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Eight-Japan Engineering Consultants Inc

Our Ref : KHIN5/OD/IGS/KMC/01/Mar/2015

Date: 10/June/2015

To: Director General (Technical Service)
Karachi Metropolitan Corporation (KMC)
Civic Centre , Karachi, The Islamic Republic of Pakistan

Dear Sir,

RE: THE PROJECT FOR CONSTRUCTION AND REHABILITATION OF NATIONAL HIGHWAY N-5 IN KARACHI CITY, JAPAN GRANT AID PROJECT

SUB: Technical note of design value to be used for Preparatory Survey of the Project

We are very pleased to submit a Technical Note for the key design value to be used for the captioned project. The values on the Technical Note is in accordance with the result of discussion carried out at the conference room of KMC on 8th June, 2015 by the Survey Team dispatched by Japan International Cooperation Agency (JICA) and KMC technical representatives..

Yours faithfully,

Hideaki MORITA
The Chief Consultant of JICA Survey Team
INGEROSEC CORPORATION

Attachment: Memorandum of Technical Note

Memorandum

10/June/2015

Subject : Technical note of Design Value to be used for Preparatory Survey on The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, JICA Grant Aid Project

The JICA Preparatory Survey Team will propose the following principal standard for the design of the captioned project.

Table Proposed Road Design Parameter

Item		Description
Target Road Section		Approx. 9.0km, between Quaidabad Flyover (Start, approx. 100m from Flyover edge) and Port Qasim Intersection
Design Standard		Geometry: AASHTO 2011 Drainage: West Pakistan Highway Code／AASHTO 2014 Pavement: AASHTO 1993 Structure: West Pakistan Highway Code
Design Speed		80 Km/hr
Carriageway		3.65m x 6 Lane
Shoulder		0 to 3.0m (depend on location)
Central Median		0.5 to 2.0m (depend on location)
Service Road		3.0 to 5.5m (depend on location)
Footpath		1.5～3.0m (depend on location)
Cross fall		2.0%
Gradient		7% (Max.), 0.3% (Min.)
Min Curve Length		280m (Horizontal). 70m (Vertical)
Slope (Fill)	Ordinary soil	1:1.5～4.0 (depend on soil type)
Slope(Cut)	Rock	1:0.5 (Solid rock), 1:0.75 (Decomposed rock)
	Other than rock	1:1.0～1.5 (depend on soil type)
Pavement design life		10 years
Traffic Load		Max. Axle 12 ton (Max. gross vehicle weight 61.5 ton)
Pavement structure	Carriageway/Junction/Bus stop	Surface: Wearing=AC(asphaltic concrete), Binder=AC Base: Crushed aggregate, Sub Base: Granular material
	Service road	Surface: AC or Interlocking block Base: Crushed aggregate, Sub Base: Granular material
	Footpath/Parking space	Surface: Interlocking block or AC or DBST Base: Sand, Sub Base: Granular material
Drainage	Design Return period	Road crossing culvert (BOX, Pipe) 10years, Ditch 5 years
	Transversal	Concrete culvert (Box, Pipe)
	Road side ditch	Concrete U type, concrete block type, concrete surface type
	Access/Entrance ditch	Ditto

Note: AC=Asphaltic concrete, DBST=Double bituminous surface treatment (Reference information: 8000ft road project AC=5+8cm, Base=30cm, Subbase=15cm)

Note:

(1) Right of Way (RoW)

1) National Highway N5: Width 150ft (150x0.3048=45.72m)

Note: Start to End point (Approx. 9.0km), The proposed road alignment will be studied within the public-private property line.

2) Port Qasim Road

General section: Width 100m (50m both side from the existing road center)
Around intersection: Width 560m (280m both side from the existing road center)

(2) Major Intersections

1) Manzil pump Intersection: At grade, signal control type
2) Cattle colony Intersection: At grade, signal control type
3) Port Qasim Intersection: At grade, signal control type

Note: Pedestrian crossing and signal will be studied for major intersections

(3) Drainage

1) Existing crossing culvert will be replaced and reconstructed
2)Installation of new drainage system to proper drainage destinations will be considered

(4) Ancillaries

1) Street light: Installation will be studied for whole target section (connection to the existing power line will be excluded)
2) Traffic signal: Installation will be considered for major intersections (refer above)
3) Fence along median: Installation will be considered to control random pedestrian crossing for 100m along median at major intersections
4) Bus stop: Installation of either side will be considered near the major intersections
5) Crossing utility duct: Installation will be considered for required location (Assumed Max. interval 1km)

(5) Protection and Relocation of existing public utilities

i) Main underground utilities (waterworks, sewage, gas, electric and telecom, etc.)

Within proposed carriageway :	Minimum relocation of existing underground utilities considered (protection by road raising approx. 60cm from the existing road elevation).
Outside proposed carriageway:	Plan and construction method of service road, footpath and ditch will be considered to avoid underground utilities damage (eg: by light weight construction equipment, pavement type selection).
Around crossing culvert/utility duct:	Underground utilities affected by the newly installed culvert and duct should be relocated
Electric/Telephone poles and manholes on the ground:	On the ground obstacles within RoW should be relocated (eg: Electric/Telephone poles/lines)

(6) Private properties

Removal of existing private properties (kiosk, plants, etc.) within the RoW required

(7) Environmental permission

Environmental permission need to be obtained before Dec./2015.

Note: Relocation should be completed before PQ call (assumed next year end).

Hideaki MORITA
The Chief Consultant of JICA Survey Team
INGEROSEC CORPORATION

Niaz Ahmed SOOMRO
Director General (TS)
KARACHI METROPOLITAN CORORATION

資料6. その他資料・情報

6-1. モニタリングフォーム

MONITORING FORM

1) Environmental Consideration

< Construction Phase >

1. Pollution

- Air Quality（Emission Gas / Ambient Air Quality）

Item	Unit	Measured Value（Mean）	Measured Value（Max.）	NEQS	Referred International Standards	Remarks (Measurement Point, Method, etc.)	Frequency
NO_2	24 hours			80ppb			Biannually
NO	24 hours			40ppb			
SO_2	1 hour			120ppb			
CO	1 hour			10ppb			
	8 hours			5ppb			
PM10	24hours			150ppb			
PM2.5	24hours			35µg/m^3			
	1hour			15µg/m^3			
SPM	24hours			0.50mg/m^3			
Survey Details	Data and Time : Monitoring Location: Problems identified: Countermeasures undertaken:						
6 Location	1, Quaidabad Bridge 2, Kohi Goth Bridge 3, Benazir Bhutto Village 4, Port Qasim Roundabout 5, Pakistan Steel 6, Shah Latif Town						
Remark	Monitoring for air quality will be conducted by Independent Monitoring Consultant employed/ funded by a contractor.						

- Noise (Unit: dB)

Location		Measured Value（Mean）	Measured Value（Max.）	Remarks (Measurement Point, Method, etc.)	Frequency
1	Quaidabad Bridg				Quarterly
2	Green Park City				
3	Kohi Goth Bridge				
4	Benazir Bhutto Villag				
5	Chowkandi More Road				
6	Port Qasim Roundabout				
7	Pakistan Steel				
8	Mosque near Abdullah Goth				
9	Shah Latif Town				
10	Export Processing Area				
Survey	Data and Time :				

Details	Problems identified: Countermeasures undertaken:
Remark	Monitoring for noise will be conducted by Independent Monitoring Consultant employed/ funded by a contractor.

Remark: NEQS

Area	Pakistan	
	Duration	Noise level
Residential area	6: 00 - 22: 00	55dB
	22: 00 - 6: 00	45dB
Commercial area	6: 00 - 22: 00	65dB
	22: 00 - 6: 00	55dB
Industrial area	6: 00 - 22: 00	75dB
	22: 00 - 6: 00	65dB
Silence zone *1	6: 00 - 22: 00	50dB
	22: 00 - 6: 00	45dB

- Vibration (Unit: dB)

Location		Measured Value (Mean)	Measured Value (Max.)	Remarks (Measurement Point, Method, etc.)	Frequency
1	Quaidabad Bridg				Quarterly
2	Green Park City				
3	Kohi Goth Bridge				
4	Benazir Bhutto Villag				
5	Chowkandi More Road				
6	Port Qasim Roundabout				
7	Pakistan Steel				
8	Mosque near Abdullah Goth				
9	Shah Latif Town				
10	Export Processing Area				
Survey Details		Data and Time : Problems identified: Countermeasures undertaken:			
Remark		Monitoring for vibration will be conducted by Independent Monitoring Consultant employed/ funded by a contractor.			

Remark: NEQS

Area		Japan	
		Duration	Vibration level
Neighborhood commercial area Commercial area	Light-industrial area Industrial area	8: 00 – 19: 00	65 - 70 dB
		19: 00 – 8: 00	60～65 dB

< **Operational Phase** >

1. Pollution

Air Quality（Emission Gas / Ambient Air Quality）

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	NEQS	Referred International Standards	Remarks (Measurement Point, Method, etc.)	Frequency
NO_2	24 hours			80ppb			Biannually
NO	24 hours			40ppb			
SO_2	1 hour			120ppb			
CO	1 hour			10ppb			
	8 hours			5ppb			
PM10	24hours			150ppb			
PM2.5	24hours			35μg/m^3			
	1hour			15μg/m^3			
SPM	24hours			0.50mg/m^3			
Survey Details	Data and Time : Monitoring Location: Problems identified: Countermeasures undertaken:						
6 Location	1, Quaidabad Bridge 2, Kohi Goth Bridge 3, Benazir Bhutto Village 4, Port Qasim Roundabout 5, Pakistan Steel 6, Shah Latif Town						
Remark	Monitoring for air quality will be conducted by Independent Monitoring Consultant employed/ funded by KMC for a year after the completion of the project constriction.						

- Water Quality（Effluent/Wastewater/Ambient Water Quality）

Monitoring Item	Monitoring Results during Report Period
● Operational status of "Karachi Water Supply and Wastewater Master Plan"	

Remark: Monitoring for water quality is conducted by KMC and Independent Monitoring Consultant.

- Waste management

Monitoring Item	Monitoring Results during Report Period
● Operational status of "Sindh Solid Waste Management Bill 2014"	

Remark: Monitoring for waste management is conducted by KMC and Independent Monitoring Consultant

- Noise (Unit: dB)

Location		Measured Value (Mean)	Measured Value (Max.)	Remarks (Measurement Point, Method, etc.)	Frequency
1	Quaidabad Bridg				Quarterly
2	Green Park City				
3	Kohi Goth Bridge				
4	Benazir Bhutto Villag				
5	Chowkandi More Road				
6	Port Qasim Roundabout				
7	Pakistan Steel				
8	Mosque near Abdullah Goth				

9	Shah Latif Town				
10	Export Processing Area				
Survey Details	Data and Time : Problems identified: Countermeasures undertaken:				
Remark	Monitoring for noise will be conducted by Independent Monitoring Consultant employed/ funded by KMC for a year after the completion of the project constriction.				

Remark: NEQS

Area	Pakistan	
	Duration	Noise level
Residential area	6: 00 - 22: 00	55dB
	22: 00 - 6: 00	45dB
Commercial area	6: 00 - 22: 00	65dB
	22: 00 - 6: 00	55dB
Industrial area	6: 00 - 22: 00	75dB
	22: 00 - 6: 00	65dB
Silence zone *1	6: 00 - 22: 00	50dB
	22: 00 - 6: 00	45dB

- Vibration (Unit: dB)

Location		Measured Value (Mean)	Measured Value (Max.)	Remarks (Measurement Point, Method, etc.)	Frequency
1	Quaidabad Bridg				Quarterly
2	Green Park City				
3	Kohi Goth Bridge				
4	Benazir Bhutto Villag				
5	Chowkandi More Road				
6	Port Qasim Roundabout				
7	Pakistan Steel				
8	Mosque near Abdullah Goth				
9	Shah Latif Town				
10	Export Processing Area				
Survey Details	Data and Time : Problems identified: Countermeasures undertaken:				
Remark	Monitoring for air quality will be conducted by Independent Monitoring Consultant employed/ funded by KMC for a year after the completion of the project constriction.				

Remark: Japanese standard

Area		Japan	
		Duration	Vibration level
Neighborhood commercial area Commercial area	Light-industrial area Industrial area	8: 00 – 19: 00	65 - 70 dB
		19: 00 – 8: 00	60～65 dB

2) Social Consideratation

Planning Phase

Monitoring Items	Methods and Intervals of Monitoring Activity
・ Local economy such as employment and livelihood ・ Existing traffic, public facilities, infrastructures and social services	<In Charge> KMC Engineering Division, KMC Anti-Encroachment Unit <Period/Interval> Once per month, during the Planning Phase <Methods> * Record every activities as it occurs. * Summarize the activities and issues in the previous month. * Plan for the activities for coming months. <Funding> * Human resource to be used as part of regular operaton. No special funding necessary.

Construction Phase (KMC)

Monitoring Items	Methods and Intervals of Monitoring Activity
・ Local economy such as employment and livelihood ・ Existing traffic/public facilities, infrastructures, social services ・ Gender ・ Children's rights ・ Accidents, crime	<In Charge> KMC Engineering Division, KMC Anti-Encroachment Unit <Period/Interval> Once per month, during the Planning Phase <Methods> * Record every activities as it occurs. * Summarize the activities and issues in the previous month. * Plan for the activities for coming months. <Funding> * Human resource to be used as part of regular operaton. No special funding necessary.

Construction Phase (Contractor)

Monitoring Items	Methods and Intervals of Monitoring Activity
・ Sanitation, public health condition, infectious diseases including HIV/AIDS ・ Industrial safety and health, working environment	<In Charge> Contractor <Period/Interval> Once per month, during the Planning Phase <Methods> * Inspect the environment of the camp, stock yard, construction site everyday. * Report the findings and issues as anything occurs. * Summarize the entries in the previous month. * Plan for the activities for coming months. <Funding> * Human resource to be used as part of regular Project Management. No special funding necessary.

Operation phase (KMC)

Monitoring Items	Methods and Intervals of Monitoring Activity
・ Local economy such as employment and livelihood ・ Existing traffic/public facilities, infrastructures, social services ・ Gender ・ Children's rights ・ Accidents, crime	<In Charge> KMC Engineering Division <Period/Interval> Once per month, during the Operation Phase <Methods> * Record every activities as it occurs. * Summarize the activities and issues in the previous month. * Plan for the activities for coming months. <Funding> * Human resource to be used as part of regular operation. No special funding necessary.

< Planning Phase >

- Local economy such as employment and livelihood
- Existing traffic, public facilities, infrastructures and social services

Date	Name (Position)	Activities	Follow-Up Action
YYYY.MM.DD		Type: □ Coordination □ Claims/complaints, suggestions □ Information dissemination □ Other (_____) Target □ Drivers on N5 □ Business / Business Associations □ Public utilities □ Schools, Police, Traffic Police, Ranger, Jail □ Mosque □ NGO □ Local residents □ Others （_____） Details:_____	In-House Reporting: Date：_____ Name：_____ Next step and goal： _____ _____ Action Taken: Date：_____ Name：_____ Action：_____ _____ _____ _____ _____
Copy above line for next entry.			

< Construction Phase >
1. Social Environment
- Resettlement: See monitoring form of ARAP.
- Local economy such as employment and livelihood
- Existing traffic/public facilities, infrastructures, social services
- Gender
- Children's rights
- Accidents, crime

Reporting Format (Records for the Reporting Period) (KMC)

Date	Name (Position)	Activities	Follow-Up Action
YYYY.MM.DD		Type: □ Coordination □ Claims/complaints, suggestions □ Information dissemination □ Other (_____) Target □ Drivers on N5 □ Business / Business Associations □ Public utilities □ Schools, Police, Traffic Police, Ranger, Jail □ Mosque □ NGO □ Local residents □ Others （_____） Details:_____	In-House Reporting: Date：_____ Name：_____ Next step and goal： _____ _____ Action Taken: Date：_____ Name：_____ Action：_____ _____ _____ _____ _____
Copy above line for next entry.			
YYYY.MM Road accidents summary		Type and number on 11.6 km Target Section □ Car Nos._____ □ Truck Nos._____	In-House Reporting: Date：_____ Name：_____

		□ Motorbike Nos._____ □ Bus, suzuki, rikisha Nos._____ □ Pedestrian Nos._____ □ Other (_____Nos._____) Death Nos. _____ Injury Nos. _____ Locations and details : _____ _____ _____	Next step and goal : _____ _____ Action Taken: Date : _____ Name : _____ Action : _____ _____ _____ _____ _____

- Sanitation, public health condition, infectious diseases including HIV/AIDS
- Industrial safety and health, working environment

Reporting Format (Records for the Reporting Period) (Contractor)

Date	Name (Position)	Record	Report / Follow-up
YYYY.MM.DD		Location: □ Camp (Rest area, toilet, kitchen) □ Office □ Stock yard □ Repair yard □ Camp site in general □ Construction site □ Access road □ Others（_____） Issue Found: □ Water stagnation □ Injury □ Occurrence of infectious diseases among the staff □ Occurrence of heat attack among the staff □ Others（_____） Locations and details : _____ _____ _____	In-House Reporting: Date : _____ Name : _____ Next step and goal: _____ Report/Coordination with Related Organizations: Date : _____ Organization : _____ Next step and goal : _____ Other Action Taken: Date : _____ Name : _____ Action : _____ _____ _____
Copy above line for next entry.			
YYYY.MM Planning and implementation of Education of Workers on infectious diseases		□ Planning Activities: _____ _____ □ Implementation : Date : _____ Hours : Start _____ End _____ Lecturor : _____ Materials : _____ Attendants Nos. _____	In-House Reporting: Date : _____ Name : _____ Next step and goal : _____ _____ Next Action Plan: Date : _____ Name : _____ Action : _____ _____ _____

< Operational Phase >
1. Social Environment
- Local economy such as employment and livelihood
- Existing traffic/public facilities, infrastructures, social services

- Gender
- Children's rights
- Accidents, crime

Date	Name (Position)	Activities	Follow-Up Action
YYYY.MM.DD		Type: □ Coordination □ Claims/complaints, suggestions □ Information dissemination, traffic safety education □ Other (_____) Target □ Drivers on N5 □ Business / Business Associations □ Public utilities □ Schools, Police, Traffic Police, Ranger, Jail □ Mosque □ NGO □ Local residents □ Others (_____) Details:_____ _____ _____	In-House Reporting: Date：_____ Name：_____ Next step and goal： _____ _____ Action Taken: Date：_____ Name：_____ Action：_____ _____ _____ _____ _____
Copy above line for next entry.			
YYYY.MM Road accidents summary		Type and number on 11.6 km Target Section □ Car Nos._____ □ Truck Nos._____ □ Motorbike Nos._____ □ Bus, suzuki, rikisha Nos._____ □ Pedestrian Nos._____ □ Other (_____Nos._____) Death Nos. _____ Injury Nos. _____ Locations and details : _____ _____ _____	In-House Reporting: Date：_____ Name：_____ Next step and goal： _____ _____ Action Taken: Date：_____ Name：_____ Action：_____ _____ _____ _____ _____

Environmental Checklist for the Project

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?	(a) Y	(a) EIA report was approved by SEPA in December 2015.
		(b) Have EIA reports been approved by authorities of the host country's government?	(b) Y	(b) EIA report was approved by SEPA in December 2015.
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	(c) N	(c) Conditions are usually imposed on the EIA approval taken from SEPA and it is the responsibility of the proponent to fulfill the conditions of the approval during construction and operation phase.
		(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?	(d) N	(d) No other environmental permits will be required in this case. Regarding the cutting of trees, trees on the target road will be planted/owned by the road authority and they are responsible for clearing those trees.
	(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?	(a) Y	(a) Scoping Meeting was conducted with around 40 participants from the government authorities, utility companies such as telecommunication water&sewerage, Union Councils and universities in May 2015. The project information (project scope and outline) was disclosed. After the scoping meeting, the environmental and social survey was conducted and the 1st draft of EIA report was prepared. After the submission of the 1st draft of EIA report to SEPA, the Public Hearing, which aims to disclose the contents of EIA report and collect opinions from government authorities, utility companies such as telecommunication water &sewerage, Union Councils, universities, local companies and local residents, will be conducted by SEPA in November.
		(b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(b) N	(b) Major queries and concerns raised by the participants of the Scoping Meeting and the Public Hearing have been reflected to the Project design.
	(3)Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) An alternative plan (Zero-option) was examined in terms of social and environmental impacts, effects on land use and living life, traffic safety and costs for construction and operation &maintenance.

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
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?	(a) Y	(a) During the construction phase, an increase in exhaust emissions is expected due to traffic congestion by traffic restriction and vehicles manoeuvring. Dust and exhaust emissions are expected due to operation of construction vehicles, construction machinery and the transport of construction materials. During the operational phase, an increase in exhaust emissions is expected due to the increase in traffic volume, especially large-sized vehicles. Environmental management plan including major mitigation measures is proposed through EIA report therefore, existing conditions during the construction and operational phases will be complied with the National Environment Quality Standards (NEQS). Mitigation measures will be taken based on the environmental management plan.
		(b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	(b) Y	(b) Air quality near the industrial area in the project area is possibility worse due to the project activities during the construction phase. Furthermore, it will be possibly worse due to the increase of exhaust emissions caused by the traffic volume.
	(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?	(a) N	(a) Water discharged by the Project into rivers is only from rainfall, so water quality will not be affected by the Project.
		(b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater?	(b) N	(b) Surface runoff from roads will not contaminate water sources such as groundwater because the surface runoff is only from rainfall.
		(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 not comply with the country's ambient water quality standards?	(c) N	(c) Facilities such as parking areas/service will not be constructed by 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) Y	(a) Facilities such as parking areas/service will not be constructed by the Project. Waste generated is collected by KMC and disposed appropriately at the official disposal site managed by KMC.

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(4) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) N	(a) According to the monitoring for noise and vibration, levels of noise in all 10 location monitored exceeded the NEQS during the day time. The noise levels in 5 of 10 locations are less than NEQS. According to the result of the survey, levels of the vibration in 9 out of 10 monitoring location exceeded the Japanese standards during day time. On the other hand, levels of vibration were less than the standards. In order for noise and vibration generated by vehicles on the target road to comply with NEQS, mitigation measures will be undertaken.
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) Conservation area is not identified around the target road. There is approximately 35 km between the target road and the nearest natural reserve that is the second largest national park called Kirthar National Park.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	(a) Y	(a) Mangrove within the boundary of Karachi City is 5 km away from the target road as a direct distance and it has a large area with approx. 310 km^2. Coral reefs and tidal flats are not confirmed.
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?	(b) N	(b) A few birds, mammals and reptiles designated by the Sindh ordinance and environmental agencies as protected habitats of endangered species are confirmed in the macroenvironment.[1]
		(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	(c) N	(c) Significant ecological impacts are not anticipated.
		(d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock?	(d) N	(d) Grazing within Karachi city is not allowed according to the Sindh Law. As there is no natural habit, migration routes, habitat fragmentation, and traffic accident of wildlife and livestock are not disrupted.
		(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?	(e) N	(e) As the outline of the Project is to widen the road lanes, rehabilitate the pavement and construct facilities within ROW, destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic species and pests are not caused.

[1] Macroenvironment means “Within Sindh Province”

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(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?	(f) N	(f) The Project does not construct roads at undeveloped areas.
	(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) The Project does not change existing watershed. No effects on water regime are anticipated.
	(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?	(a) N	(a) Soft ground on the target road is not observed.
		(b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides?	(b) N	(b) While civil works will be carried out. However, its scale is small and it will not cause slope failures and 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?	(c) N	(c) Soil runoff will be not generated due to cut and fill areas, waste soil disposal sites, and borrow sites.
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?	(a) Y	(a) No resettlement of resident is caused by the Project. Five public facilities, 1 mosque, 3 shops, 1 signboard of public hospital, 1 NGO-operated ambulance dispatcher are located on ROW and will be cleared. Efforts are made to minimize the number of businesses and public facilities to be affected by the Project by moving ROW boundary, changing the curb design, and inclusion of graveyard on ROW.
		(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?	(b) Y	(b) Adequate explanation was given to the occupants of structures to be affected, and hawkers operating on ROW. Moving assistance shall be given to the 3 shops to be affected prior to clearance. Five public facilities shall be given temporal structure prior to clearance to function during the Construction Phase.
		(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards, developed based on socioeconomic studies on resettlement?	(c) Y	(c) Assistance measures are developed based on socioeconomic studies and interviews to the PAPs

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(d) Are the compensations going to be paid prior to the resettlement?	(d) Y	(d) Moving assistance shall be given to the 3 shops to be affected prior to clearance. Five public facilities shall be given temporal structure prior to clearance to function during the Construction Phase.
		(e) Are the compensation policies prepared in document?	(e) Y	(e) Programs and measures to mitigate the impact of the Project shall be noted in the official document that to be shared and signed by JICA and KMC.
		(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?	(f) Y	(f) The Project basic design paid particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples, assessed impacts on them, and planned impact mitigation measures.
		(g) Are agreements with the affected people obtained prior to resettlement?	(g) Y	(g) During the interview survey in the basic design phase, agreements were obtained from businesses to be affected regarding the necessary clearance of ROW. No residents are residing on ROW.
		(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?	(h) Y	(h) No residents are residing on ROW. Organizational framework to implement structure clearance and assistance to businesses to be relocated is established mobilizing Engineering Department and Anti-Encroachment Unit of KMC. Those works are regularly operated by those 2 departments with well-experienced staff, and no project-specific budget is necessary.
		(i) Are any plans developed to monitor the impacts of resettlement?	(i) Y	(i) The change of business sales of the 3 relocated shops shall be conducted by KMC.
		(j) Is the grievance redress mechanism established?	(j) Y	(j) Site officer of Engineering Department, police staff stationed on the Project Area shall be the window of grievance redress, as usually operated in road projects in Karachi.
	(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?	(a) N/A	(a) The Project is to improve existing national highway within the existing ROW. No significant changes of transportation means, land uses, sources of livelihood, unemployment are expected.

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(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?	(b) N	(b) The Project is to improve existing national highway within the existing ROW. No significant changes of living conditions of the inhabitants other than the target population are expected.
		(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?	(c)Y/Y	(c) Spreads of communicable and infectious diseases, such as diarrhea by project workers when the living environment is not kept in sanitary condition. Control of sanitary environment at houses and work places shall be the responsibility of the Contractor. Although there is no statistical evidence of spreading sexually transmitted diseases by construction workers or immigrants in Karachi available so far, education program regarding such issues shall be developed by the project proponent and contractor with the assistance of UNAIDS located in Islamabad.
		(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)?	(d) N/Y	(d) The Project in Operation Phase will increase the traffic capacity of N5, shall reduce traffic congestions on N5 and surrounding area. With faster and heavier traffic flow on N5, there is possibility of increase of traffic accidents, mainly motorbikes and crossing pedestrians, during the period road users get used to new condition and acquire adequate safety behaviors.
		(e) Is there any possibility that roads will impede the movement of inhabitants?	(e) N	(e) The Project is to improve existing ROW. Foot paths for movement along the road. Zebra crossings and pedestrian bridges shall be provided to cross the road safely.
		(f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	(f) N	(f) No specific structures will cause a sun shading and radio interference. Two pedestrian bridges are planned to cross the main 6-lanes but there will be wide space between the structure and ROW boundary.
	(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) A nationally designated Historic Monument, the Chaukhandi Tombs, is located about 500 m north of the Target Section. The Project will not affect the monument directly with the construction works or drainage from the work area. No indirect impacts such as a negative effect on access to the monument are expected.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) The Project widens the target road from 4 to 6 lanes and rehabilitate the pavement so it will not generate significant change in local landscape.
	(5) Ethnic Minorities and Indigenous	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?	(a) N/A	(a) No specific community, or concentrated residential area, of ethnic minorities and indigenous people was identified.

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	Peoples	(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(b) N/A	(b) No specific community, or concentrated residential area, of ethnic minorities and indigenous people was identified.
	(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?	(a) N	(a) Not violating and the Project proponent follows Labour Safety (Hazardous Substances Rules, 2003 (Federal), Labour Laws (Amendment) Ordinance 1972 (No.9) (Federal) and Sindh Minimum Wages Ordinance (1961).
		(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?	(b) Y	(b) The contractor is required to establish and implement safety measures at construction sites.
		(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.?	(c) Y	(c) The contractor is required to establish and implement safety measures at construction sites.
		(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?	(d) Y	(d) The contractor is responsible for the design and implementation of the safety measures.
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)?	(a) Y	(a) Mitigation measures for reducing impacts was proposed by the EIA report and KMC will be mandated to comply the environmental protection and mitigation measures.
		(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?	(b) Y	(b) While mangrove is 5 km away from the target road as a direct distance, an adverse effect on the mangrove is not expected.
		(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(c) Y/Y	(c) Traffic congestion and increase of accidents are the main possible negative impacts. Monitoring and guidance role of KMC Site Office shall be clearly stated in the EIA Report and KMC Site Office will be mandated to respond to the grievances and complaints to reduce impacts.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?	(a) Y	(a) During the construction phase, potential impacts caused by the Project will be monitored based on the Environmental Monitoring Plan.
		(b) What are the items, methods and frequencies of the monitoring program?	(b)TBD	(b) All will be described in the EIA report and will be approved by SEPA.

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?	(c) Y	(c) As mentioned in EIA report, the framework for the project monitoring for measuring the project potential impacts was established. Roles and responsibilities of PMU (KMC), a contractor (only during construction phase), Independent Monitoring Consultant (IMC), and SEPA were clarified. According to KMC, budgets for monitoring will be secured. Furthermore, the framework of the project affected persons (RAP) are implementation organization was also established. Costs and budgets for RAP monitoring will be secured.
		(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?	(d) Y	(d) Results of the monitoring for measuring the environmental impacts are reported to KMC by IMC (Air pollution is biannually, waste management is monthly and noise and vibration is quarterly reported).
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).	(a) N/A	(a) Pertinent items described in the Forestry Projects checklist is not expected.
		(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).	(b) Y	(b) Pertinent items described in the Power Transmission and Distribution Lines checklist is not expected.
	Note on Using Environmental Checklist	(a) 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	(a) Impacts to transboundary or global issues are not expected.

