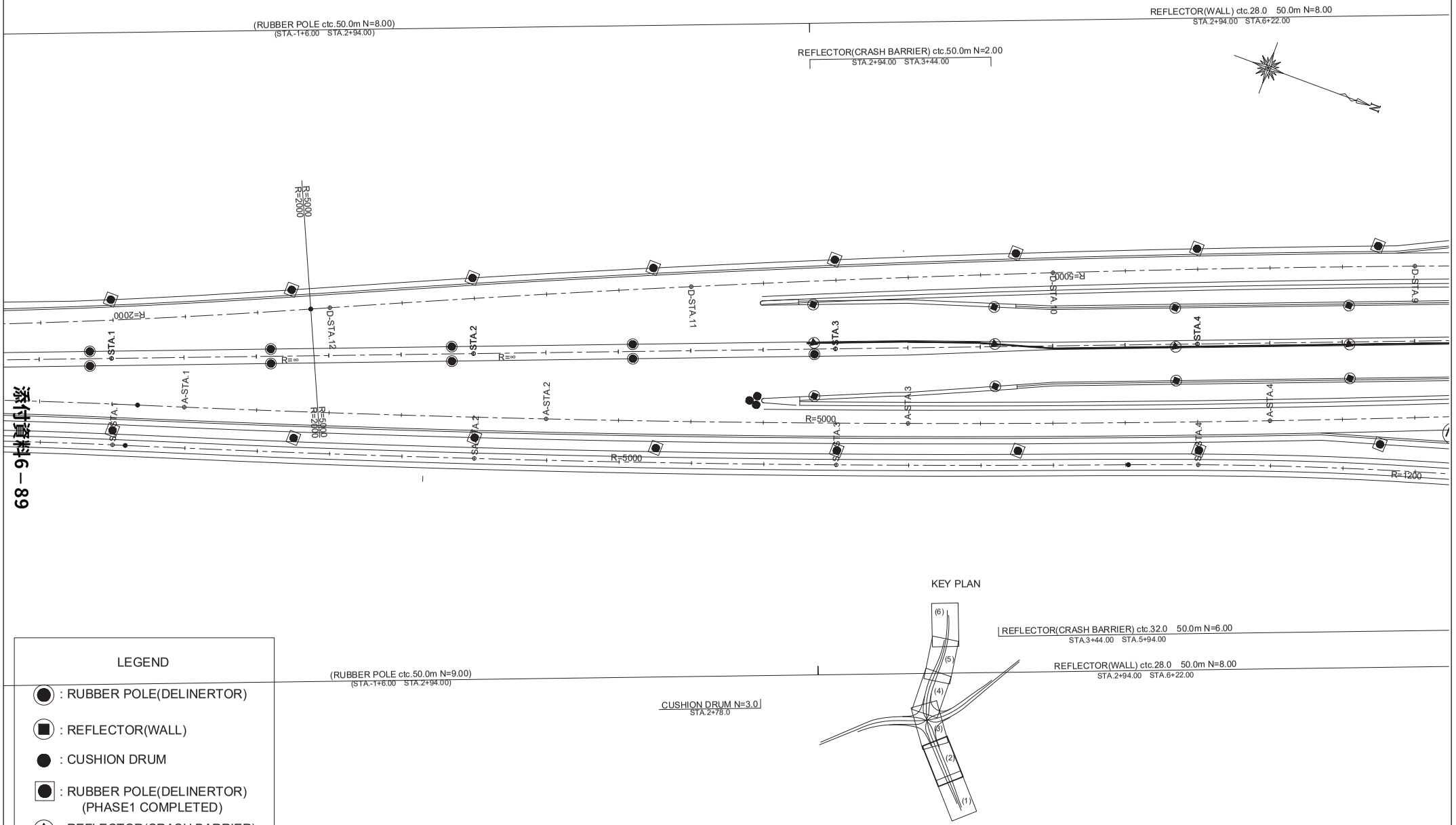
: REFLECTOR(CRASH BARRIER)



KEY PLAN



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF REFLECTOR(1)	SCALE:(A1size) 1:500	DRAWING NO. RA-07



KEY PLAN

REFLECTOR(CRASH BARRIER) ctc.32.0 50.0m N=6.00
STA.3+44.00 STA.5+94.00

REFLECTOR(WALL) ctc.28.0 50.0m N=8.00
STA.2+94.00 STA.6+22.00

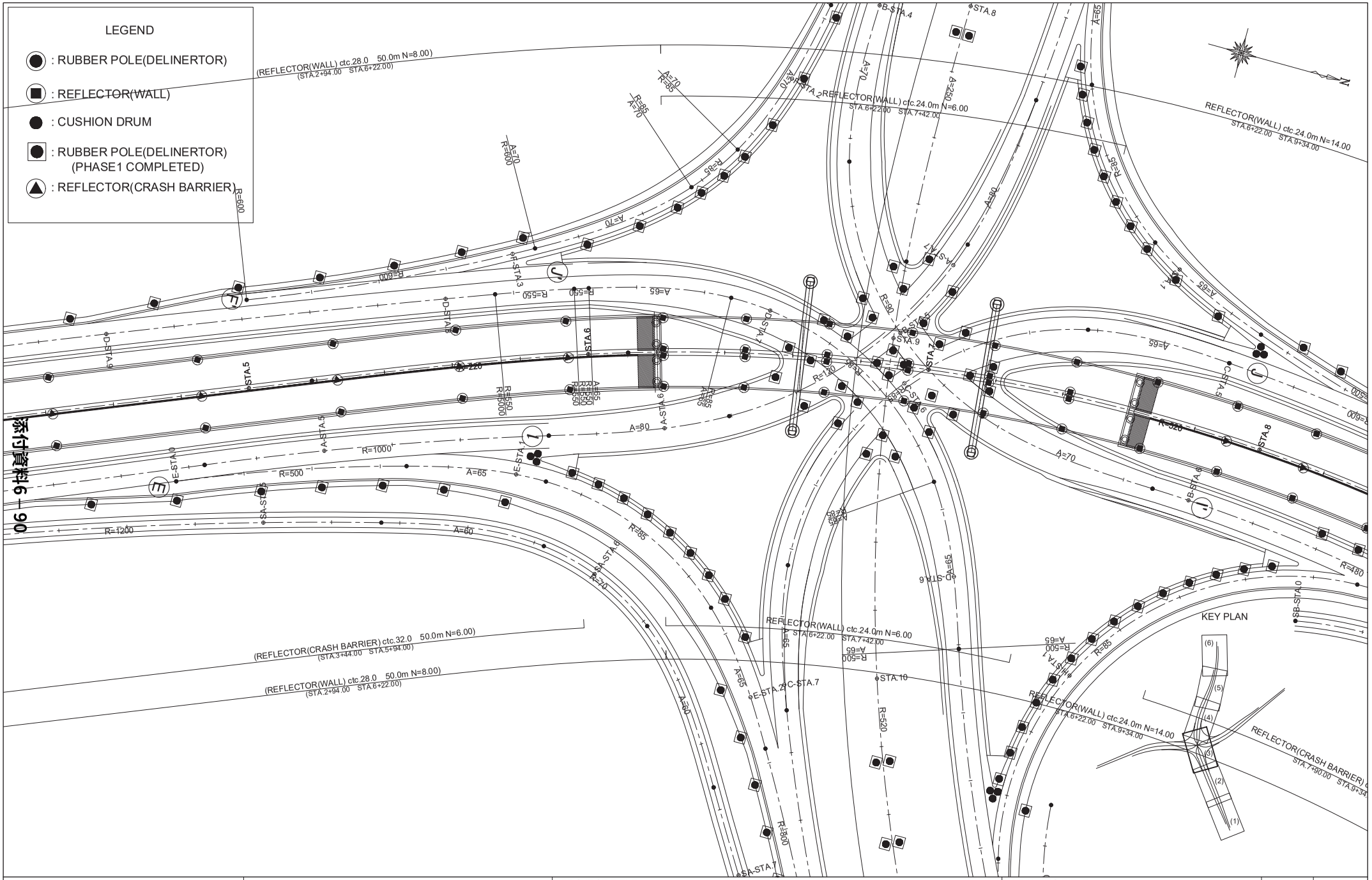
(RUBBER POLE ctc.50.0m N=9.00)
(STA.-1+6.00 STA.2+94.00)

CUSHION DRUM N=3.0
STA.2+78.0

LEGEND

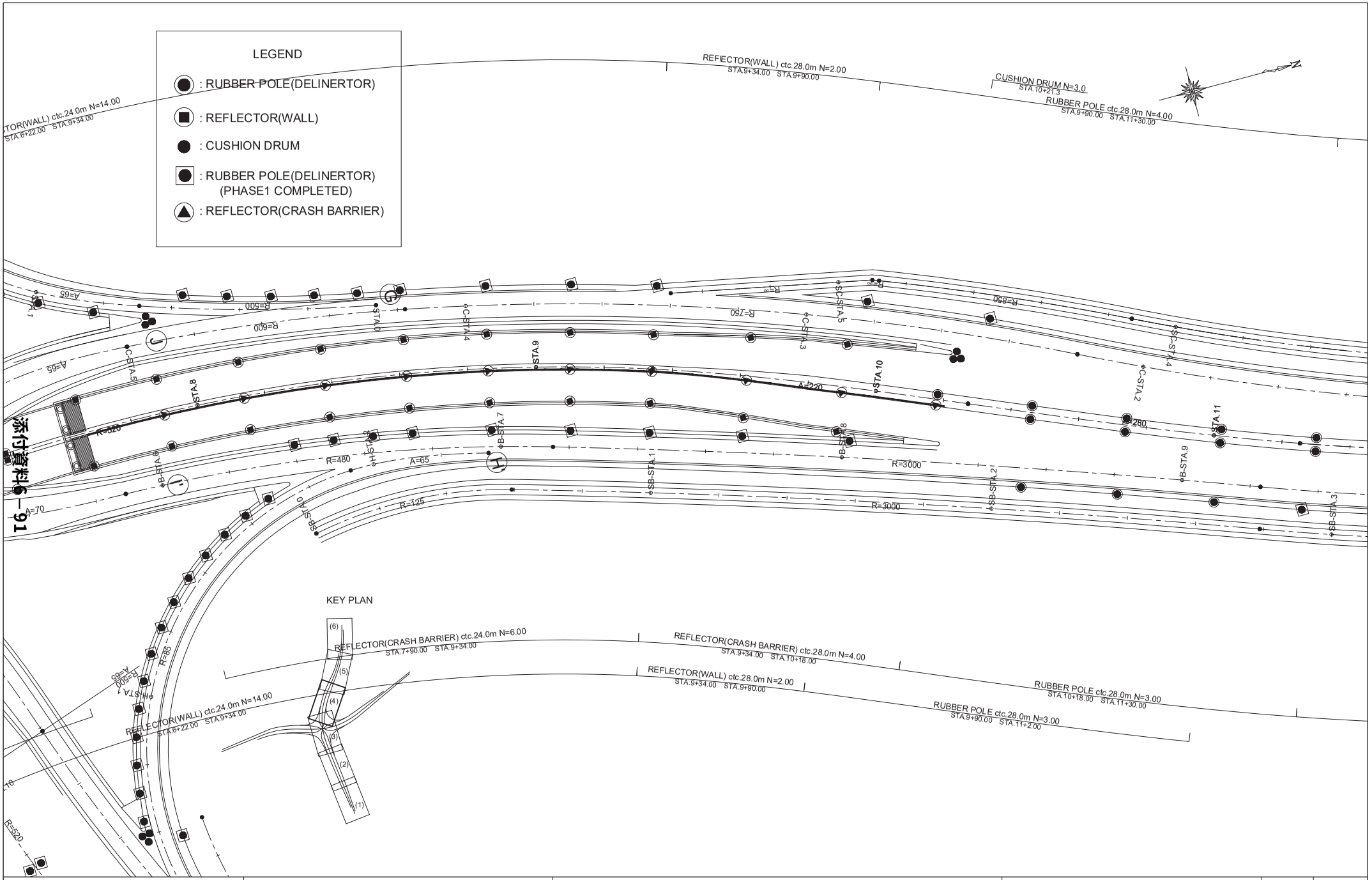
- : RUBBER POLE(DELINERTOR)
- : REFLECTOR(WALL)
- : CUSHION DRUM
- : RUBBER POLE(DELINERTOR) (PHASE1 COMPLETED)
- : REFLECTOR(CRASH BARRIER)

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF REFLECTOR(2)	SCALE:(A1size) 1:500	DRAWING NO. RA-08

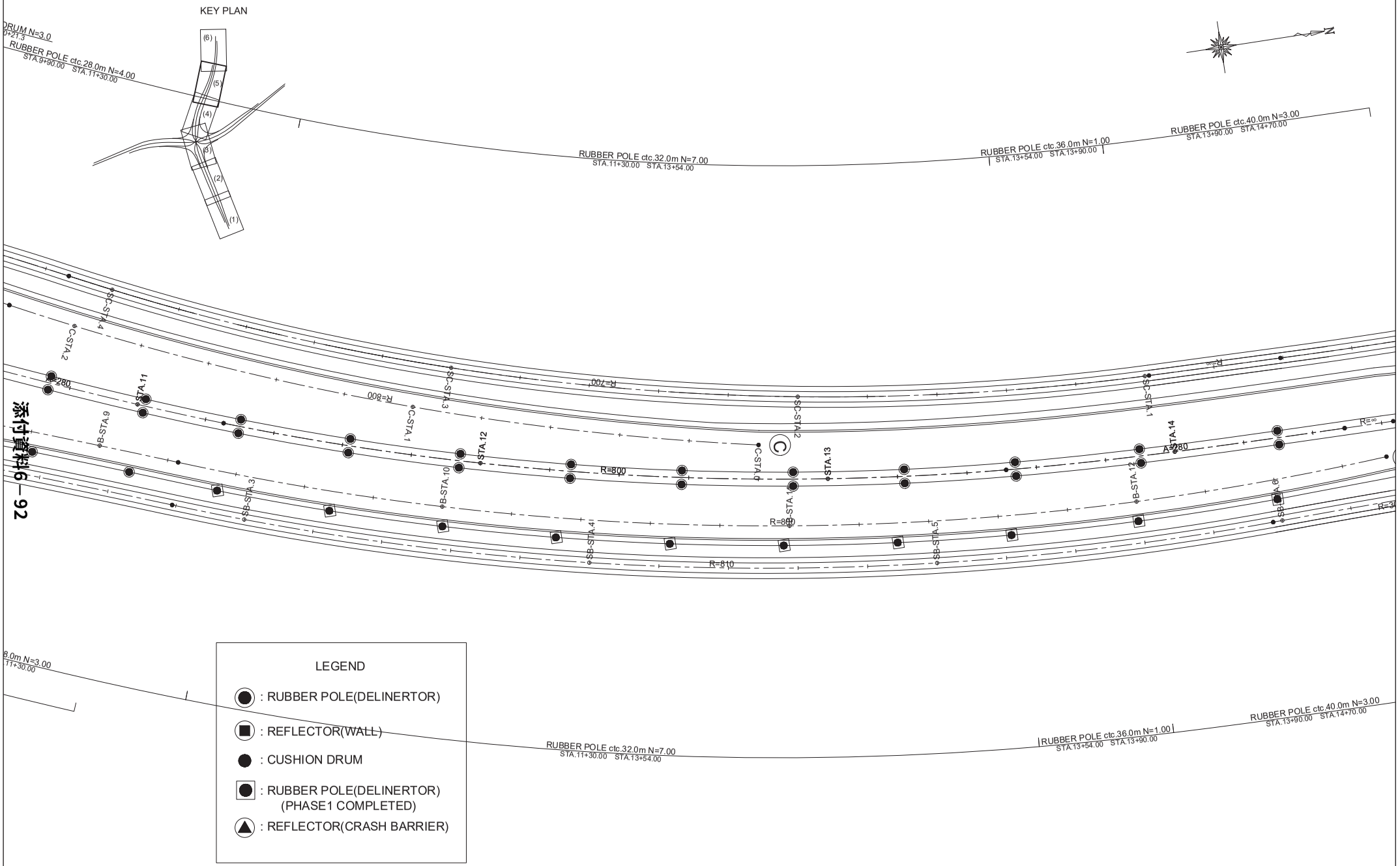


添付資料6－96

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF REFLECTOR(3)	SCALE:(A1size) 1:500	DRAWING NO. RA-09



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF REFLECTOR(4)	SCALE:(A1size) 1:500	DRAWING NO. RA-10

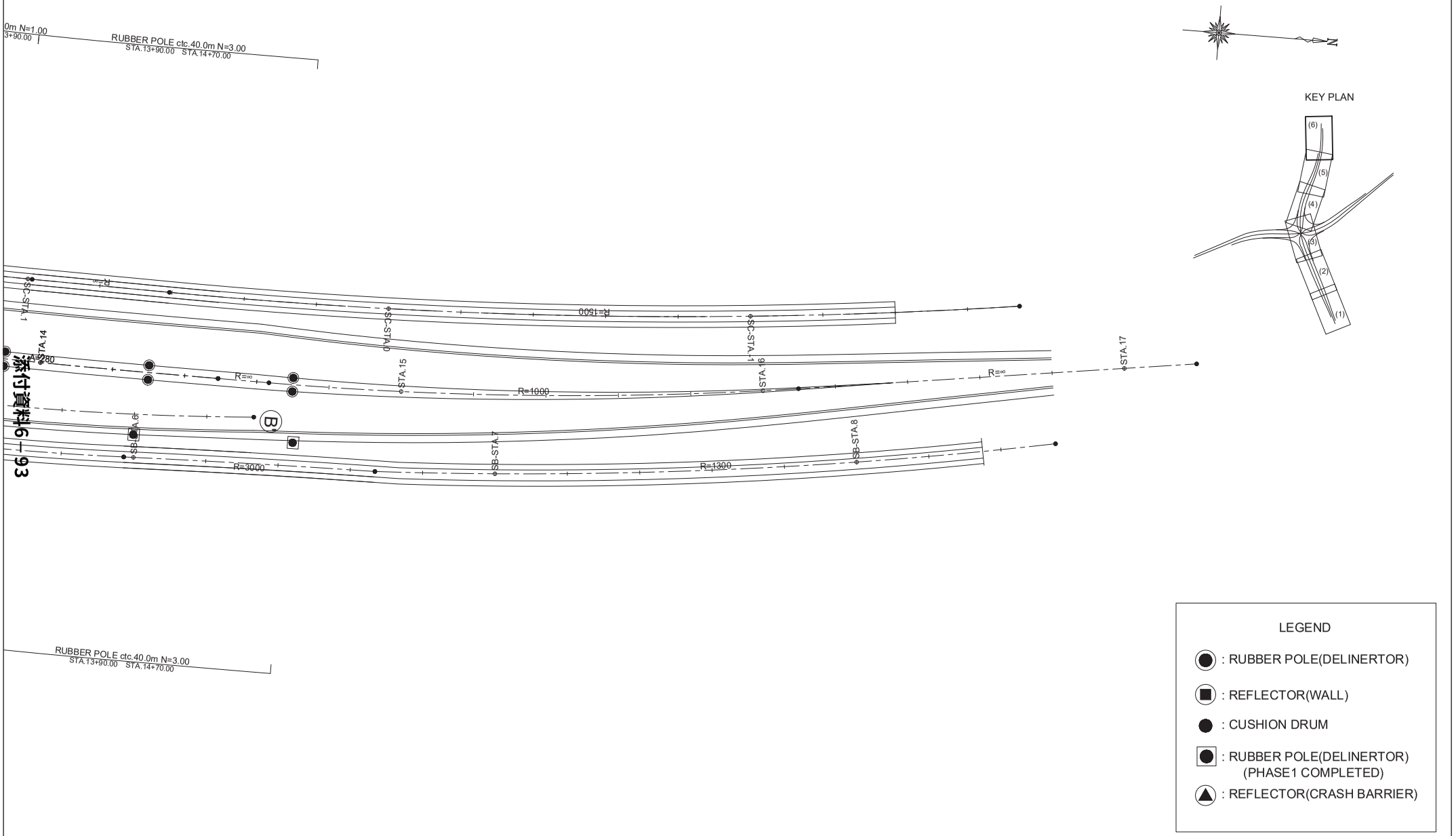


LEGEND

- : RUBBER POLE(DELINERTOR)
- : REFLECTOR(WALL)
- : CUSHION DRUM
- : RUBBER POLE(DELINERTOR) (PHASE1 COMPLETED)
- : REFLECTOR(CRASH BARRIER)

添付資料6－92

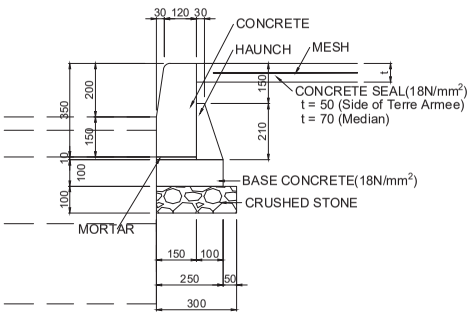
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF REFLECTOR(5)	SCALE:(A1size) 1:500	DRAWING NO. RA-11