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.

Reference No: EPA/2015/10/13/EIA/52

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Dated: 11-12-2015

SUBJECT: DECISION ON ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

1.	**Name & Address of Proponent:**	Director General (Technical Services) Karachi Metropolitan Corporation (KMC) Engineering Department 4th Floor, Civic Center, Gulshan-e-Iqbal Karachi
2.	**Description of Project:**	Construction & Rehabilitation of National Highway N-5 Project; includes widening of N-5 from 4 lanes to 6 lanes for approx. 11.3 km and provision of service road having enough width for dual traffic, provision of additional drainage culverts, facilities for traffic management and safety in accordance with the AASHTO standard.
3.	**Location of Project:**	The project starts off from east end of Quaidabad Flyover to Pakistan Steel Intersection in Karachi covering a length of 11.3 km.
4.	**Date of Filing of EIA:**	14th September, 2015

5. After careful review of the Environmental Impact Assessment report, the Sindh Environmental Protection Agency (SEPA) accords its Approval subject to the following conditions:

(i) All mitigation measures recommended in EIA report should be complied with, for achieving negligible impacts on physical, ecological and socio-economic environment of the area. Sindh Environmental Quality Standards (SEQS) for ambient air quality, noise, emissions, wastewater and drinking water will be followed in letter and spirit.

(ii) KMC (hereinafter referred as project proponent) will appoint a qualified Independent Monitoring Consultant (IMC) whose responsibility will be to monitor hazards, dust emissions, road obstructions, traffic jams, vibration and noise level(s) and other environmental damages due to construction of N-5. The IMC will ensure that the activities at project site are undertaken in environment friendly manner and the mitigation measures are implemented as per the recommendations of EIA. The proponent will be liable to submit quarterly environmental monitoring reports produced by IMC to EPA Sindh. The report will include pollutants measurement and analysis reports along with photographic records showing therein the environmental conditions at site during the construction of project. KMC will also conduct a detailed environmental audit of the under construction portion of the N-5 & submit its report to EPA within eight(08) weeks after the start of the construction.

(iii) Dust emission from soil piles and aggregate storage stockpiles will be reduced by appropriate measures. These may include: (i) Keeping the material moist by sprinkling

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of water at appropriate frequency, (ii) Erecting windshield walls on three sides of the piles such that the wall project 01 m above the pile, or, (iii) Covering the pile. for example with tarpaulin or thick plastic sheets, to prevent emission. Water will be sprinkled daily or when there is an obvious dust problem on all exposed surfaces to suppress emission of dust. Frequency of sprinkling will be kept such that the dust remains under control, particularly when wind is blowing towards the community.

(iv) KMC will undertake compensatory tree plantation in and around the project corridor. Plantation will be carried out along the project road in consultation with the Forest Department with the ratio of 1:5.

(v) During the development of the green belt within the project area, emphasis will be given on selection of plant species like nitrogen fixing species, species of ornamental values, species of fast growth with good canopy cover etc but all local species.

(vi) Traffic diversions during construction of N-5 will be carefully planned to ensure smooth flow of traffic. Information will be provided to the public through electronic & print media well in advance for all the diversions & detours planned during the construction.

(vii) A road safety audit must be conducted before the start of construction and operation respectively to reduce accidents and the audit reports will be submitted to SEPA well in time.

(viii) Use of appropriate construction techniques would be adopted during construction of N-5 so as to least disturb the flow of traffic along the corridor.

(ix) Solid waste generated during construction will be sent to designated disposal sites. A comprehensive waste disposal plan would be developed to effectively manage all wastes and its proper disposal will be reported through IMC.

(x) During construction, the impact of noise and vibration would be controlled and monitored through best available practices. For this purpose generators would be placed in the canopies or inside the civil structure.

(xi) Drainage culverts will be so designed to accommodate the uninterrupted flow of stormwater into the neighboring drains and to avoid localized flooding along the project alignment and nearby areas.

(xii) The Abbreviated Resettlement Action Plan (ARAP) developed for the project will be implemented in letter and spirit and programs and measures to mitigate the impact of the Project on Project Affected Persons (PAPs) will be applied.

(xiii) Public awareness of the construction activities will be provided using signage, which will indicate that construction is in progress. These signs will be placed at appropriate intervals along the roadway. The construction area will be fenced to help prevent unauthorized access by members of the public.

(xiv) The impacts of splitting of a community will be minimized by taking account of local movements during the road design stage, and by including provision for improved

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crossings such as pedestrian bridges at appropriate locations along the corridor to minimize the impact. Impact on local businesses & communities will be mitigated by providing service roads and by encouraging local communities to make use of the new opportunities provided.

(xv) Emergency and safety plan will be built, and pedestrian bridges will be included in project design properly and in specific places of pedestrian movement to avoid accident risk. A proper road safety program needs to be developed.

(xvi) An institutional framework for the implementation of Environmental Management Plan (EMP) will be developed under the umbrella of Project Management Unit. For this purpose, adequate staff will be hired as per the positions defined in EMP and supervised by a designated officer under PMU at the senior level with sufficient administrative and technical authority to perform the designated functions. Proponent will make sure that the operating instructions and emergency actions are made available to every worker / labor / commuters / citizens / passersby at the site.

(xvii) KMC will constantly coordinate and consult the construction plan and schedule with all the relevant civic agencies i.e. KW&SB, KESC, NTC, PTCL, SSGCL, Rangers. Traffic Police and other relevant organization for relocation / strengthening of their facilities/network in order to minimize the difficulties of the commuters and the citizens. The project will be constructed in the minimum possible time and will not be left abandoned or unattended at any stage from the commencing day till the completion day.

6. This approval will be treated null and void if the conditions, mentioned in para-5 above, are not complied with.
7. The proponent will be liable for compliance of Section 14, 15, 19 and 18 of EIA / IEE regulation 2014, which direct for condition for approval, confirmation of compliance, entry inspection and monitoring.
8. The approval is accorded only for the project activity described in the EIA report. Proponent will submit separate EIA or IEE as required under regulation for any enhancement or change in the design of project.
9. This approval does not absolve the proponent of the duty to obtain any other approval or consent that may be required under any other law in force.
10. Implementation Report of all the mitigation measures and EMP laid down in the EIA report will be submitted to this office on quarterly basis. No violation of any regulations, rules, instruction and provision of SEP Act, 2014 will be made and in case of any such violation of the rules / laws in the approval will stand cancelled without any further notice.

Muhammad Imran Sabir
Deputy Director(Technical)

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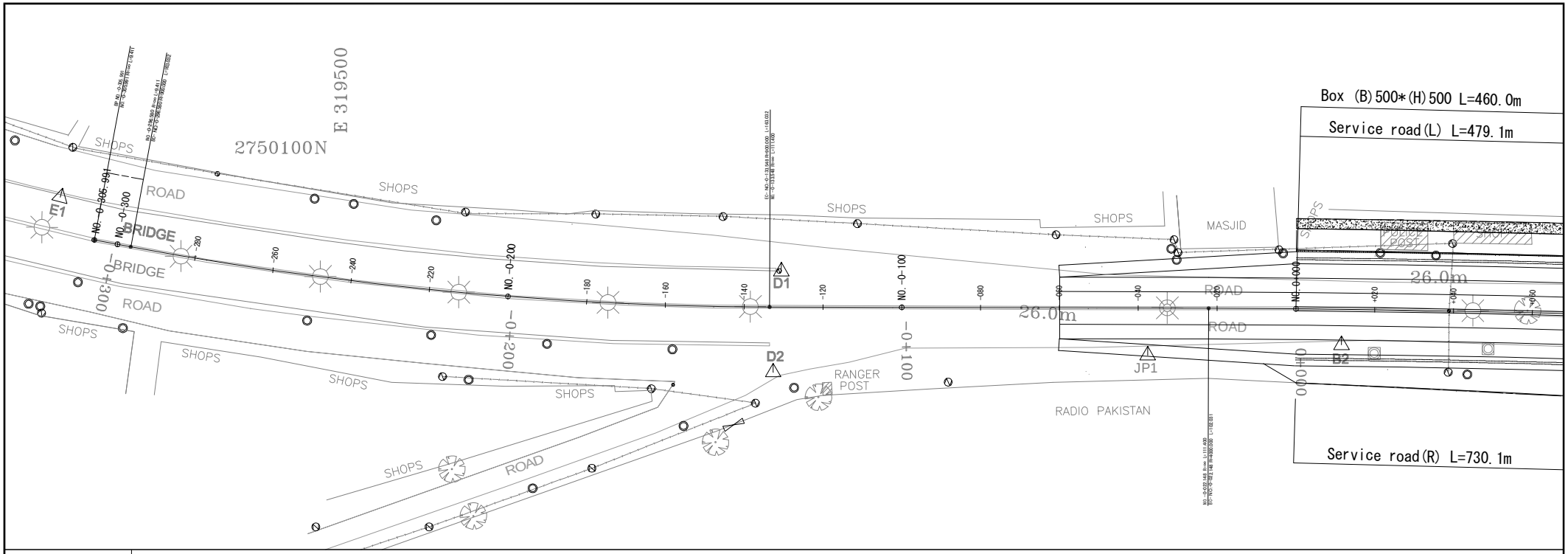

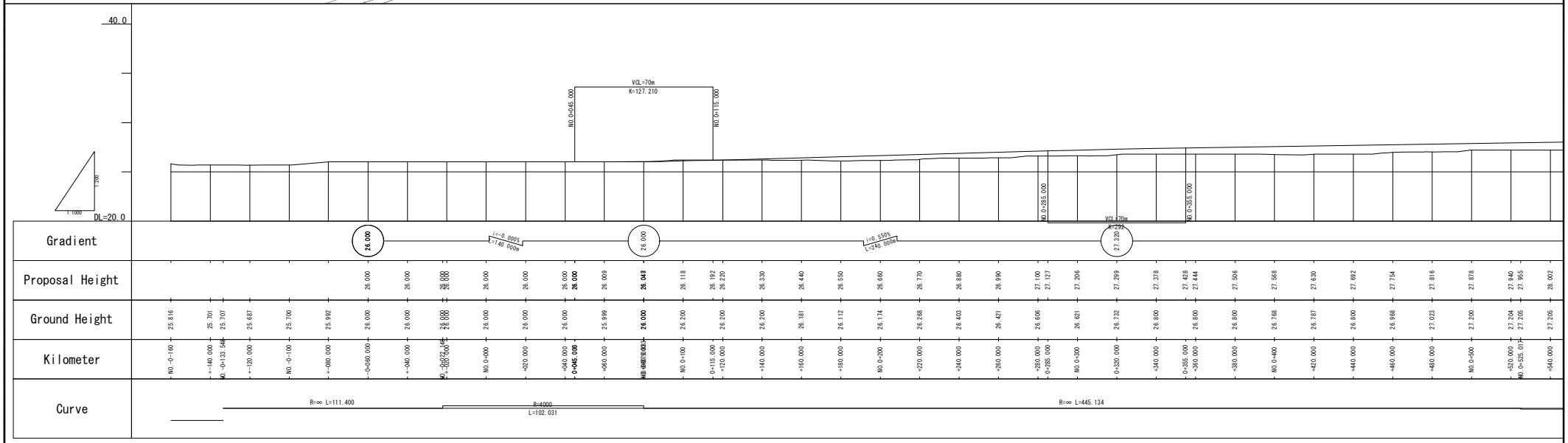

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DRAWING TITLE: PLAN AND PROFILE

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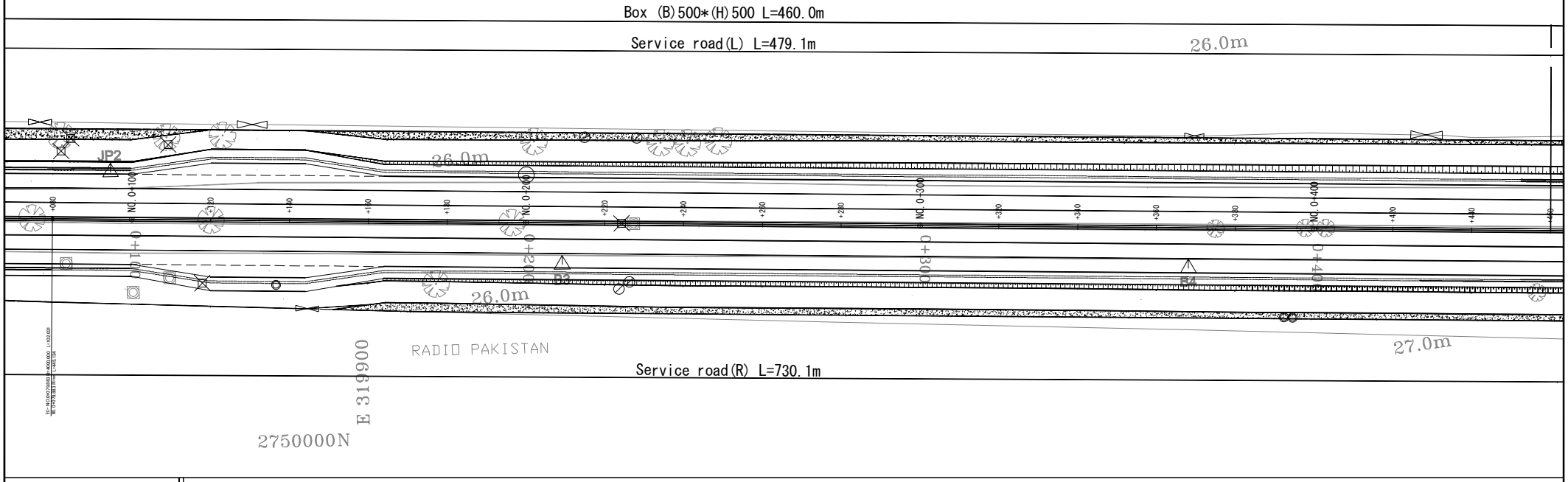

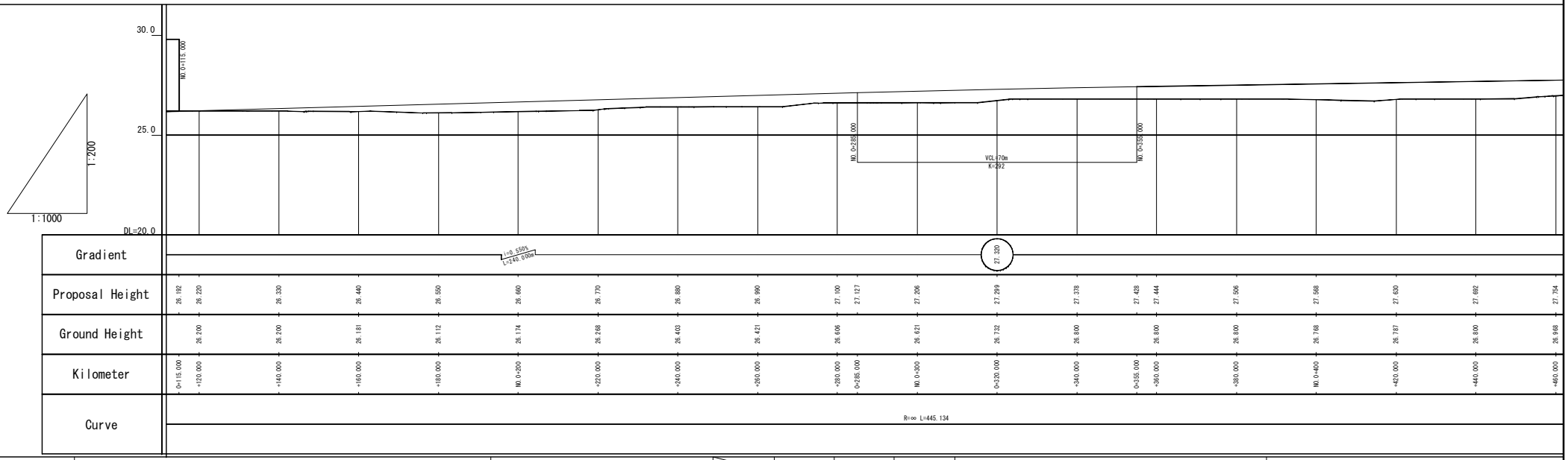

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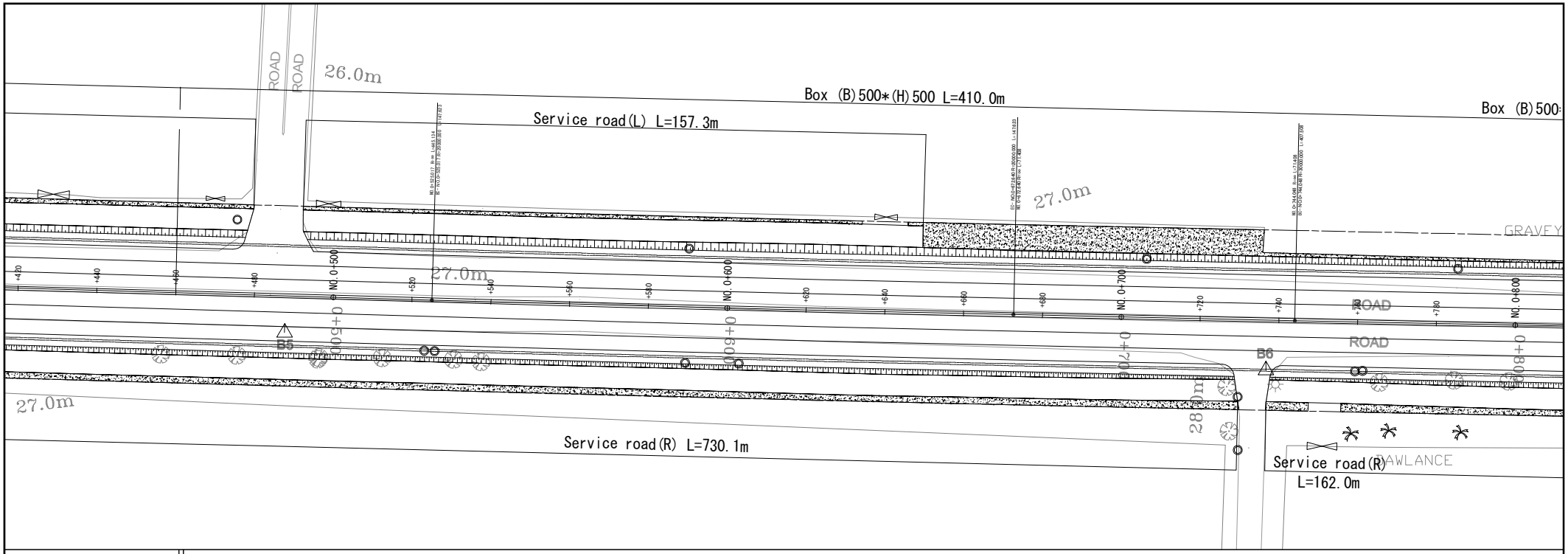

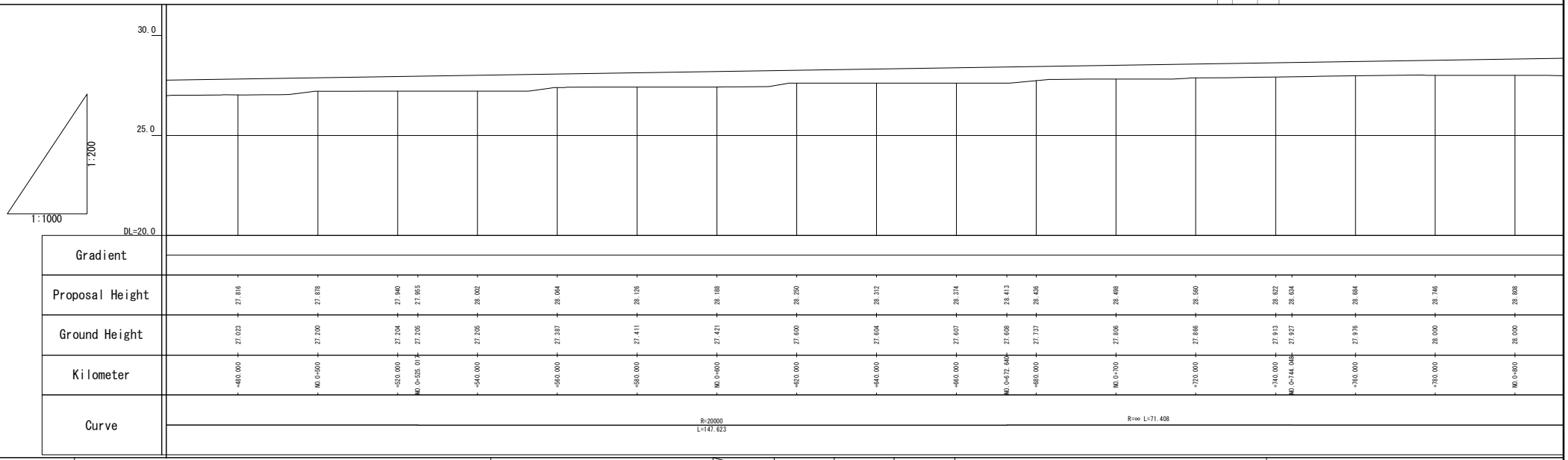

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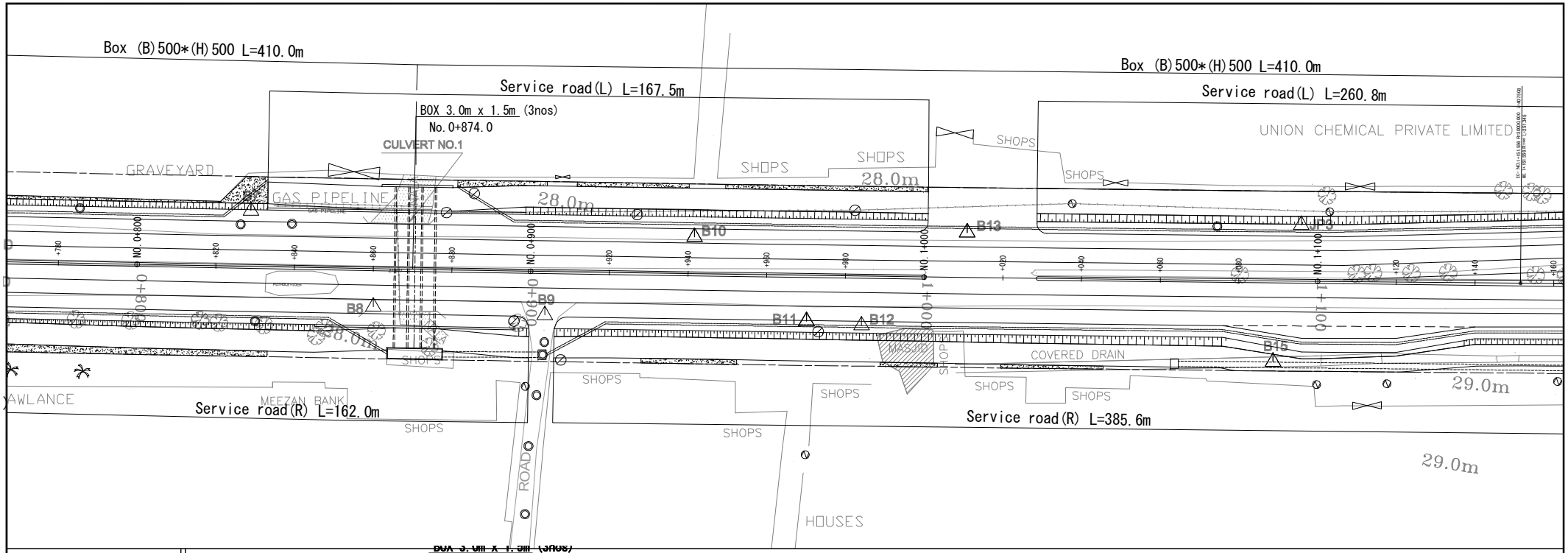

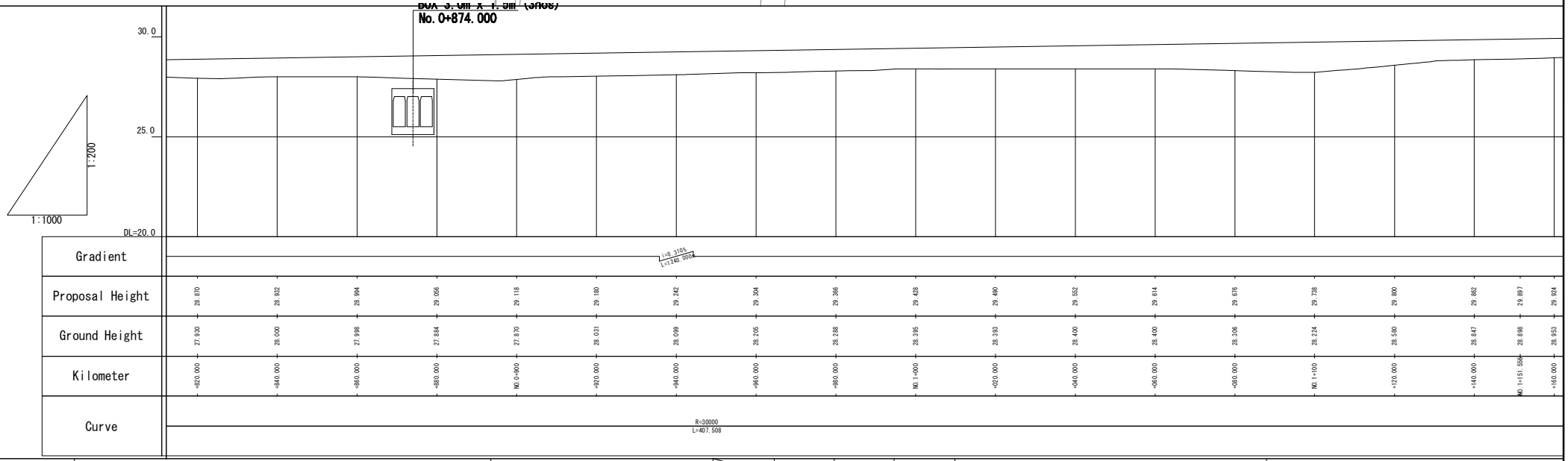

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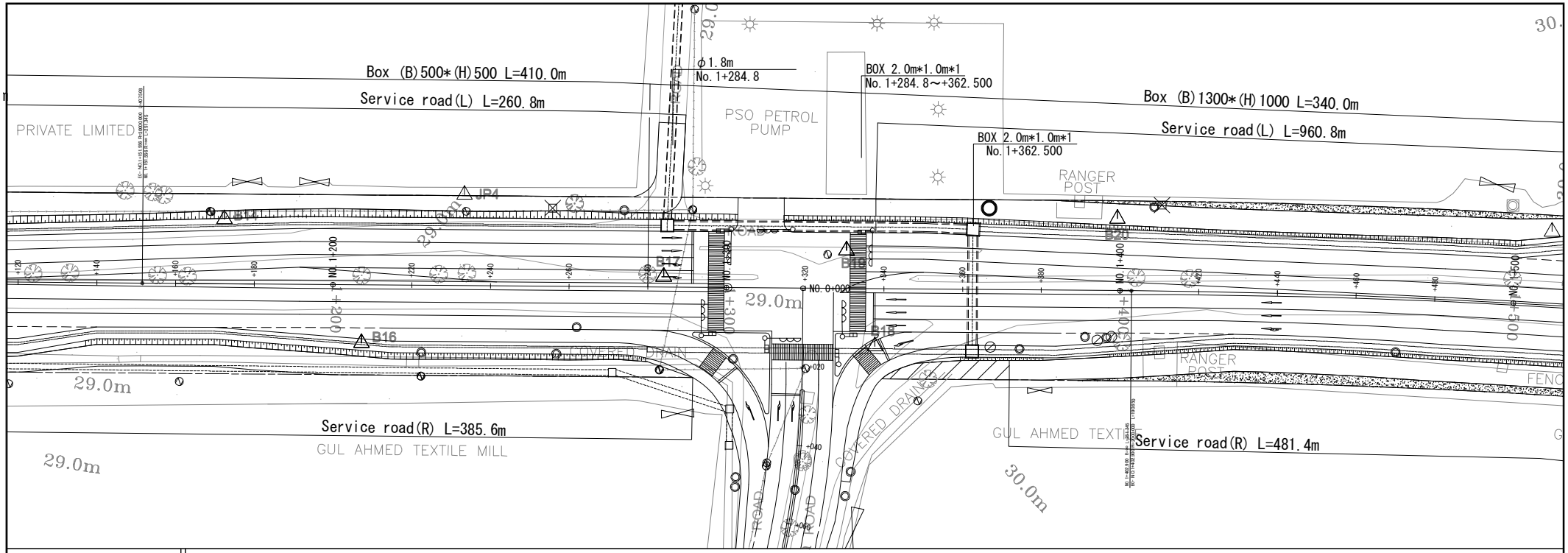

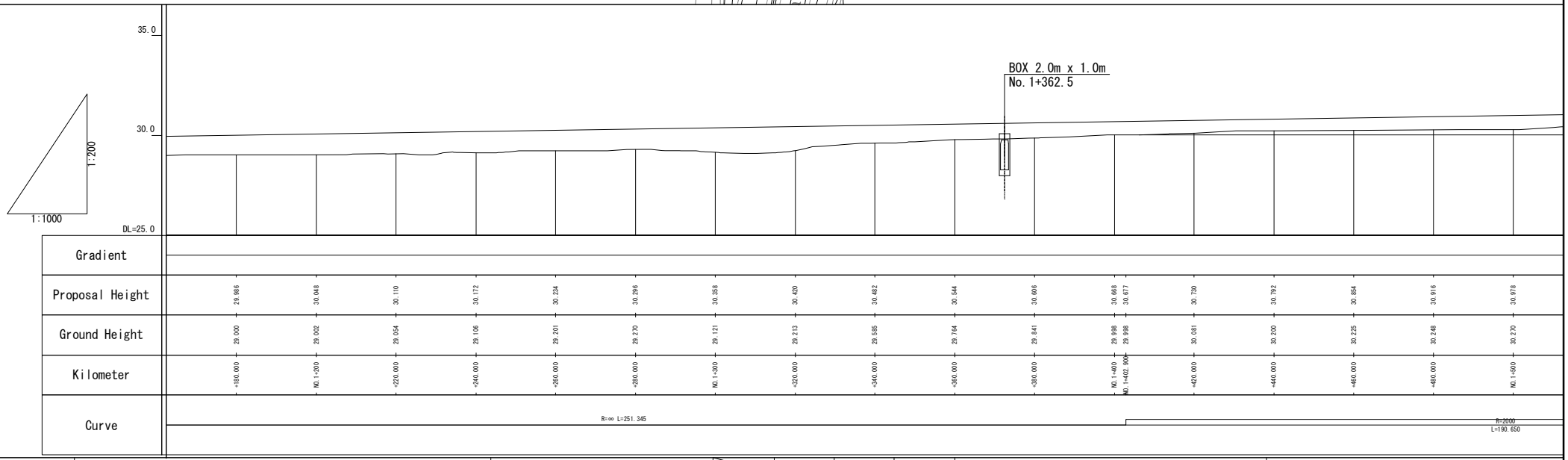

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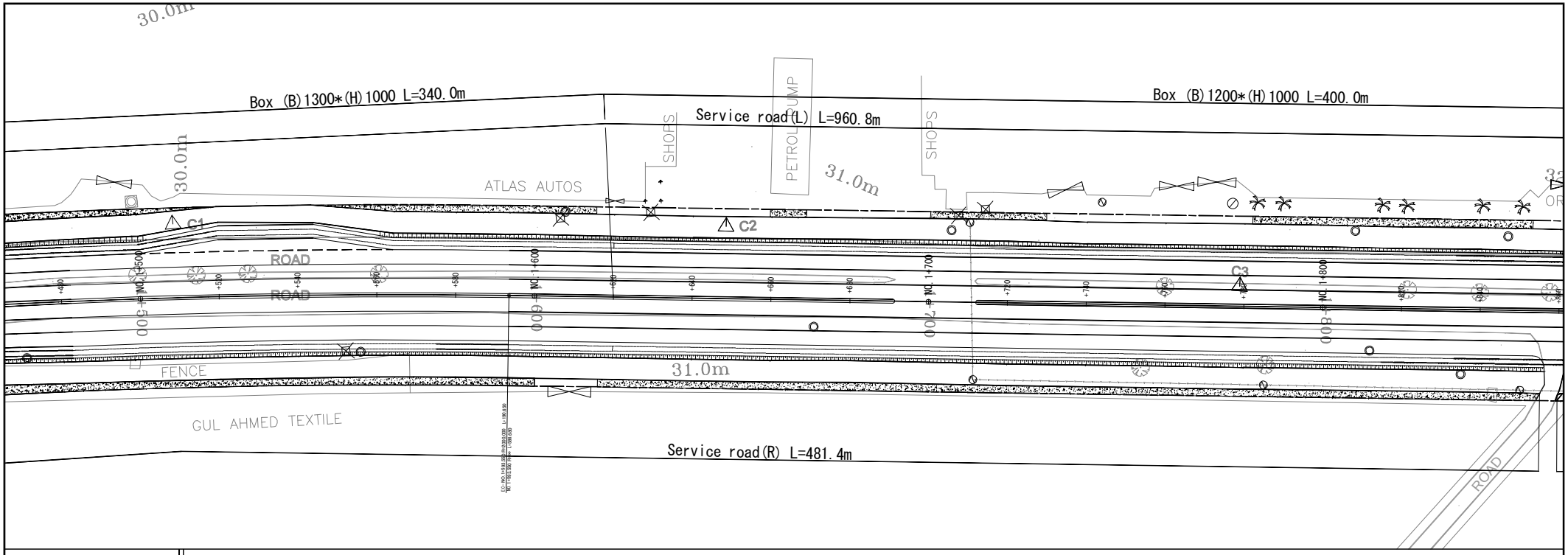

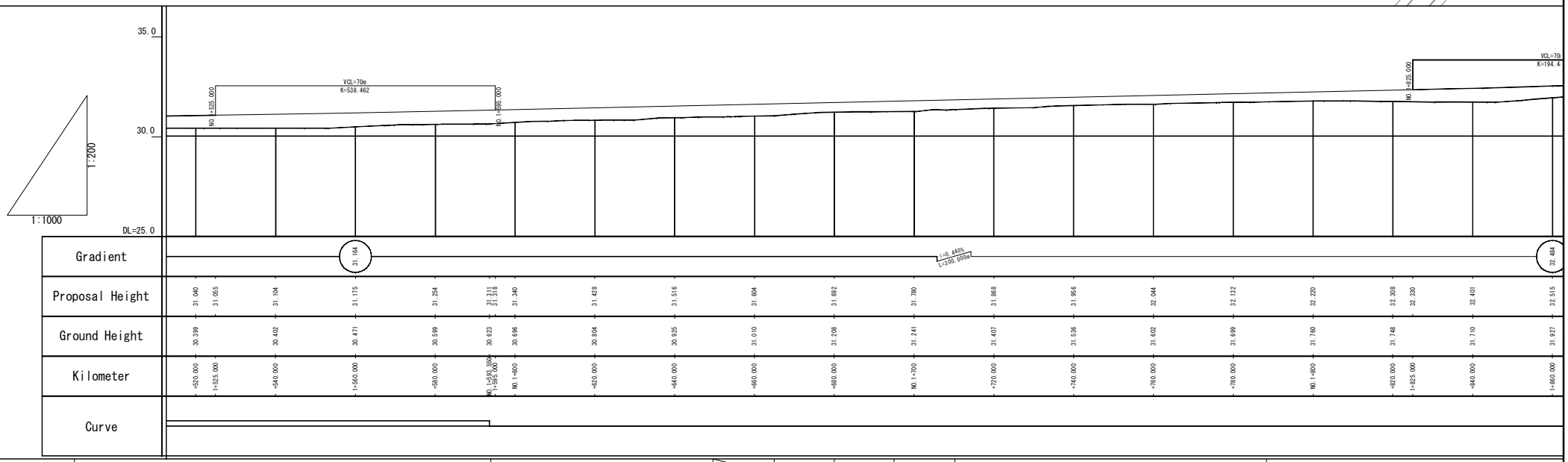

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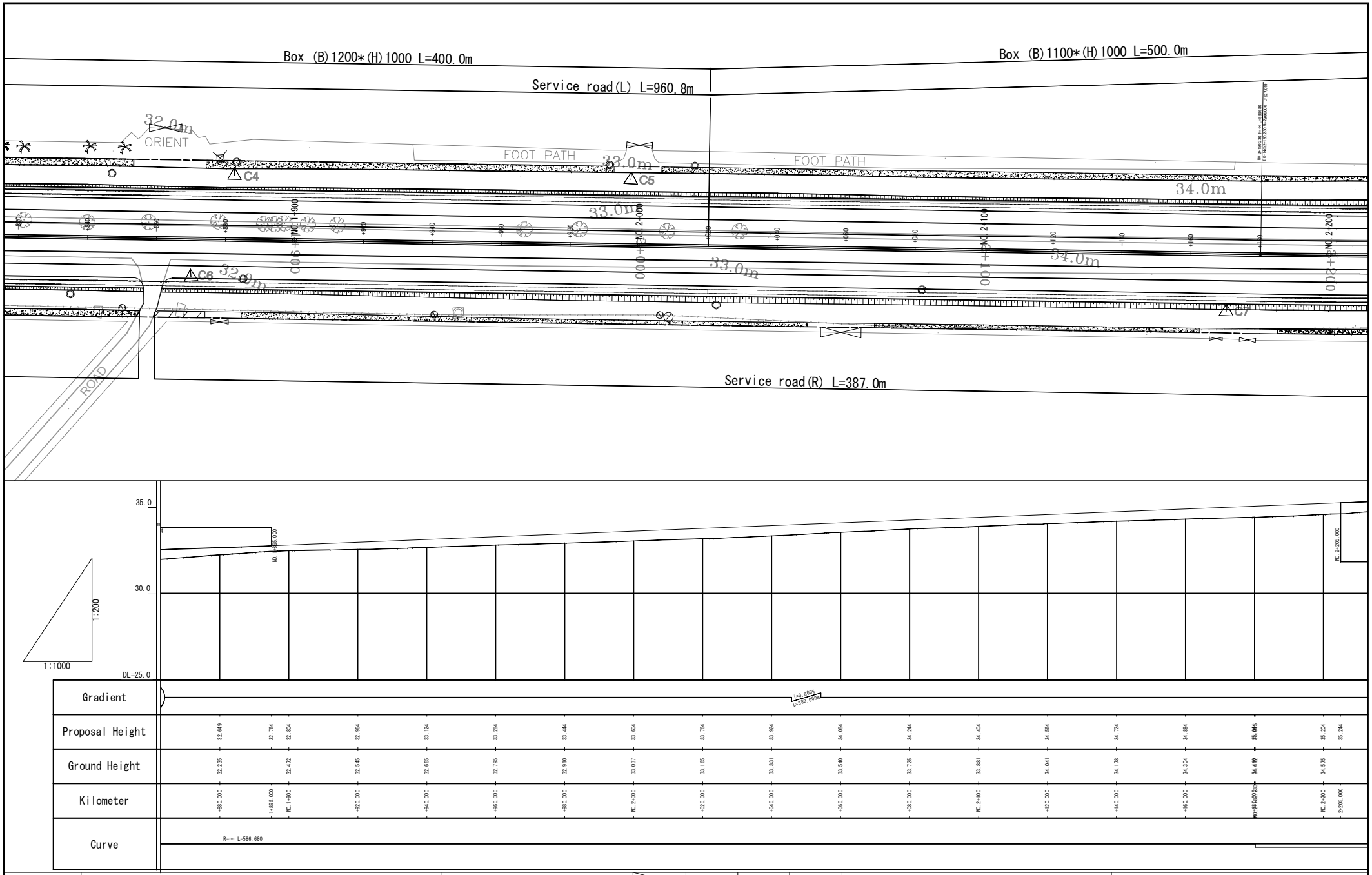

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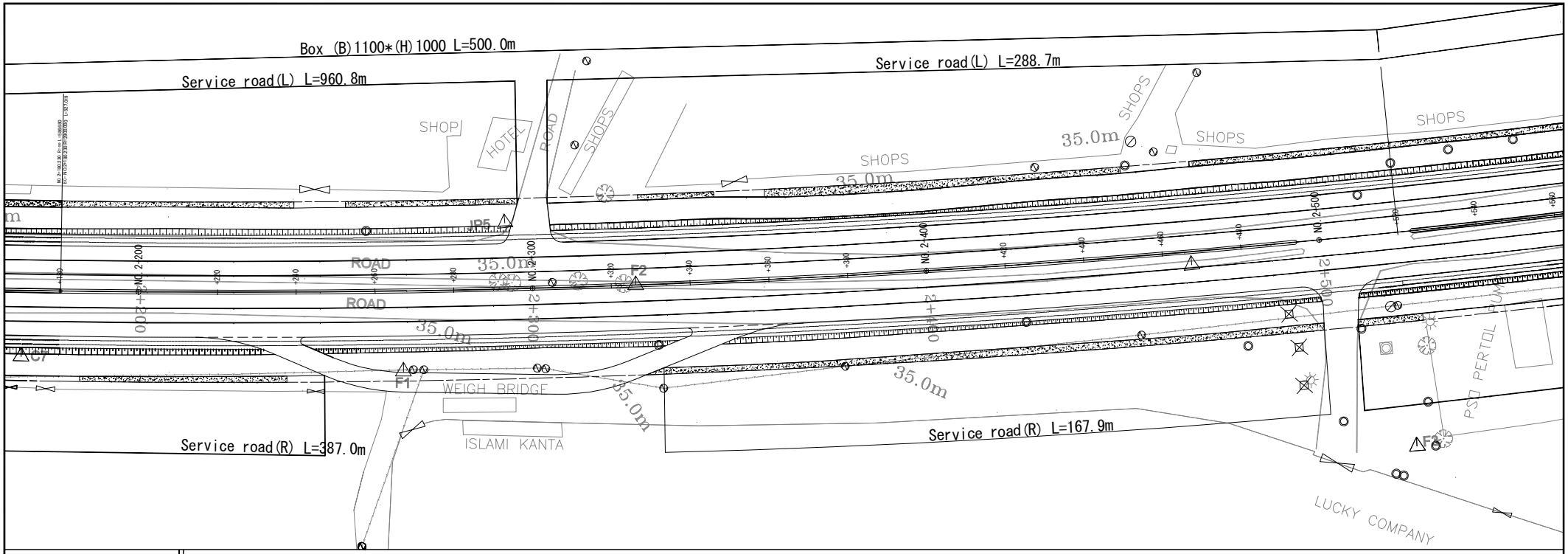
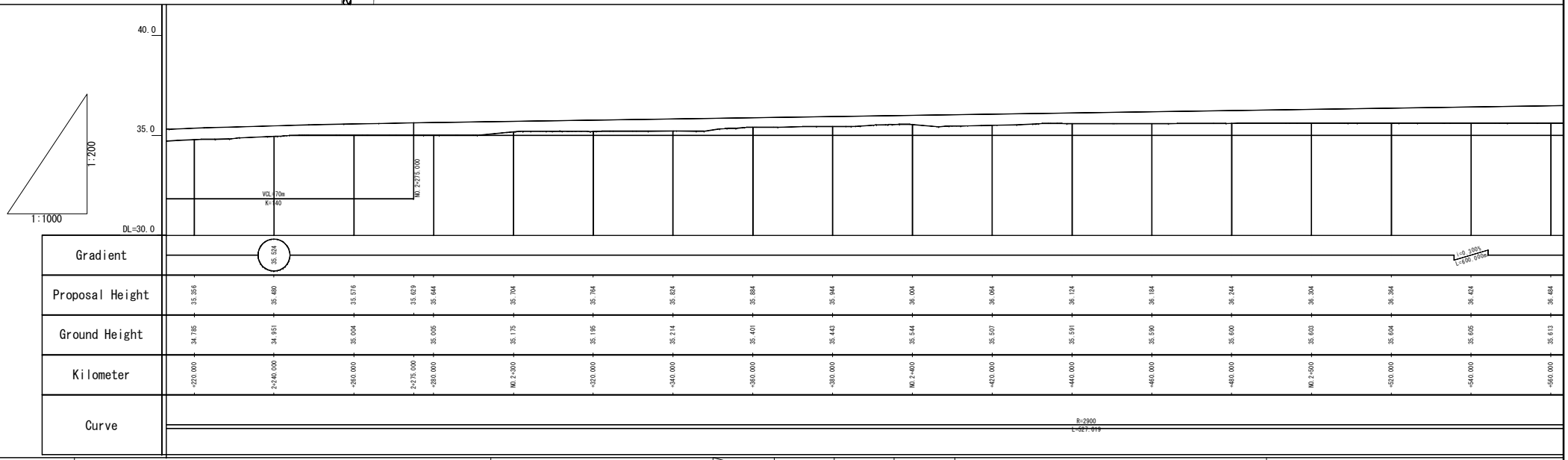
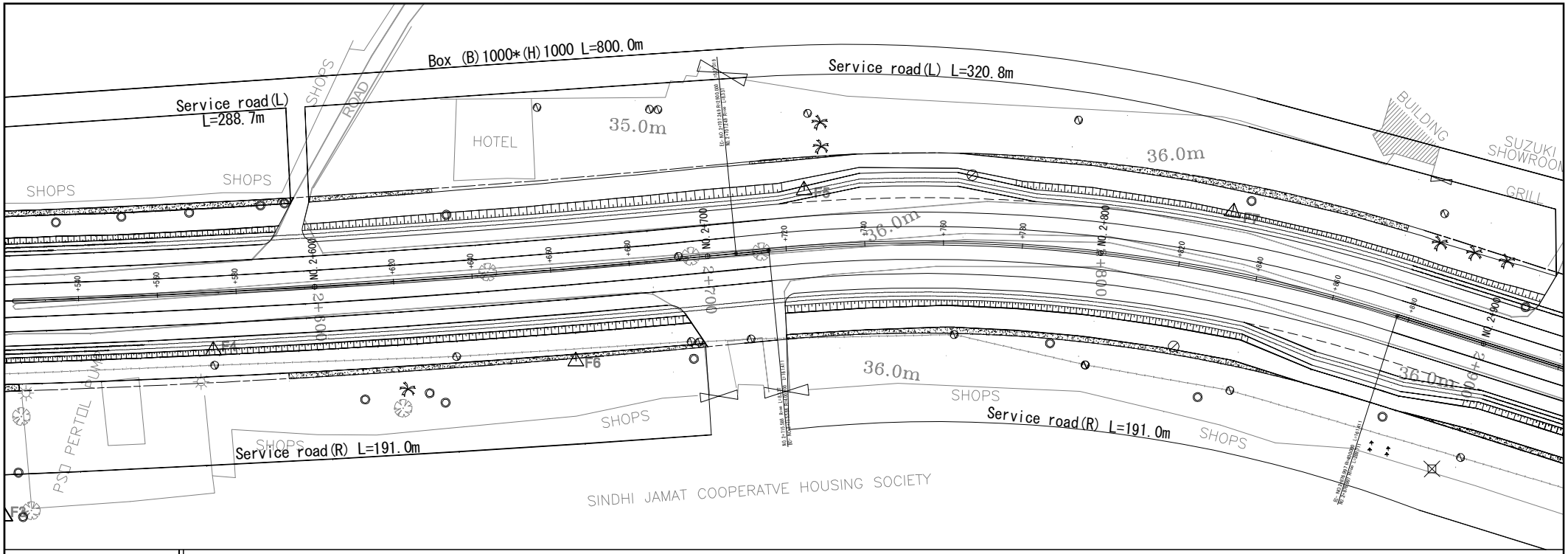
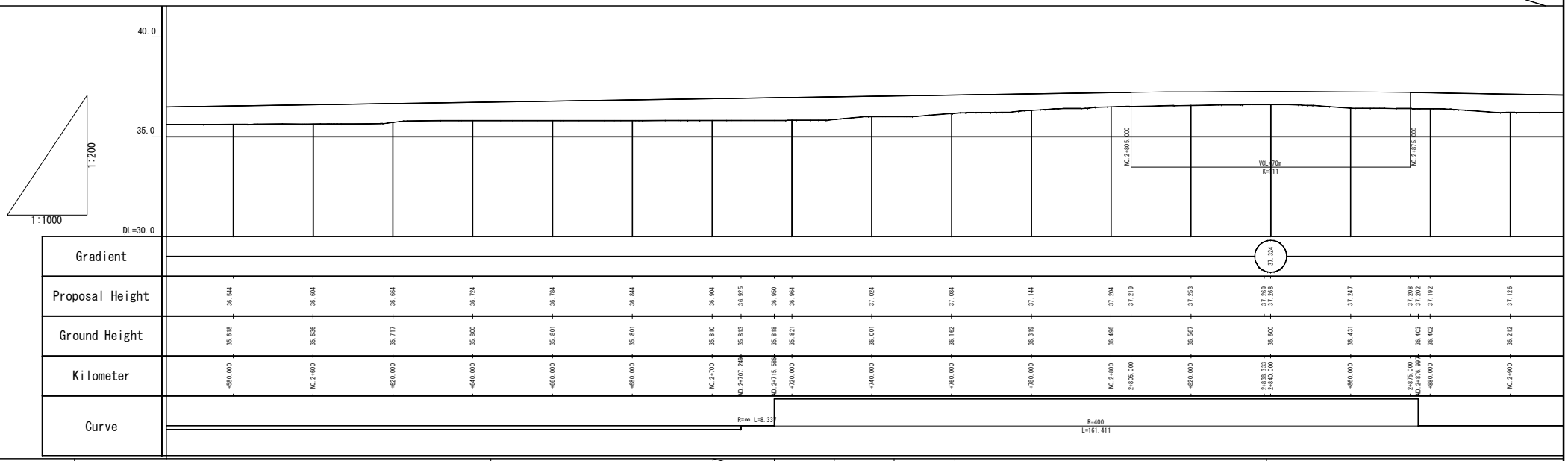




JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION (NAME, SIGNATURE, DATE)	SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 8/49





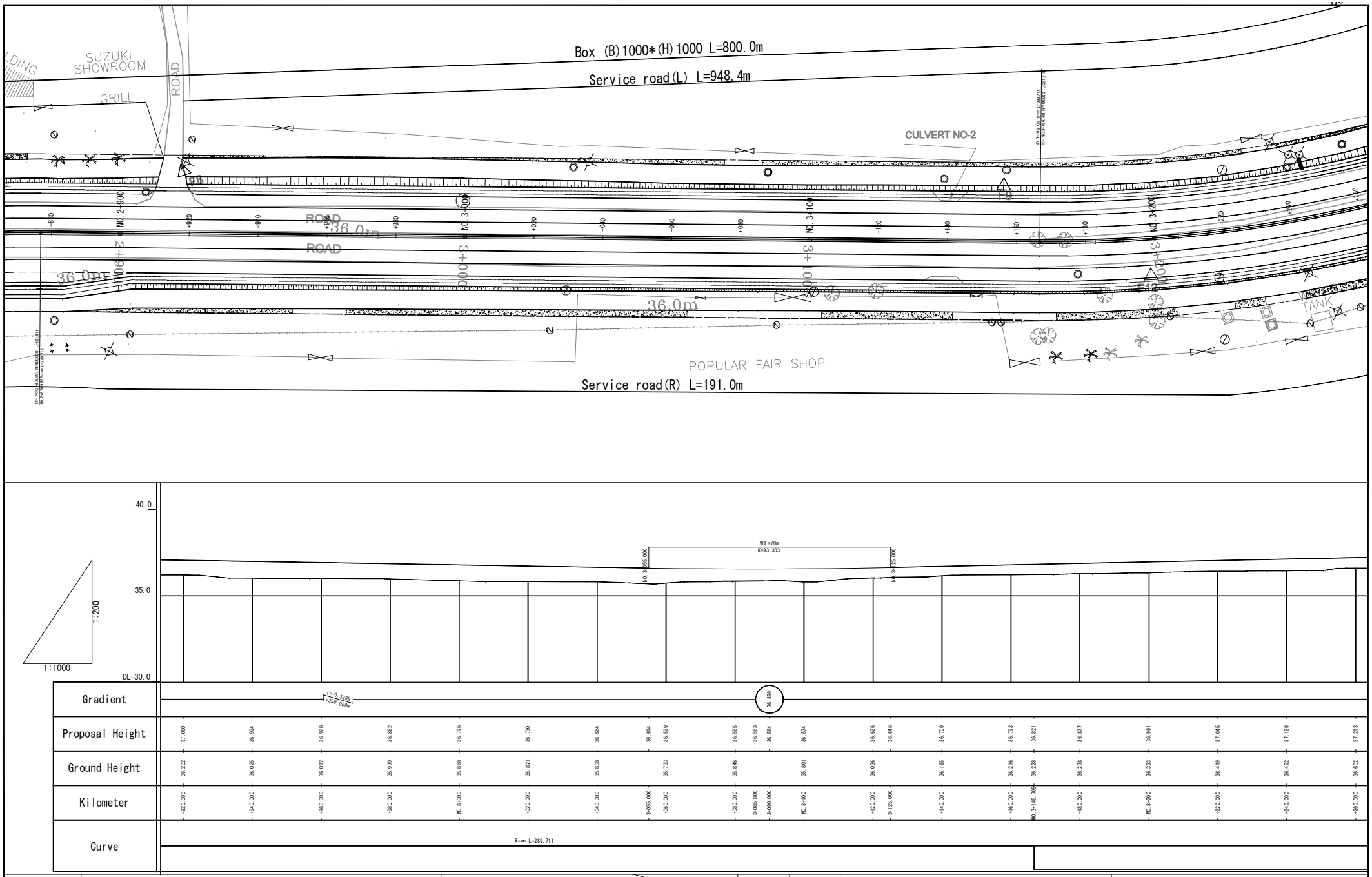
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 9/49



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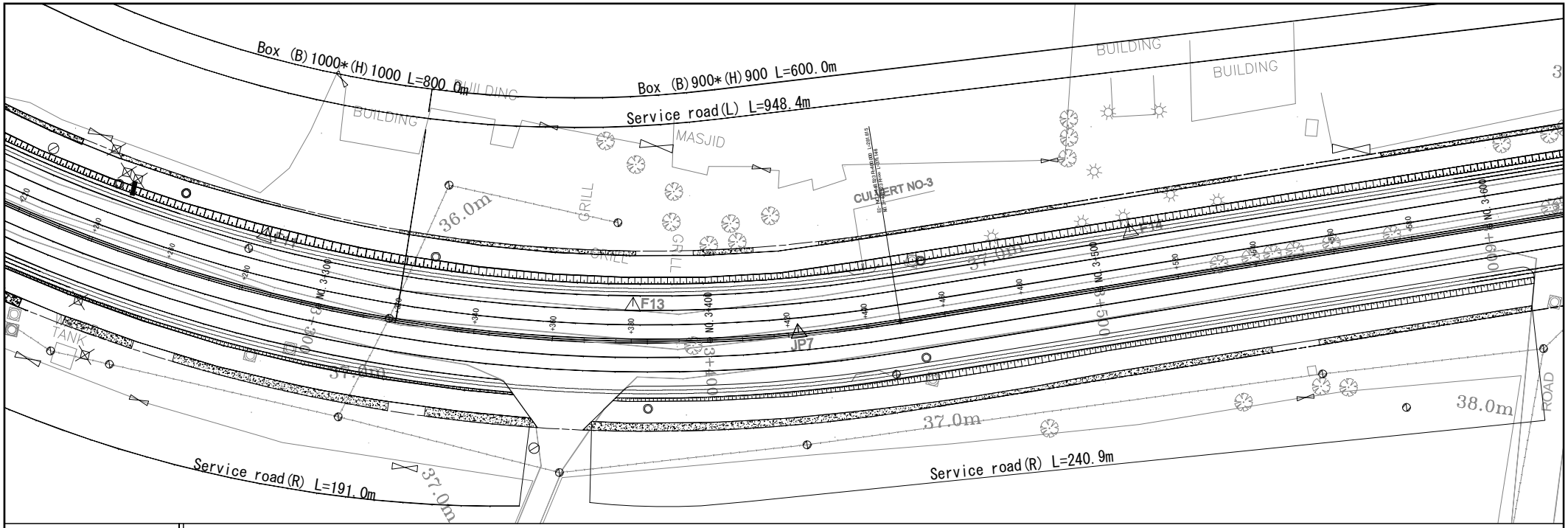
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

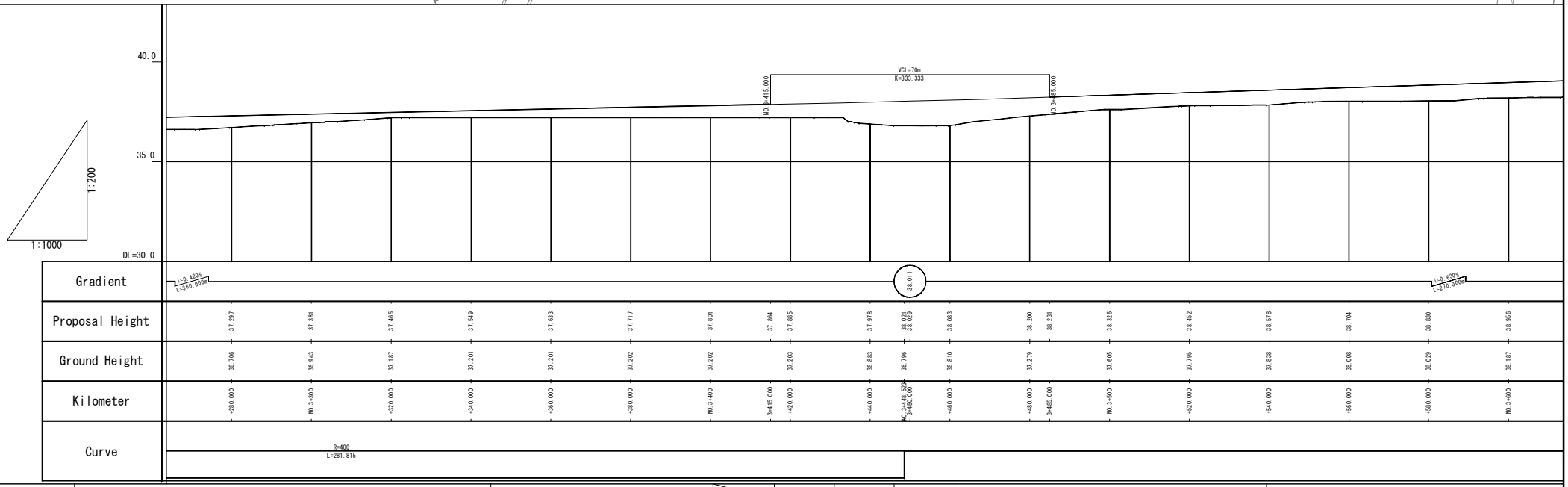
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 10/49