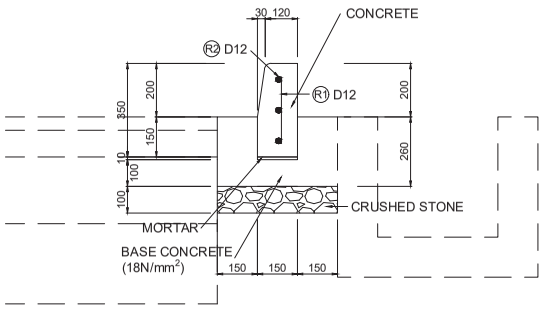
添付資料6－93

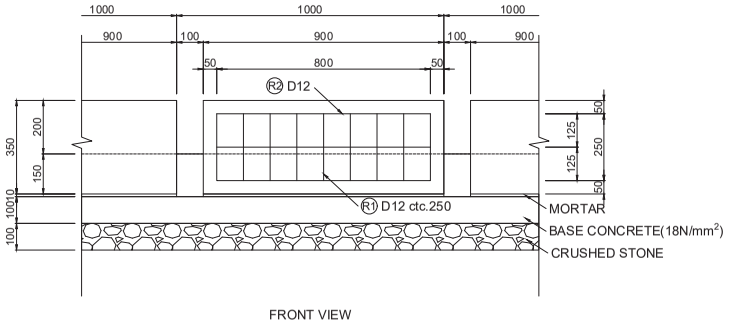
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF REFLECTOR(6)	SCALE:(A1size) 1:500	DRAWING NO. RA-12

MEDIAN BLOCK,KERB AND EDGE BLOCK(FLUSH KERB)



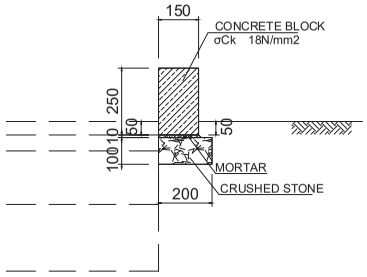
NON-MOUNTABLE TYPE KERB (A)





FRONT VIEW

NON-MOUNTABLE TYPE KERB (D)



EDGE BLOCK

SCHEDULE OF ROAD ANCILLARY
NON-MOUNTABLE TYPE KERB, EDGE BLOCK,CONCRETE SEAL

NON-MOUNTABLE TYPE KERB(A)					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	-1 + 30.0	2 + 91.0	LEFT	421.0	
2	-1 + 30.0	6 + 14.5	RIGHT	744.5	
3	2 + 79.4	6 + 21.5	LEFT	353.9	
4	2 + 79.4	6 + 21.5	RIGHT	353.9	
5	6 + 21.5		-	22.1	
6	7 + 59.5		-	22.1	
7	7 + 59.5	10 + 20.6	LEFT	272.9	
8	7 + 59.5	10 + 20.6	RIGHT	272.9	
9	7 + 66.5	10 + 33.5	RIGHT	267.0	
10	10 + 20.2	15 + 60.0	LEFT	539.8	
			TOTAL	3270.1	

NON-MOUNTABLE TYPE KERB(D)					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	2 + 91.0	6 + 14.5	LEFT	323.5	
2	7 + 66.5	10 + 20.2	LEFT	253.7	
3	10 + 33.5	15 + 60.0	RIGHT	526.5	
			TOTAL	1103.7	

EDGE BLOCK					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
A-RAMP					
1	6 + 90.3	7 + 17.1	LEFT	26.7	
B-RAMP					
1	4 + 56.6	4 + 82.5	LEFT	25.9	
C-RAMP					
1	6 + 20.7	6 + 64.9	LEFT	39.5	
D-RAMP					
1	6 + 1.7	6 + 43.0	LEFT	38.4	
			TOTAL	130.5	

CONCRETE SEAL t=5cm					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	AREA	REMARKS
Harbour-Akosombo Road					
1	2 + 90.0	6 + 21.5	-	239.8	
2	7 + 59.5	10 + 10.0	-	190.5	
			TOTAL	430.3	

CONCRETE SEAL t=7cm					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	AREA	REMARKS
Harbour-Akosombo Road					
1	-1 + 30.0	6 + 19.5	-	1933.3	
2	7 + 61.5	15 + 60.0	-	1807.2	
3	2 + 80.0	2 + 90.0	LEFT	10.8	
4	2 + 80.0	2 + 90.0	RIGHT	15.0	
5	10 + 10.0	10 + 20.0	LEFT	14.3	
6	10 + 10.0	10 + 20.0	RIGHT	13.2	
			TOTAL	3793.8	

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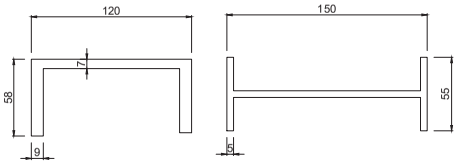
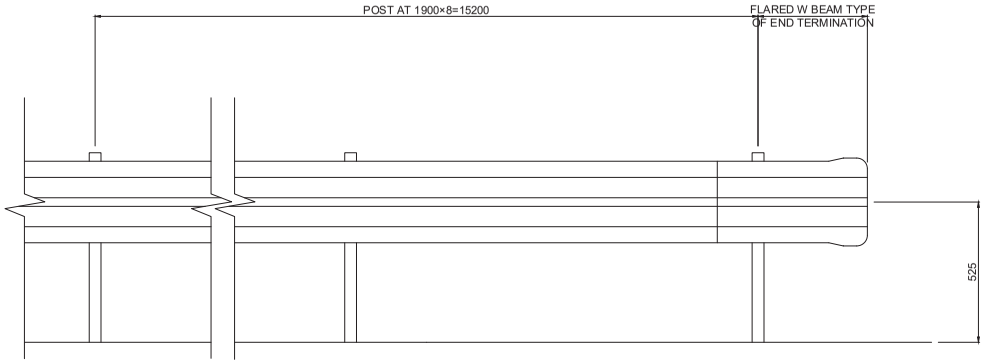
CRASH BARRIER

CRASH BARRIER



TYPICAL POST SECTION
S=1:2



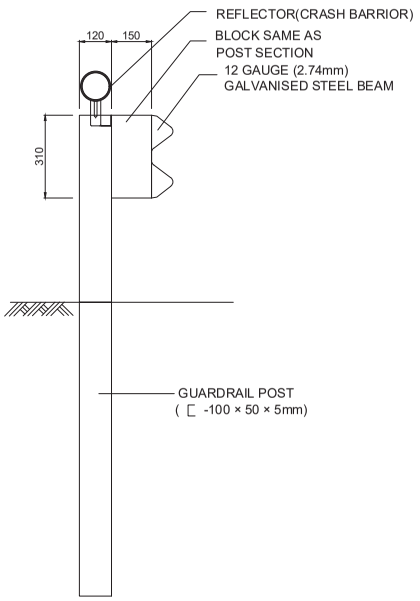
(ALL LAPS IN DIRECTION OF TRAFFIC)

FRONT VIEW
S=1:10

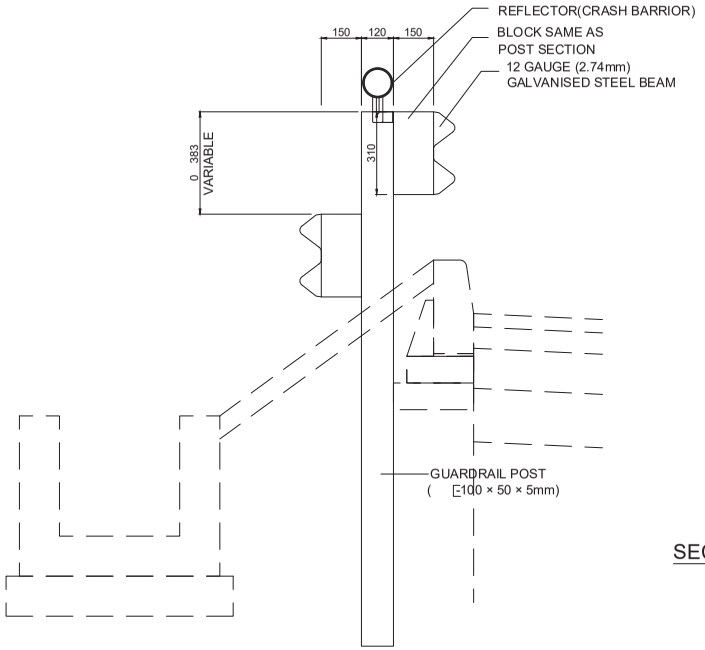
SCHEDULE OF ROAD ANCILLARY
CRASH BARRIER

CRASH BARRIER					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	2 + 86.1	2 + 90.5	RIGHT	5.0	
2	2 + 87.0	3 + 60.0	LEFT	73.0	
3	9 + 40.0	10 + 20.0	RIGHT	80.0	
4	10 + 62.1	10 + 66.5	RIGHT	5.0	
5	10 + 63.5	10 + 67.9	LEFT	5.0	
A-RAMP					
1	6 + 25.0	6 + 44.0	RIGHT	60.0	
B-RAMP					
1	4 + 66.0	4 + 85.0	RIGHT	72.0	
C-RAMP					
1	5 + 57.0	5 + 73.0	RIGHT	56.0	
D-RAMP					
1	6 + 24.0	6 + 40.0	RIGHT	64.0	
			TOTAL	420.0	

CRASH BARRIER(W)					
NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road					
1	3 + 60.0	6 + 14.5	RIGHT	254.5	
2	7 + 66.5	9 + 40.0	RIGHT	173.5	
			TOTAL	428.0	

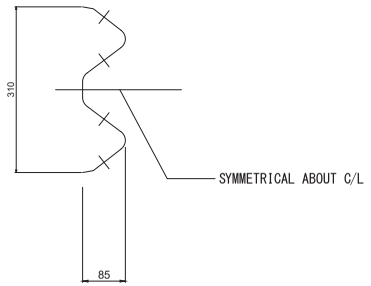


Beam On One sides
CRASH BARRIER

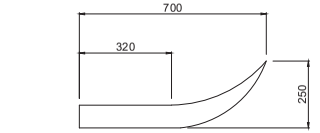


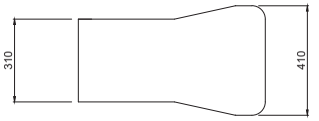
Beam On Both sides
CRASH BARRIER(W)

TYPICAL POST DETAIL
S=1:10



SECTION THROUGH W-BEAM
S=1/5



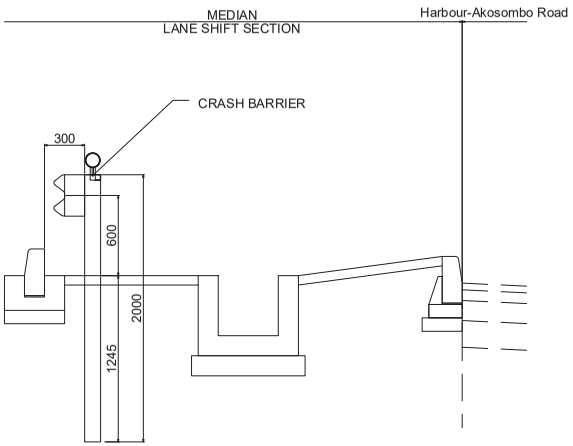


W-BEAM TERMINAL SECTION
S=1:10

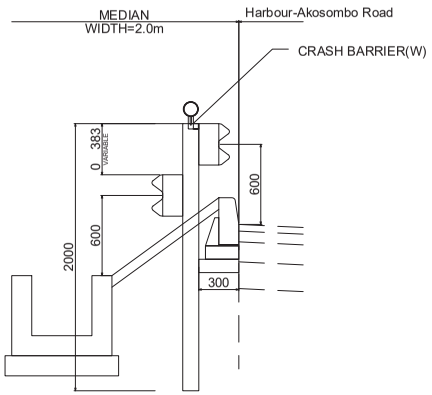
NOTE :
Crash Barrier at ends should be in accordance with the standards of Ghana.
or as instructed by the Engineer.

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: CRASH BARRIER	SCALE:(A1size) 1:10 / DRAWING NO. RA-14

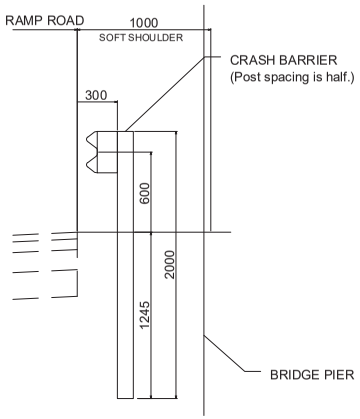
DETAIL OF CRASH BARRIER



Harbour-Akosombo Road
LANE SHIFT SECTION



Harbour-Akosombo Road
MEDIAN WIDTH=2.0m SECTION

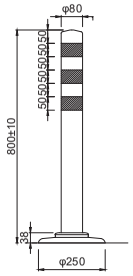


INTERSECTION
PROTECTION BRIDGE PIER SECTION

添付資料6－96

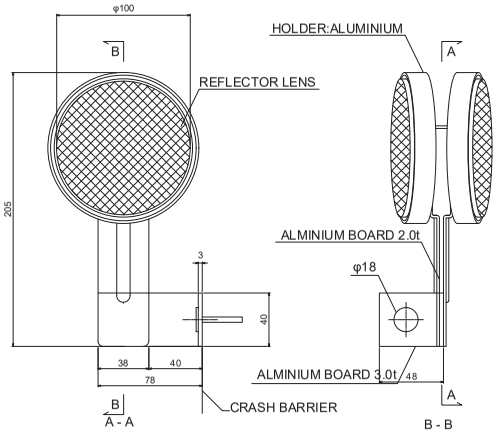
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF CRASH BARRIER	SCALE:(A1size) 1:10	DRAWING NO. RA-15

REFLECTOR



FRONT VIEW
S=1:10

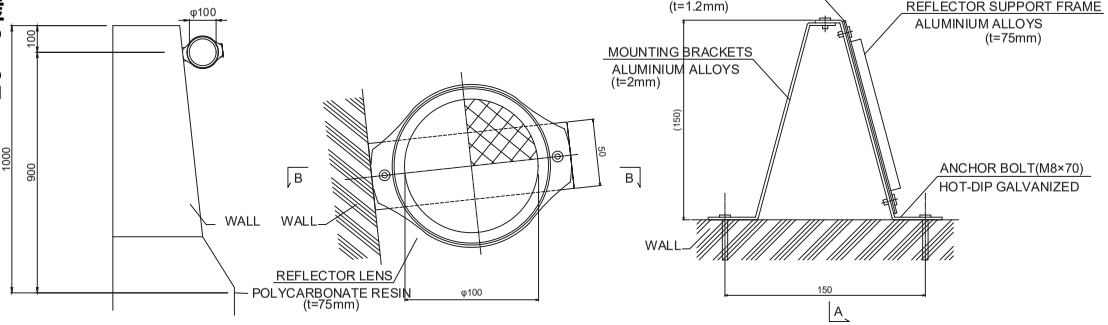
RUBBER POLE (DELINEATOR)



FRONT VIEW
S=1:2

SIDE VIEW
S=1:2

REFLECTOR(CRASH BARRIER)



FRONT VIEW
S=1:10

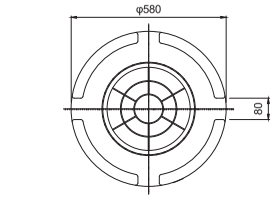
FRONT VIEW (MAGNIFICATION)
S=1:2

PLAN VIEW
S=1:2

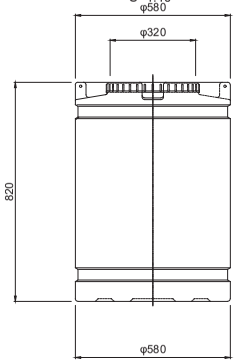
REFLECTOR(WALL)

The orange reflector uses a special fluorescent prism lens

The anchor bolt uses a core rod drive type male screw anchor (drill diameter φ 8.5, depth 40 mm)



PLAN VIEW
S=1:10



FRONT VIEW
S=1:10

CUSHION DRUM

NOTE :
Exact installation location shall be as instructed/approved by the Engineer.
Replacement by other equivalent material may be acceptable upon approval by the Enginner

SCHEDULE OF ROAD ANCILLARY RUBBER POLE(DELINEATOR), CUSHION DRUM

RUBBER POLE(DELINERTOR)

NO.	"STARTING STATION"	"ENDING STATION"	SIDE	NUMBER	REMARKS
Harbour-Akosombo Road					
1	-1 + 6.0	2 + 94.0	LEFT	8.0	
2	-1 + 6.0	2 + 94.0	RIGHT	9.0	
3	9 + 90.0	11 + 30.0	LEFT	4.0	
4	9 + 90.0	11 + 2.0	RIGHT	3.0	
5	10 + 18.0	11 + 30.0	RIGHT	3.0	
6	11 + 30.0	13 + 54.0	LEFT	7.0	
7	11 + 30.0	13 + 54.0	RIGHT	7.0	
8	13 + 54.0	13 + 90.0	LEFT	1.0	
9	13 + 54.0	13 + 90.0	RIGHT	1.0	
10	13 + 90.0	14 + 70.0	LEFT	3.0	
11	13 + 90.0	14 + 70.0	RIGHT	3.0	
			TOTAL	49.0	

REFLECTOR(WALL)

NO.	"STARTING STATION"	"ENDING STATION"	SIDE	NUMBER	REMARKS
Harbour-Akosombo Road					
1	2 + 94.0	6 + 22.0	LEFT	8.0	
2	2 + 94.0	6 + 22.0	RIGHT	8.0	
3	6 + 22.0	9 + 34.0	LEFT	14.0	
4	6 + 22.0	9 + 34.0	RIGHT	14.0	
5	6 + 22.0	7 + 42.0	LEFT	6.0	
6	6 + 22.0	7 + 42.0	RIGHT	6.0	
7	9 + 34.0	9 + 90.0	LEFT	2.0	
8	9 + 34.0	9 + 90.0	RIGHT	2.0	
			TOTAL	60.0	

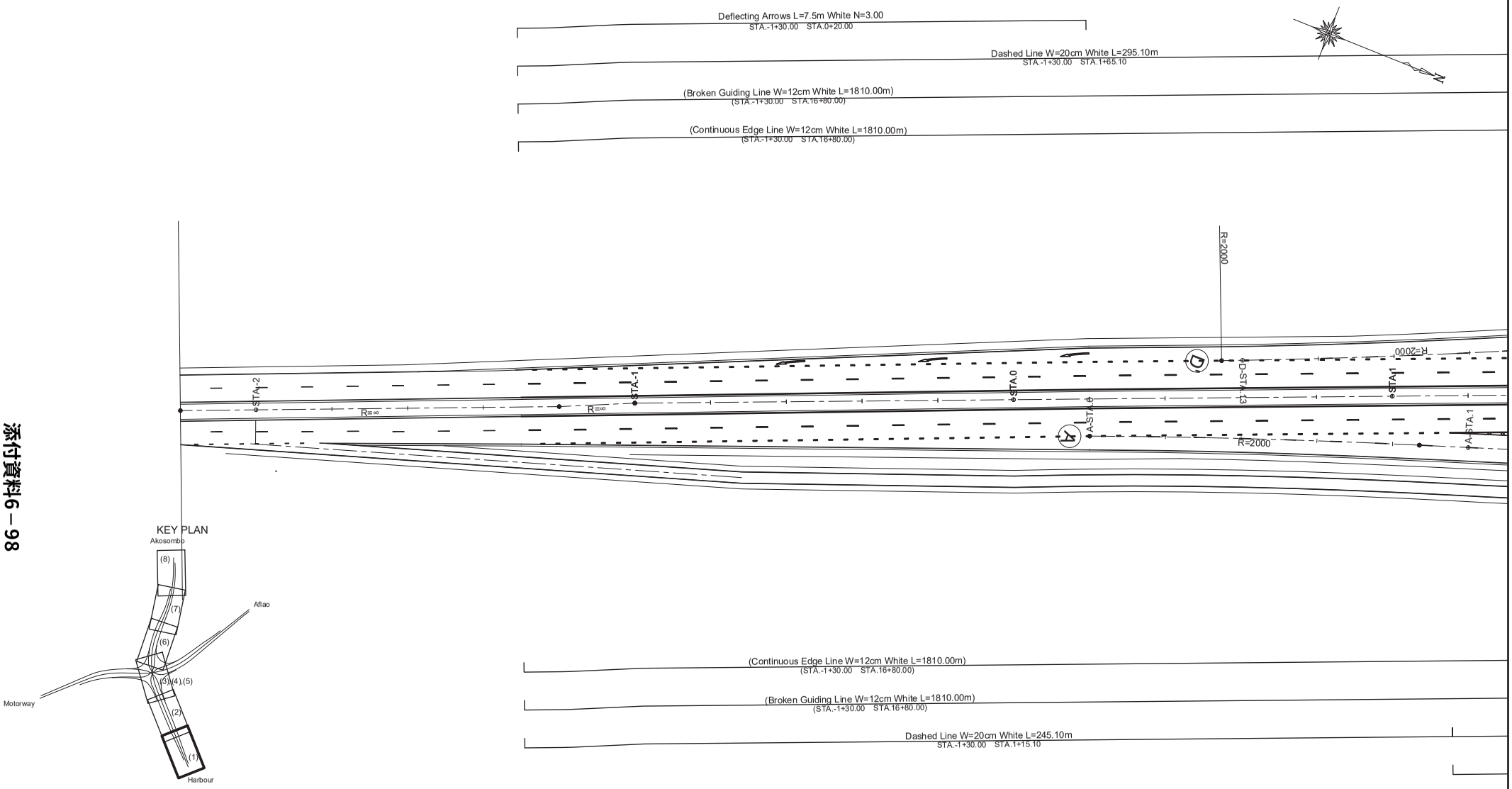
REFLECTOR(CRASH BARRIER)