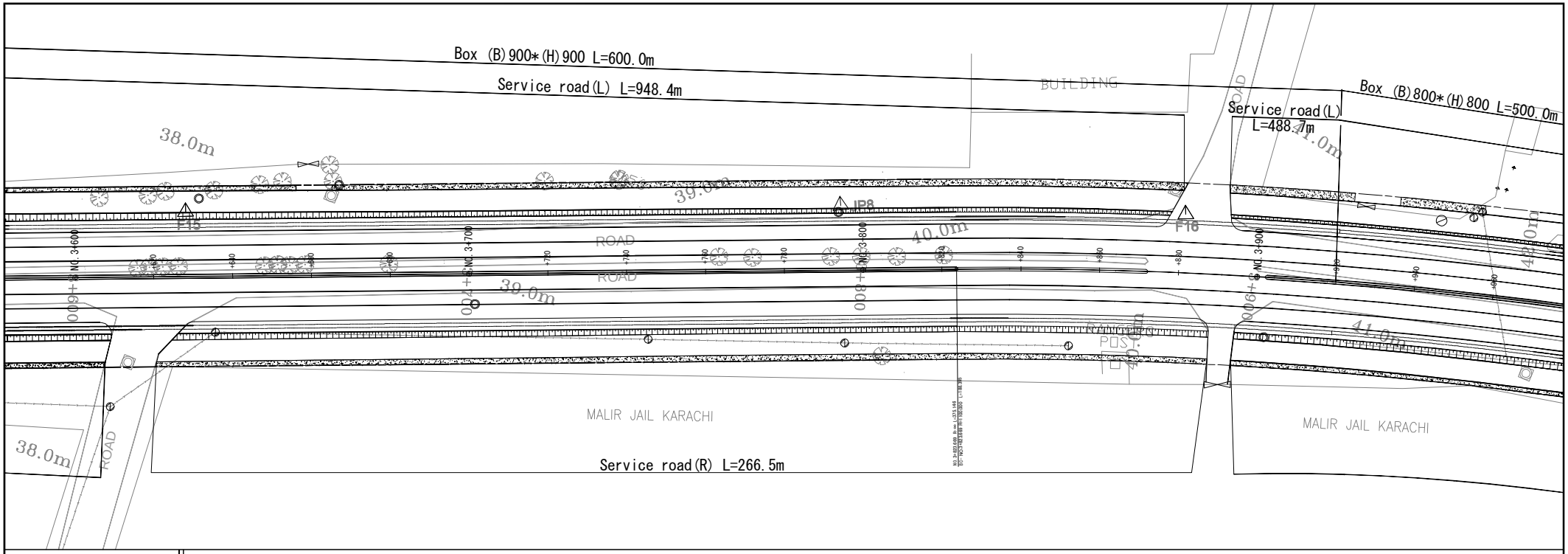
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

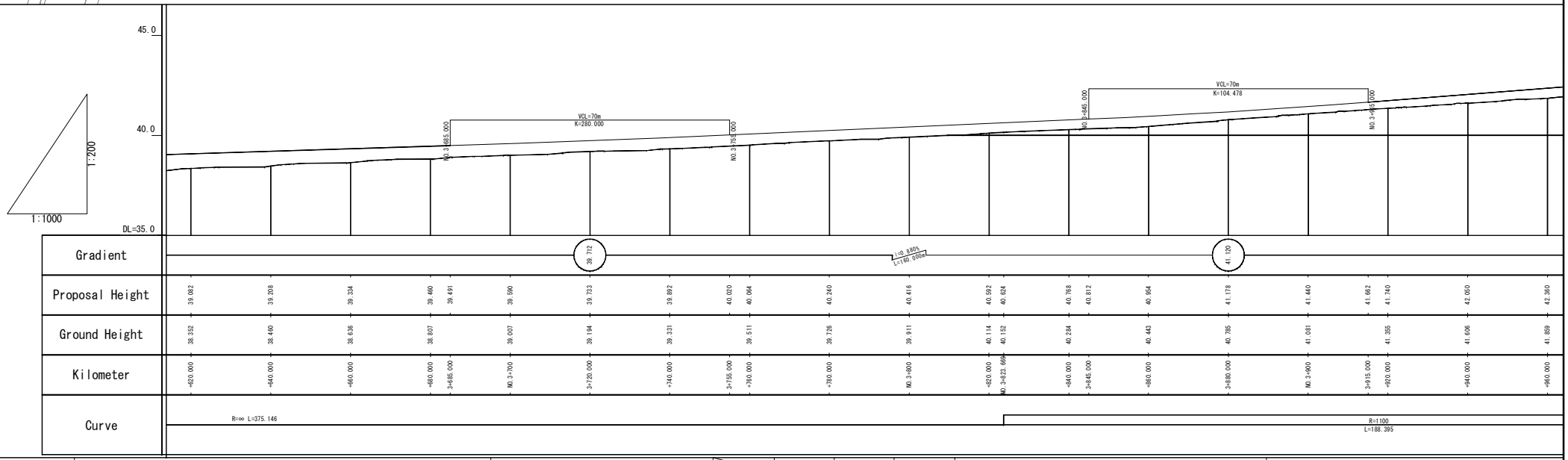
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

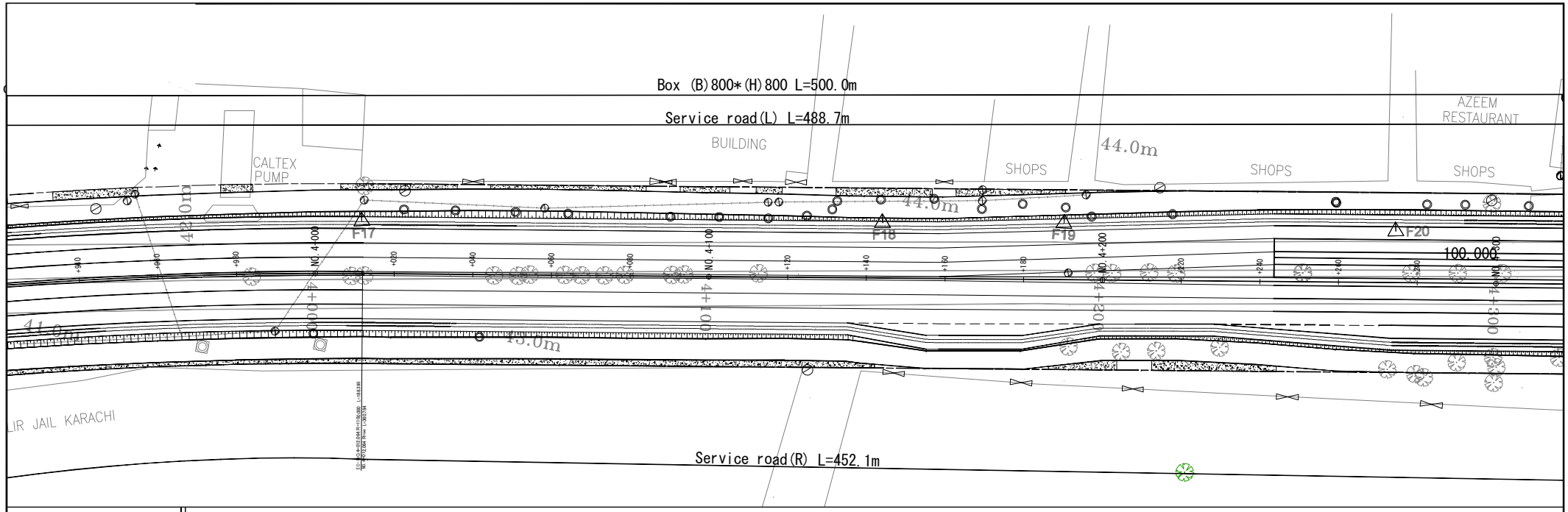
REV. | DRG. NO. 11/49

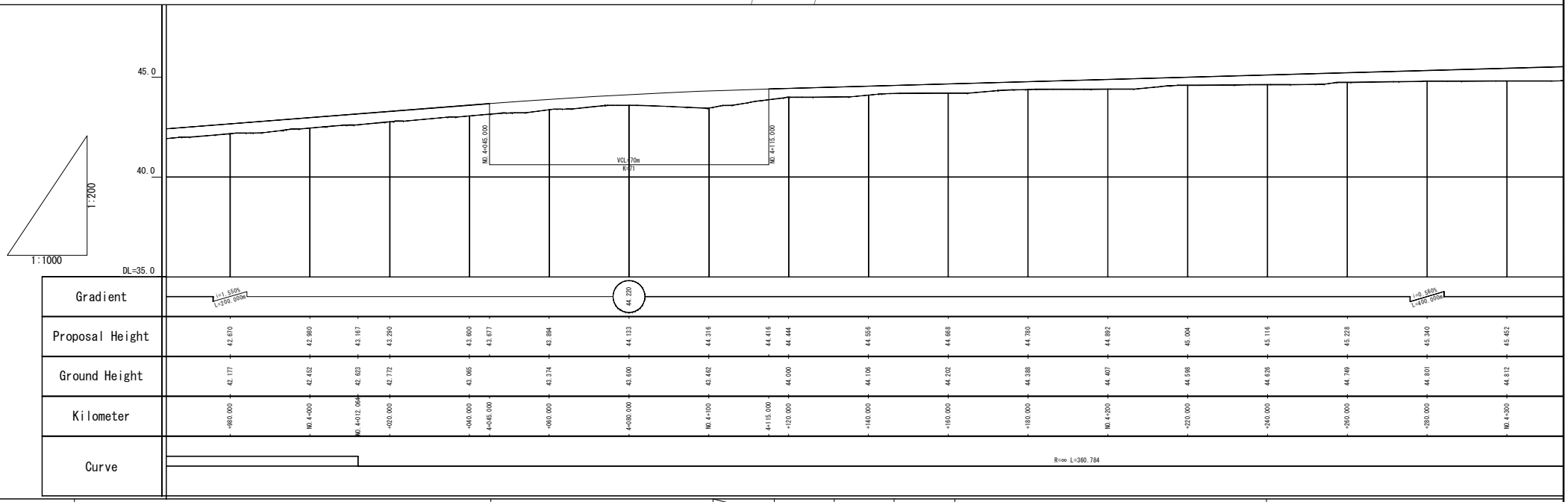




JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION	SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 12/49

A-75





JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION			SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 13/49

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

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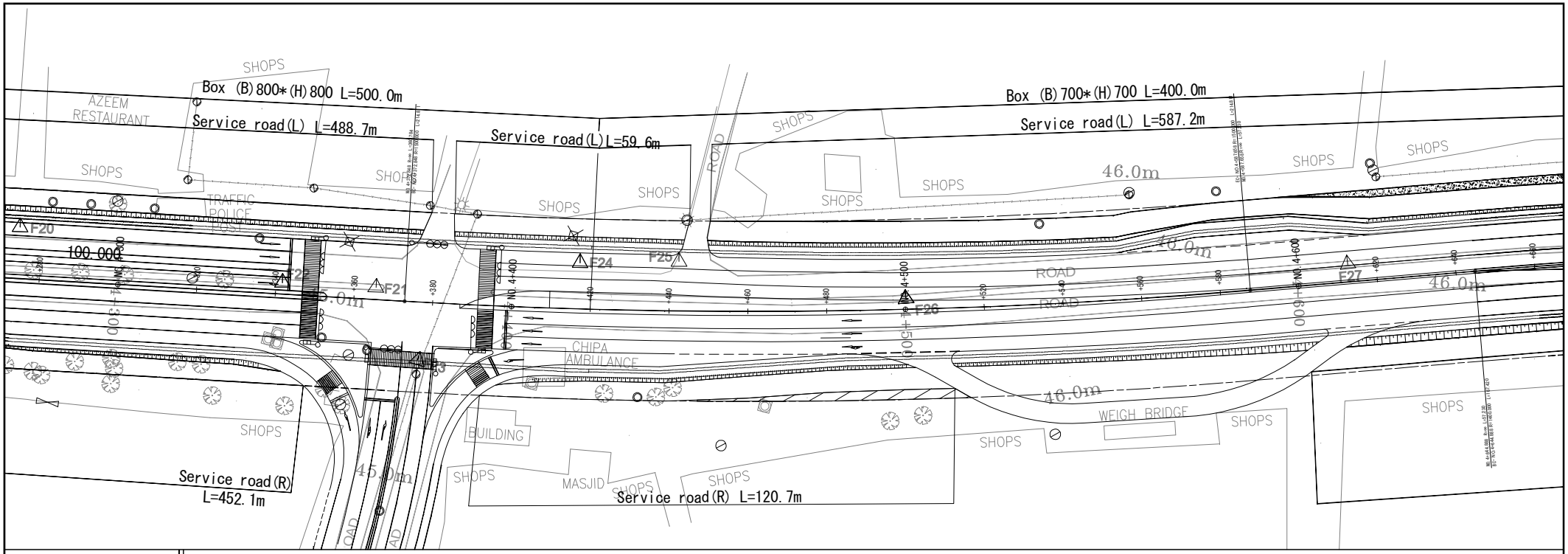
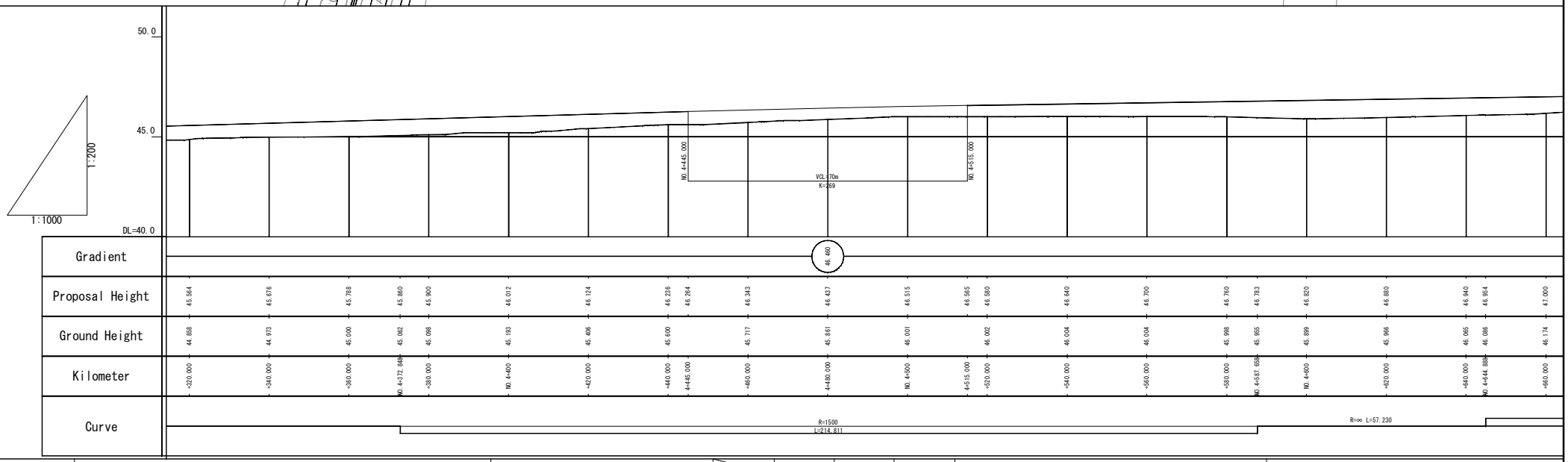
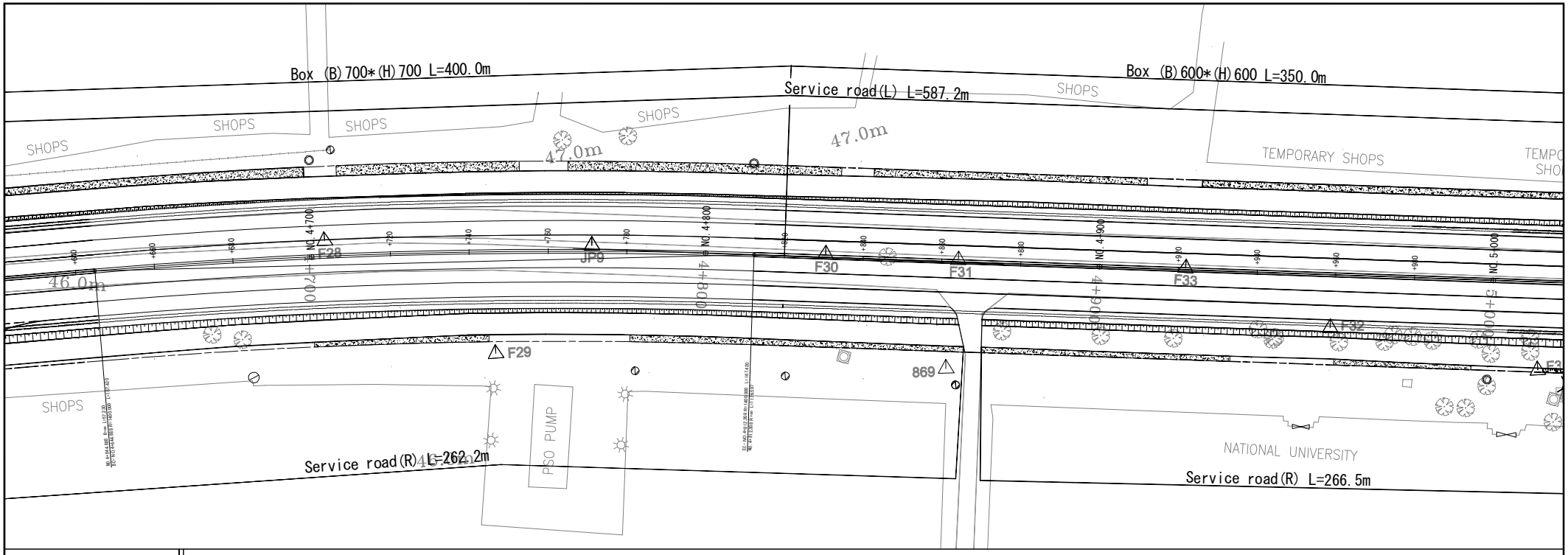
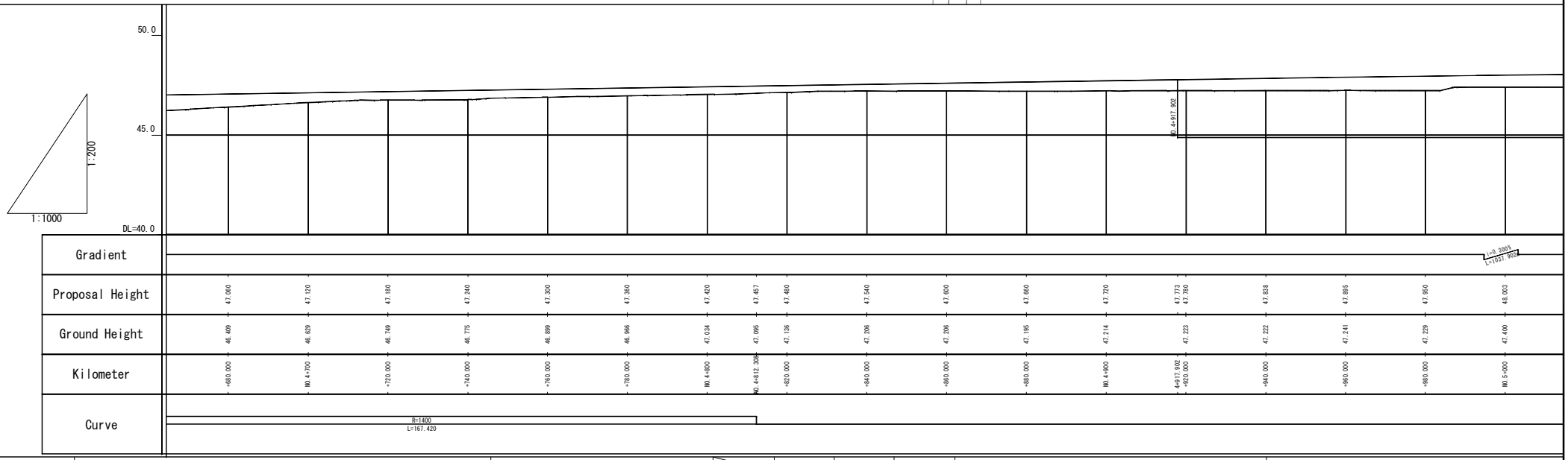




JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION — NAME / SIGNATURE / DATE	SCALE (A1) 1:500 SCALE (A3) 1:1000	REV. DRG. NO. 14/49

A-77





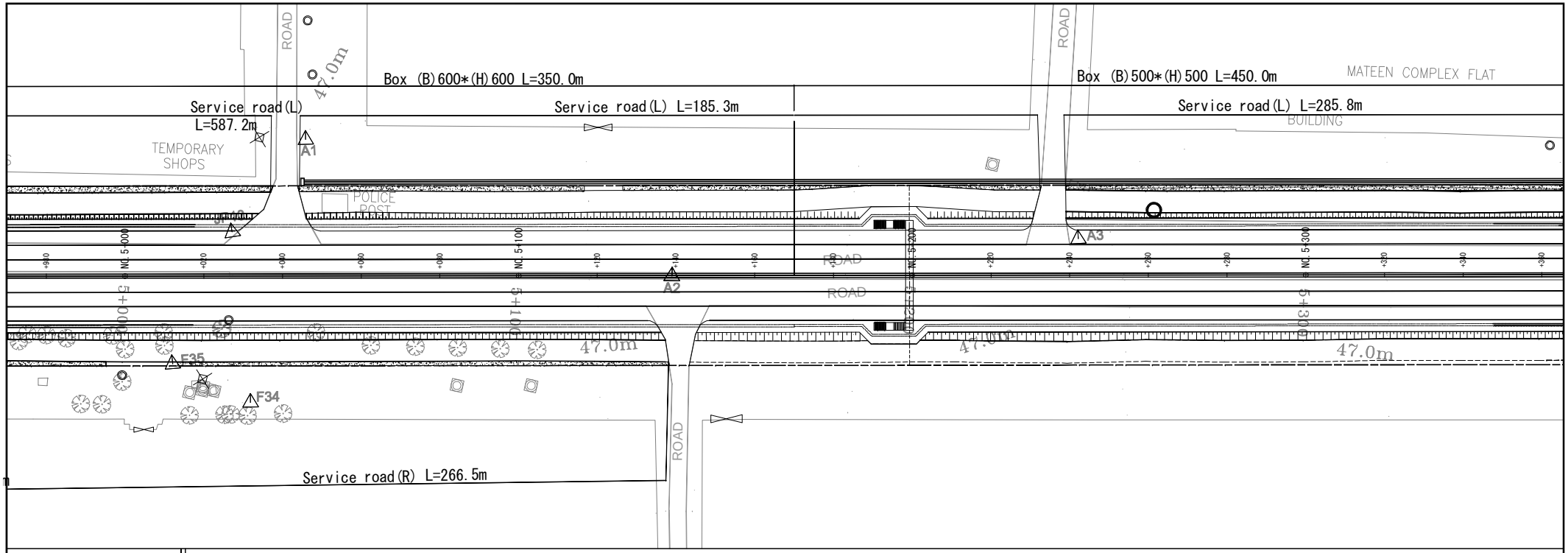
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 15/49



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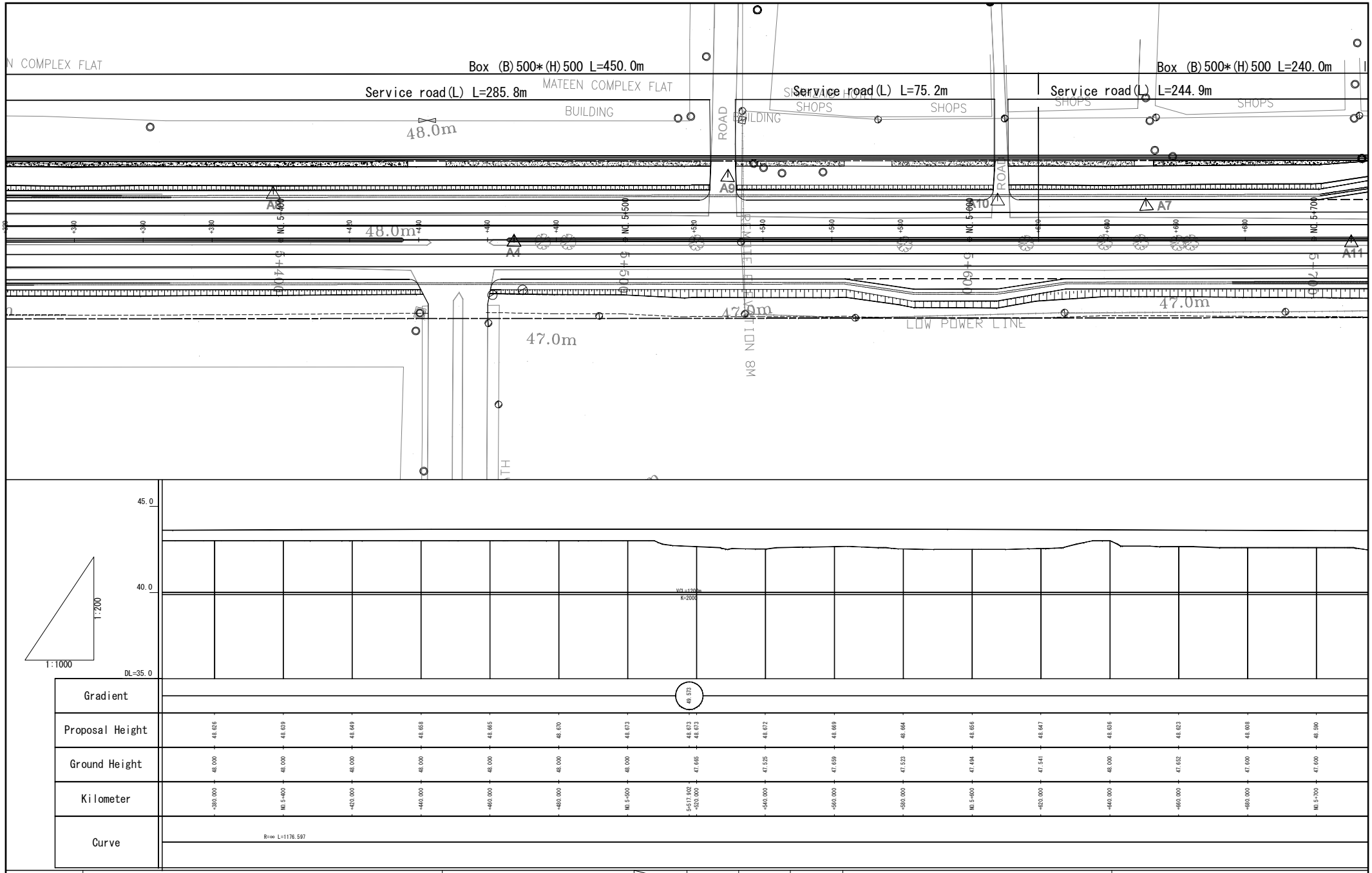
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION			SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 16/49

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			



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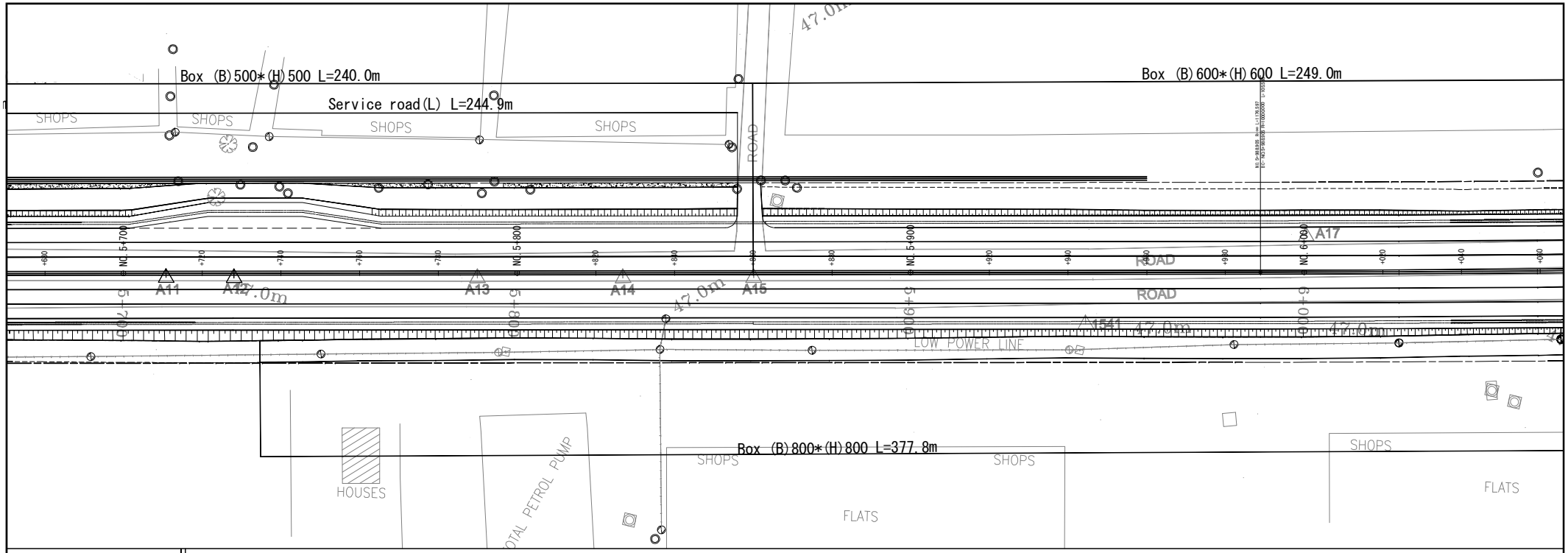
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