NO.	"STARTING STATION"	"ENDING STATION"	SIDE	NUMBER	REMARKS
Harbour-Akosombo Road					
1	2 + 94.0	3 + 44.0	LEFT	2.0	
2	3 + 44.0	5 + 94.0	RIGHT	6.0	
3	7 + 90.0	9 + 34.0	RIGHT	6.0	
4	9 + 34.0	10 + 18.0	RIGHT	4.0	
			TOTAL	18.0	

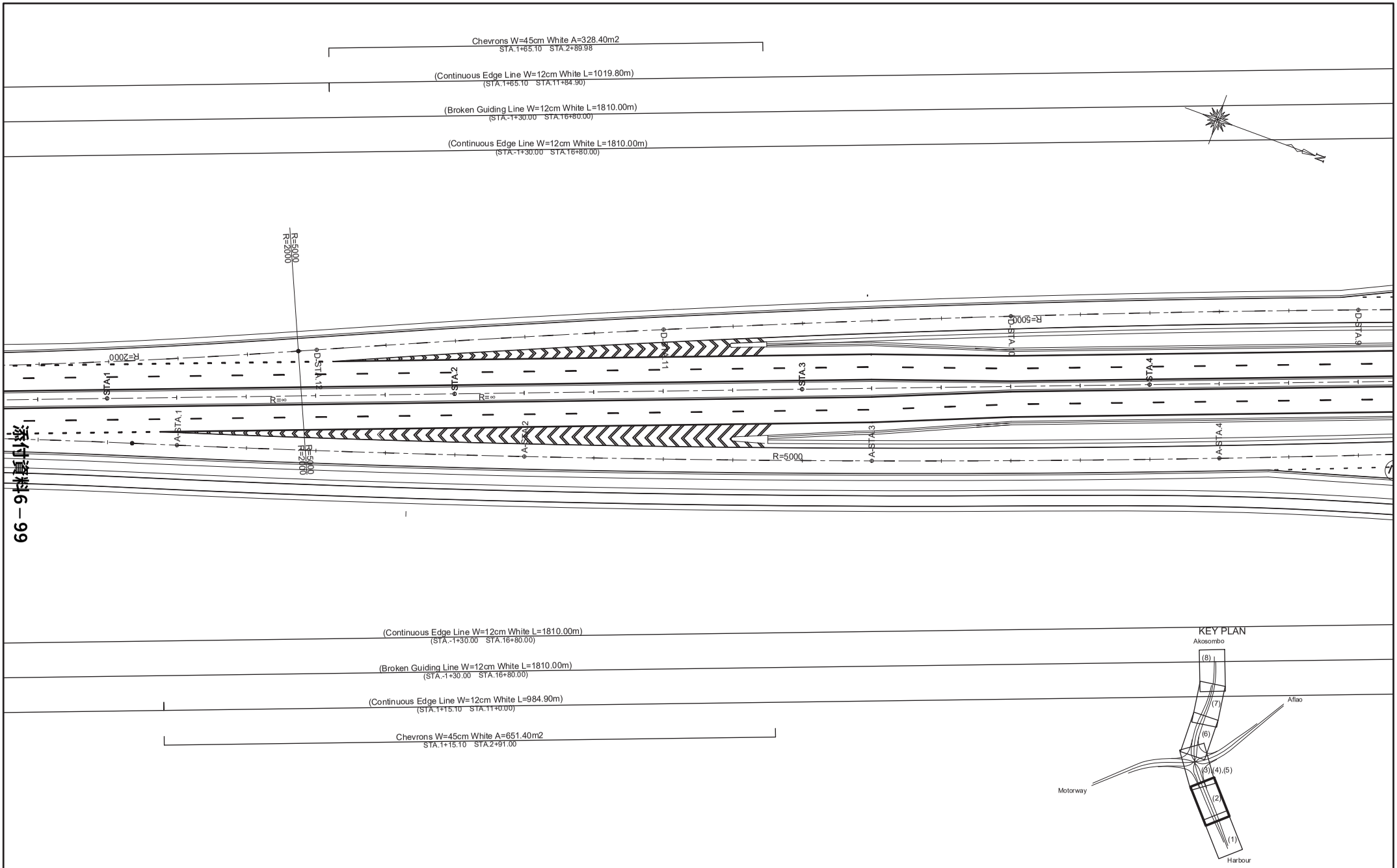
CUSHION DRUM

NO.	"STARTING STATION"	"ENDING STATION"	SIDE	NUMBER	REMARKS
Harbour-Akosombo Road					
1	2 + 78.0		RIGHT	3.0	
2	10 + 21.3		LEFT	3.0	
			TOTAL	6.0	

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: REFLECTOR	SCALE:(A1size) 1:10 DRAWING NO. RA-16

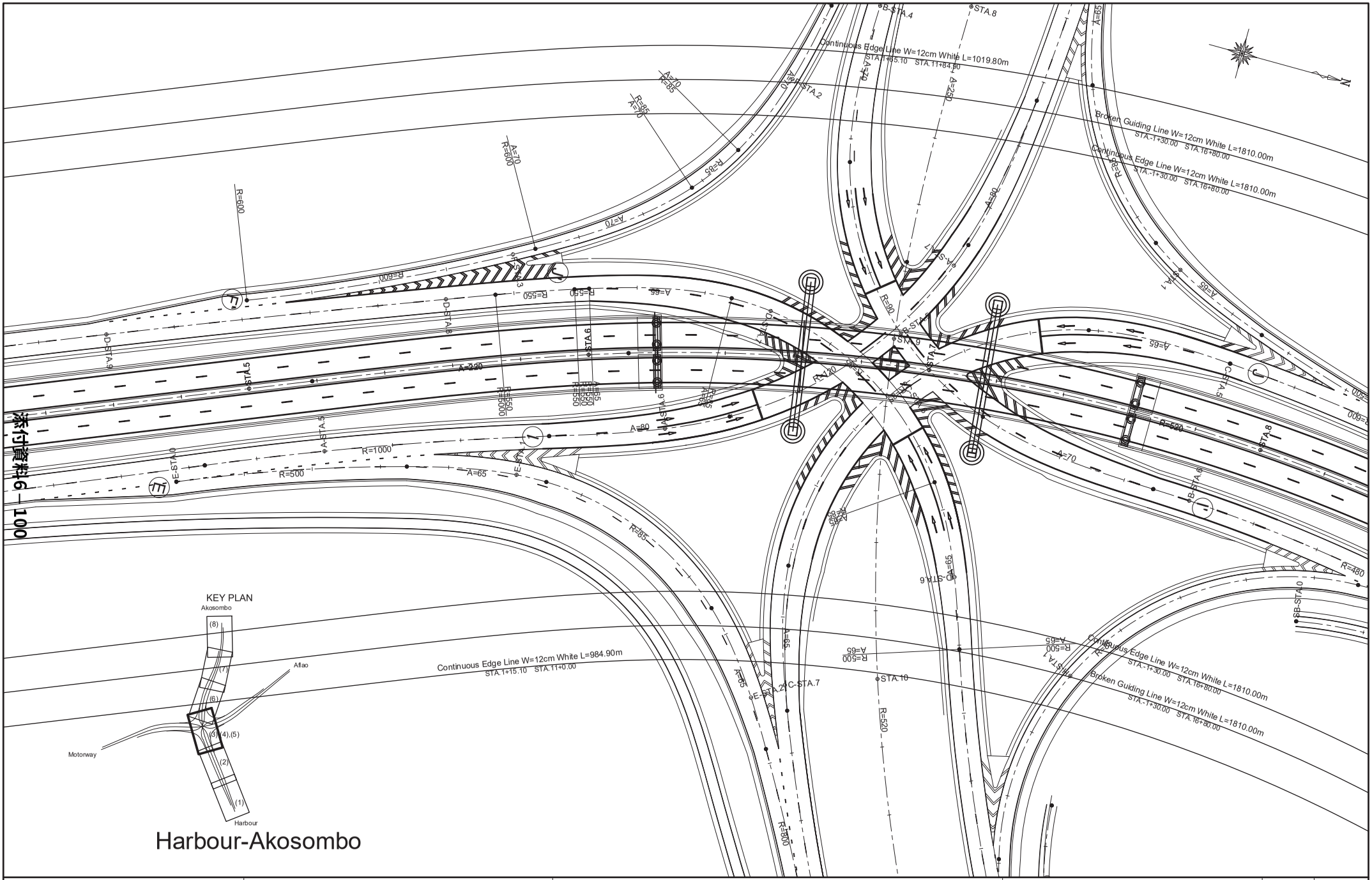


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(1)	SCALE:(A1size) 1:500	DRAWING NO. RA-17



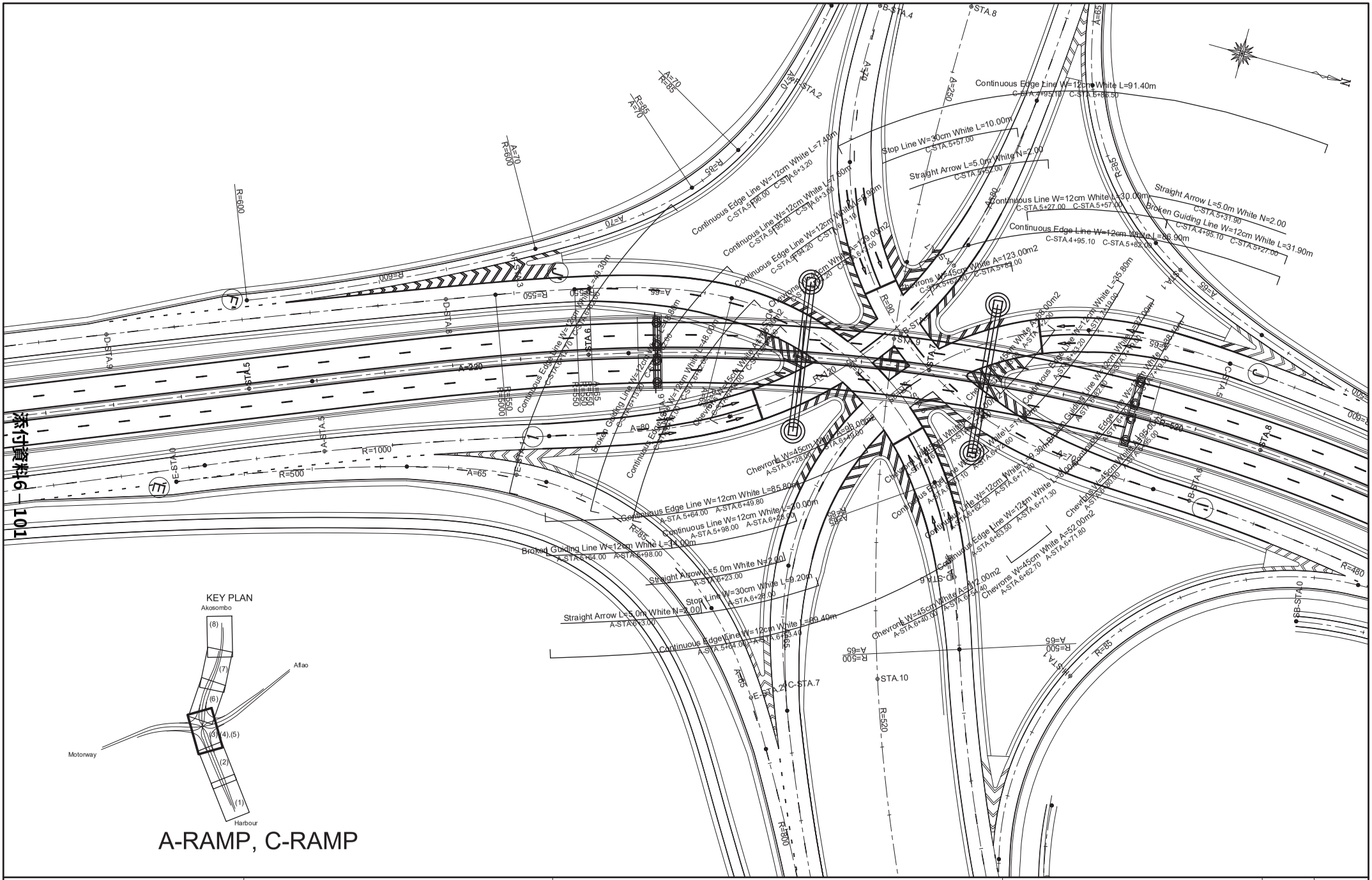
参考資料 6 – 99

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(2)	SCALE:(A1size) 1:500	DRAWING NO. RA-18

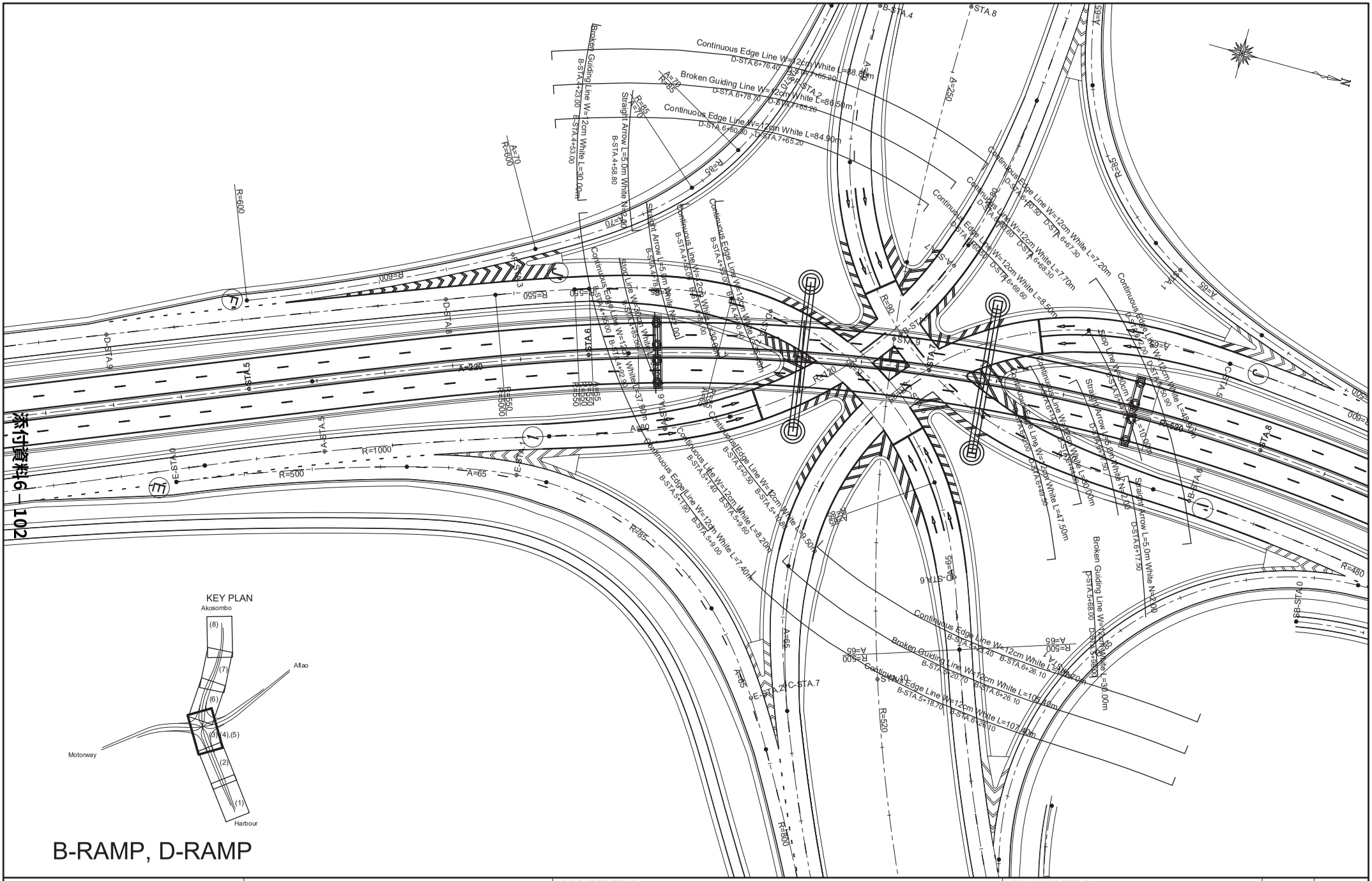


添付資料6－100

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(3)	SCALE:(A1size) 1:500	DRAWING NO. RA-19

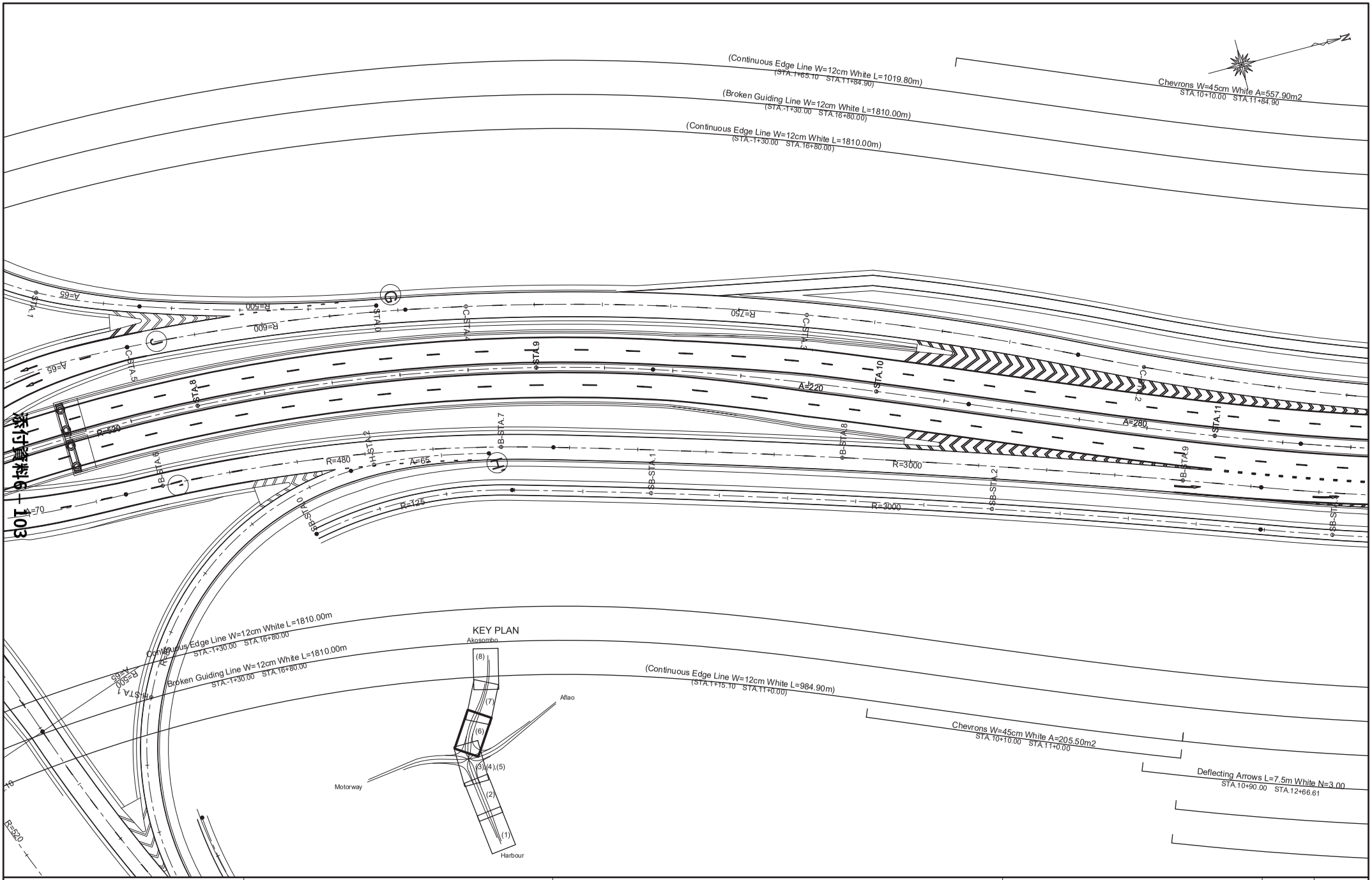


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(4)	SCALE:(A1size) 1:500	DRAWING NO. RA-20

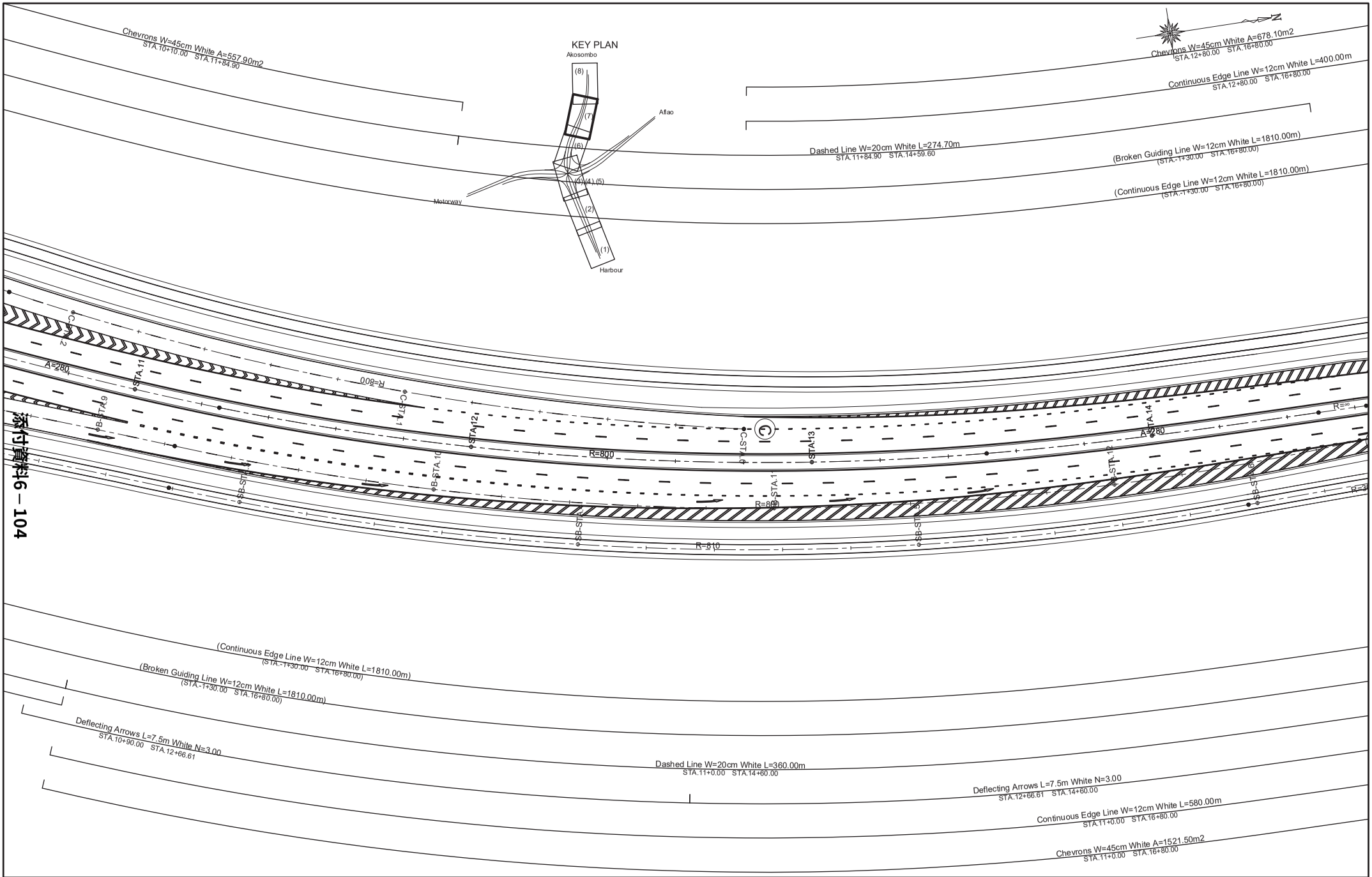


添付資料6－102

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(5)	SCALE:(A1size) 1:500	DRAWING NO. RA-21

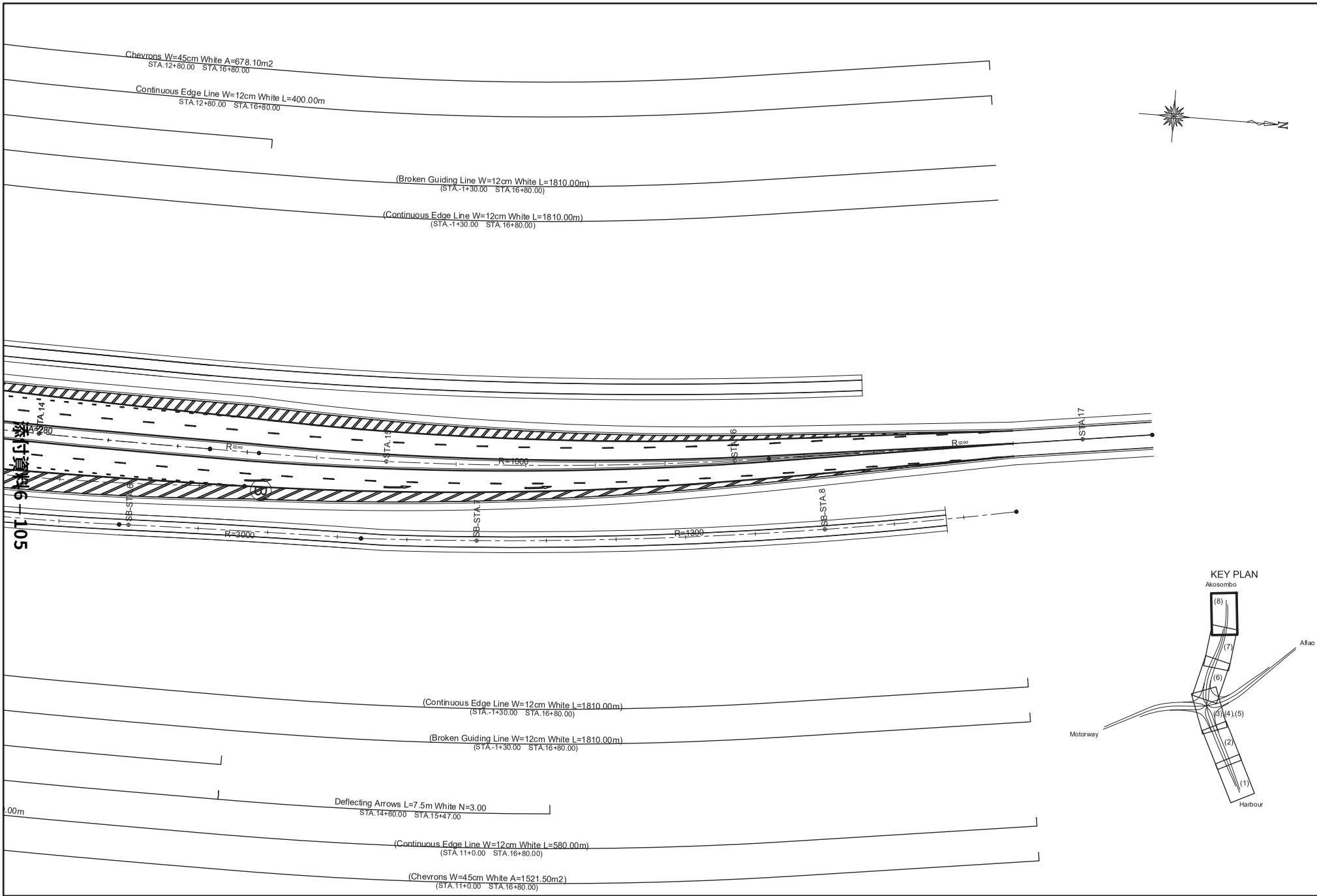


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(6)	SCALE:(A1size) 1:500	DRAWING NO. RA-22



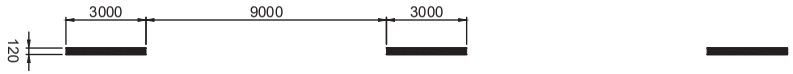
添付資料6－104

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(7)	SCALE:(A1size) 1:500	DRAWING NO. RA-23



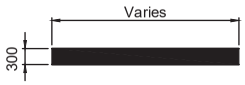
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: LAYOUT OF PAVEMENT MARKINGS(8)	SCALE:(A1size) 1:500	DRAWING NO. RA-24

CONTINUOUS LINE

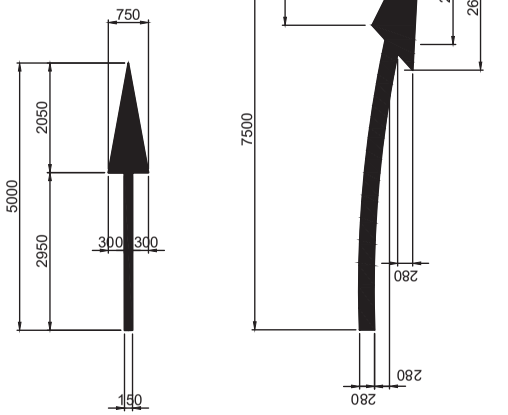


BROKEN GUIDING LINE

DASHED LINE

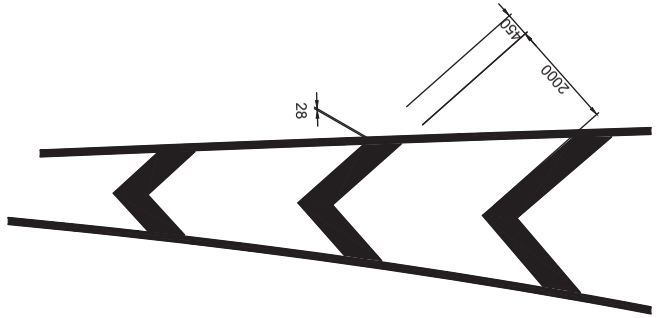


STOP LINE



FOR SPEED < 60km/h FOR SPEED > 60km/h

ARROW MARKINGS



CHEVRONS

SCHEDULE OF DRAINAGE

Continuous Line

NO.	"STARTING STATION"		"ENDING STATION"	SIDE	LENGTH	REMARKS
A-Ramp						
1	6 + 11.7	~	6 + 41.7	-	30.0	
2	6 + 62.5	~	6 + 71.8	-	9.3	
B-Ramp						
1	4 + 55.0	~	4 + 85.0	-	30.0	
2	5 + 1.4	~	5 + 9.6	-	8.2	
C-Ramp						
1	5 + 43.0	~	5 + 73.0	-	30.0	
2	5 + 95.4	~	6 + 3.0	-	7.6	
D-Ramp						
1	6 + 14.0	~	6 + 44.0	-	30.0	
2	6 + 60.6	~	6 + 68.3	-	7.7	
				TOTAL	152.8	

Broken Guding Line

NO.	"STARTING STATION"		"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road						
1	-1 + 30.0	~	16 + 80.0	RIGHT	1810.0	
2	-1 + 30.0	~	16 + 80.0	LEFT	1810.0	
A-Ramp						
1	5 + 64.0	~	6 + 11.7	-	47.7	
2	6 + 82.0	~	7 + 19.0	-	37.0	
B-Ramp						
1	5 + 20.7	~	6 + 26.1	-	105.4	
C-Ramp						
1	4 + 95.1	~	5 + 43.0	-	47.9	
2	6 + 13.2	~	6 + 62.0	-	48.8	
D-Ramp						
1	6 + 78.7	~	7 + 65.2	-	86.5	
				TOTAL	3993.3	

Chevrons

NO.	"STARTING STATION"		"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road						
1	1 + 15.1	~	2 + 91.0	RIGHT	651.4	
2	1 + 65.1	~	2 + 90.0	LEFT	328.4	
3	10 + 10.0	~	11 + 84.9	LEFT	557.9	
4	10 + 10.0	~	11 + 0.0	RIGHT	205.5	
5	11 + 0.0	~	16 + 80.0	RIGHT	1521.5	
6	12 + 80.0	~	16 + 80.0	LEFT	678.1	
A-Ramp						
1	6 + 28.0	~	6 + 49.0	LEFT	93.0	
2	6 + 40.0	~	6 + 54.4	RIGHT	112.0	
3	6 + 61.0	~	6 + 72.0	LEFT	120.0	
4	6 + 62.7	~	6 + 71.8	RIGHT	52.0	
5	6 + 83.0	~	7 + 2.0	LEFT	88.0	
6	6 + 80.0	~	6 + 95.0	RIGHT	95.0	
C-Ramp						
1	5 + 62.0	~	5 + 82.0	LEFT	123.0	
2	5 + 94.2	~	6 + 3.0	LEFT	129.0	
3	6 + 14.0	~	6 + 38.0	LEFT	150.0	
				TOTAL	4904.8	

Continuous Edge Line

NO.	"STARTING STATION"		"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road						
1	-1 + 30.0	~	16 + 80.0	RIGHT	1810.0	
2	-1 + 30.0	~	16 + 80.0	LEFT	1810.0	
3	1 + 15.1	~	11 + 0.0	RIGHT	984.9	
4	1 + 65.1	~	11 + 84.9	LEFT	1019.8	
5	11 + 0.0	~	16 + 80.0	RIGHT	580.0	
6	12 + 80.0	~	16 + 80.0	LEFT	400.0	
A-Ramp						
1	5 + 64.0	~	6 + 49.8	LEFT	85.8	
2	5 + 64.0	~	6 + 53.4	RIGHT	89.4	
3	5 + 61.1	~	6 + 72.6	LEFT	11.0	
4	5 + 63.5	~	6 + 71.3	RIGHT	8.0	
5	6 + 80.9	~	7 + 19.0	RIGHT	38.1	
6	6 + 83.2	~	7 + 19.0	LEFT	35.8	
B-Ramp						
1	4 + 55.0	~	4 + 90.4	LEFT	35.4	
2	4 + 55.0	~	4 + 92.9	RIGHT	37.9	
3	5 + 0.5	~	4 + 10.8	LEFT	9.5	
4	5 + 1.9	~	5 + 9.0	RIGHT	7.4	
5	5 + 23.4	~	6 + 26.1	LEFT	102.7	
6	5 + 18.7	~	6 + 26.1	RIGHT	107.4	
C-Ramp						
1	4 + 95.1	~	5 + 82.0	LEFT	86.9	
2	4 + 95.1	~	5 + 86.5	RIGHT	91.4	
3	5 + 94.2	~	6 + 3.1	LEFT	8.9	
4	5 + 96.0	~	6 + 3.2	RIGHT	7.4	
5	6 + 14.0	~	6 + 62.0	LEFT	48.0	
6	6 + 12.7	~	6 + 62.0	RIGHT	49.3	
D-Ramp						
1	6 + 2.0	~	6 + 49.5	LEFT	47.5	
2	6 + 2.0	~	6 + 50.9	RIGHT	48.9	
3	6 + 60.5	~	6 + 69.6	LEFT	8.5	
4	6 + 60.5	~	6 + 67.3	RIGHT	7.2	
5	6 + 80.3	~	7 + 65.2	LEFT	84.9	
6	6 + 76.4	~	7 + 65.2	RIGHT	88.8	
				TOTAL	7750.8	

Dashed Line

NO.	"STARTING STATION"		"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road						
1	-1 + 30.0	~	1 + 65.1	LEFT	295.1	
2	-1 + 30.0	~	1 + 15.1	RIGHT	245.1	
3	11 + 0.0	~	14 + 60.0	RIGHT	360.0	
4	11 + 84.9	~	14 + 59.6	LEFT	274.7	
				TOTAL	1174.9	

Straight Arrow

NO.	"STARTING STATION"	"ENDING STATION"	SIDE	NUMBER	REMARKS
A-Ramp					
1	6 + 15.4		LEFT	1.0	
2	6 + 15.4		RIGHT	1.0	
3	6 + 35.4		LEFT	1.0	
4	6 + 35.4		RIGHT	1.0	
B-Ramp					
1	4 + 58.8		LEFT	1.0	
2	4 + 58.8		RIGHT	1.0	
3	4 + 78.8		LEFT	1.0	
4	4 + 78.8		RIGHT	1.0	
C-Ramp					
1	5 + 46.8		LEFT	1.0	
2	5 + 46.8		RIGHT	1.0	
3	5 + 66.8		LEFT	1.0	
4	5 + 66.8		RIGHT	1.0	
D-Ramp					
1	6 + 17.5		LEFT	1.0	
2	6 + 17.5		RIGHT	1.0	
3	6 + 37.5		LEFT	1.0	
4	6 + 37.5		RIGHT	1.0	
			TOTAL	16.0	

Stop Line

NO.	"STARTING STATION"	"ENDING STATION"	SIDE	LENGTH	REMARKS
A-Ramp					
1	6 + 41.7		-	9.2	
B-Ramp					
1	4 + 85.0		-	9.8	
C-Ramp					
1	5 + 73.0		-	10.0	
D-Ramp					
1	6 + 44.0		-	10.0	
			TOTAL	39.0	

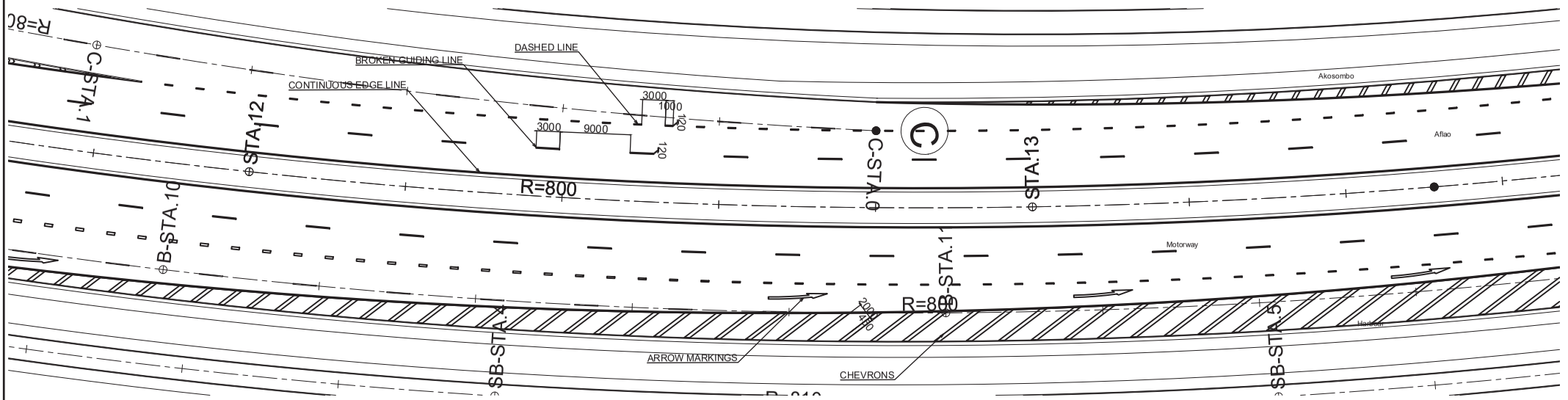
Deflecting Arrows

NO.	"STARTING STATION"		"ENDING STATION"	SIDE	LENGTH	REMARKS
Harbour-Akosombo Road						
1	-1 + 30.0	~	0 + 20.0	LEFT	3.0	
2	10 + 90.0	~	12 + 66.6	RIGHT	3.0	
3	12 + 66.6	~	14 + 60.0	RIGHT	3.0	
4	14 + 60.0	~	15 + 47.0	RIGHT	3.0	
				TOTAL	12.0	

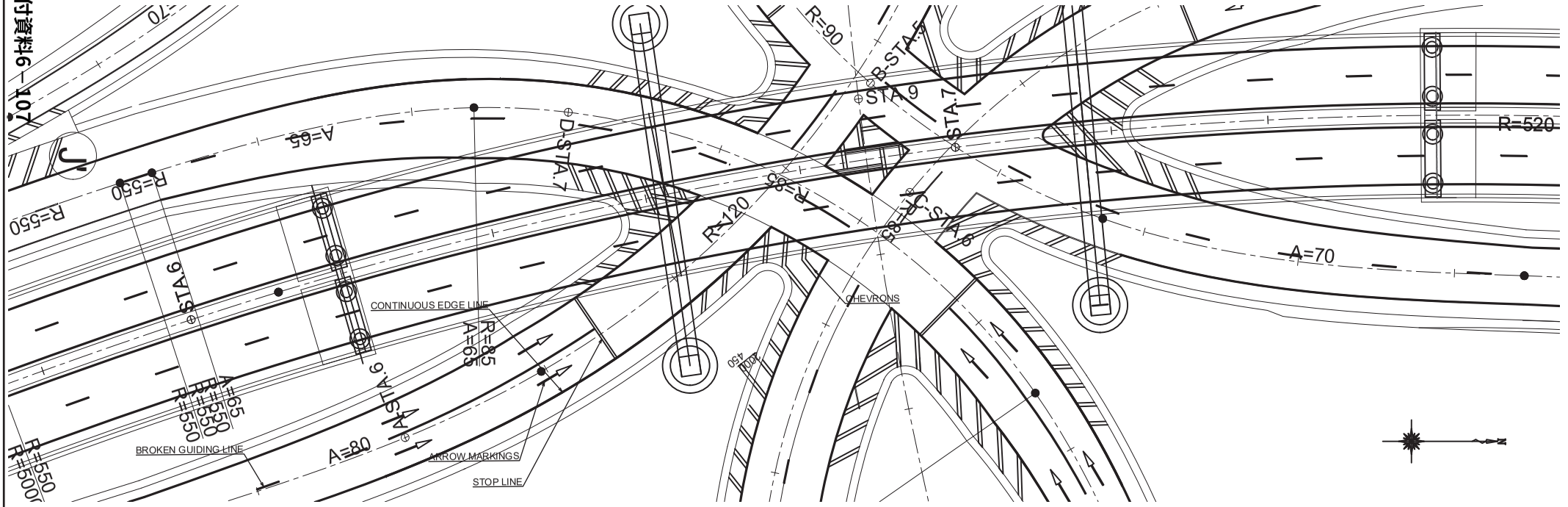
添付資料6－106

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PAVEMENT MARKINGS(1)	SCALE:(A1size) 1:50	DRAWING NO. RA-25