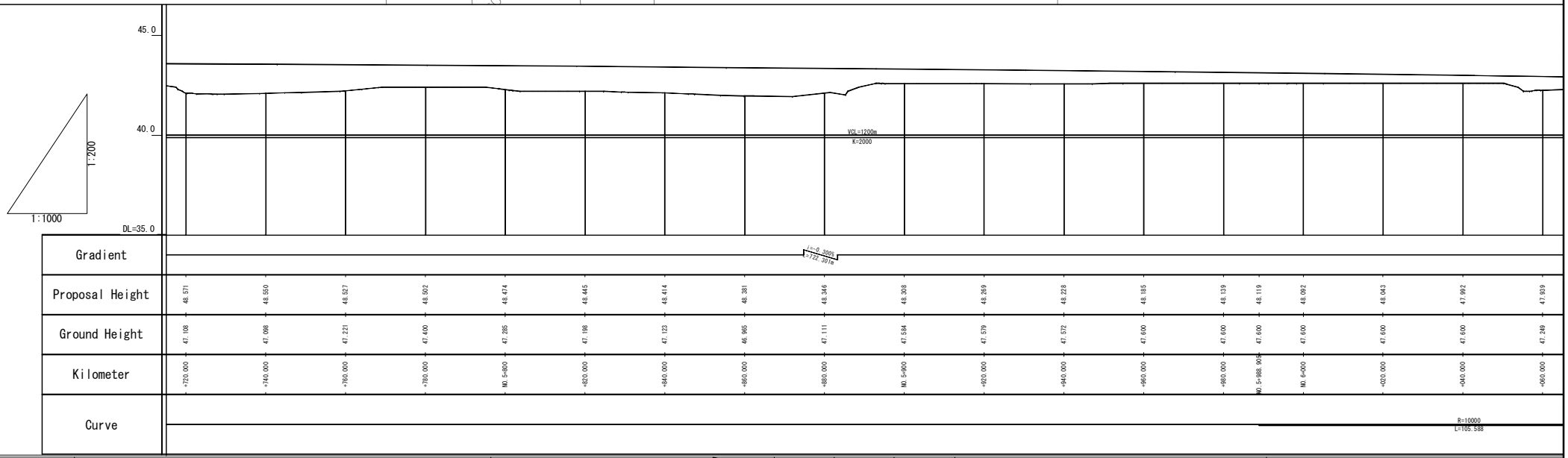
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 17/49

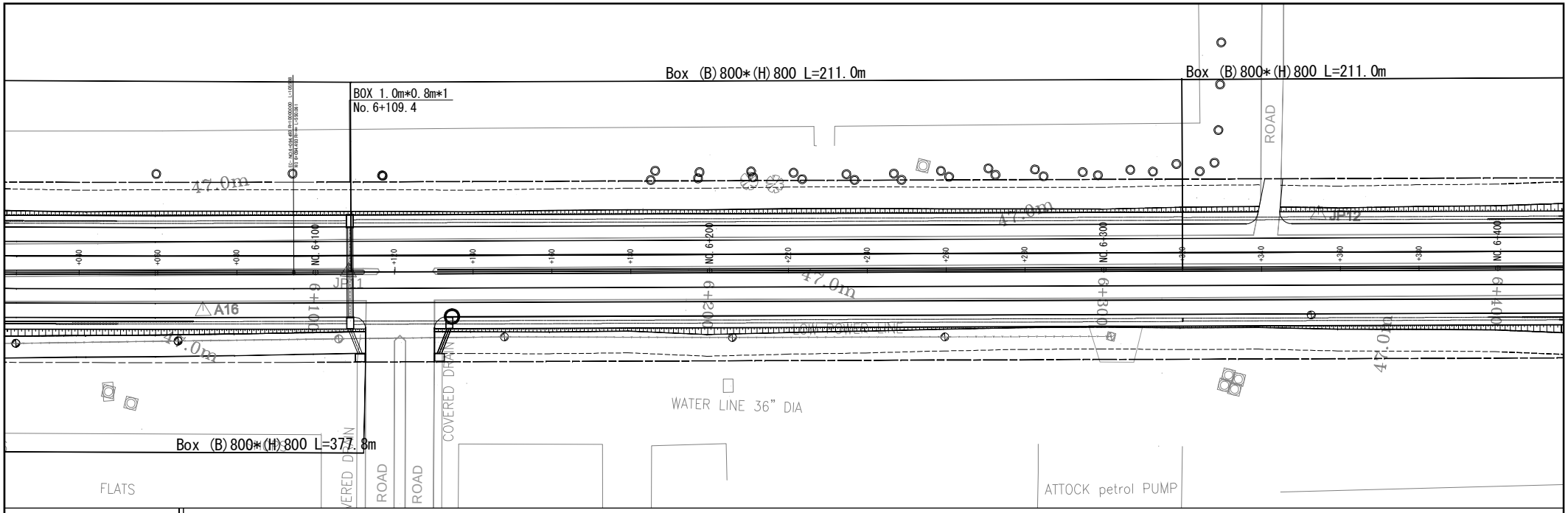


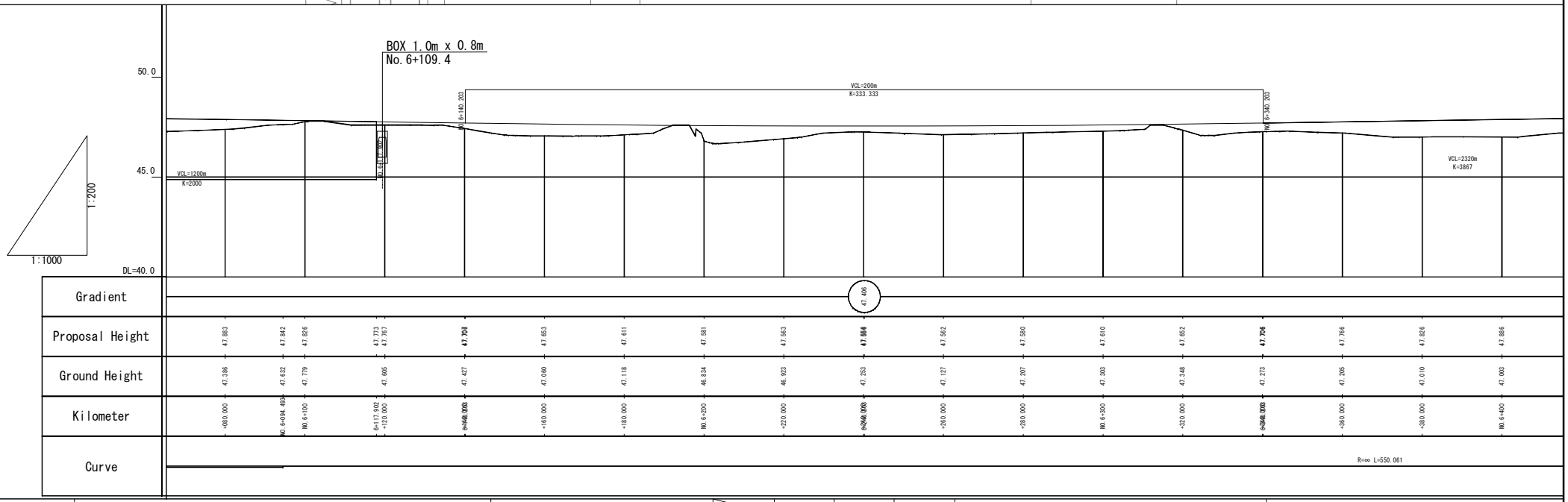


JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION			SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 18/49

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

A-81





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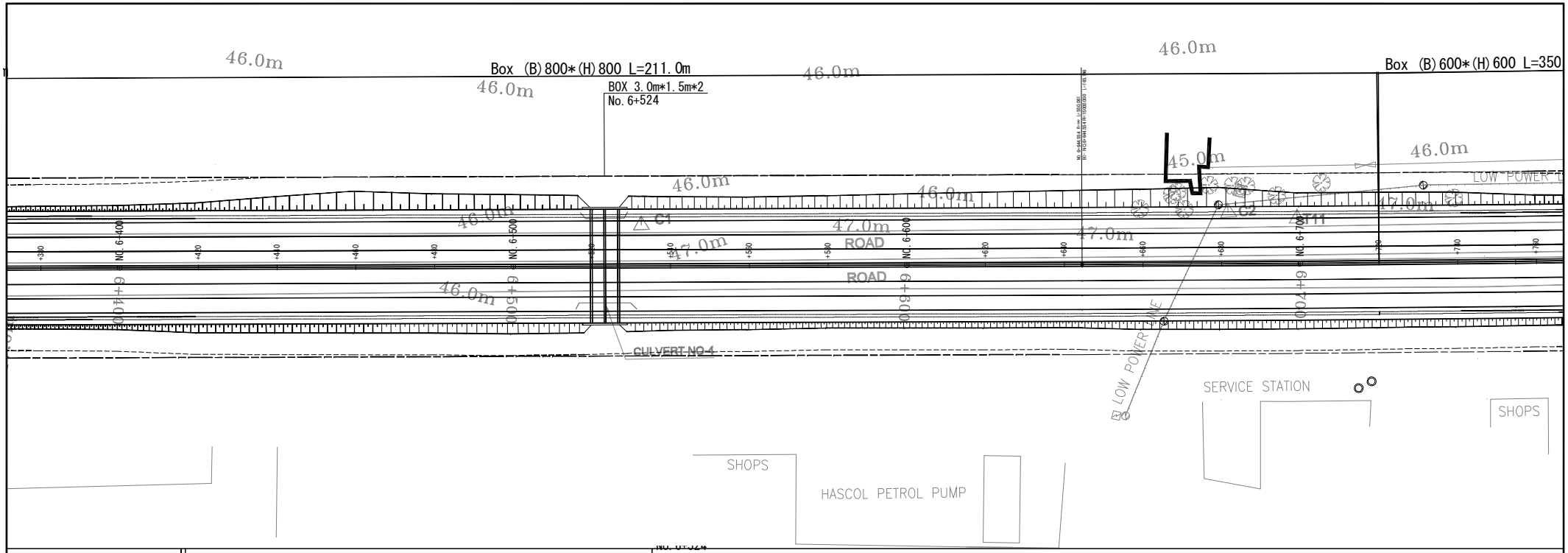
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

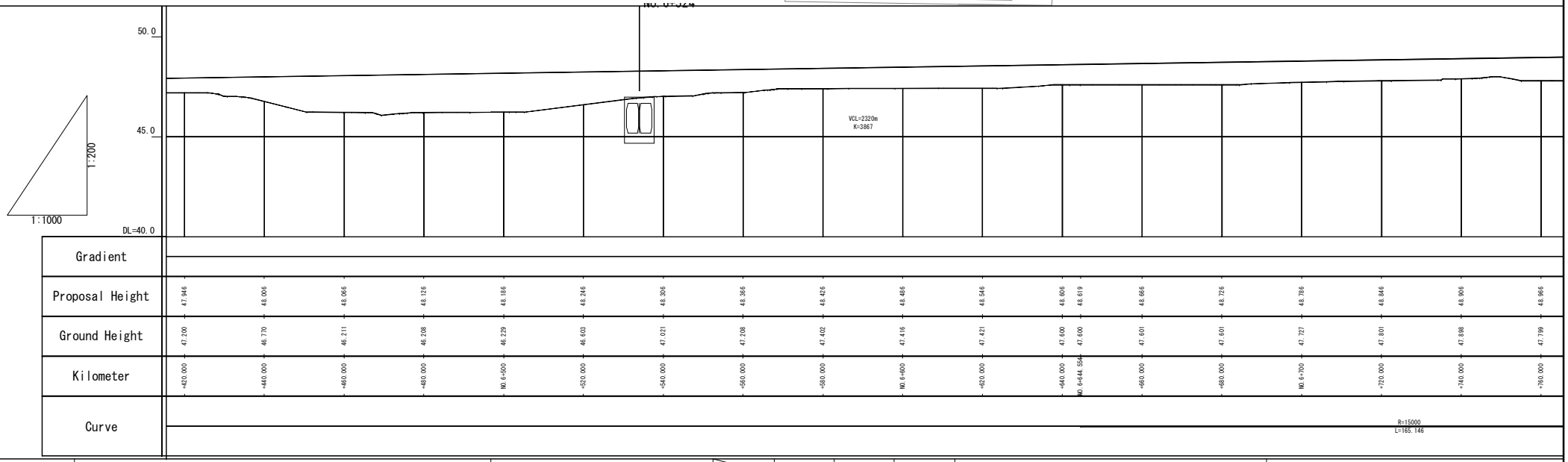
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

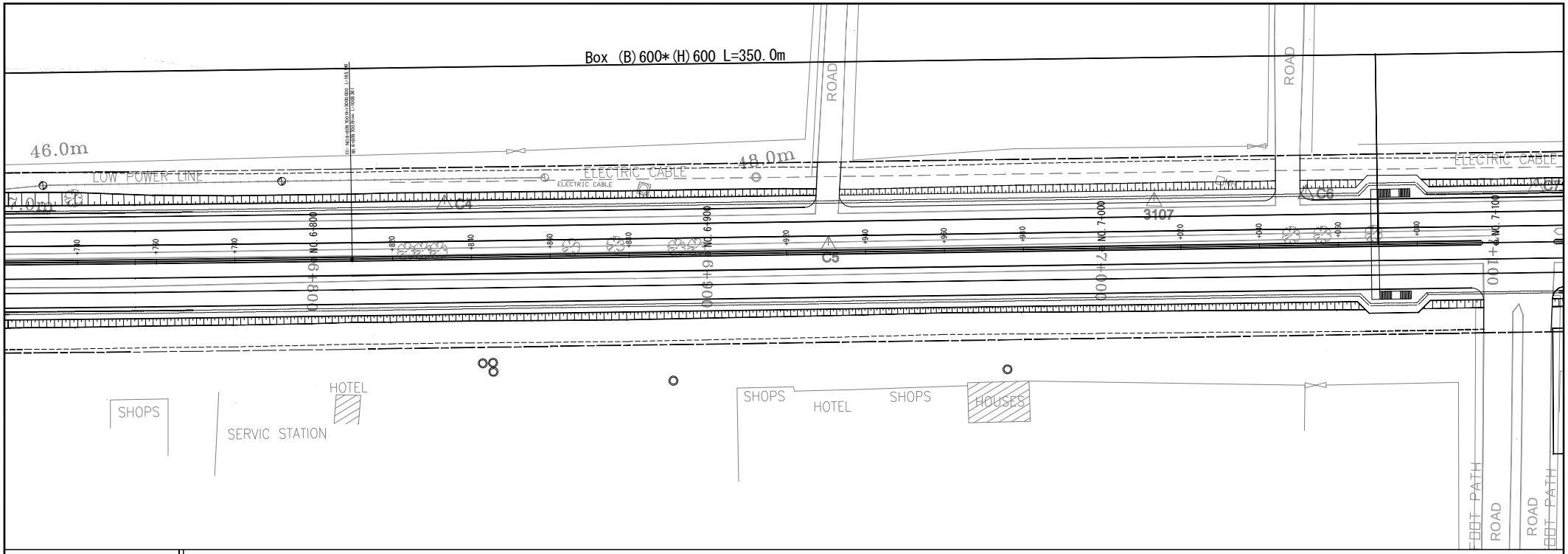
REV. | DRG. NO. 19/49

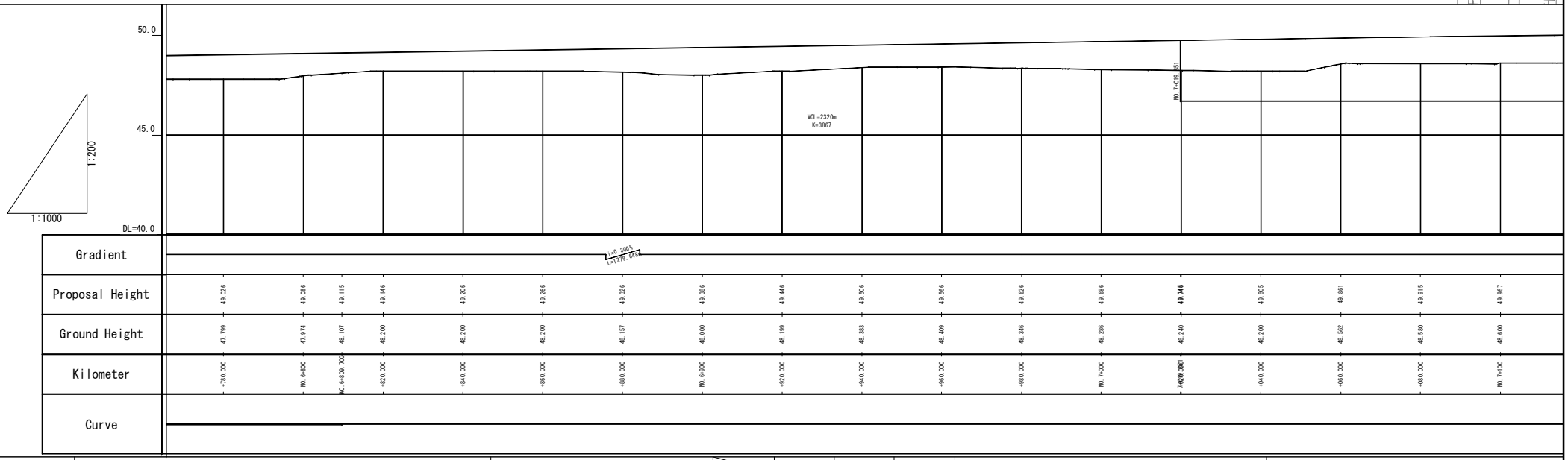




JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION	SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 20/49

A-83





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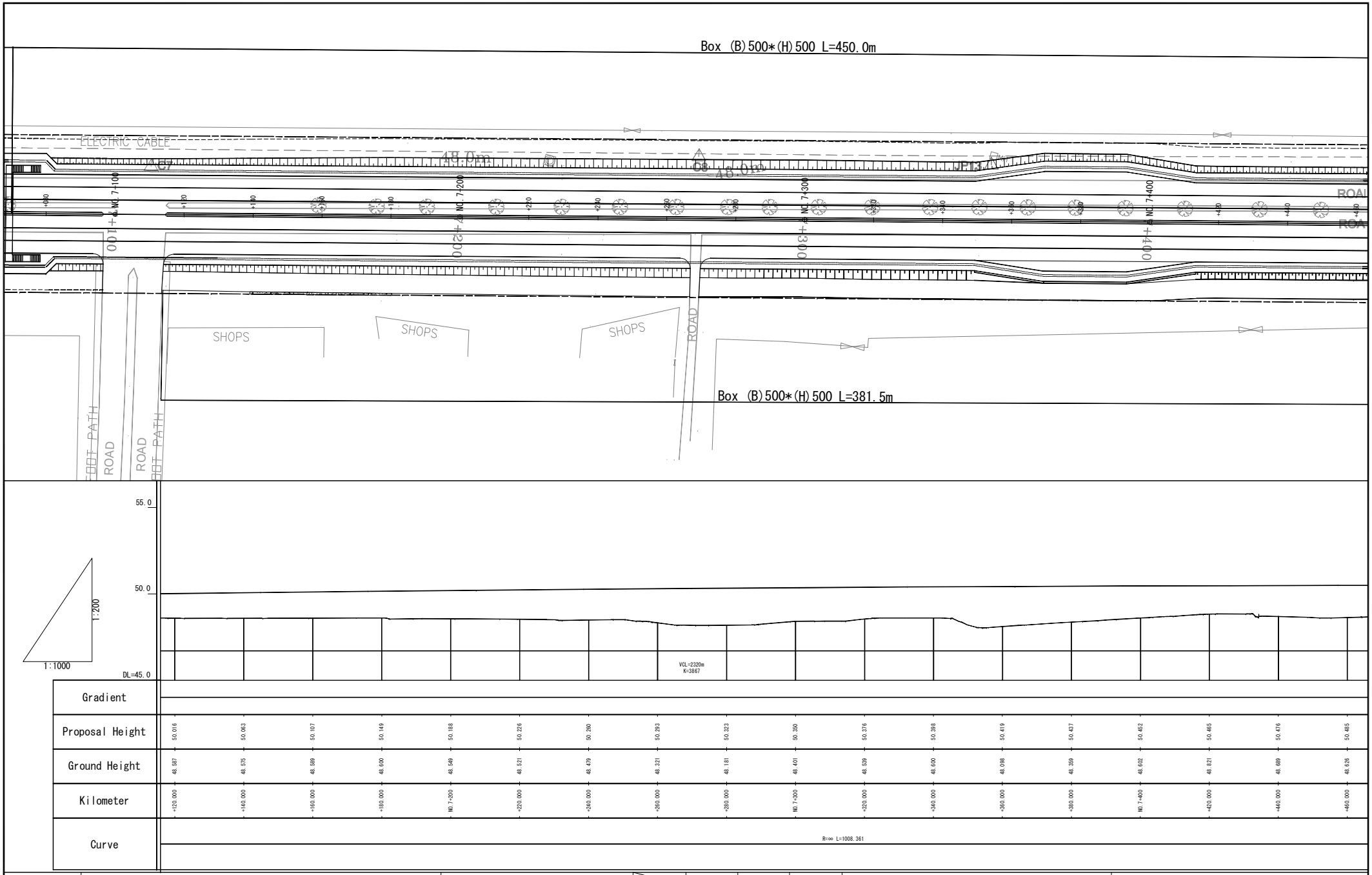
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION	SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 21/49

A-84



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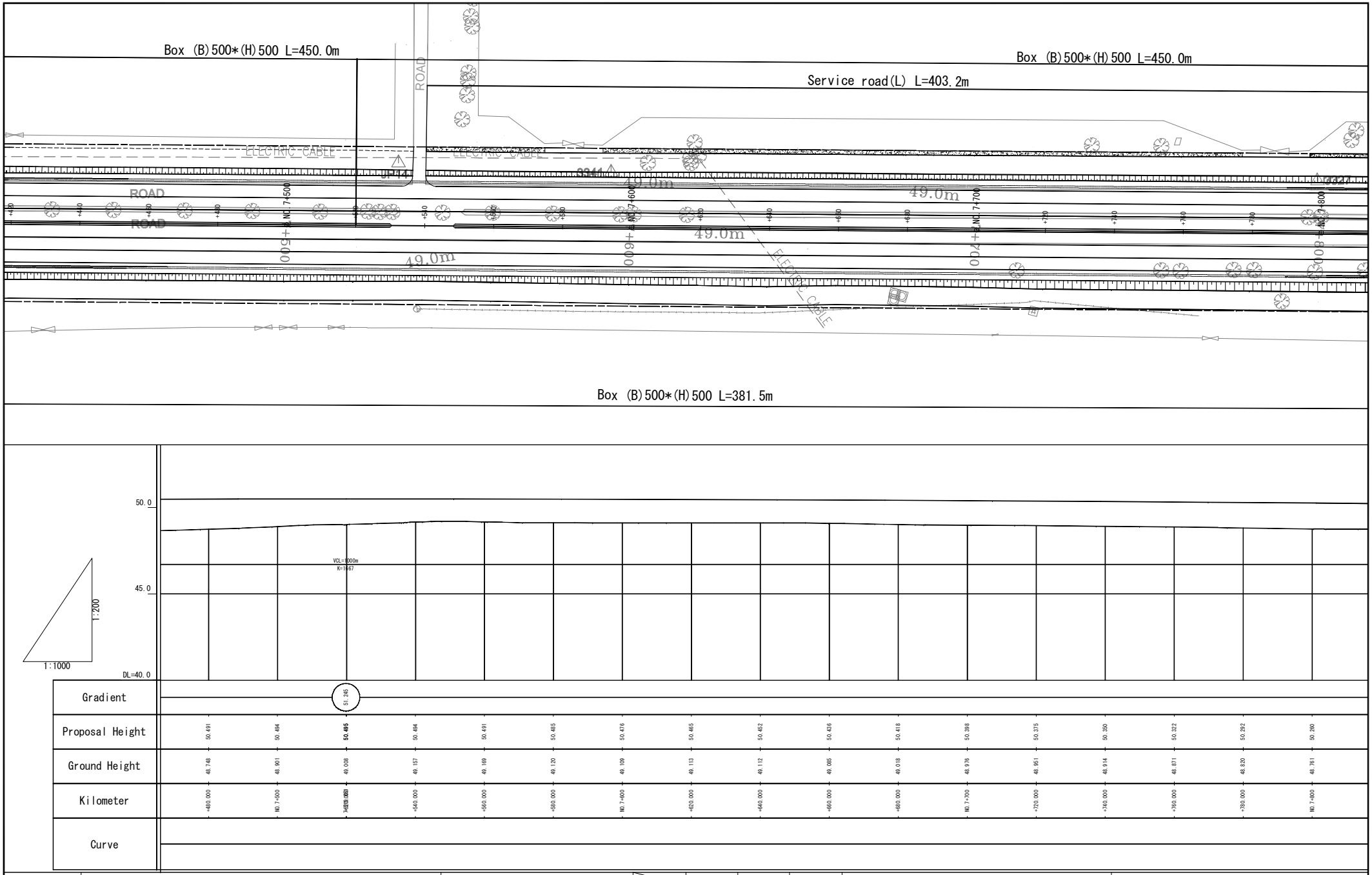
JICA / JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
KARACHI METROPOLITAN CORPORATION		PREPARED BY			
		CHECKED BY			
		APPROVED BY			
		DESCRIPTION			

PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: **PLAN AND PROFILE**

REV. | DRG. NO. 22/49



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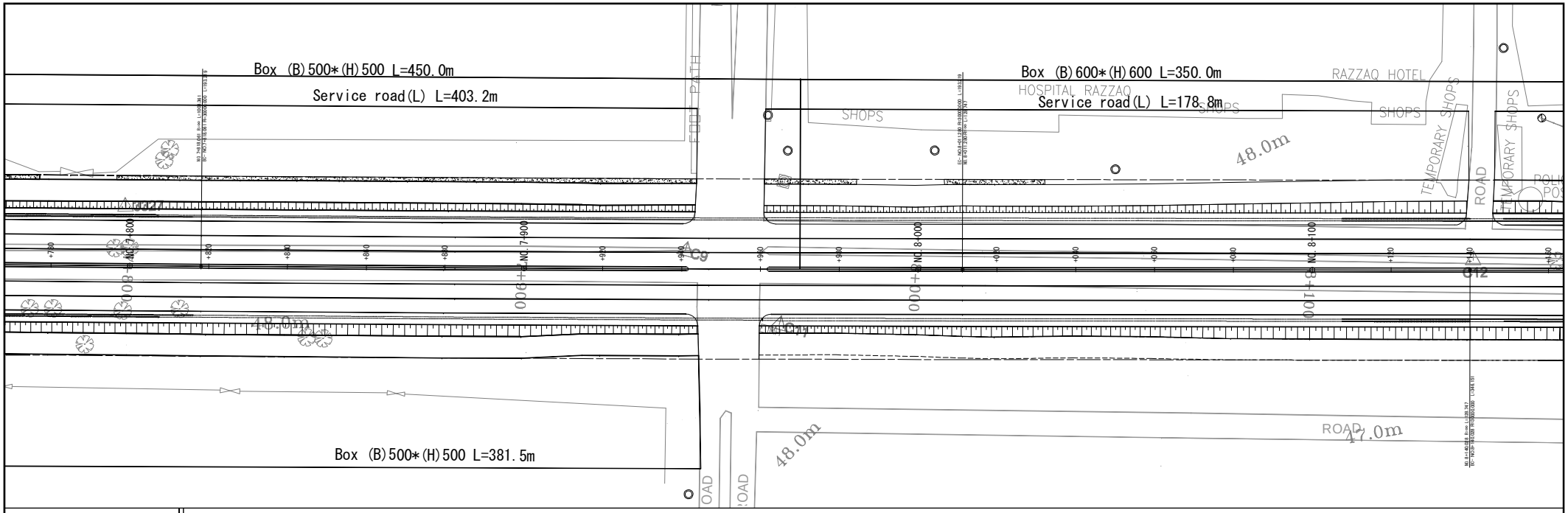
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

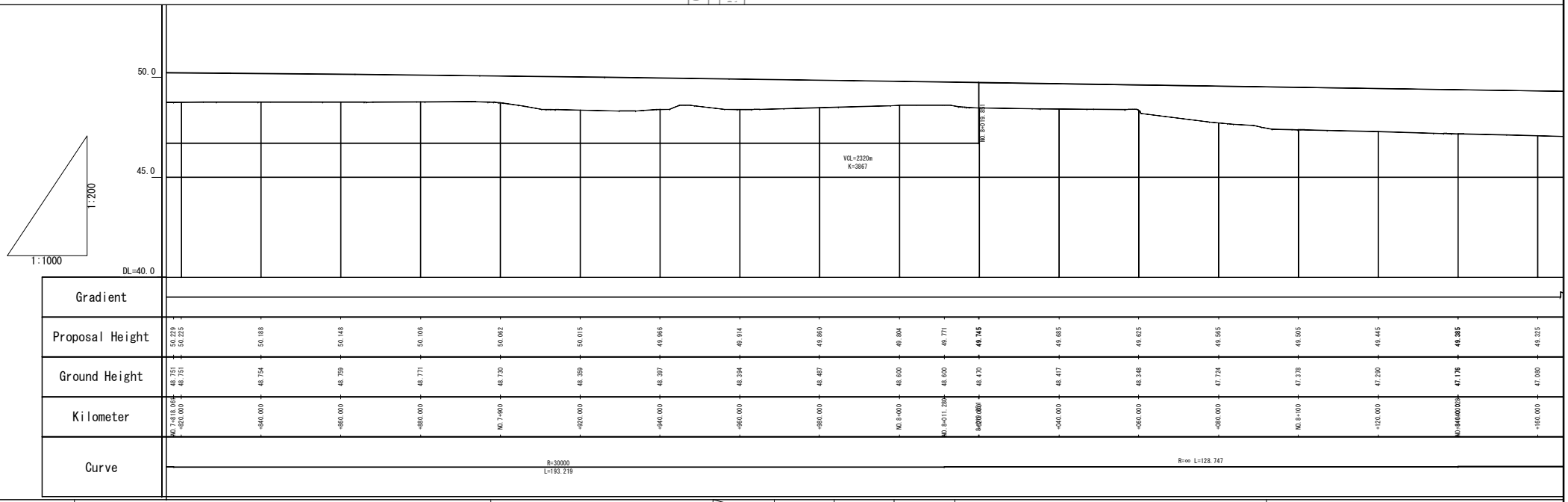
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 23/49