AT RAMP SECTION

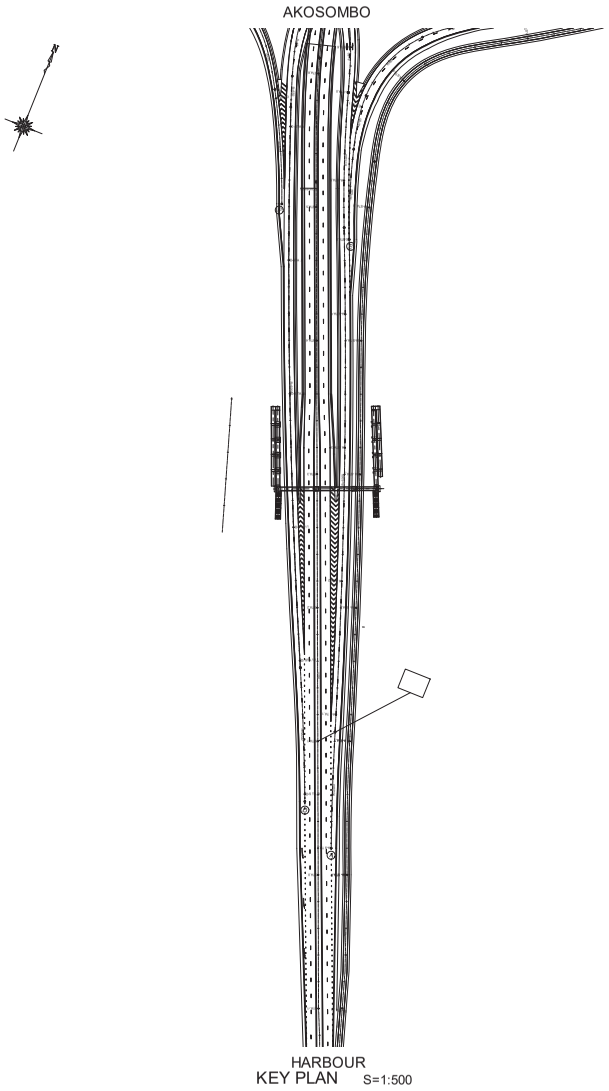


AT INTERSECTIONS

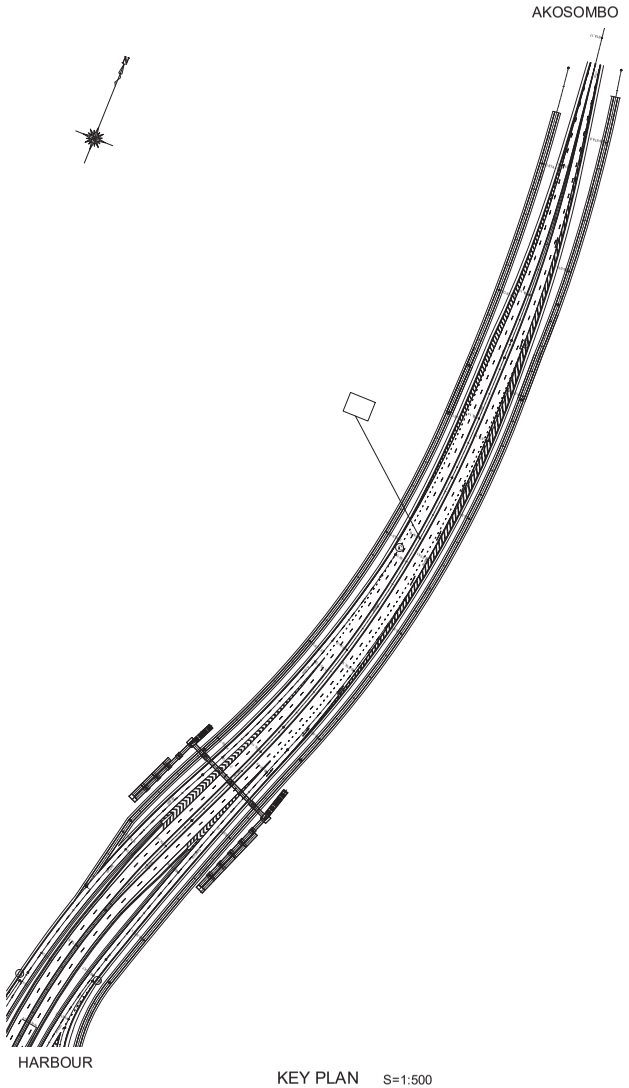


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: PAVEMENT MARKINGS(2)	SCALE:(A1size) 1:250	DRAWING NO. RA-26

TYPICAL TRAFFIC SIGNS(1)



KEY PLAN S=1:500



KEY PLAN S=1:500

添付資料6－108

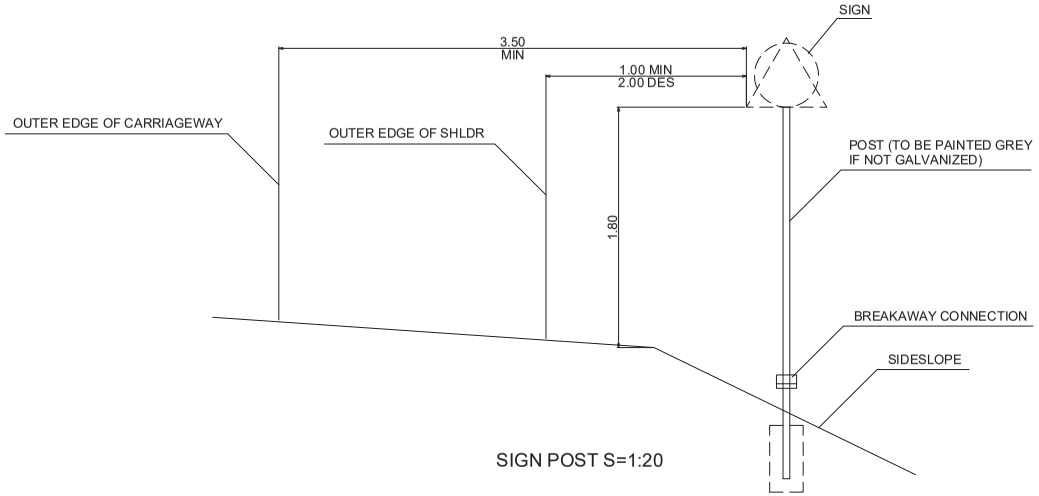
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TYPICAL TRAFFIC SIGNS(1)	SCALE:(A1size) 1:500	DRAWING NO. RA-27

TYPICAL TRAFFIC SIGNS(2)

82

MAX SPEED LIMIT AS SHOWN

MAX SPEED LIMIT AS SHOWN(80km/h)				
NO.	STATION	SIDE	NUMBER	REMARKS
Harbour-Akosombo Road				
1	1 + 0.0	-	1.0	
2	13 + 0.0	-	1.0	
	TOTAL		2.0	

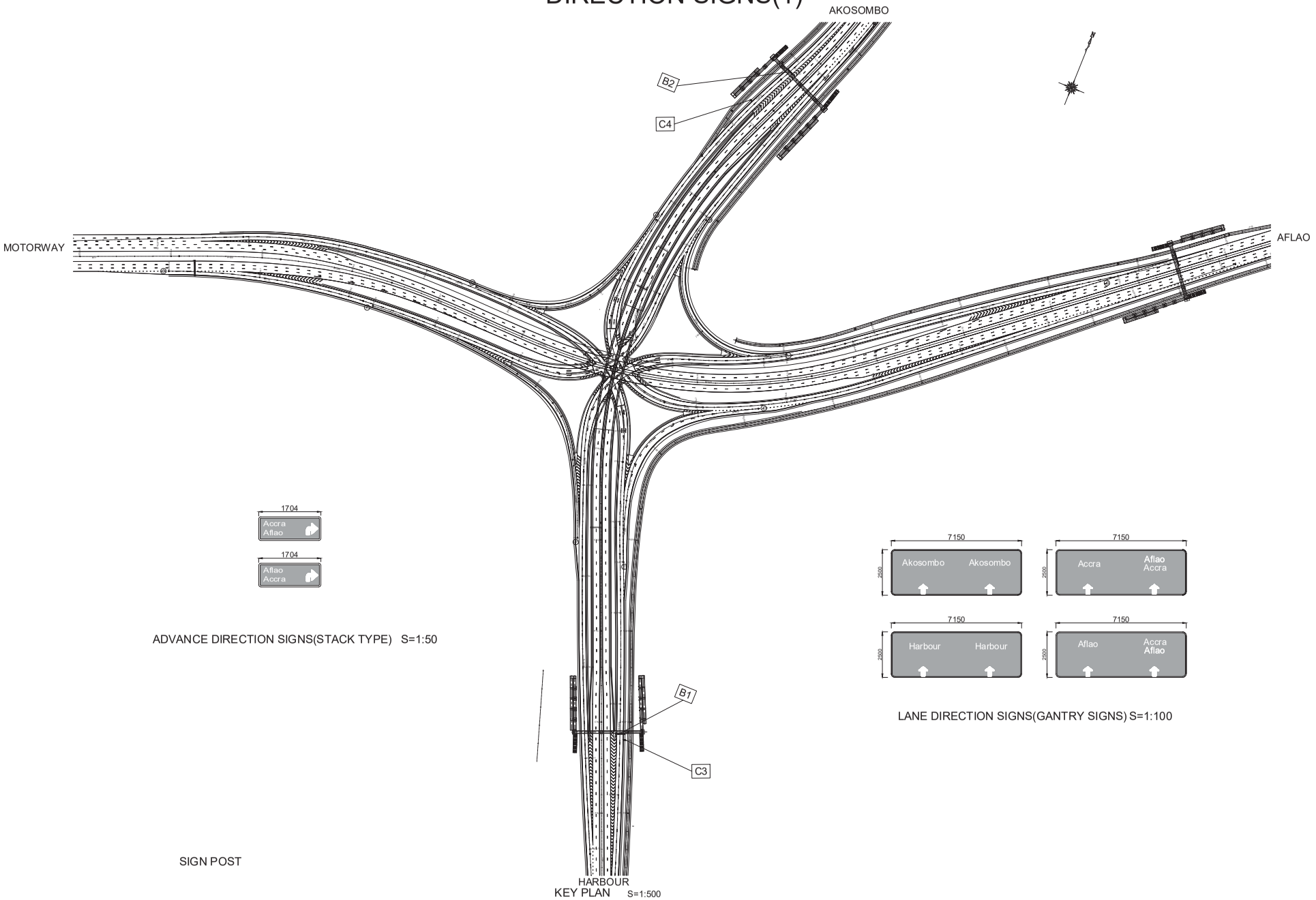


SIGN POST S=1:20

添付資料6－109

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TYPICAL TRAFFIC SIGNS(2)	SCALE:(A1size) AS SHOWN DRAWING NO. RA-28

DIRECTION SIGNS(1)



KEY PLAN S=1:500

ADVANCE DIRECTION SIGNS(STACK TYPE) S=1:50

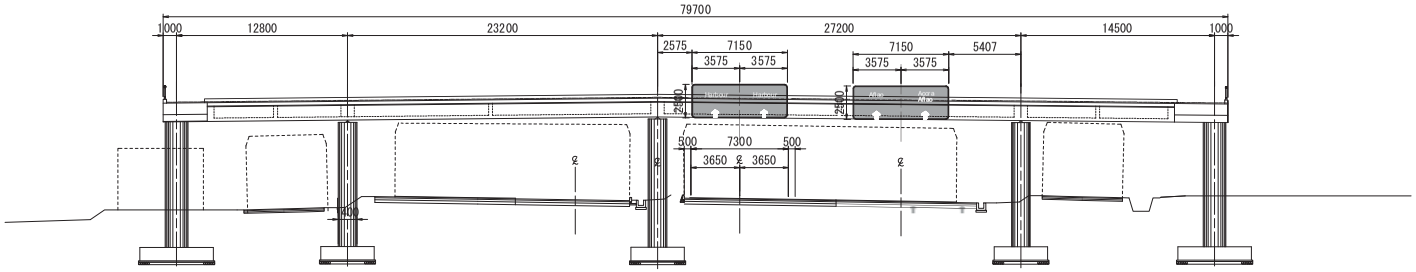
SIGN POST

LANE DIRECTION SIGNS(GANTRY SIGNS) S=1:100

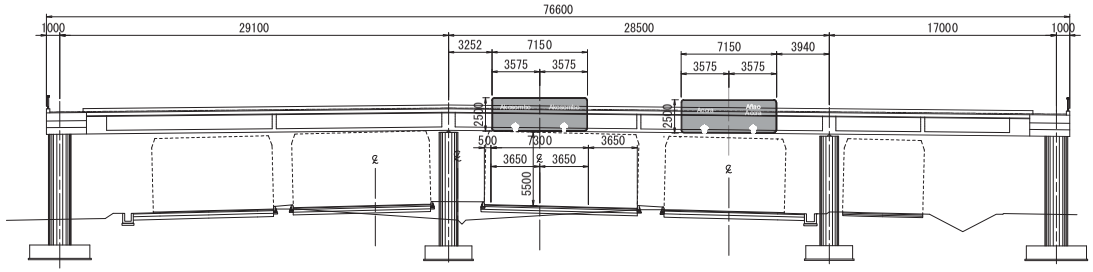
添付資料6－110

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DIRECTION SIGNS(1)	SCALE:(A1size) 1:500	DRAWING NO. RA-29

DIRECTION SIGNS(2)



Harbour-Akosombo_No.10+65 B2



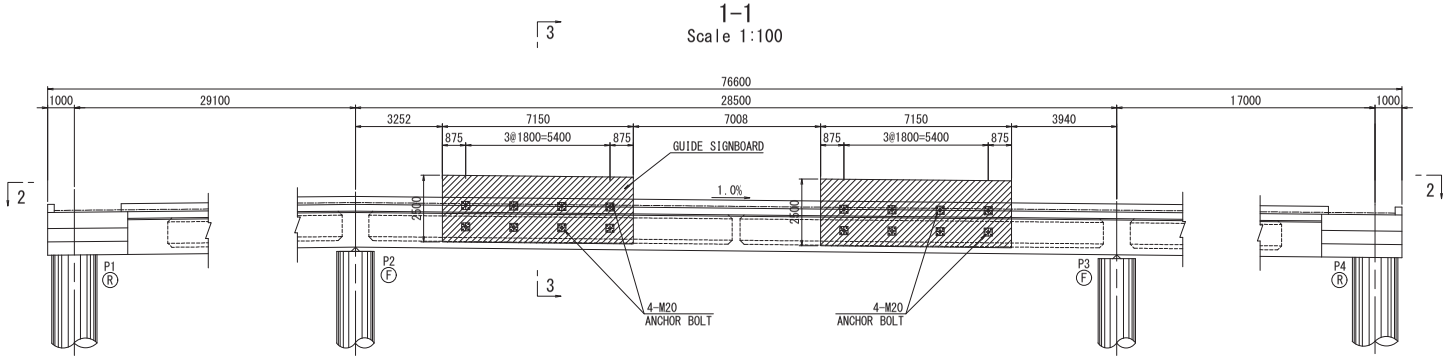
Harbour-Akosombo_No.2+89 B1

添付資料6－111

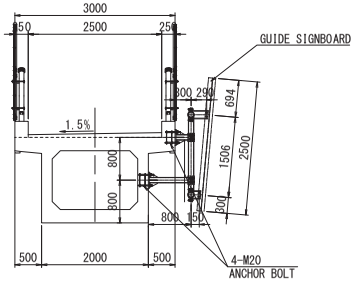
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DIRECTION SIGNS(2)	SCALE:(A1size) 1:200	DRAWING NO. RA-30

ANCHOR ARRANGEMENT OF GUIDE SIGN BOARD
HARBOUR ROAD STA. 2+90.00

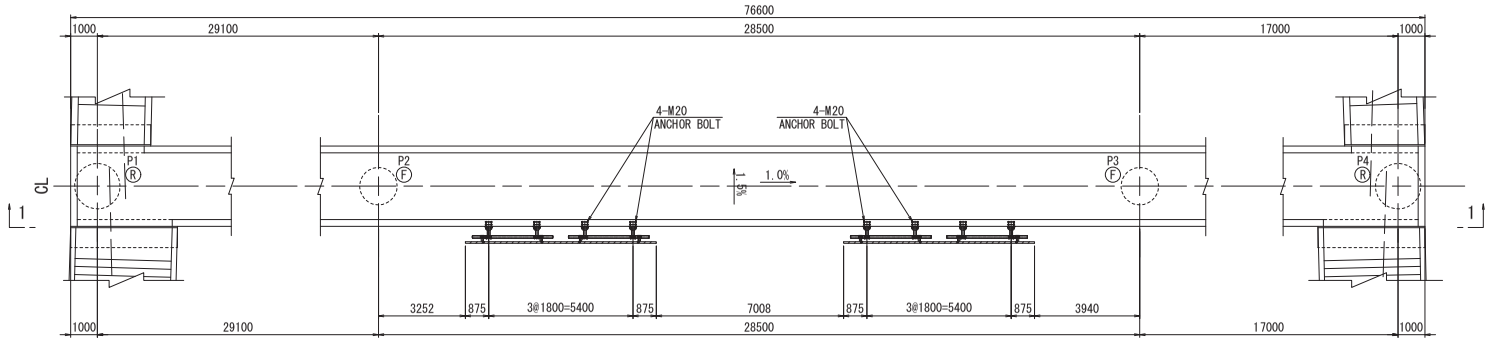
SIDE VIEW
1-1
Scale 1:100



CROSS SECTION
3-3
Scale 1:50



PLAN
2-2
Scale 1:100



MATERIAL LIST PER SET

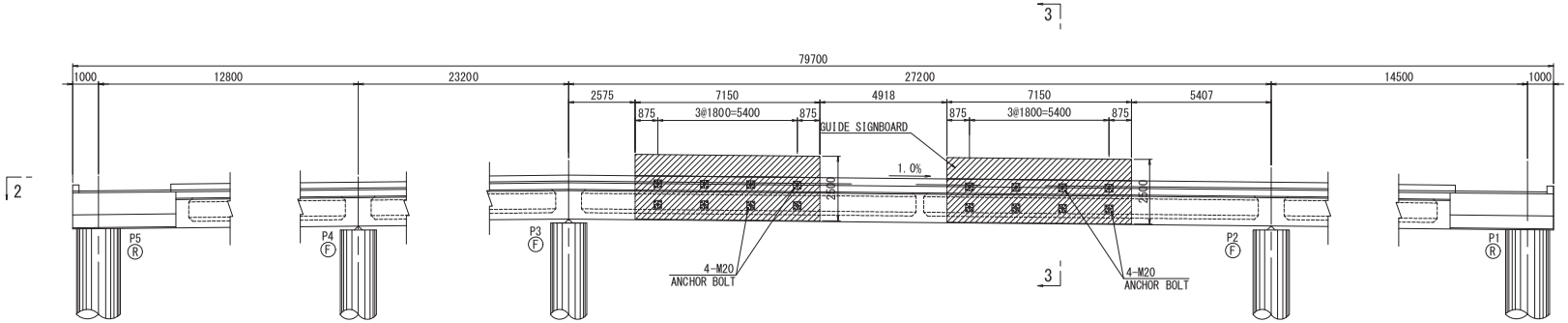
KIND	DIMENSION (mm)		WEIGHT (kg)	NUMBER	TOTAL WEIGHT	NOTE
SS	BOLT	M20×280 (1W, 2N)	———	4	———	ANCHOR BOLT
SS	FB	50×4.5×250	0.44	8	3.5	ANCHOR PLATE

添付資料6－112

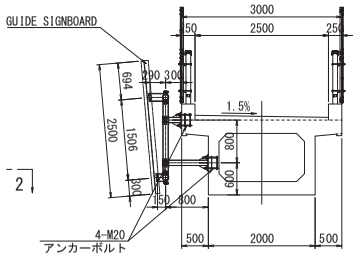
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DIRECTION SIGNS(3) ANCHOR ARRANGEMENT OF GUIDE SIGN BOARD HARBOUR ROAD STA.2+90.00	SCALE:(A1size) AS SHOWN	DRAWING NO. RA-31

ANCHOR ARRANGEMENT OF GUIDE SIGN BOARD
AKOSOMBO ROAD STA.10+65.00

SIDE VIEW
1-1
Scale 1:100



CROSS SECTION
3-3
Scale 1:50

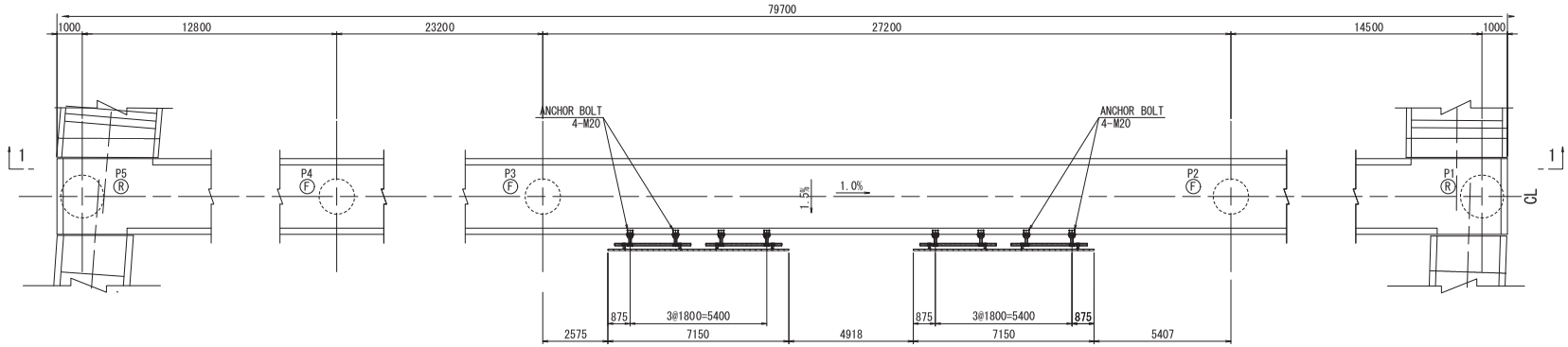


MATERIAL LIST

PER SET

KIND	DIMENSION (mm)		WEIGHT (kg)	NUMBER	TOTAL WEIGHT	NOTE
SS	BOLT	M20×280 (1W, 2N)	——	4	——	ANCHOR BOLT
SS	FB	50×4.5×250	0.44	8	3.5	ANCHOR PLATE

PLAN
2-2
Scale 1:100

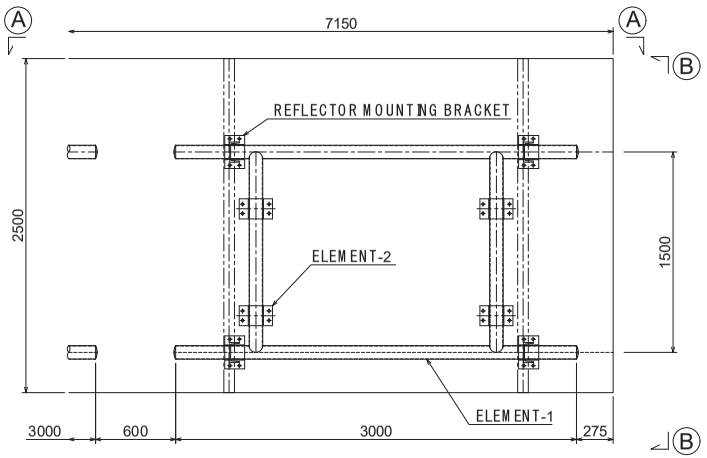


添付資料6－113

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DIRECTION SIGNS(4) ANCHOR ARRANGEMENT OF GUIDE SIGN BOARD AKOSOMBO ROAD STA.10+65.00	SCALE:(A1size) AS SHOWN	DRAWING NO. RA-32

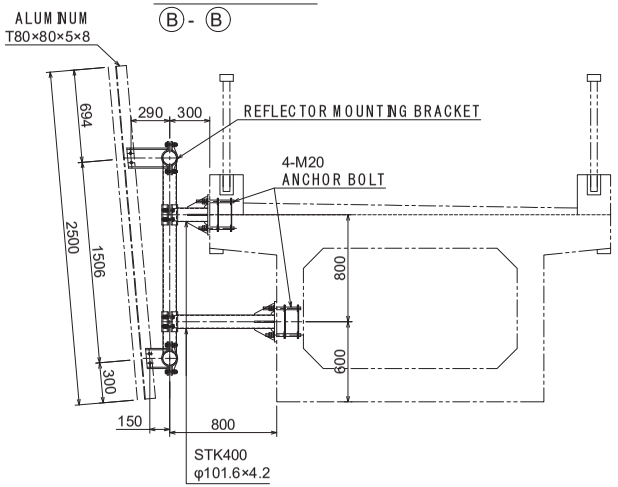
OV SUPPORT TYPE GUIDE SIGN BOARD(REFLECTION TYPE)
STRUCTURAL DRAWING S=1:20
PEDESTRAIN BRIDGE ANCILLARIES

FRONT VIEW



SIDE VIEW

Ⓑ - Ⓑ



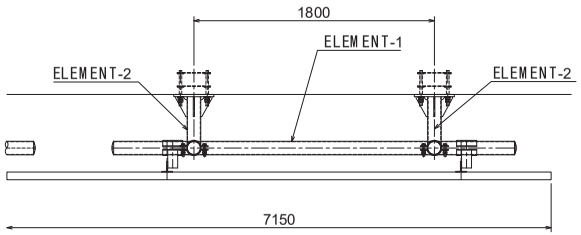
MATERIAL LIST

KIND		DIMENSION mm	WEIGHT kg	NUMBER	TOTAL WEIGHT	NOTE
STK	Pipe	φ101.6×4.2×290	2.93	4	11.7	POST
STK	Pipe	φ101.6×4.2×790	7.98	4	31.9	POST
SS	PL	300×16×300	11.30	8	90.4	BASE PL
SS	PL	85×9×150	0.90	32	28.8	RIB PL
SS	PL	150×9×340	3.60	16	57.6	BAND:A
SS	PL	40×4.5×40	0.06	32	1.9	RIB PL
STK	Pipe	φ101.6×3.2×3000	23.28	4	93.1	BEAM
STK	Pipe	φ101.6×3.2×1500	11.64	4	46.6	TIE BEAM
SS	PL	φ105×2.3	0.16	8	1.3	CAP PL
SS	PL	150×9×340	3.60	16	57.6	BAND:B
SS	PL	40×4.5×40	0.06	32	1.9	RIB PL
SS	C	150×75×6.5×10×165	3.07	4	12.3	PIECE
SS	C	150×75×6.5×10×305	5.67	4	22.7	PIECE
	BOLT	M16×80 2W,2N	——	32	——	BAND:A
	BOLT	M16×80 2W,2N	——	32	——	BAND:B
	BOLT	M16×60 2W,2N	——	16	——	PIECE
			TOTAL		457.8	

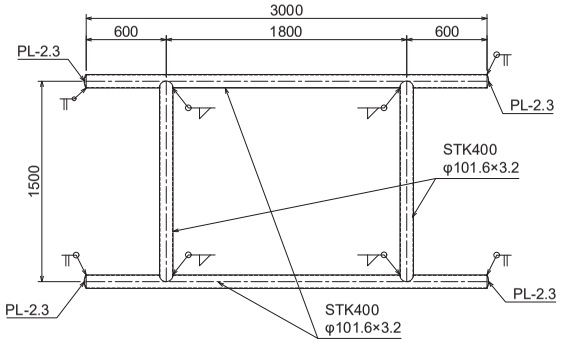
CAUTION
As a standard without special mention, steel pipe is STK400
,steel plate and mold steel is SS400.
The surface treatment of the pillars is due to JIS H 8641 hot plating.

PLAN

Ⓐ - Ⓐ



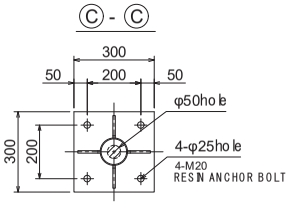
ELEMENT-1

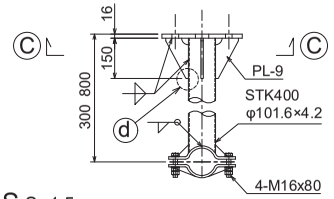


ELEMENT-2 DETAILS

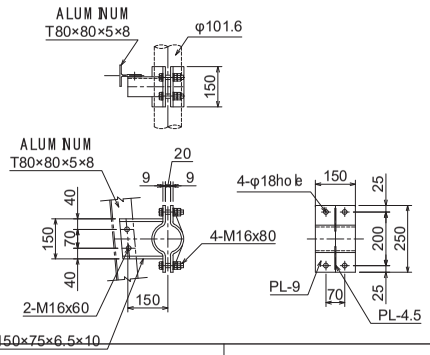
S=1:10

Ⓒ - Ⓒ

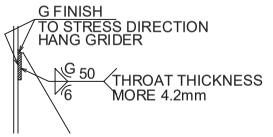


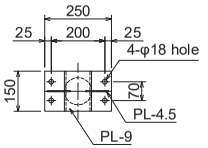


REFLECTOR MOUNTING BRACKET S=1:10



ⓓSECTION DETAILS S=1:5





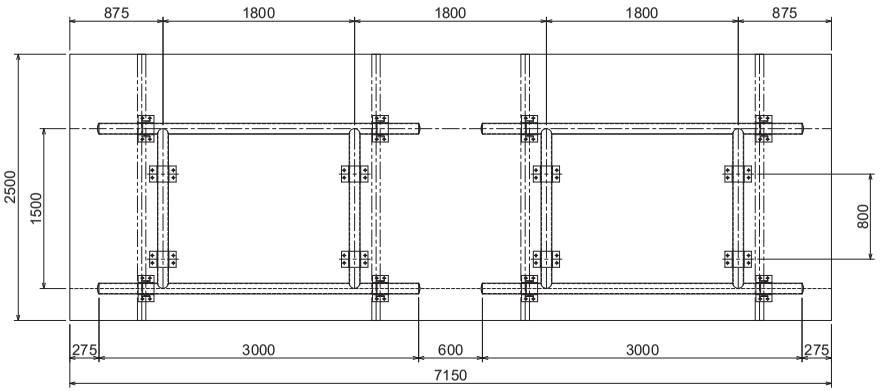
添付資料6－114

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DIRECTION SIGNS(5) OV SUPPORT TYPE GUIDE SIGN BOARD (REFLECTION TYPE) STRUCTURAL DRAWING PEDESTRAIN BRIDGE ANCILLARIES	SCALE:(A1size) 1:500 DRAWING NO. RA-33

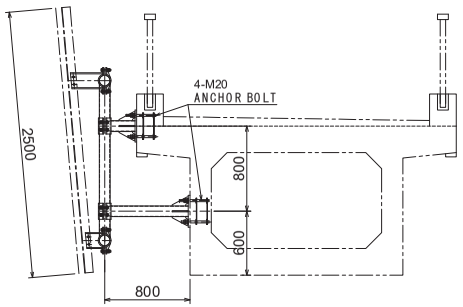
OV SUPPORT TYPE GUIDE SIGN BOARD(REFLECTION TYPE)
MOUNTING BRACKET LAYOUT DRAWING S=1:25
PEDESTRAIN BRIDGE ANCILLARIES

2500×7150

FRONT VIEW



SIDE VIEW

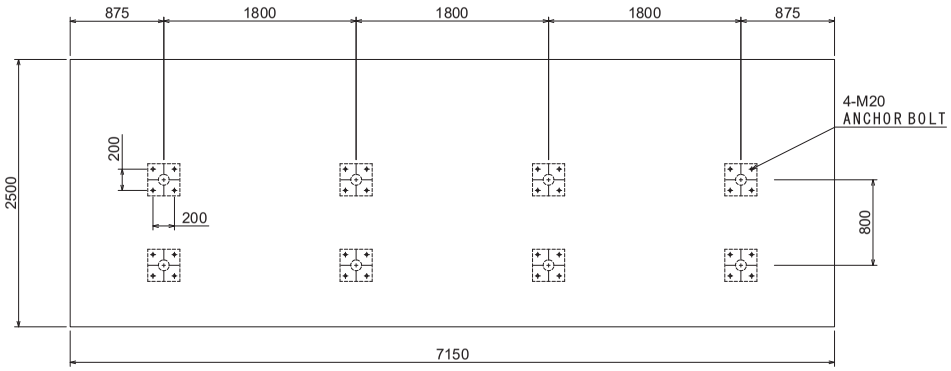


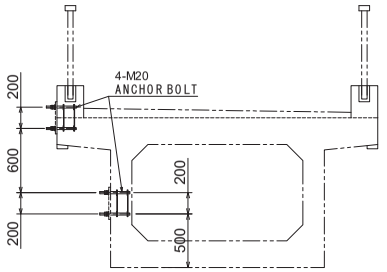
添付資料6－115

注記 縮尺　判　拡大時 GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DIRECTION SIGNS(6) OV SUPPORT TYPE GUIDE SIGN BOARD(REFLECTION TYPE) MOUNTING BRACKET LAYOUT DRAWING PEDESTRAIN BRIDGE ANCILLARIES	SCALE:(A1size) AS SHOWN	DRAWING NO. RA-34

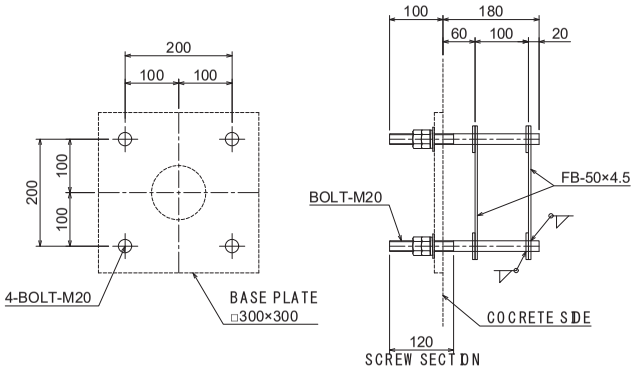
OV SUPPORT TYPE GUIDE SIGN BOARD(REFLECTION TYPE)
ANCHOR BOLT LAYOUT DRAWING S=1:25
PEDESTRAIN BRIDGE ANCILLARIES

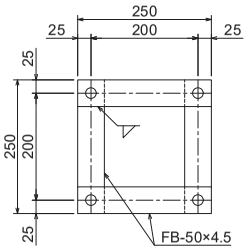
2500×7150





ANCHOR BOLT S=1:5





MATERIAL LIST

FOR 1 SET

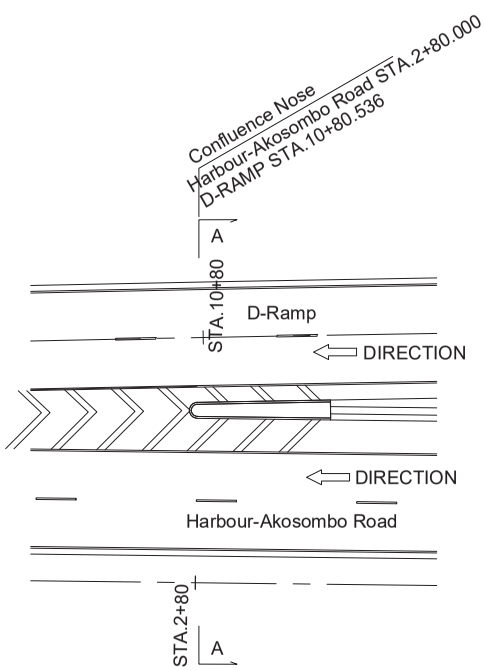
KIND	DIMENSION mm		WEIGHT kg	NUMBER	TOTAL WEIGHT	NOTE
SS	BOLT	M20×280 1W,2N	——	4	——	ANCHOR BOLT
SS	FB	50×4.5×250	0.44	8	3.5	ANCHOR FLAME

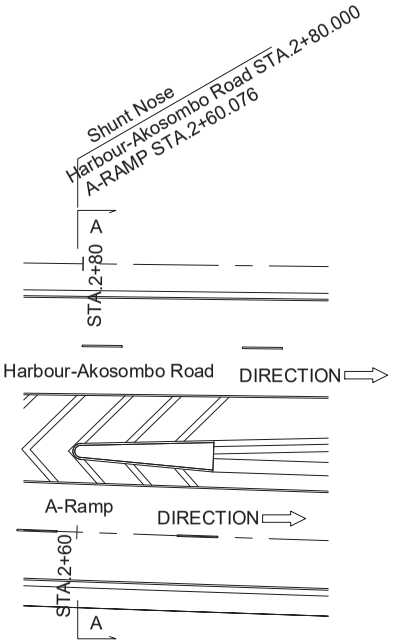
CAUTION
1 The surface treatment of the pillars is due to JIS H 8641 hot plating.

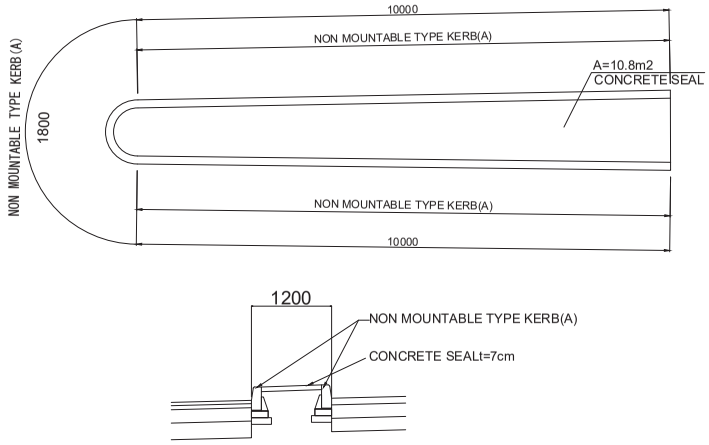
添付資料6－116

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DIRECTION SIGNS(7) OV SUPPORT TYPE GUIDE SIGN BOARD(REFLECTION TYPE) ANCHOR BOLT LAYOUT DRAWING PEDESTRAIN BRIDGE ANCILLARIES	SCALE:(A1size) AS SHOWN	DRAWING NO. RA-35

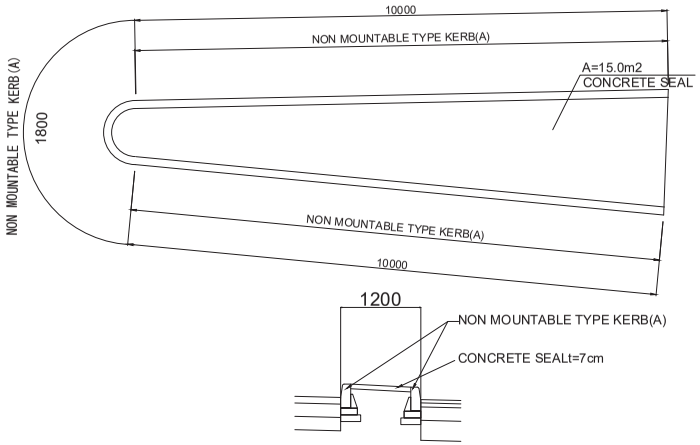
DETAIL OF NOSE(1)
Harbour SECTION







STA.2+80 Confluence Nose
A - A SECTION

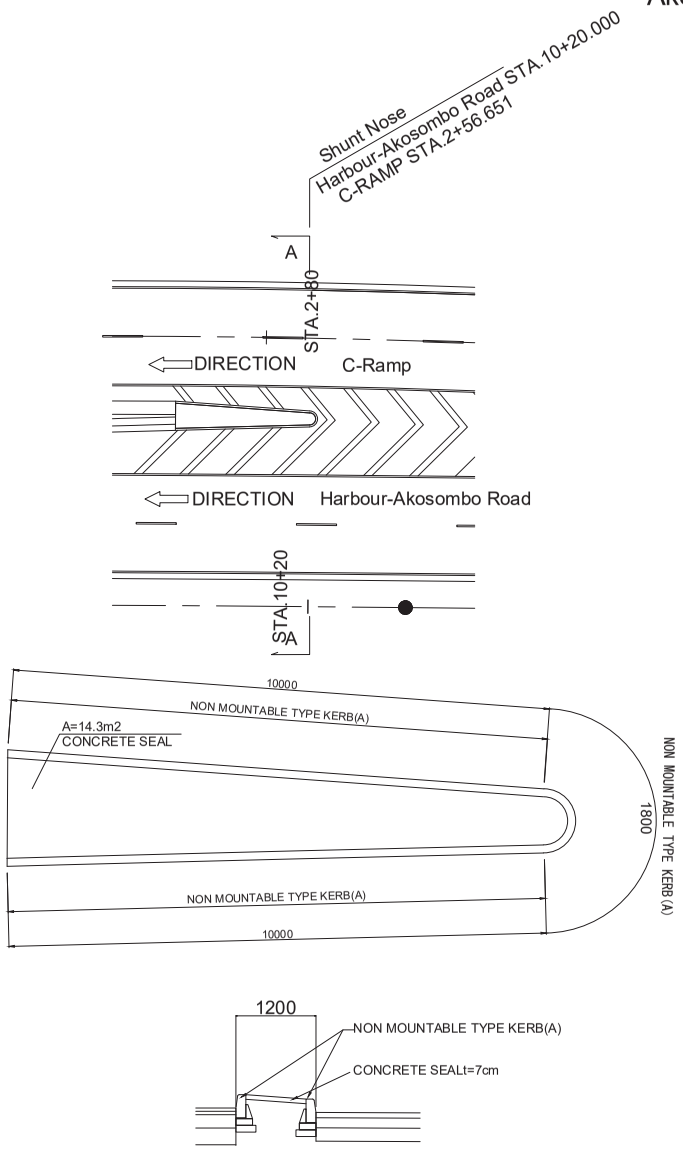


STA.2+80 Shunt Nose
A - A SECTION

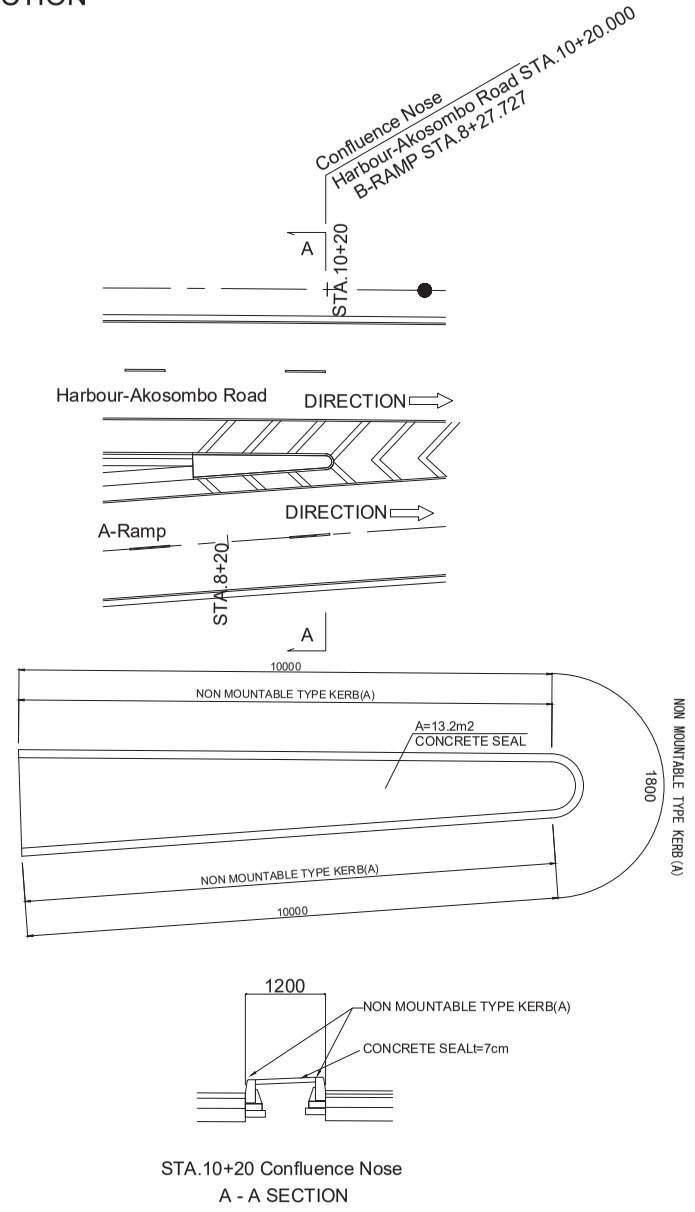
添付資料6－117

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF NOSE(1)	SCALE:(A1size) AS SHOWN	DRAWING NO. RA-36