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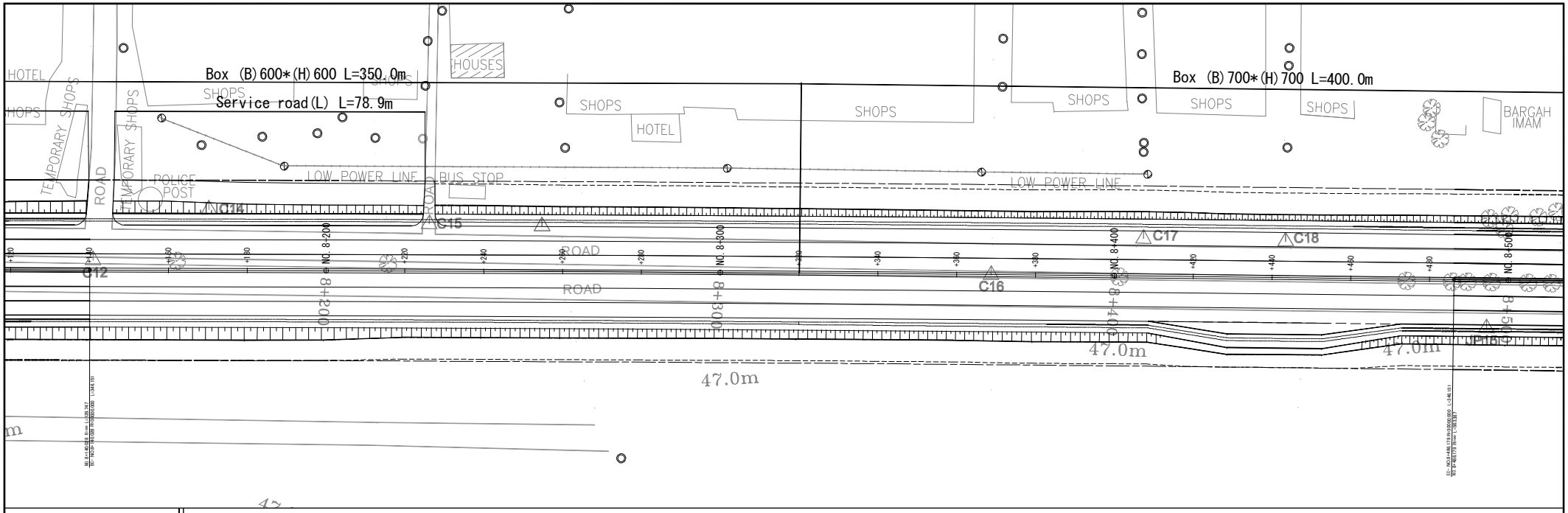
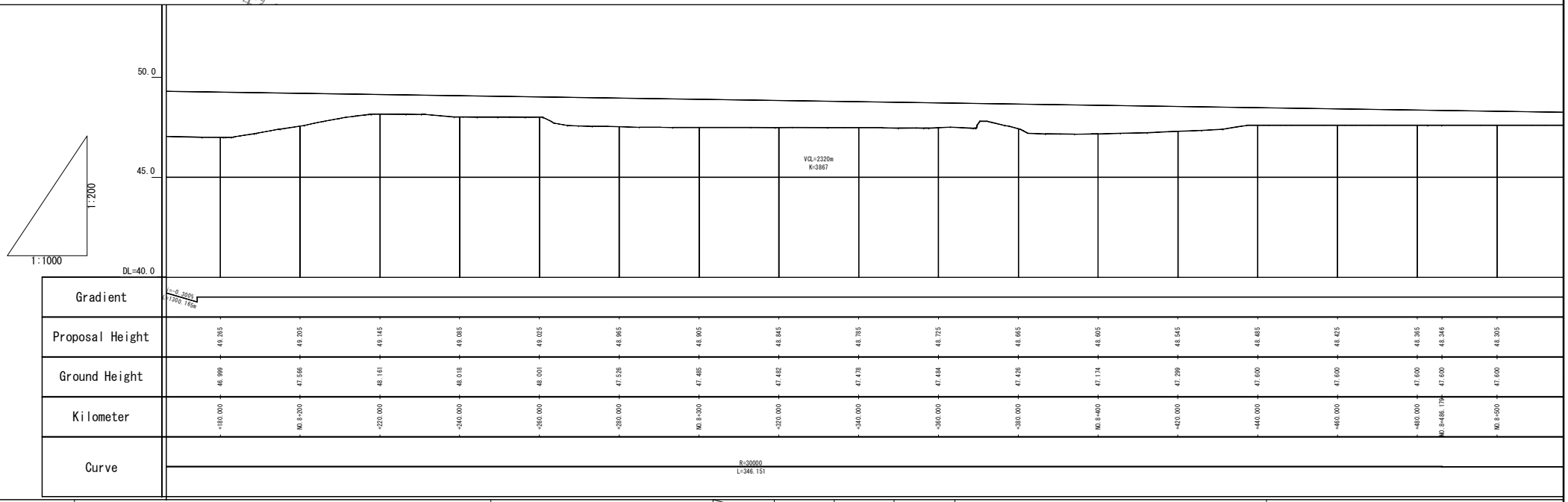
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION	SCALE (A1) 1:500 SCALE (A3) 1:1000	REV. DRG. NO. 24/49

A-87





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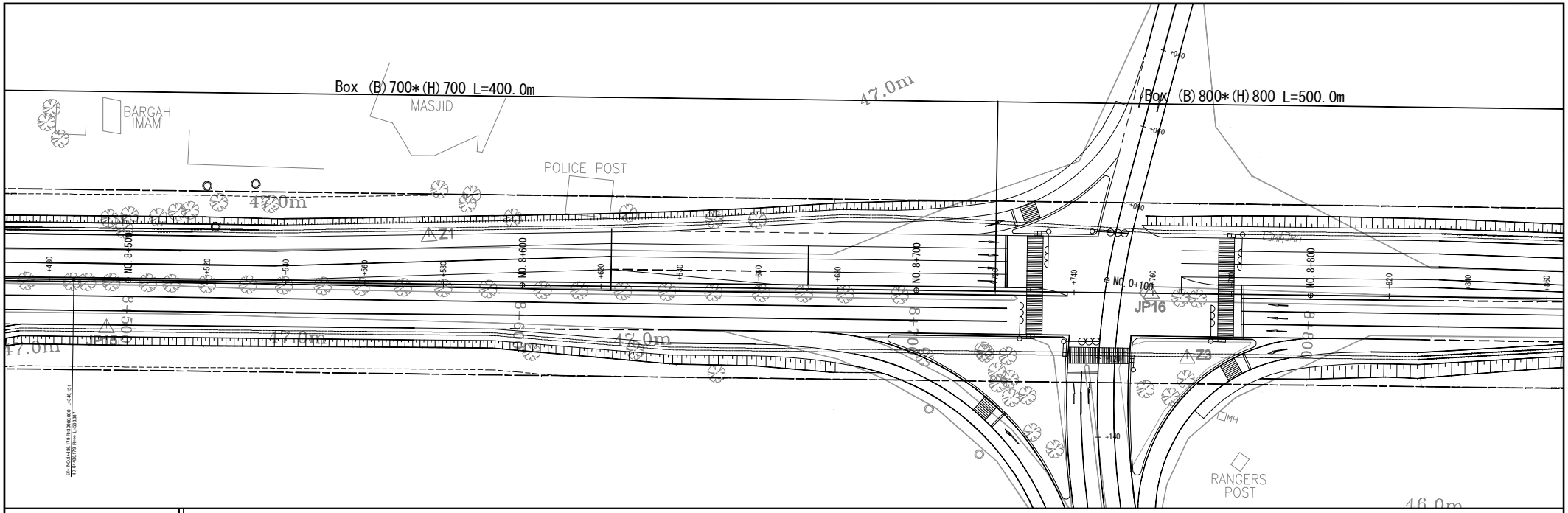
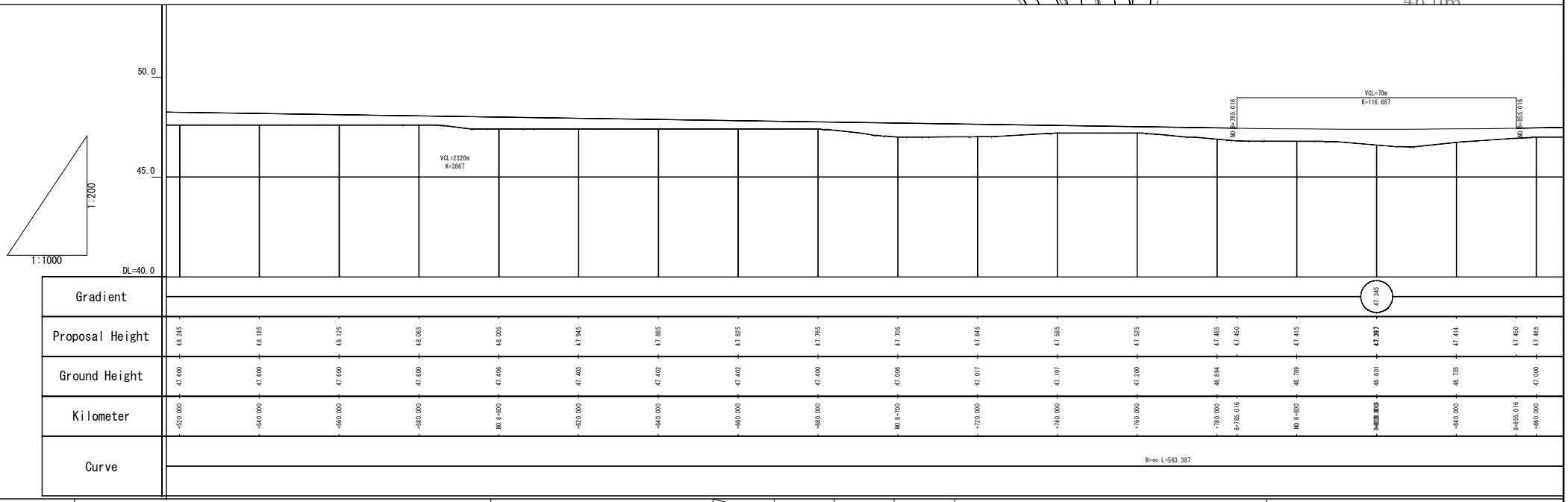
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION	SCALE (A1) 1:500 SCALE (A3) 1:1000	REV. DRG. NO. 25/49

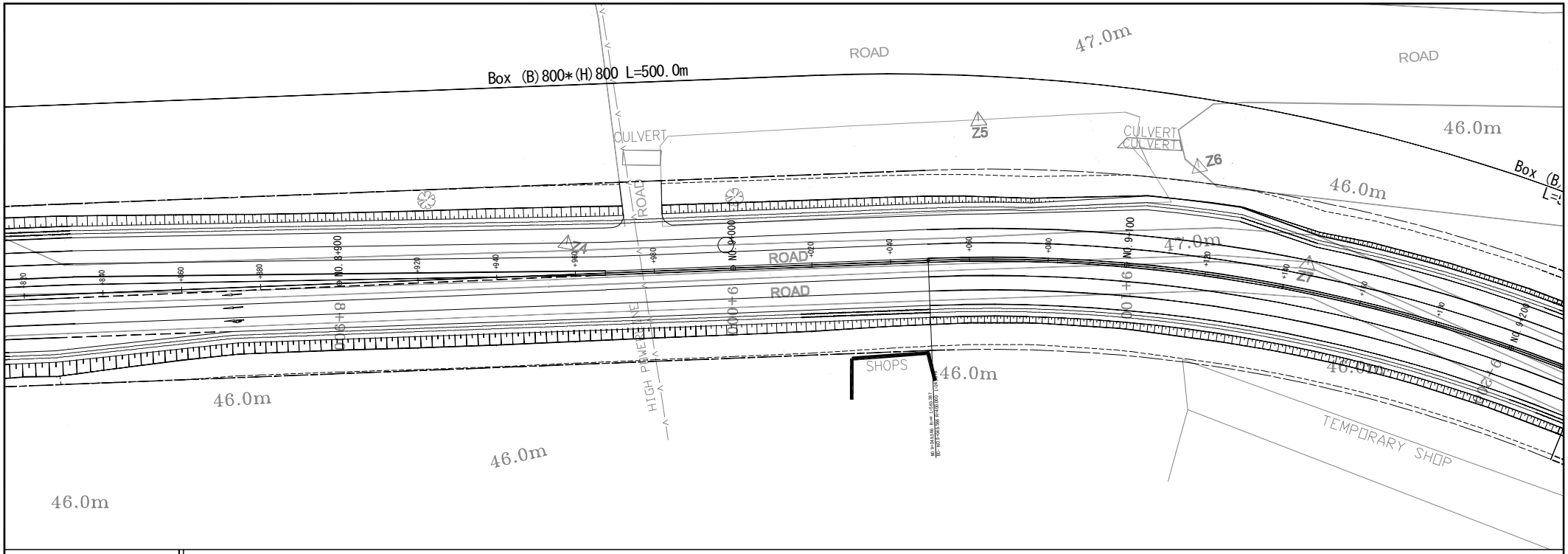
	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			

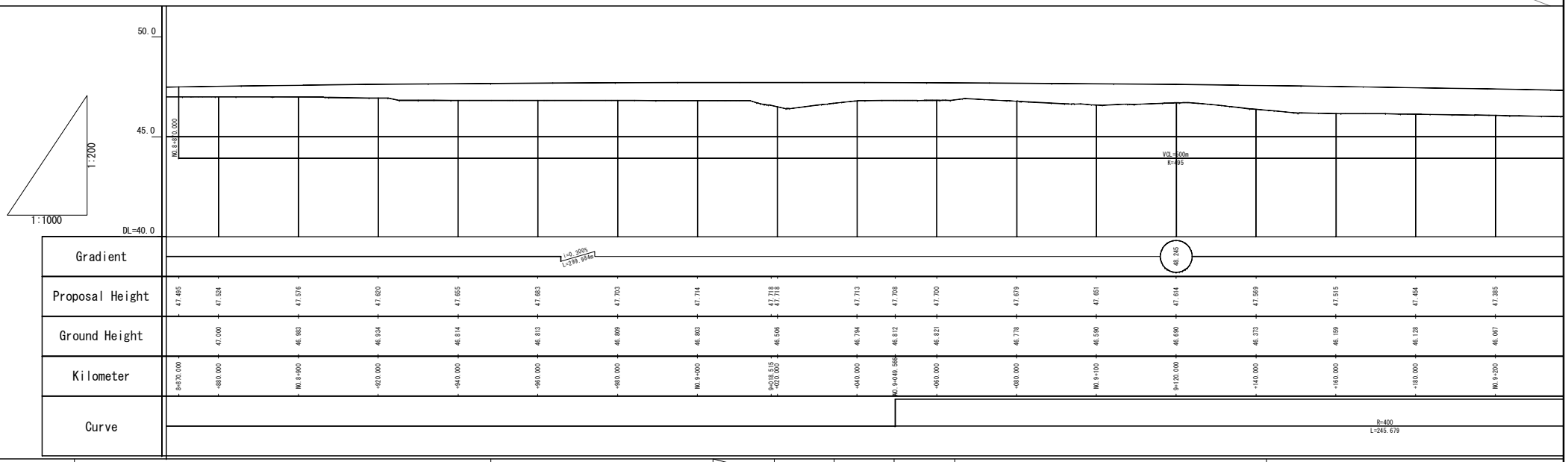
A-88





JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION (NAME, SIGNATURE, DATE)	SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 26/49





JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

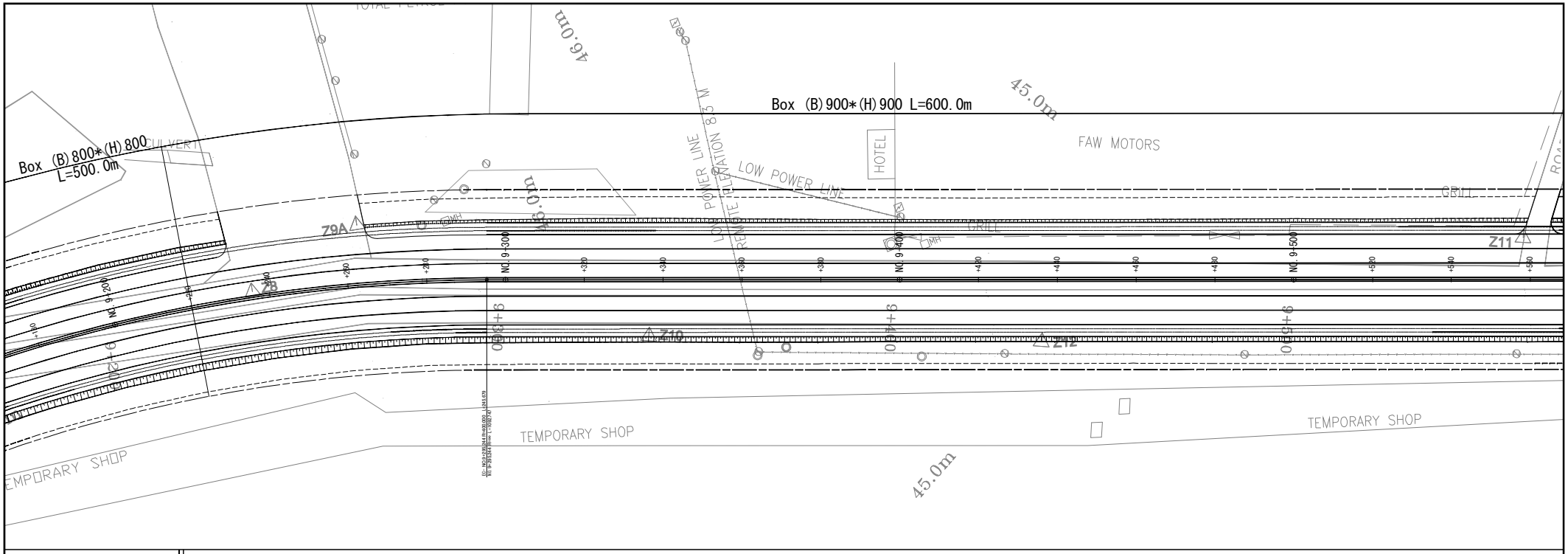
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

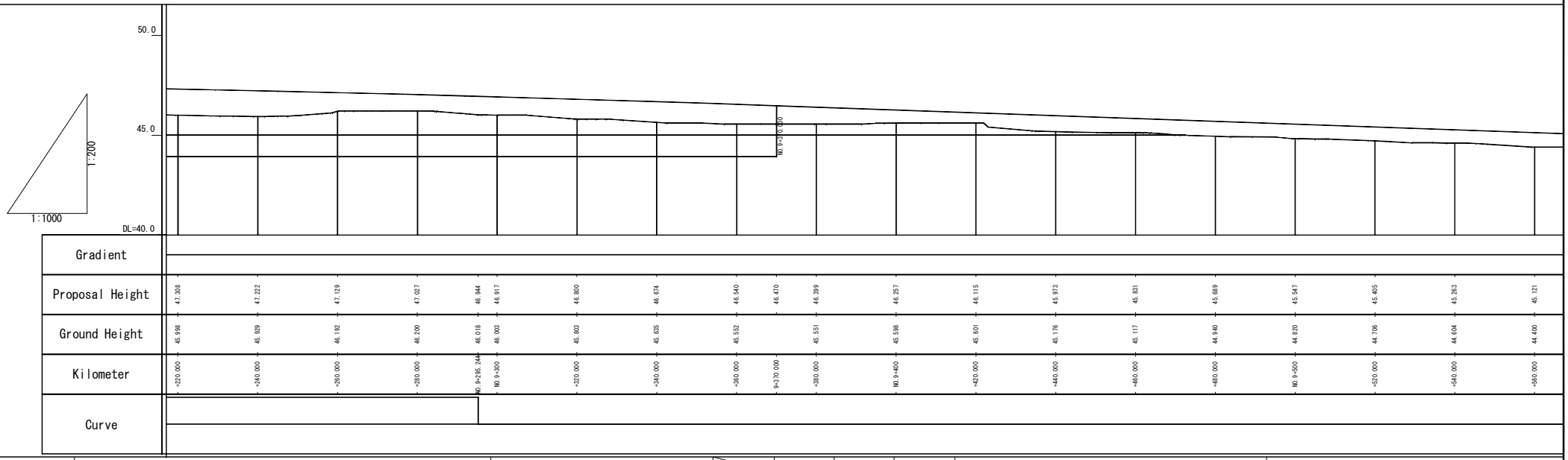
SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 27/49

A-90





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	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION	SCALE (A1) 1:500 SCALE (A3) 1:1000	REV. DRG. NO. 28/49

	NAME	SIGNATURE	DATE
PREPARED BY			
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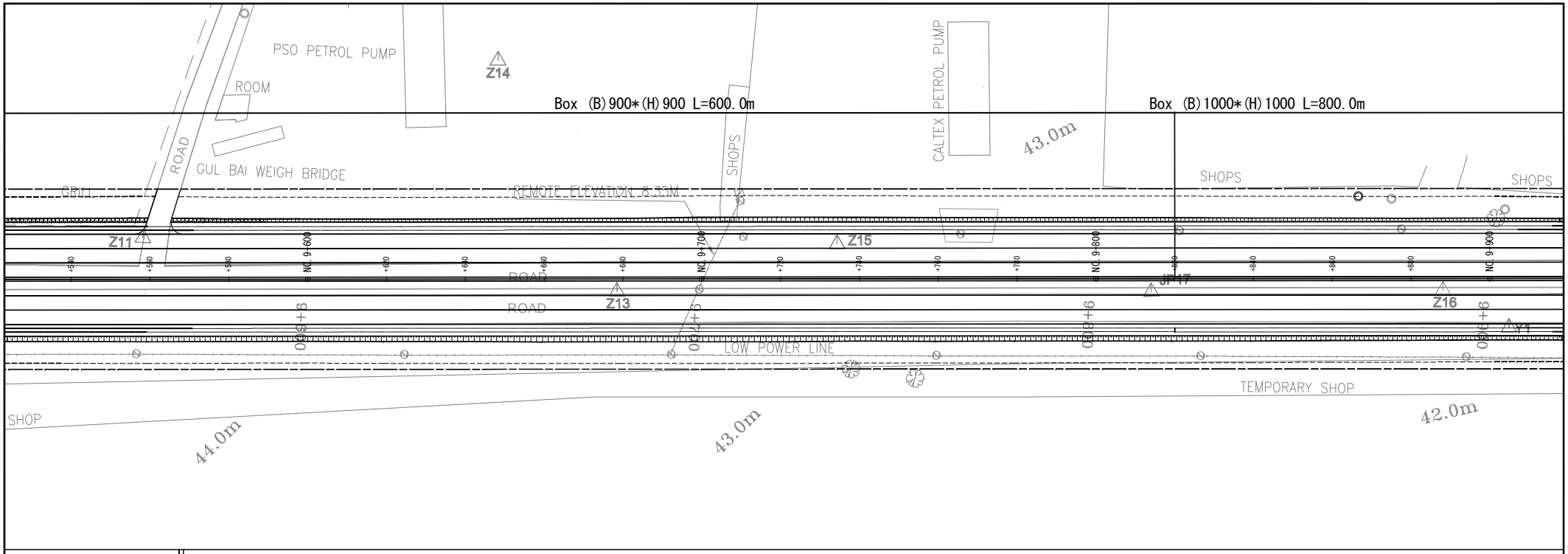
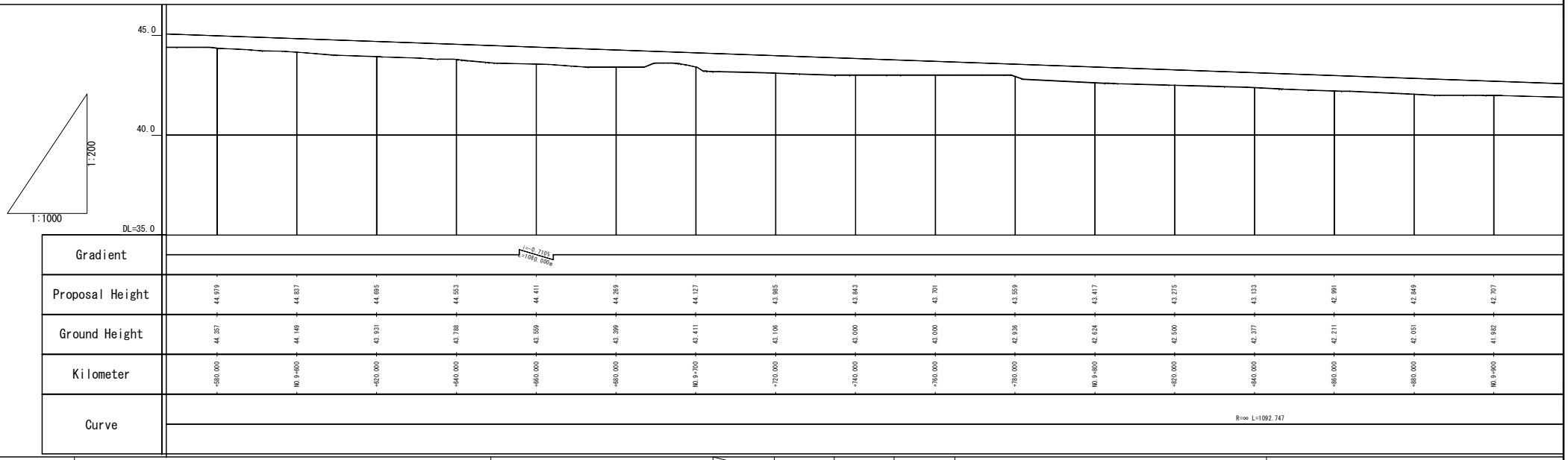
APPROVED BY			

A-91





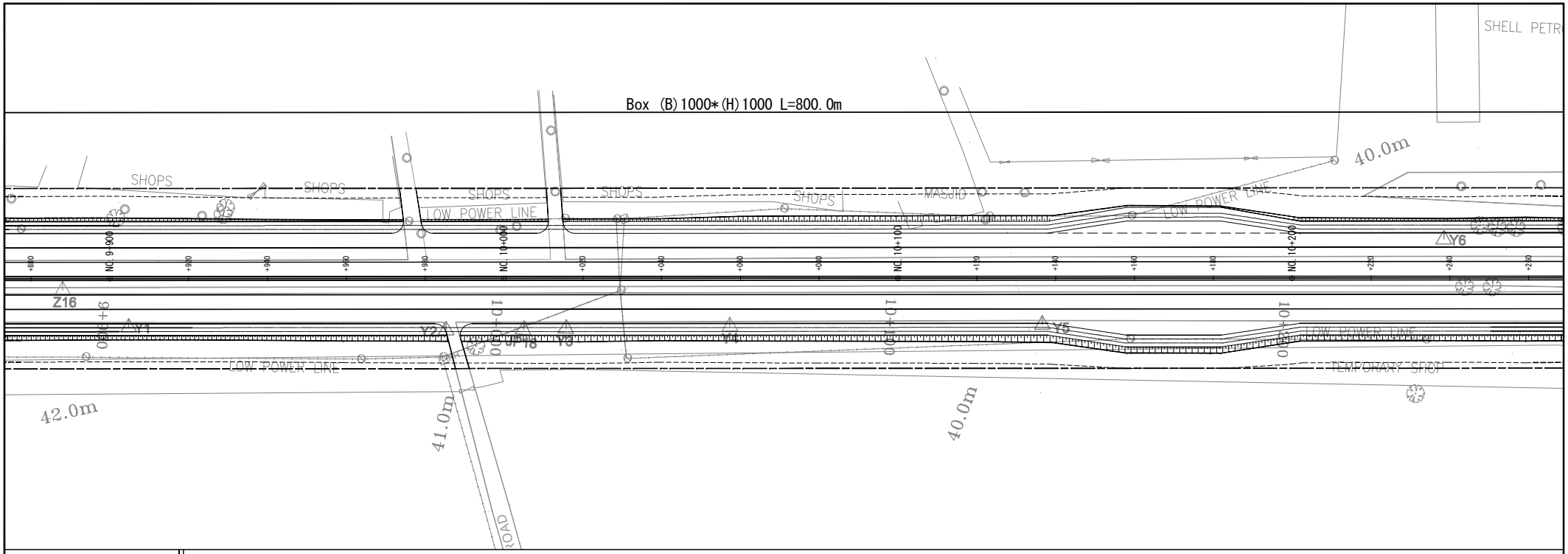
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

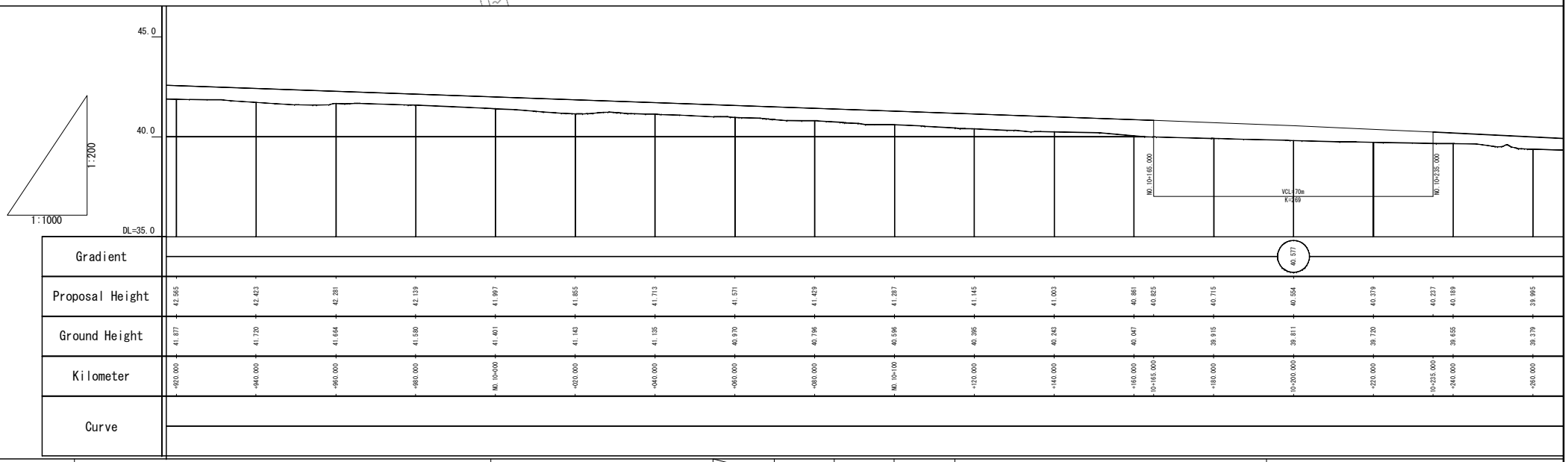
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 29/49





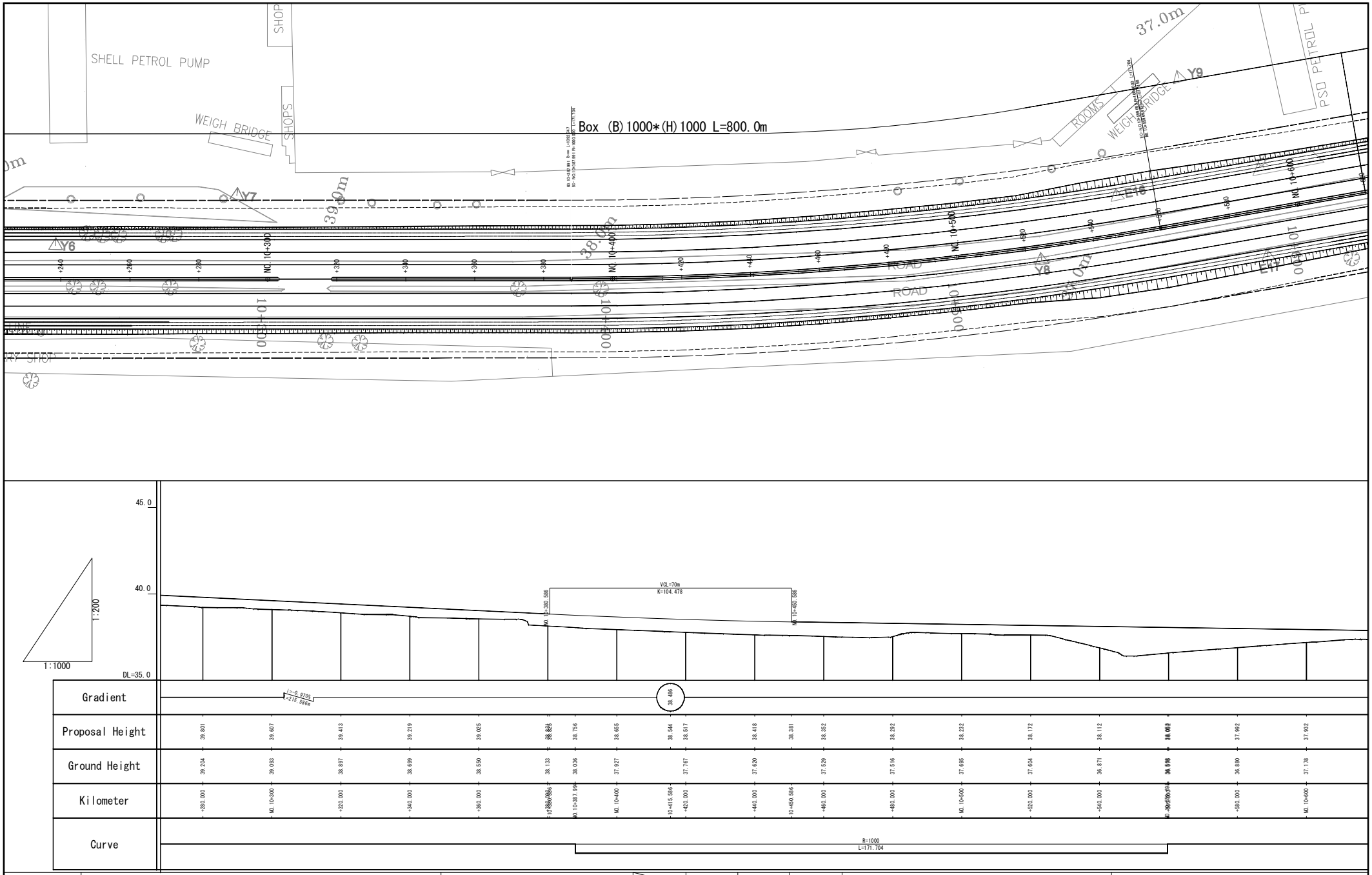
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: PLAN AND PROFILE

REV. | DRG. NO. 30/49



A-94

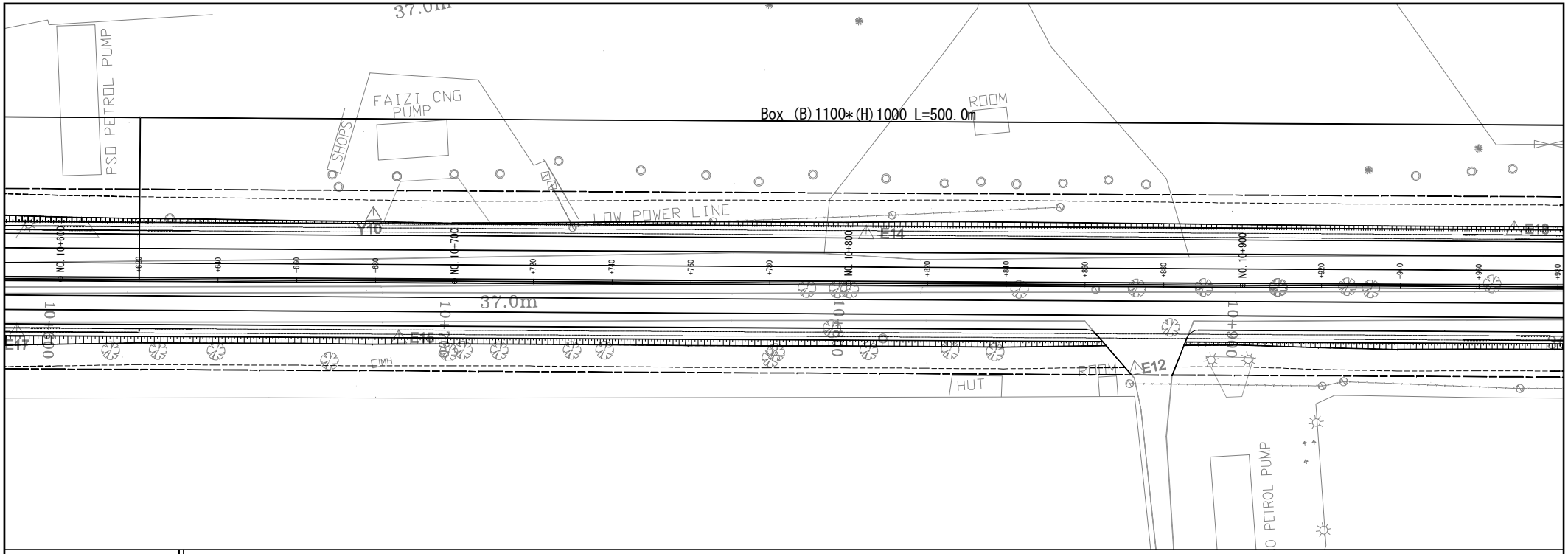
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

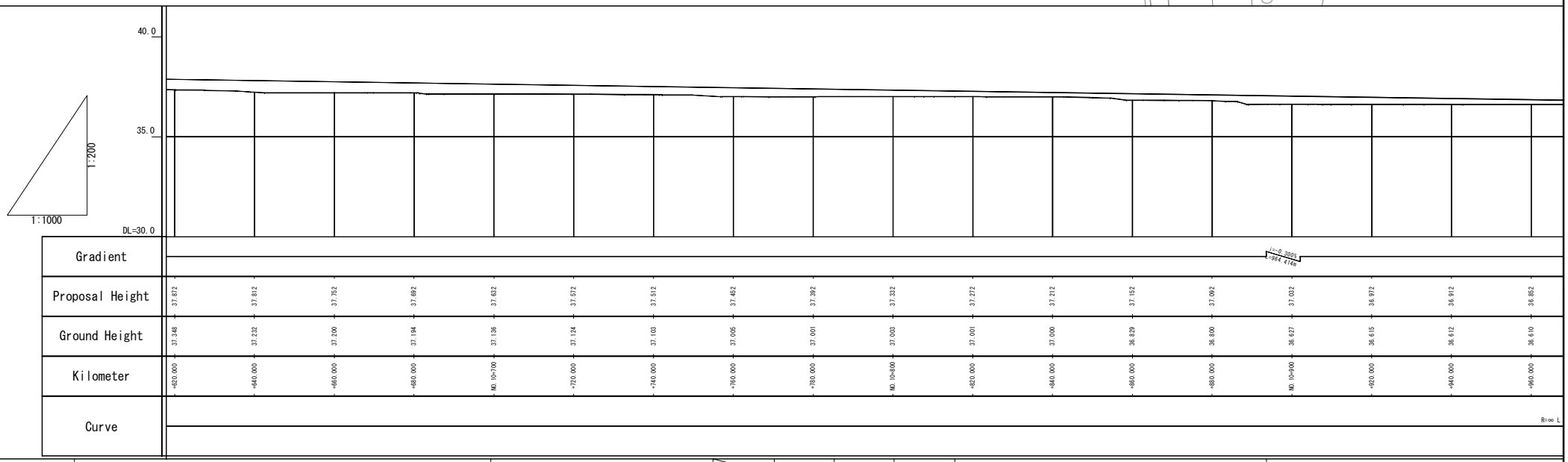
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

DRAWING TITLE: **PLAN AND PROFILE**

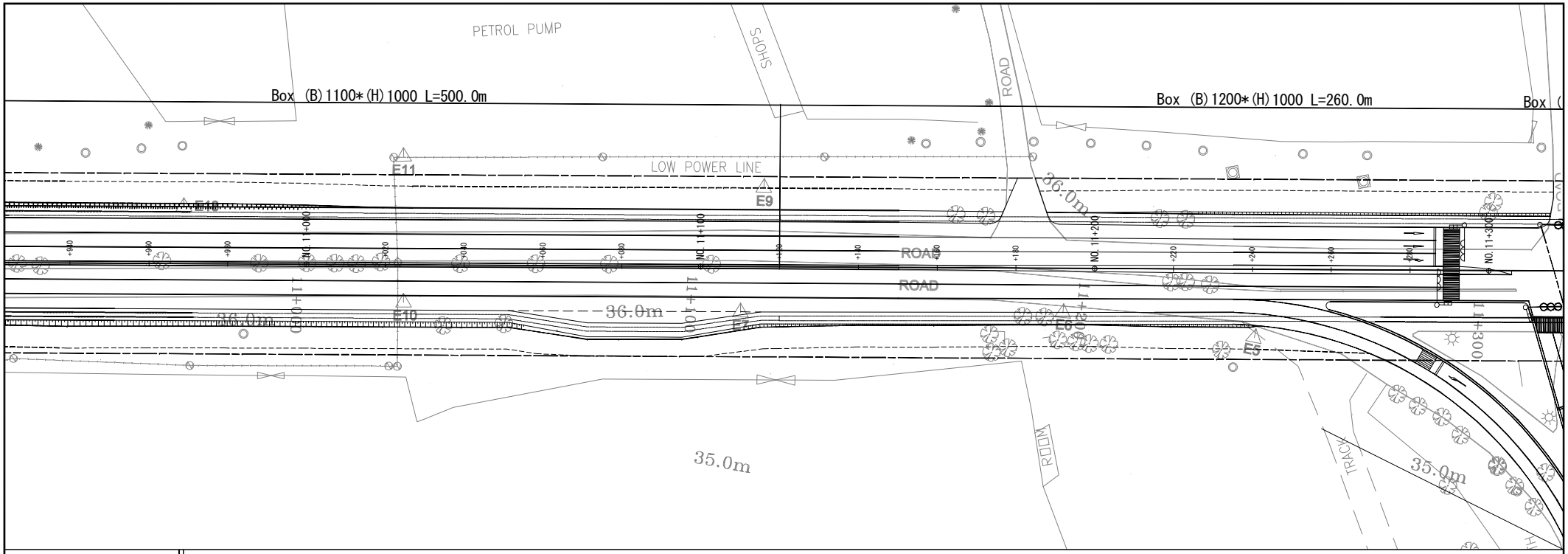
REV. | DRG. NO. 31/49

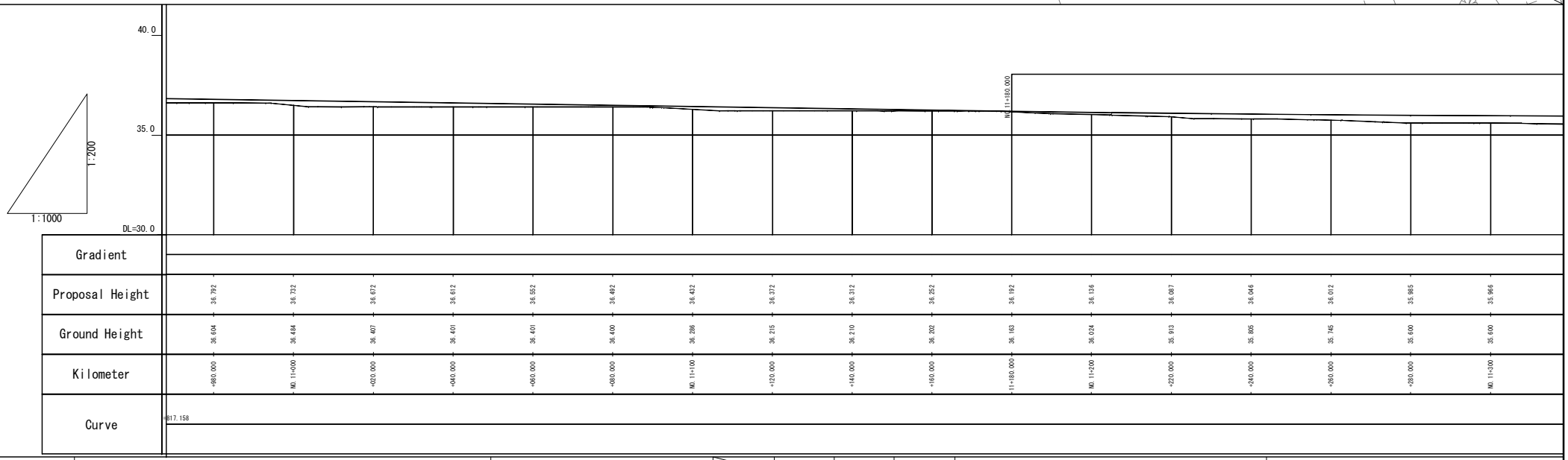




JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION	SCALE (A1) 1:500 / SCALE (A3) 1:1000	REV. / DRG. NO. 32/49

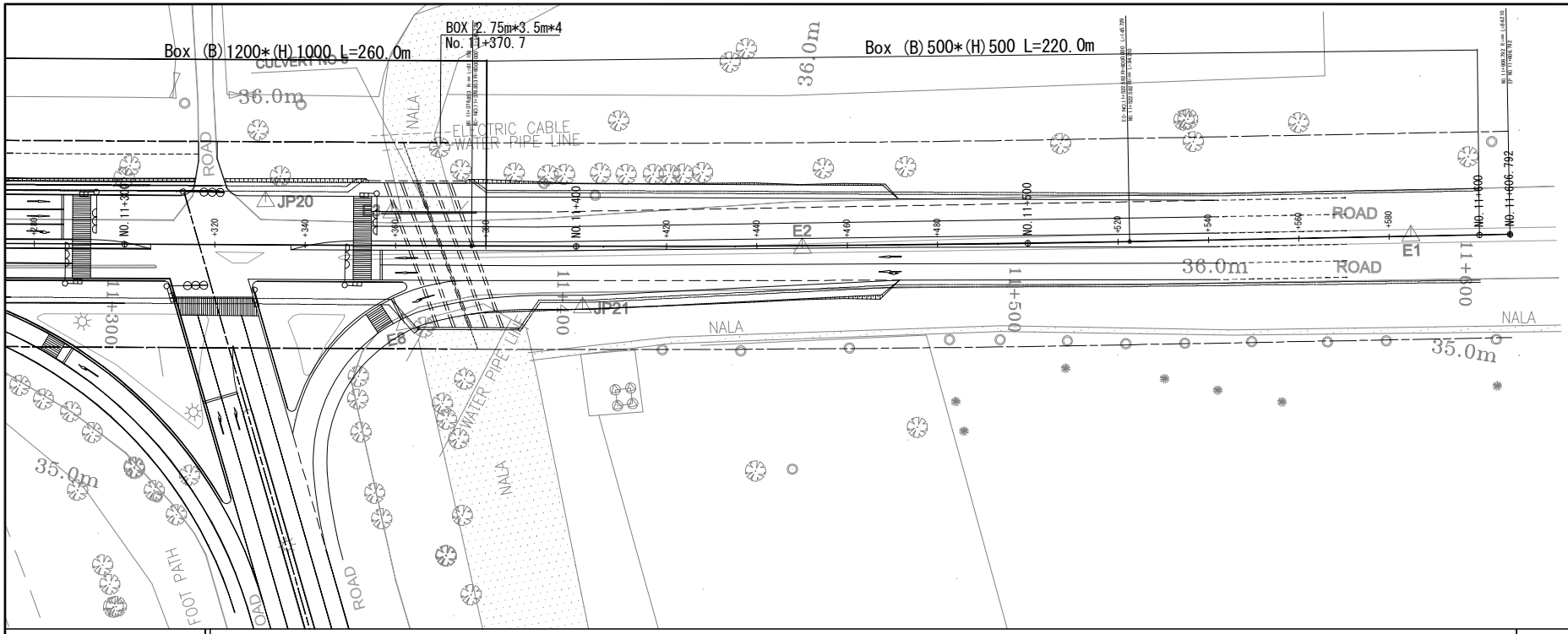
A-95

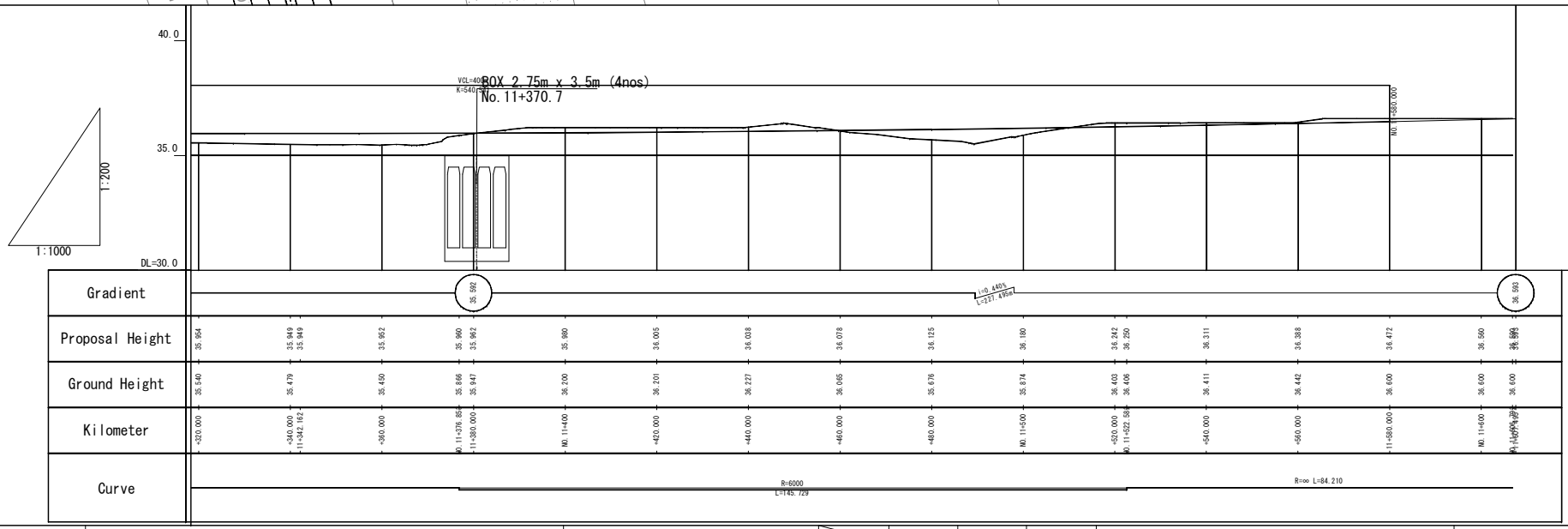




JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: PLAN AND PROFILE
	KARACHI METROPOLITAN CORPORATION			SCALE (A1) 1:500 SCALE (A3) 1:1000	REV. DRG. NO. 33/49

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			





A-97

JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE / DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY		
			CHECKED BY		
			APPROVED BY		
			DESCRIPTION		

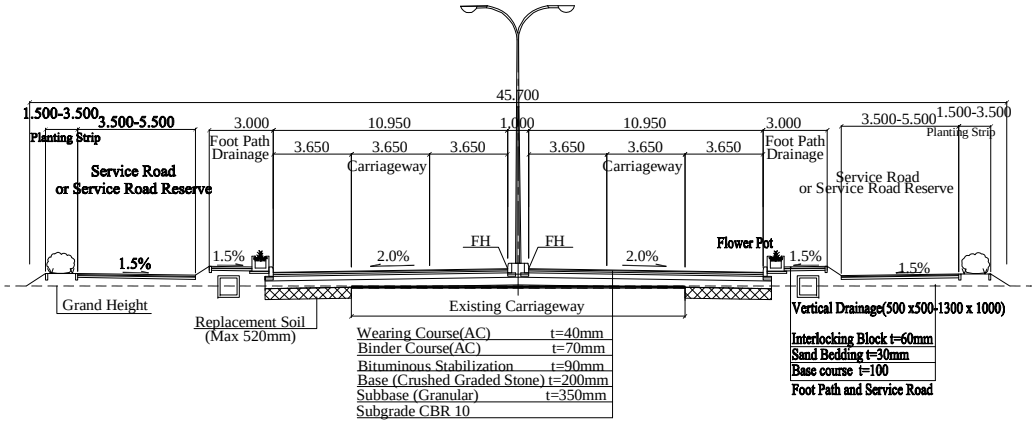
PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) 1:500 | SCALE (A3) 1:1000

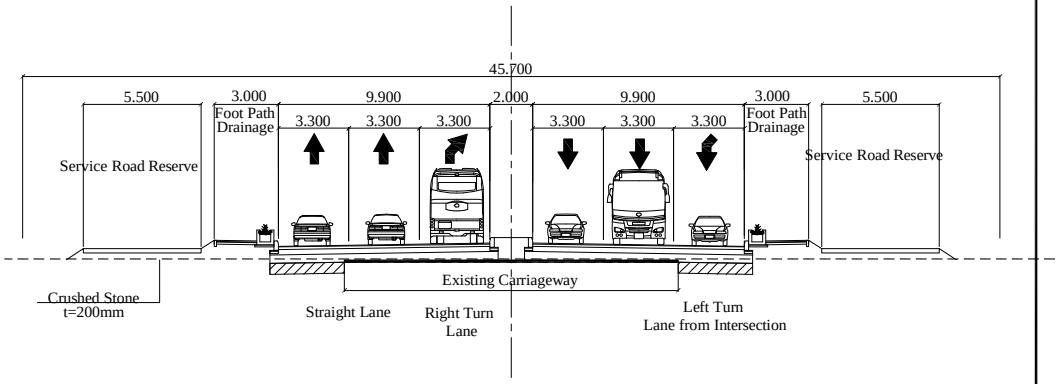
DRAWING TITLE: **PLAN AND PROFILE**

REV. | DRG. NO. 34/49

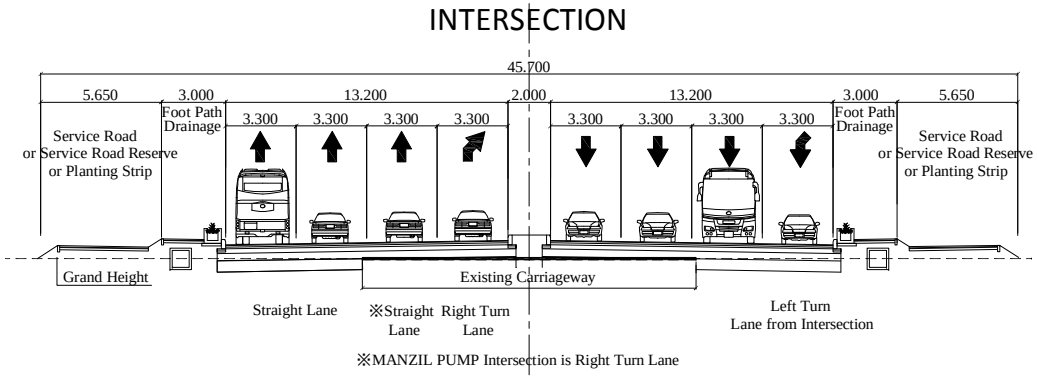
TYPICAL CROSS SECTION



PAK STEEL INTERSECTION



INTERSECTION



※MANZIL PUMP Intersection is Right Turn Lane

A-98

JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE / DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY		
			CHECKED BY		
			APPROVED BY		
			DESCRIPTION		

PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

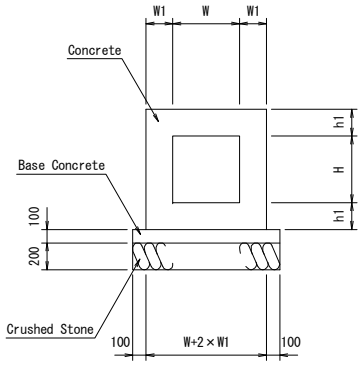
SCALE (A1) SCALE (A3)

DRAWING TITLE: TYPICAL CROSS SECTION

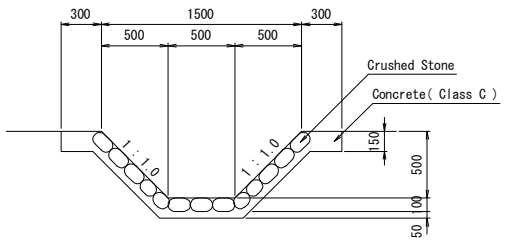
REV. DRG. NO. 35/49

Drainage Structure (1)

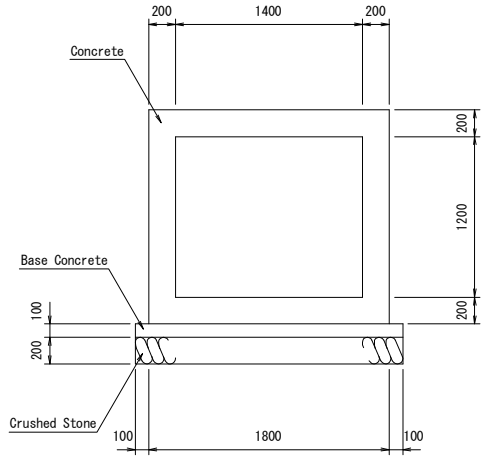
Box Culvert SCALE 1:40
(Vertical)



Rip-Rap Side Ditch SCALE 1:40



Culvert for the Substitution
(Box 1.4×1.2) SCALE 1:40



Dimension Table

TYPE	W	H	W1	h1
500×500	500	500	200	200
600×600	600	600	200	200
700×700	700	700	200	200
800×800	800	800	200	200
900×900	900	900	200	200
1000×1000	1000	1000	300	300
1100×1000	1100	1000	300	300
1200×1000	1200	1000	300	300
1300×1000	1300	1000	300	300

Rip Pap Side Ditch PER 10m

Classifications	Standard	Unit	Quantity	Remark
Concrete	Class C	cu.m	6.210	
Form		sq.m	3.000	
Crushed Stone	C-40 t=10cm	cu.m	19.140	

Culvert for the substitution PER m

Classifications	Standard	Unit	Quantity	Remark
Excavation		cu.m	4.800	
Filling		cu.m	0.800	
Surplus Soils		cu.m	4.000	
Concrete	σck=18MPa	cu.m	1.200	
Form		sq.m	5.6	
Reinforcement		kg	93.81	
Base Form		sq.m	0.2	
Base Concrete	t=100	cu.m	0.200	
Crushed Stone	t=200	cu.m	0.400	

BOX Culvert (Vertical) PER m

Classifications	Standard	Unit	Quantity								Remark
			500×500	600×600	700×700	800×800	900×900	1000×1000	1100×1000	1200×1000	1300×1000	
Excavation		cu.m	1.015	1.280	1.575	1.900	2.255	3.500	3.640	3.780	3.920	
Filling		cu.m	0.350	0.400	0.450	0.500	0.550	0.700	0.700	0.700	0.700	
Surplus Soils		cu.m	0.665	0.880	1.125	1.400	1.705	2.800	2.940	3.080	3.220	
Concrete	σck=18MPa	cu.m	0.560	0.640	0.720	0.800	0.880	1.560	1.620	1.680	1.740	
Form		sq.m	2.8	3.2	3.6	4.0	4.4	5.2	5.2	5.2	5.2	
Reinforcement		kg	43.78	50.03	56.28	62.54	68.79	121.95	126.64	131.33	136.02	
Base Form		sq.m	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Base Concrete	t=100	cu.m	0.110	0.120	0.130	0.140	0.150	0.180	0.190	0.200	0.210	
Crushed Stone	t=200	cu.m	0.220	0.240	0.260	0.280	0.300	0.360	0.380	0.400	0.420	

JICA INTERTATIONAL CORPORATION AGENCY

KARACHI METROPOLITAN CORPORATION

CONSULTANTS:
INGEROSEC Corporation
Eight-Japan Engineering Consultants Inc

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

PROJECT TITLE:
The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) SCALE (A3)

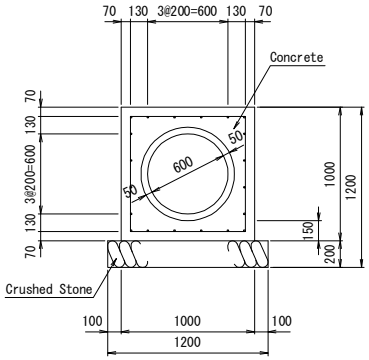
DRAWING TITLE:
Drainage Structure (1)

REV.