DETAIL OF NOSE(2)
Akosombo SECTION



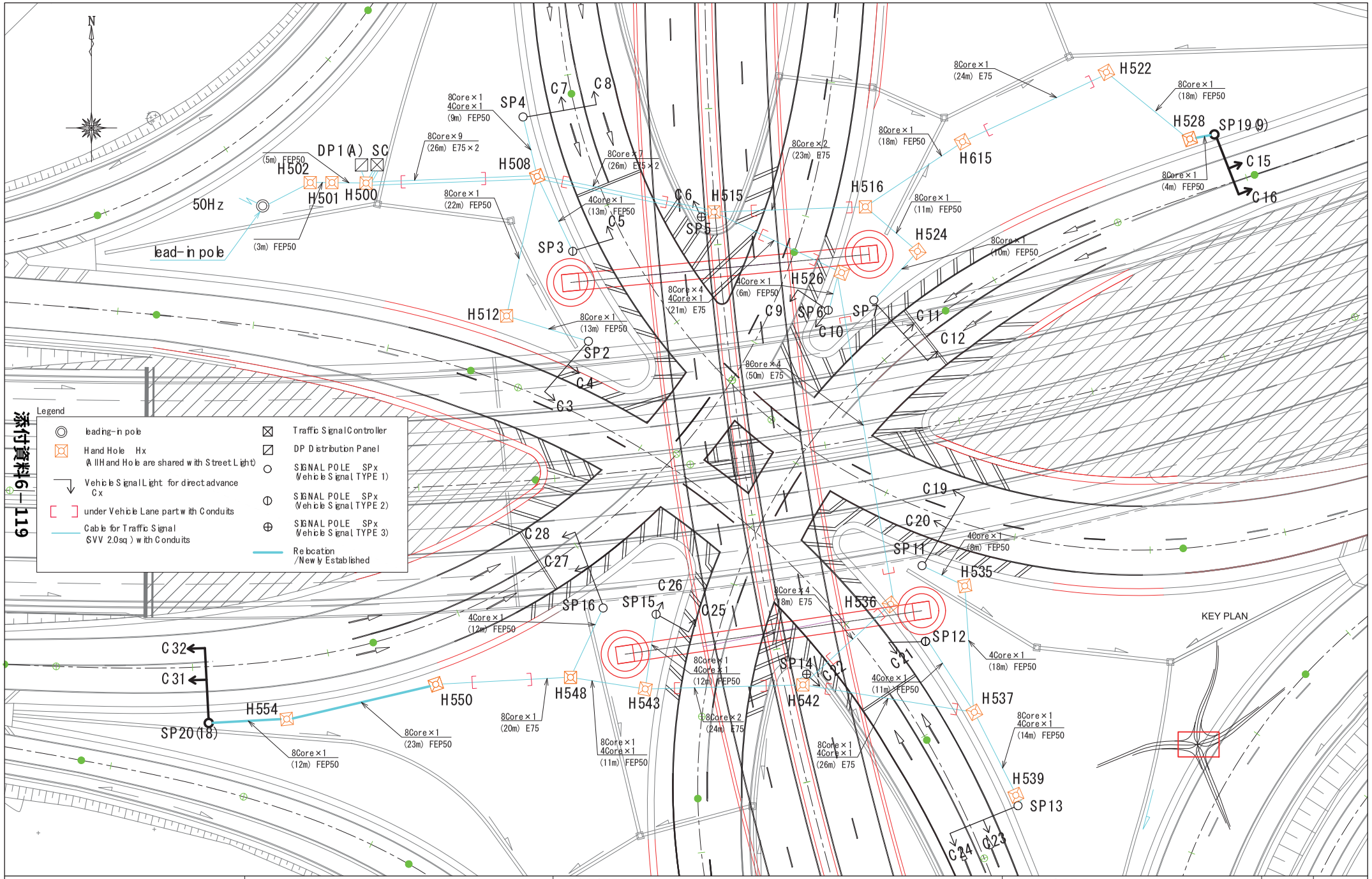
STA.10+20 Shunt Nose
A - A SECTION



STA.10+20 Confluence Nose
A - A SECTION

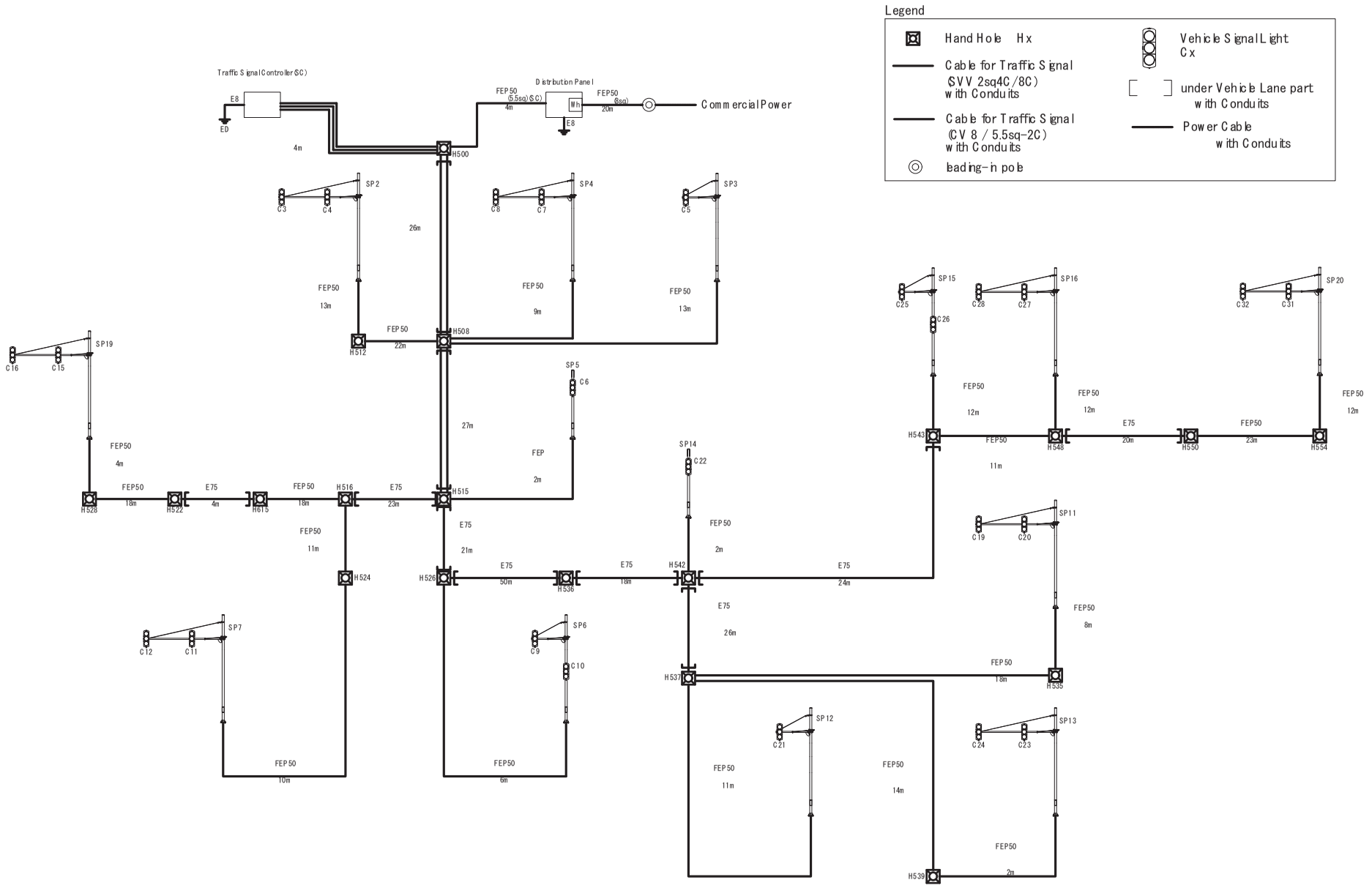
添付資料6－118

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: DETAIL OF NOSE(2)	SCALE:(A1size) AS SHOWN	DRAWING NO. RA-37

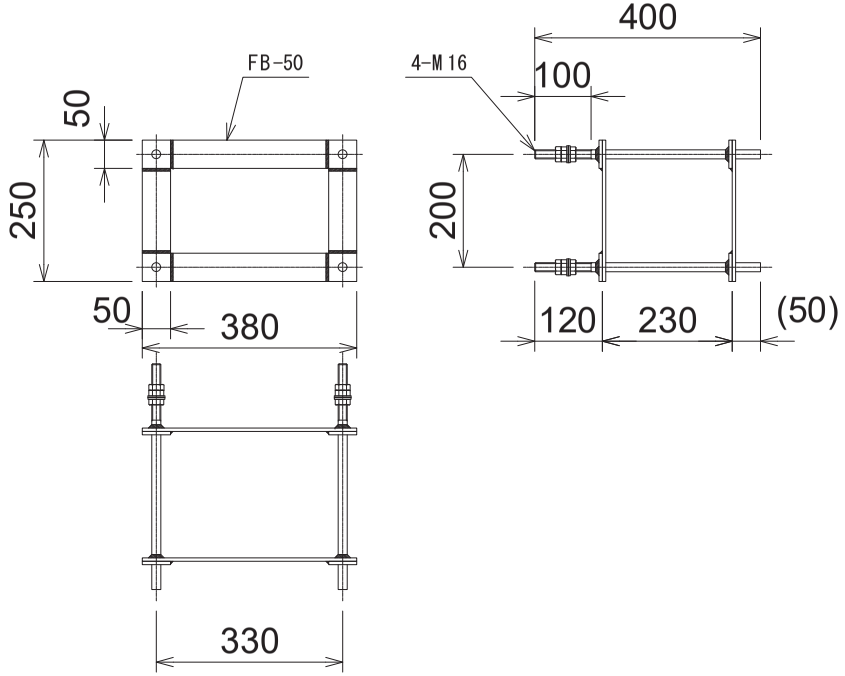


添付資料6-119

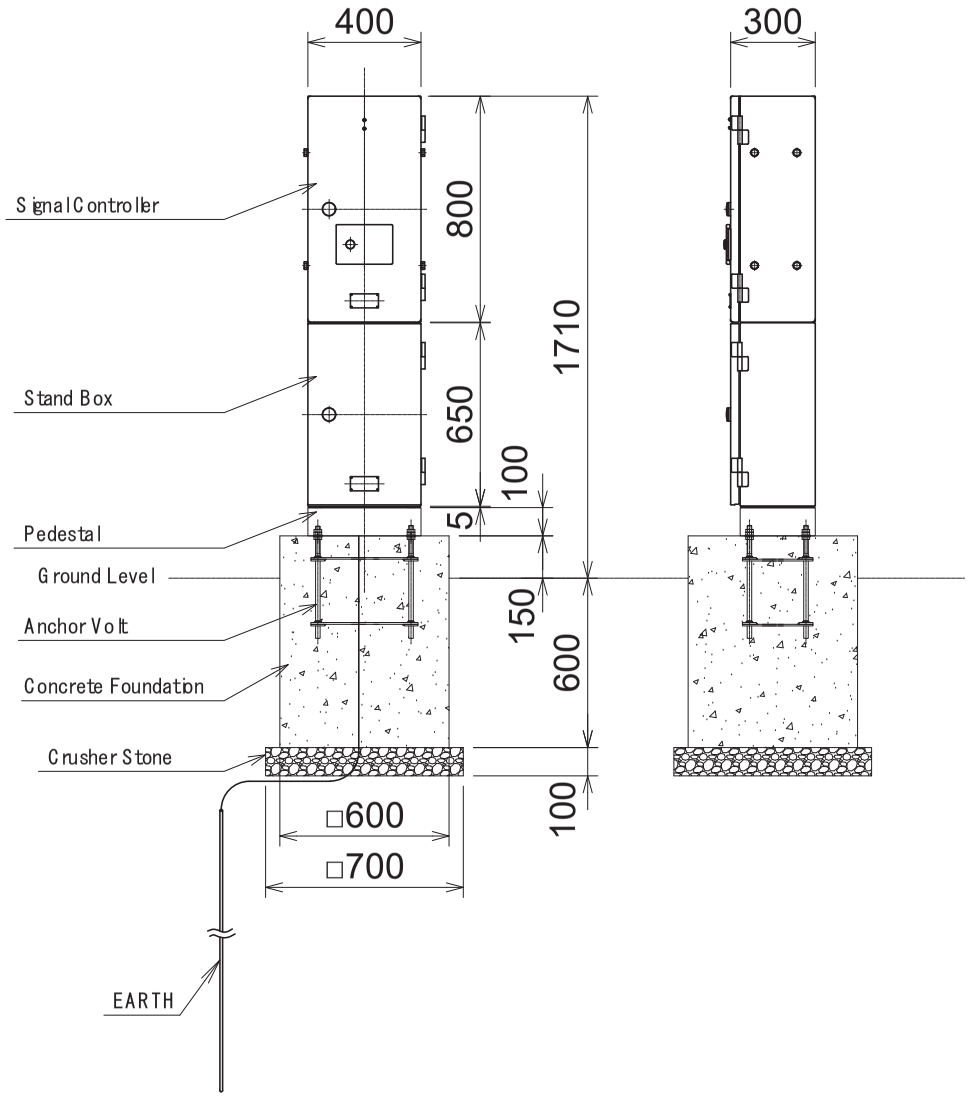
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(1) LAYOUT PLAN OF TRAFFIC SIGNAL LIGHT (PHASE 2)	SCALE:(A1size) DRAWING NO. SL-01



GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(2) WIRING PLAN OF TRAFFIC SIGNAL LIGHT (PHASE 2)	SCALE:(A1size)	DRAWING NO. SL-02

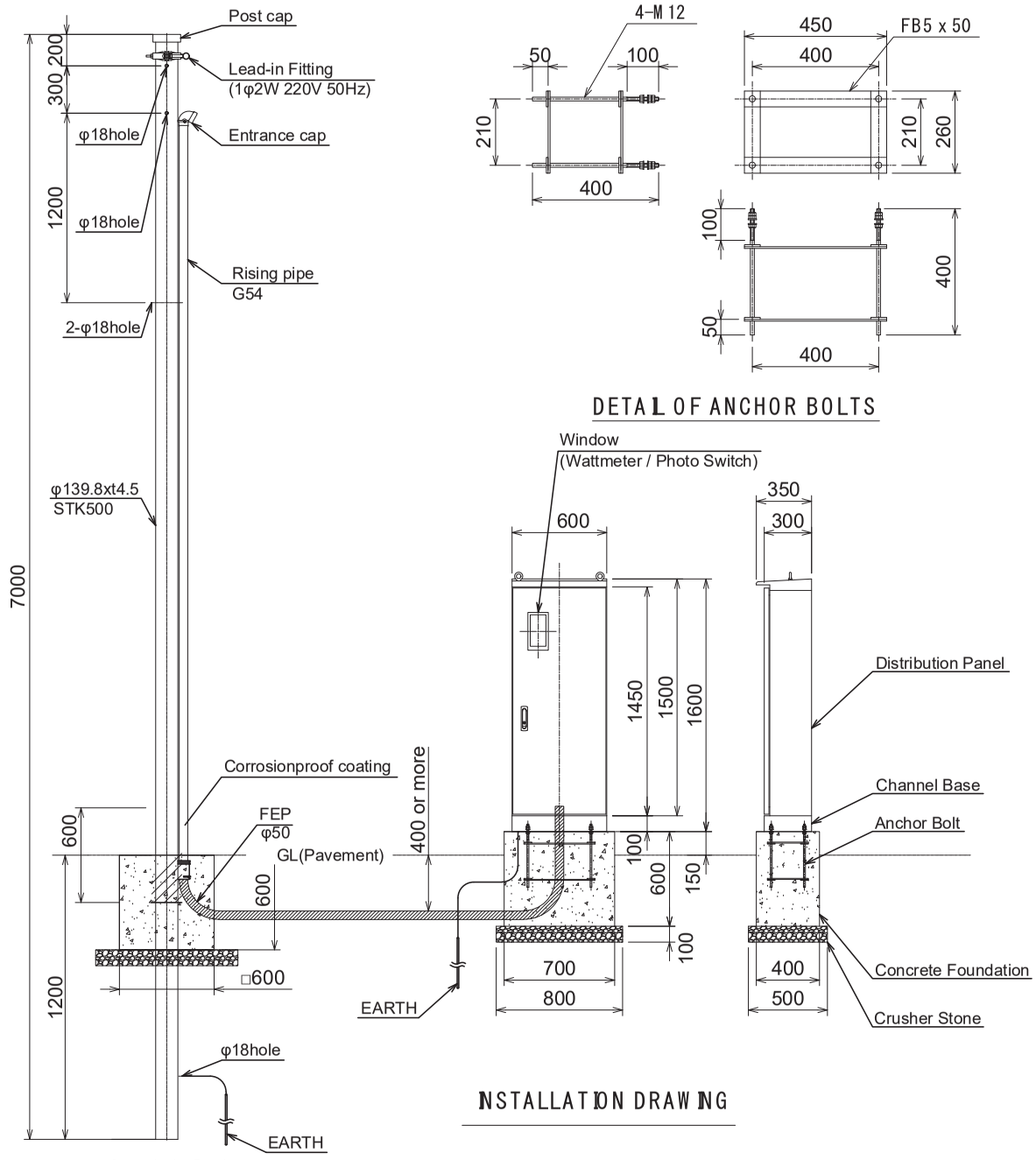


DETAIL OF ANCHOR BOLTS



INSTALLATION DRAWING

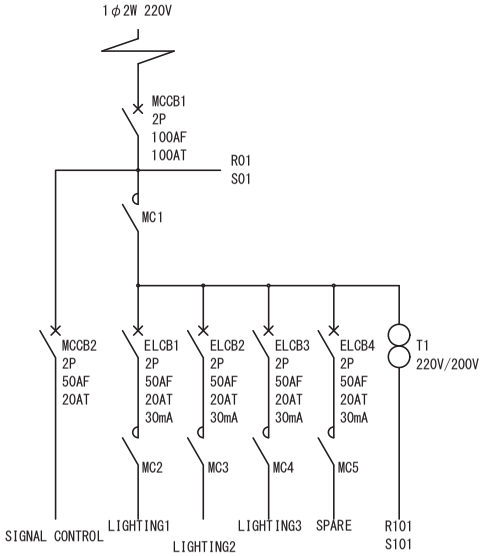
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(3) INSTALLATION DRAWING OF TRAFFIC SIGNAL CONTROLLER	SCALE:(A1size)	DRAWING NO. SL-03



DETAIL OF ANCHOR BOLTS

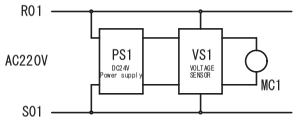
INSTALLATION DRAWING

SINGLE CIRCUIT

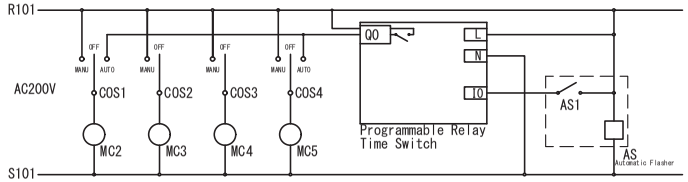


(For Underpass)

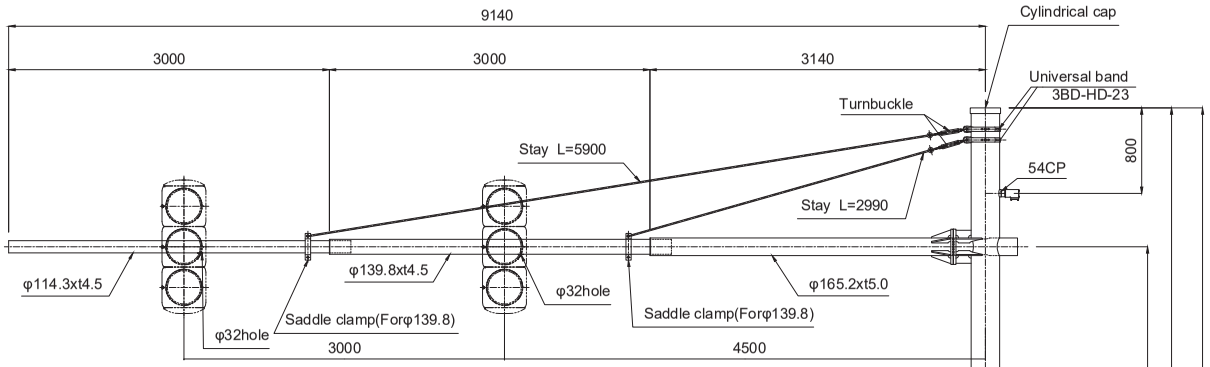
VOLTAGE MONITOR CIRCUIT

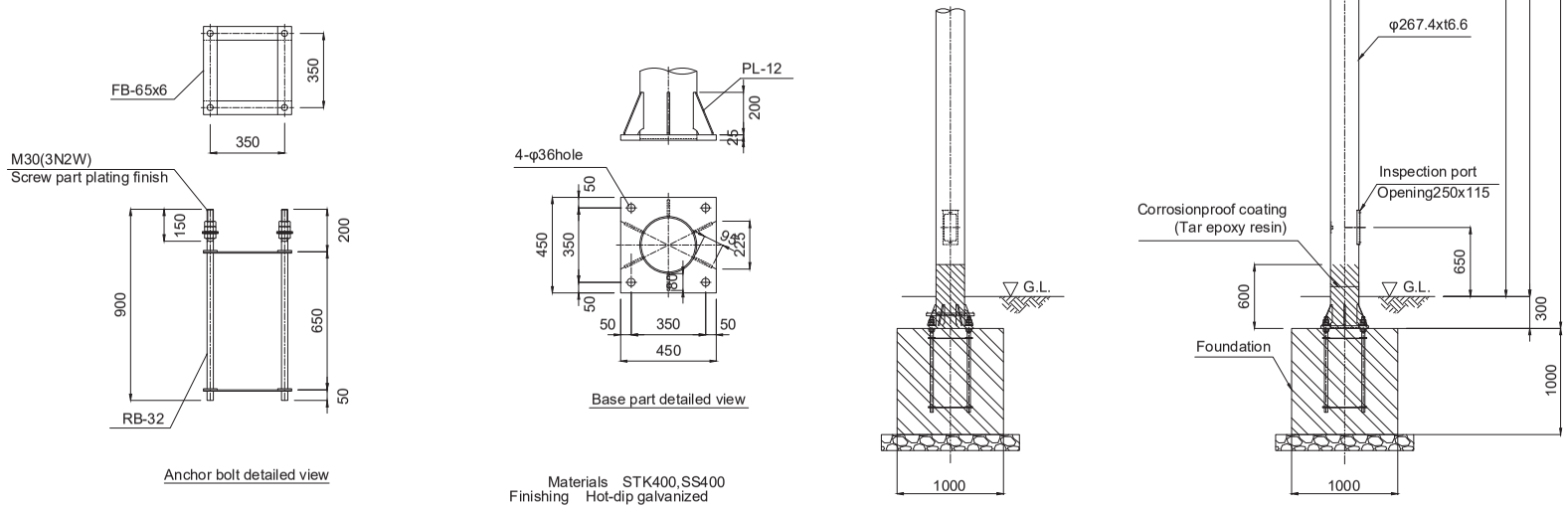


CONTROL CIRCUIT

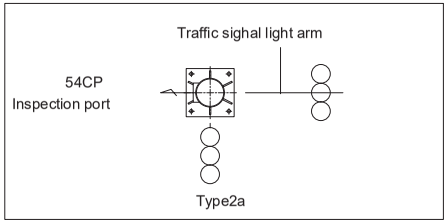


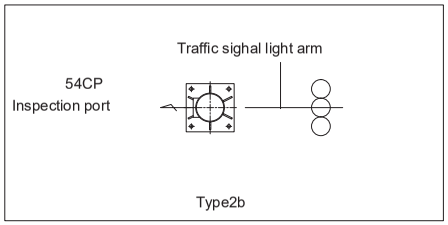
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(4) INSTALLATION DRAWING OF DISTRIBUTION PANEL	SCALE:(A1size)	DRAWING NO. SL-04

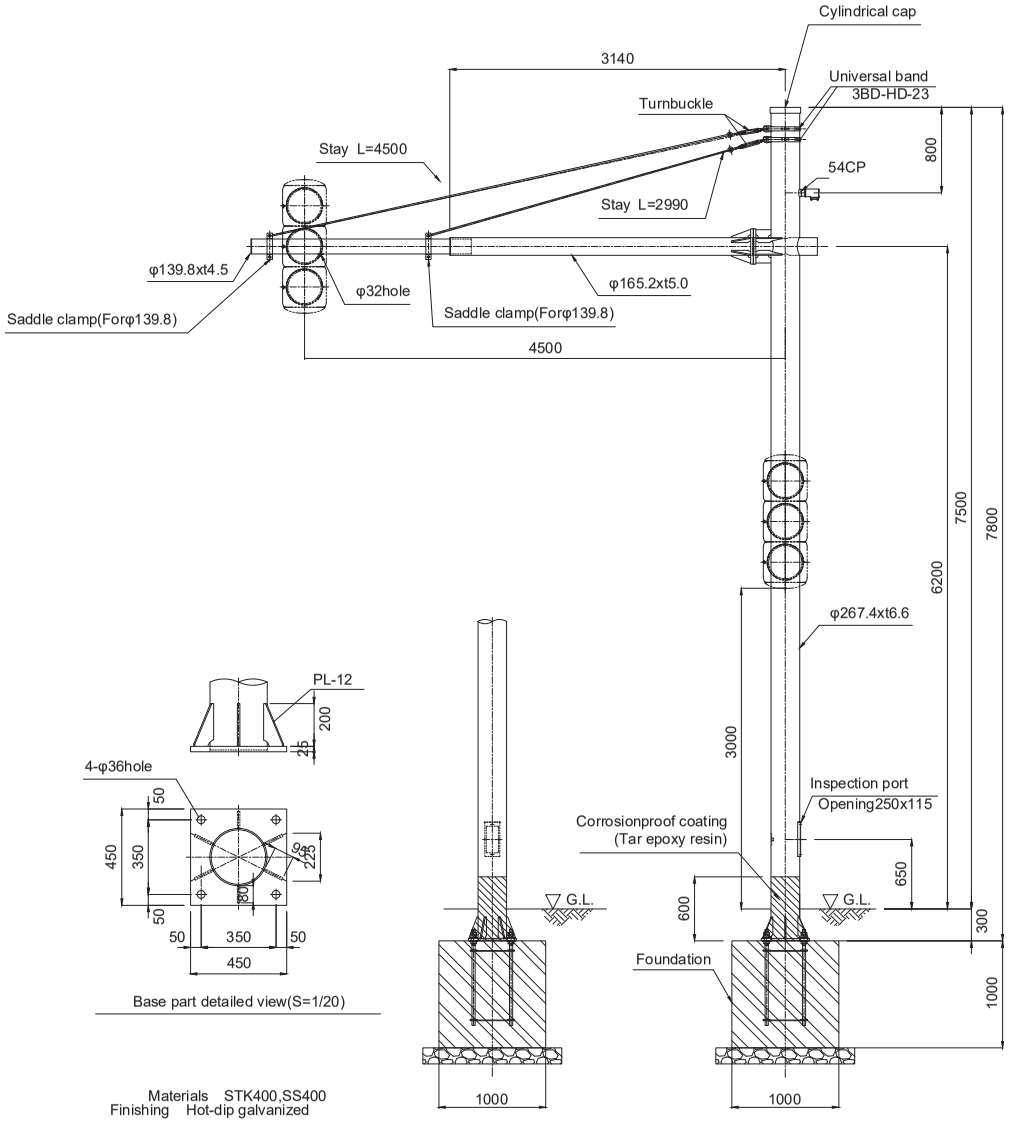


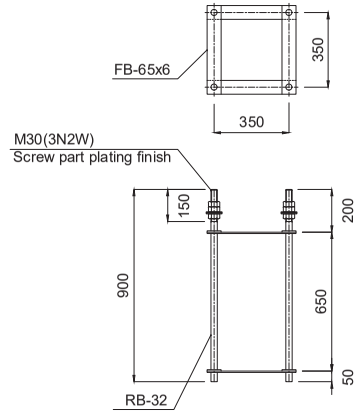


GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(5) INSTALLATION AND DETAIL DRAWING OF TRAFFIC SIGNAL LIGHT(TYPE 1)	SCALE:(A1size)	DRAWING NO. SL-05







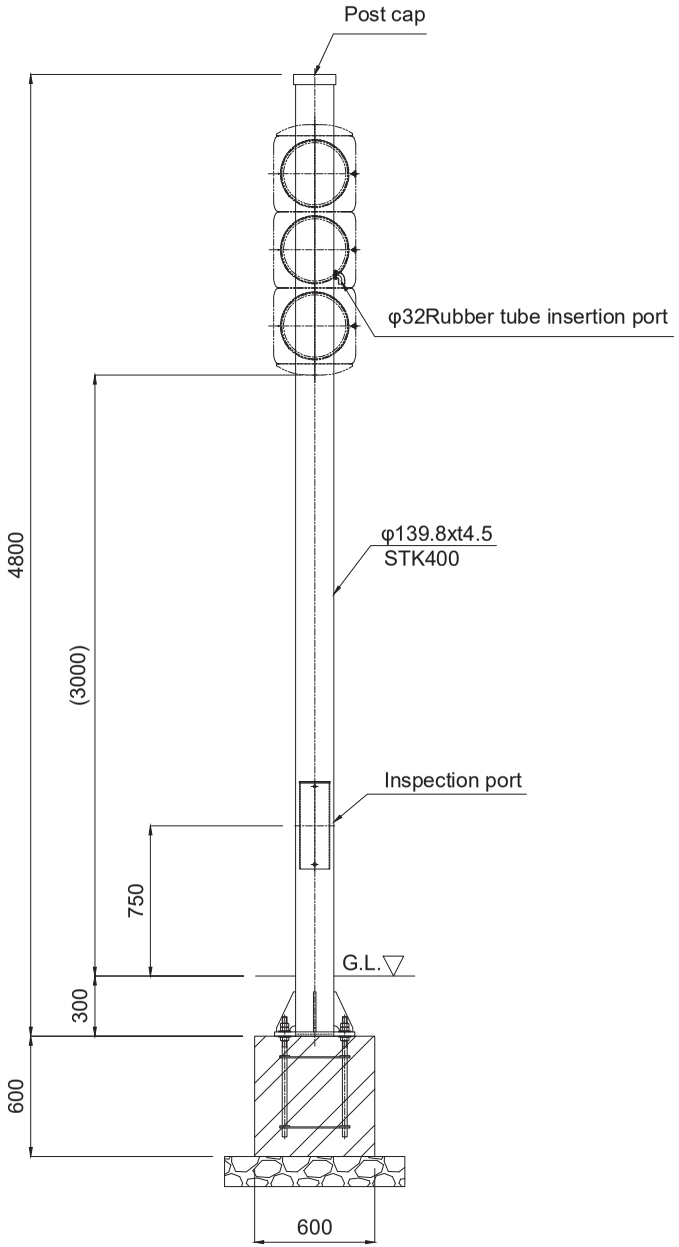


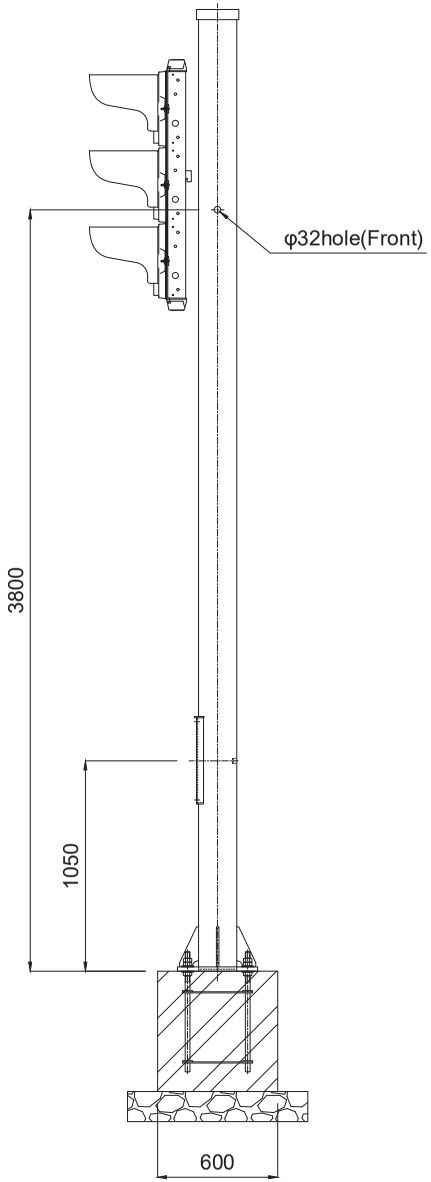
Anchor bolt detailed view(S=1/20)

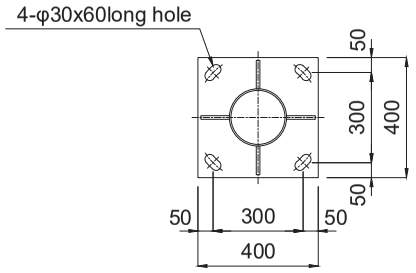
Base part detailed view(S=1/20)

Materials STK400,SS400
Finishing Hot-dip galvanized

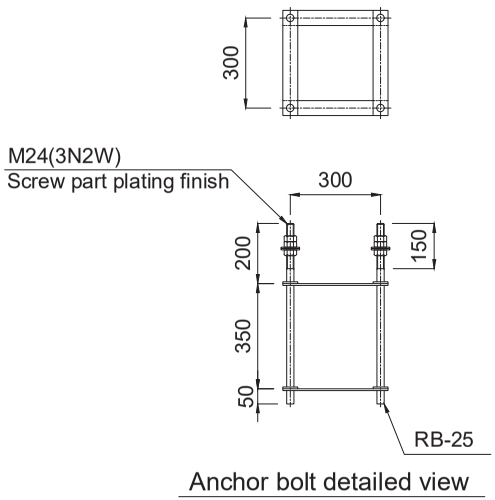
GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(6) INSTALLATION AND DETAIL DRAWING OF TRAFFIC SIGNAL LIGHT(TYPE 2)	SCALE:(A1size)	DRAWING NO. SL-06







Base part detailed view

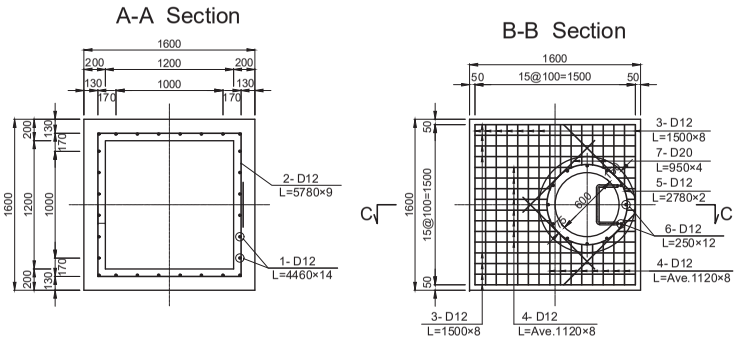


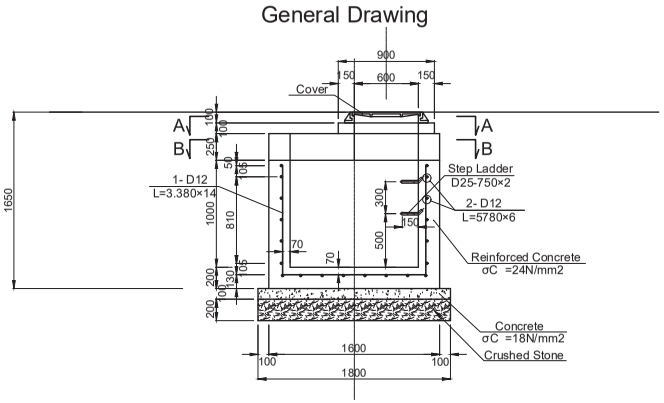
Anchor bolt detailed view

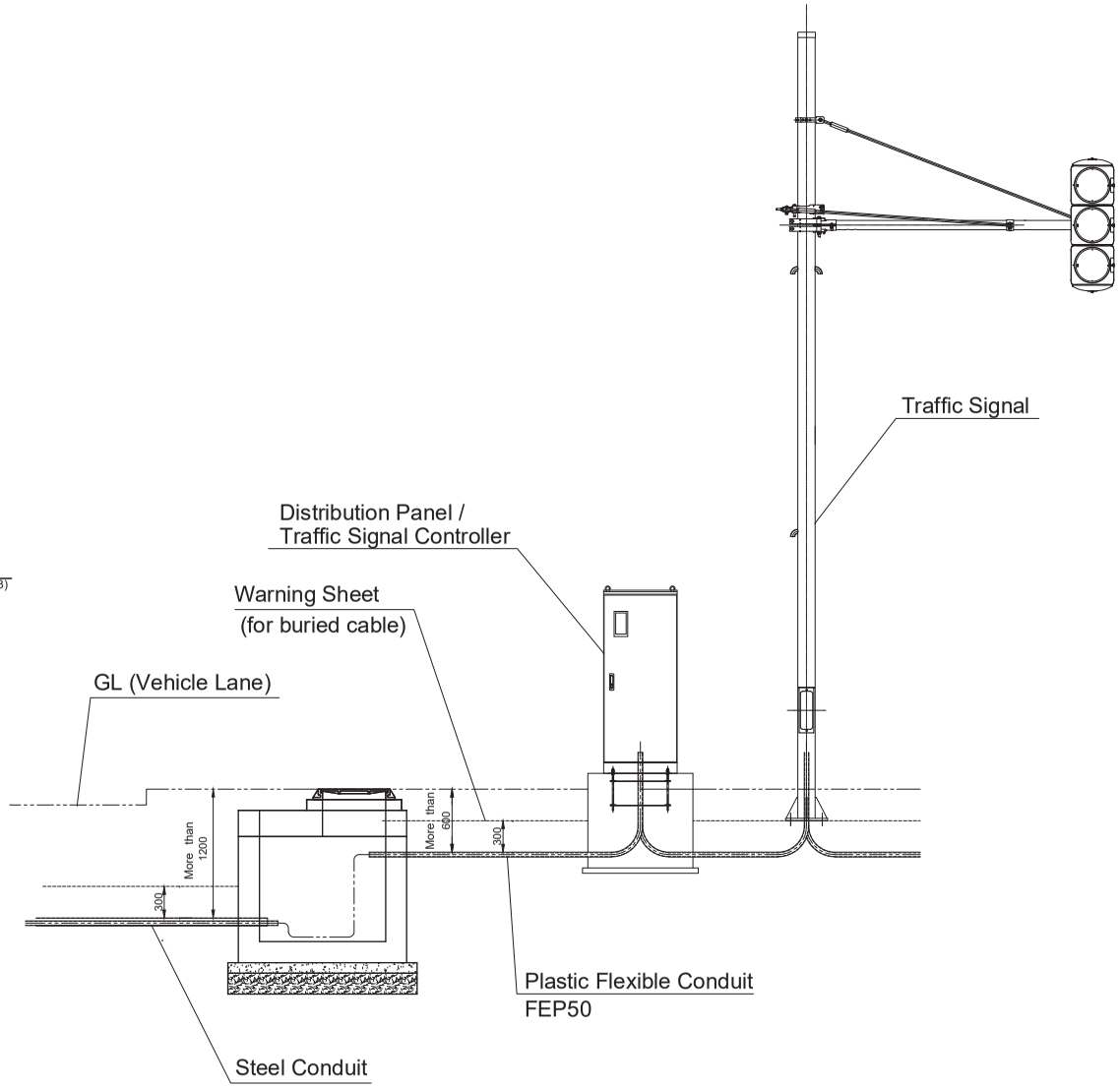
Materials STK400,SS400
Finishing Hot-dip galvanized

GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(7) INSTALLATION AND DETAIL DRAWING OF TRAFFIC SIGNAL LIGHT(TYPE 3)	SCALE:(A1size)	DRAWING NO. SL-07

Hand Hole







GHANA HIGHWAY AUTHORITY MINISTRY OF ROADS AND HIGHWAYS REPUBLIC OF GHANA	CTI ENGINEERING INTERNATIONAL CO., LTD. JAPAN INTERNATIONAL COOPERATION AGENCY	PROJECT TITLE: THE PROJECT FOR IMPROVEMENT OF THE TEMA MOTORWAY ROUNDABOUT (PHASE 2)	DRAWING TITLE: TRAFFIC SIGNAL LIGHT(8) INSTLLATION DRAWING OF CONDUIT PIPES AND CABLES	SCALE:(A1size)	DRAWING NO. SL-08