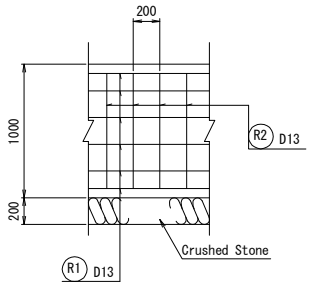
DRG. NO.
36/49

Drainage Structure (2)

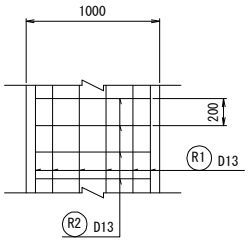
Pipe Culvert D600



SIDE VIEW



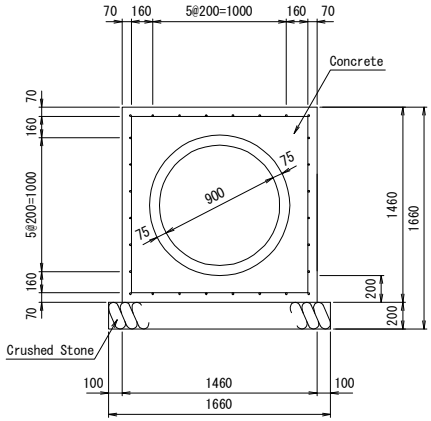
SKY VIEW



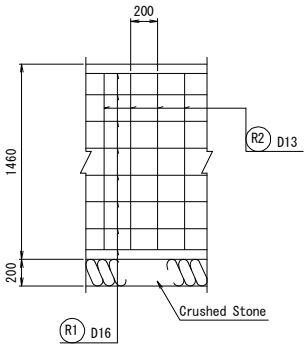
Pipe Culvert D600 PER m

Classifications	Standard	Unit	Quantity	Remark
Excavation		cu.m	2.60	
Filling		cu.m	1.16	
Surplus Soils		cu.m	1.31	
Concrete	σck=18MPa	cu.m	0.62	
Form		sq.m	2.00	
Crushed Stone	t=200	cu.m	1.20	
Reinforcement	D13	kg	41.69	

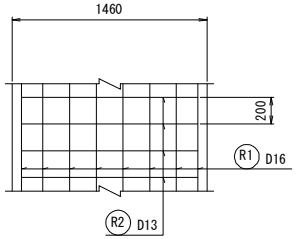
Pipe Culvert D900



SIDE VIEW



SKY VIEW



Pipe Culvert D900 PER m

Classifications	Standard	Unit	Quantity	Remark
Excavation		cu.m	4.37	
Filling		cu.m	1.74	
Surplus Soils		cu.m	2.44	
Concrete	σck=18MPa	cu.m	1.27	
Form		sq.m	2.92	
Crushed Stone	t=200	cu.m	1.66	
Reinforcement	D13	kg	30.94	
	D16	kg	43.68	

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JICA INTERTATIONAL CORPORATION AGENCY

KARACHI METROPOLITAN CORPORATION

CONSULTANTS:

INGEROSEC Corporation

Eight-Japan Engineering Consultants Inc

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			

DESCRIPTION

PROJECT TITLE:

The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) SCALE (A3)

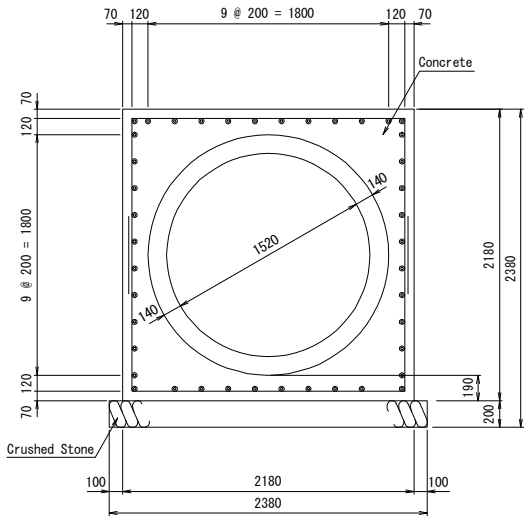
DRAWING TITLE:

Drainage Structure (2)

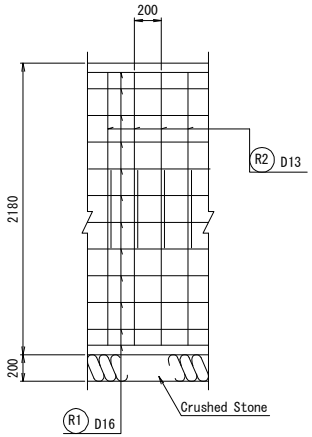
REV. DRG. NO.

Drainage Structure (3)

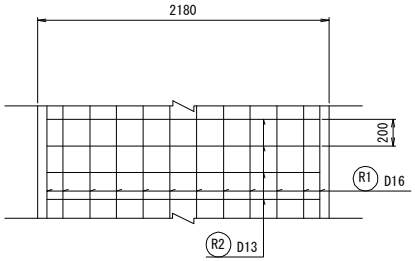
Pipe Culvert D1500



SIDE VIEW



SKY VIEW



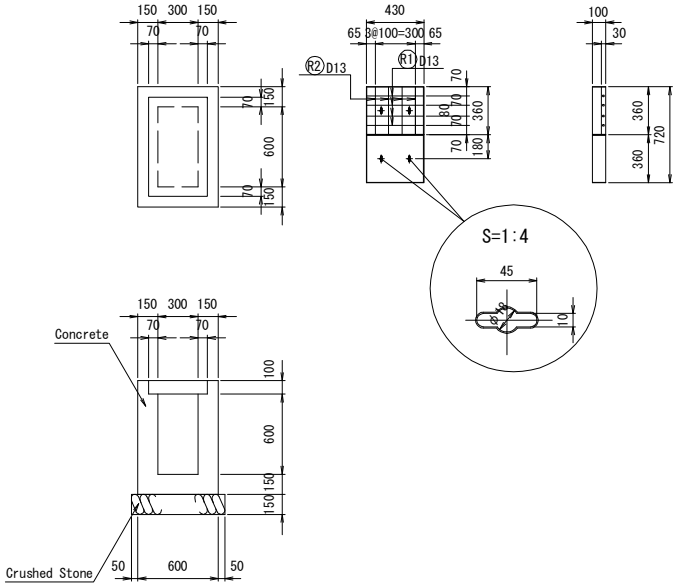
Pipe Culvert D1520

PER m

Classifications	Standard	Unit	Quantity	Remark
Excavation		cu.m		
Filling		cu.m		
Surplus Soils		cu.m		
Concrete	σck=18MPa	cu.m		
Form		sq.m		
Crushed Stone	t=200	cu.m		
Reinforcement	D13	kg		
	D16	kg		

街渠桝

SCALE 1:40



街渠桝蓋 300X600

PER Each

Classifications	Standard	Unit	Unit	Remark
Concrete	σck=18MPa	cu.m	0.030	
Form		sq.m	0.152	
Reinforcement	D13	kg	6.21	

街渠桝

PER Each

Classifications	Standard	Unit	Unit	Remark
Concrete	σck=18MPa	cu.m	0.318	
Form		sq.m	4.080	
Crushed Stone	t=200	cu.m	0.700	

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JICA INTERTATIONAL CORPORATION AGENCY

KARACHI METROPOLITAN CORPORATION

CONSULTANTS:

INGEROSEC Corporation

Eight-Japan Engineering Consultants Inc

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			

DESCRIPTION

PROJECT TITLE:

The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) SCALE (A3)

DRAWING TITLE:

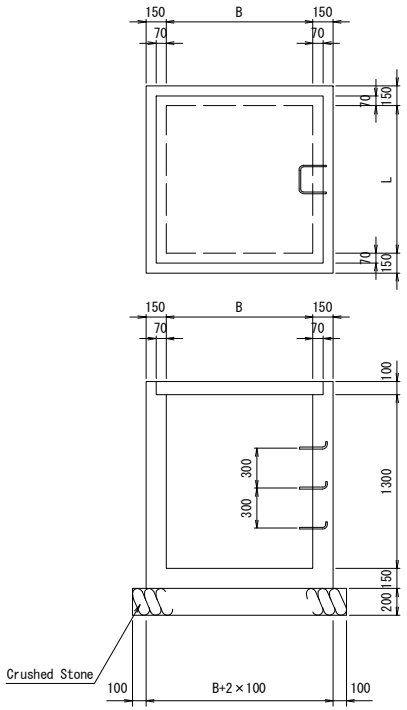
Drainage Structure (3)

REV. DRG. NO.

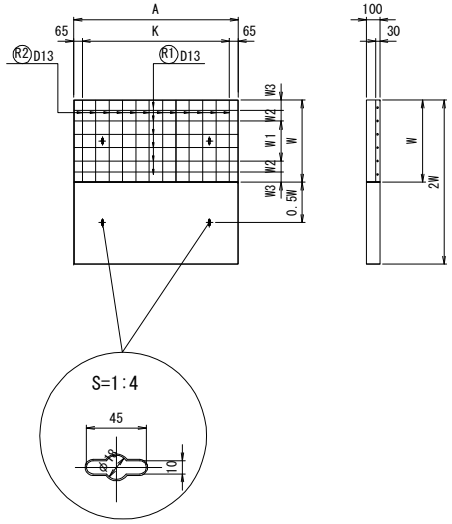
Drainage Structure (4)

Catch Pit

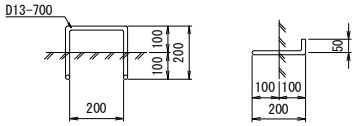
SCALE 1:40



Cover



Step SCALE 1:20



Dimension Table

TYPE	B	L
700×1300	700	700
800×1300	800	800
900×1300	900	900
1000×1300	1000	1000
1100×1300	1100	1100
1200×1300	1200	1200
1300×1300	1300	1300
1400×1300	1400	1400
1500×1300	1500	1500

Dimension Table

TYPE	A	K	W	W1	W2	W3	REMARK
700×1300	830	7@100=700	410	1@100=100	85	75	
800×1300	930	8@100=800	460	2@80=160	75	75	
900×1300	1030	9@100=900	510	2@100=200	80	75	
1000×1300	1130	10@100=1000	560	3@90=270	70	75	
1100×1300	1230	11@100=1100	610	3@100=300	80	75	
1200×1300	1330	12@100=1200	660	4@90=360	75	75	
1300×1300	1430	13@100=1300	710	4@100=400	80	75	
1400×1300	1530	14@100=1400	760	5@90=450	80	75	
1500×1300	1630	15@100=1500	810	5@100=500	80	75	

Catch pit

PER Each

Classifications	Standard	Unit	Quantity									Remark
			700×1300	800×1300	900×1300	1000×1300	1100×1300	1200×1300	1300×1300	1400×1300	1500×1300	
Concrete	σck=18MPa	cu.m	0.906	1.026	1.149	1.275	1.405	1.537	1.672	1.810	1.952	
Form		sq.m	10.180	11.360	12.540	13.720	14.900	16.080	17.260	18.440	19.620	
Crushed Stone	t=200	cu.m	0.288	0.338	0.392	0.450	0.512	0.578	0.648	0.722	0.800	

Cover

PER Each

Classifications	Standard	Unit	Quantity									Remark
			700×1300	800×1300	900×1300	1000×1300	1100×1300	1200×1300	1300×1300	1400×1300	1500×1300	
Concrete	σck=18MPa	cu.m	0.072	0.090	0.110	0.132	0.156	0.182	0.210	0.240	0.272	
Form		sq.m	0.340	0.380	0.420	0.460	0.500	0.540	0.580	0.620	0.660	
Reinforcement	D13	kg	14.932	18.652	22.785	27.332	32.292	37.665	43.452	49.652	56.265	

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JICA INTERTATIONAL CORPORATION AGENCY

KARACHI METROPOLITAN CORPORATION

CONSULTANTS:

INGEROSEC Corporation

Eight-Japan Engineering Consultants Inc

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

PROJECT TITLE:

The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) SCALE (A3)

DRAWING TITLE:

Drainage Structure (4)

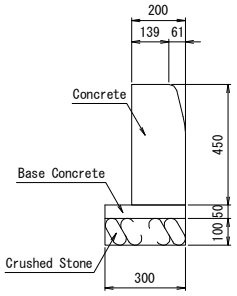
REV.

DRG. NO.

39/49

Ancillary Works Structure (1)

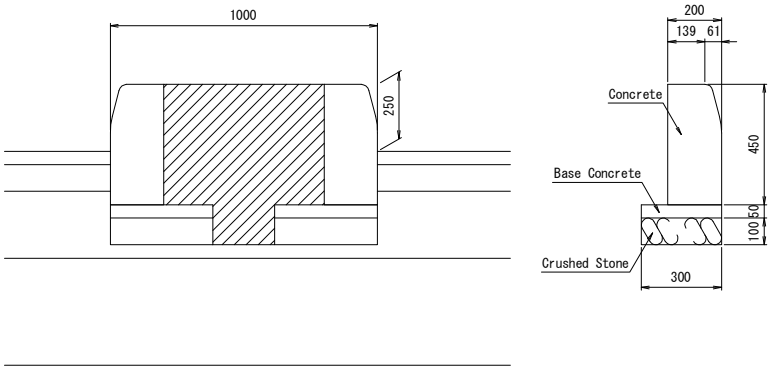
Kerb SCALE 1:20



Kerb PER m

Classifications	Standard	Unit	Quantity	Remark
Concrete	σck=18MPa	cu.m	0.050	
Form		sq.m	0.900	
Base Concrete	t=50	cu.m	0.015	
Base Form		sq.m	0.100	
Crushed Stone	t=100	cu.m	0.030	

Kerb (Median) SCALE 1:20



Kerb (Median) PER m

Classifications	Standard	Unit	Quantity	Remark
Concrete	σck=18MPa	cu.m	0.100	
Form		sq.m	1.800	
Base Concrete	t=50	cu.m	0.030	
Base Form		sq.m	0.200	
Crushed Stone	t=100	cu.m	0.060	
盛 土		cu.m	0.300	

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JICA INTERTATIONAL CORPORATION AGENCY

KARACHI METROPOLITAN CORPORATION

CONSULTANTS:

INGEROSEC Corporation

Eight-Japan Engineering Consultants Inc

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			

DESCRIPTION

PROJECT TITLE:

The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) SCALE (A3)

DRAWING TITLE:

Ancillary Works Structure (1)

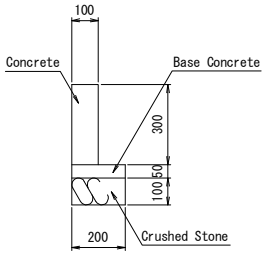
REV.

DRG. NO.

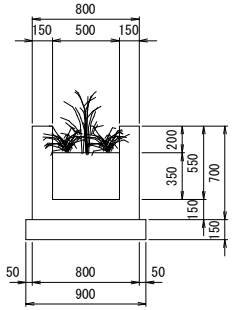
40/49

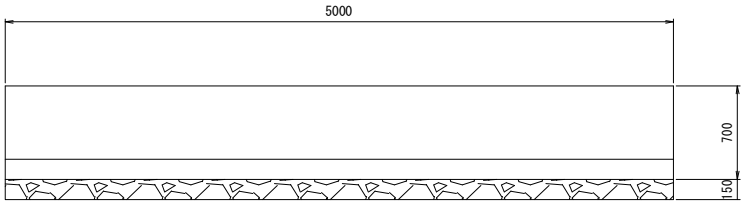
Ancillary Works Structure (2)

Boundary Block SCALE 1:40



Flower Pot SCALE 1:40





A-104

Boundary Block PER m

Classifications	Standard	Unit	Quantity	Remark
Concrete	σck=18MPa	cu.m	0.030	
Form		sq.m	0.600	
Base Concrete	t=50	cu.m	0.010	
Base Form		sq.m	0.100	
Crushed Stone	t=100	cu.m	0.020	

JICA INTERTATIONAL CORPORATION AGENCY

KARACHI METROPOLITAN CORPORATION

CONSULTANTS:

INGEROSEC Corporation

Eight-Japan Engineering Consultants Inc

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PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

PROJECT TITLE:

The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) SCALE (A3)

DRAWING TITLE:

Ancillary Works Structure (2)

REV.

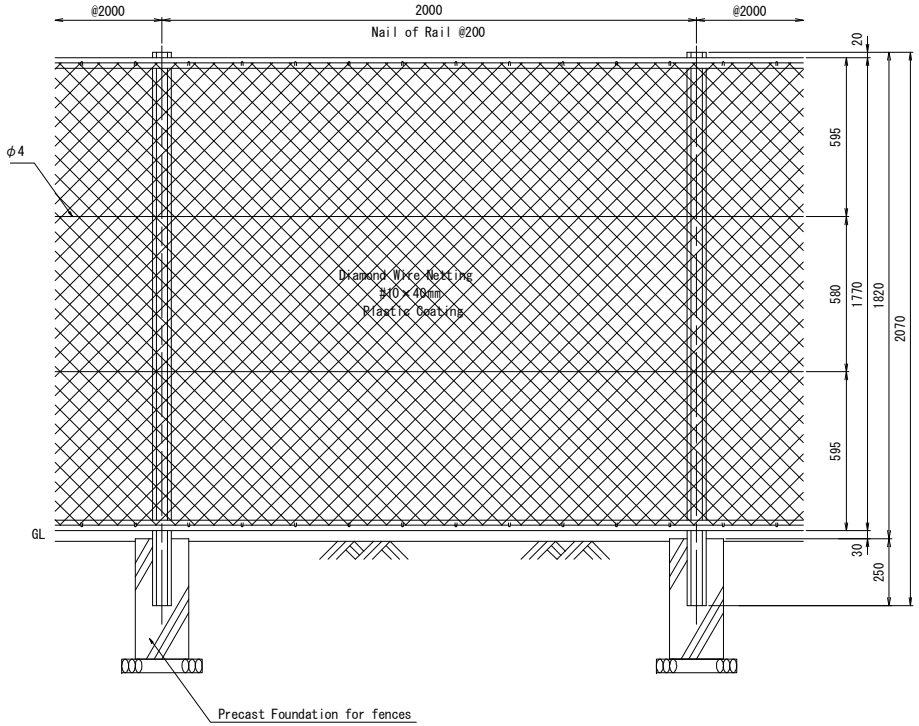
DRG. NO.

41/49

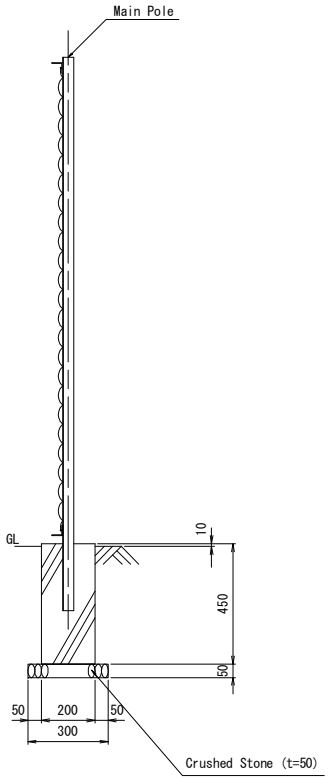
Ancillary Works Structure (3)

Fence SCALE 1:20

Front View



Side View



MATERIALS LIST PER100 m

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
FENCE		m	100.00	
MAIN POLE	Main Pole	nos	50.00	
FOUNDATION FOR FENCES		nos	50.00	

MATERIALS LIST(Foundation for fence) PER each

CLASSIFICATION	STANDARD	UNIT	QUANTITY	REMARK
EXCAVATION		cu.m	0.314	
FILLING		cu.m	0.292	
SURPLUS SOIL		cu.m	0.000	
FOUNDATION	t=50	Sq.m	0.090	
PRECAST FOUNDATION		nos	1.000	

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JICA INTERTATIONAL CORPORATION AGENCY

KARACHI METROPOLITAN CORPORATION

CONSULTANTS:

INGEROSEC Corporation

Eight-Japan Engineering Consultants Inc

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

PROJECT TITLE:

The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) SCALE (A3)

DRAWING TITLE:

Ancillary Works Structure (3)

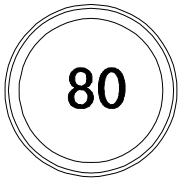
REV.

DRG. NO.

42/49

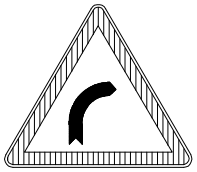
Ancillary Works Structure (4)

Regulatory Sings

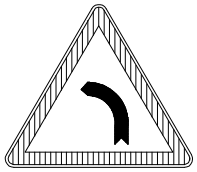


SPEED LIMIT
R-25-2

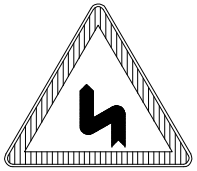
Warning Sings



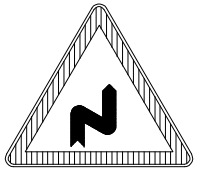
CURVE TOWARDS RIGHT
W-1



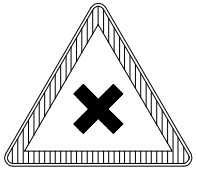
CURVE TOWARDS LEFT
W-2



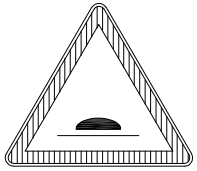
LEFT REVERSE CURVE
W-3



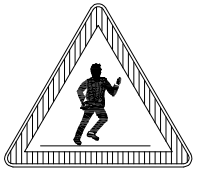
RIGHT REVERSE CURVE
W-4



JUNCTION
W-30

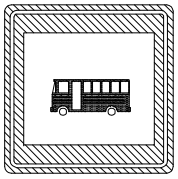


HUMP SIGN
W-12

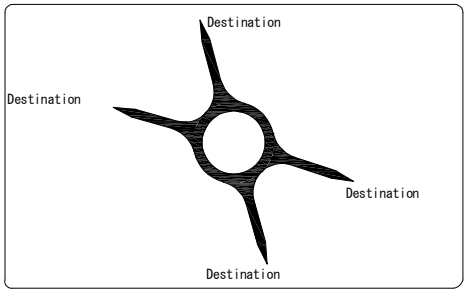


PEDESTRIAN CROSSING
W-17

Informatory Sings

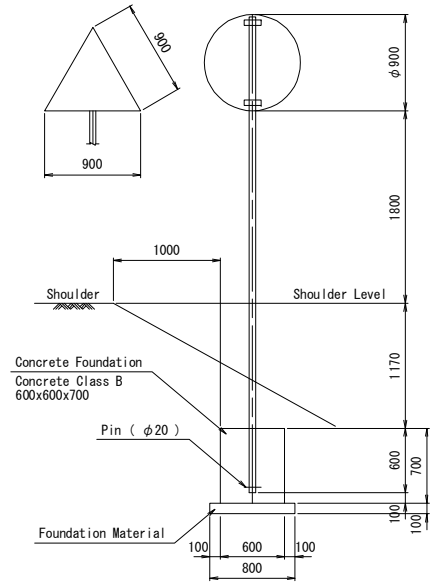


BUS STOP
I-25



ROUND ABOUT
I-1A

Sign Post SCALE 1:50



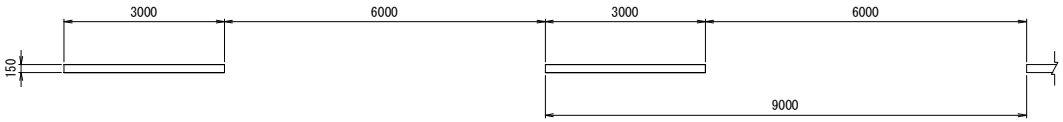
A-106

JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGEROSEC Corporation Eight-Japan Engineering Consultants Inc	PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: Ancillary Works Structure (4)
KARACHI METROPOLITAN CORPORATION		SCALE (A1) / SCALE (A3)	REV. / DRG. NO. 43/49

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

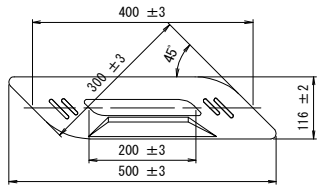
Ancillary Works Structure (5)

Lane Marking （W = 15 cm）

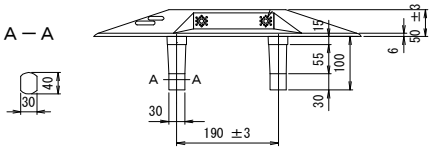


Chatter bar SCALE 1:10

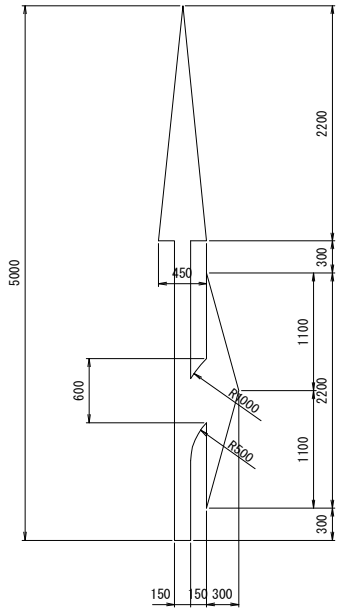
平面図



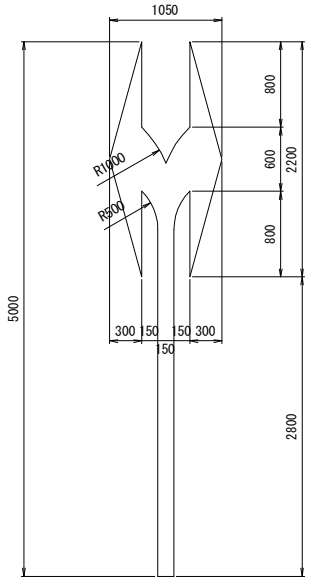
A－A



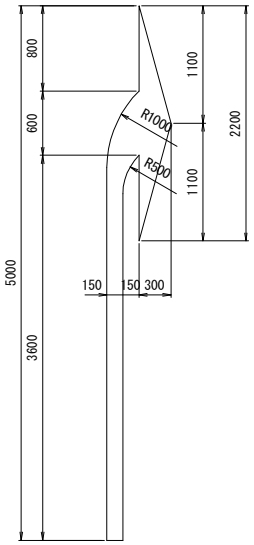
Arrow Marking （W = 15 cm）



L15 = 9.2m



L15 = 9.7m



L15 = 6.7m

JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGEROSEC Corporation Eight-Japan Engineering Consultants Inc	PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project
	KARACHI METROPOLITAN CORPORATION		

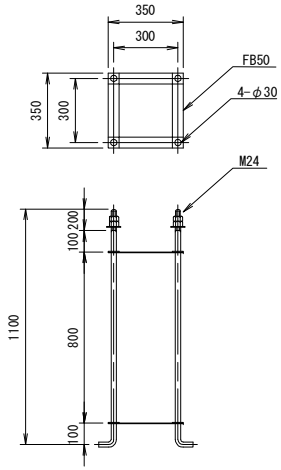
	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

SCALE (A1) SCALE (A3)

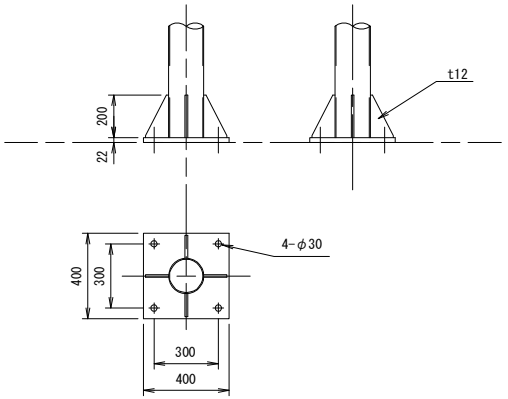
DRAWING TITLE: Ancillary Works Structure (5)

REV. DRG. NO. 44/49

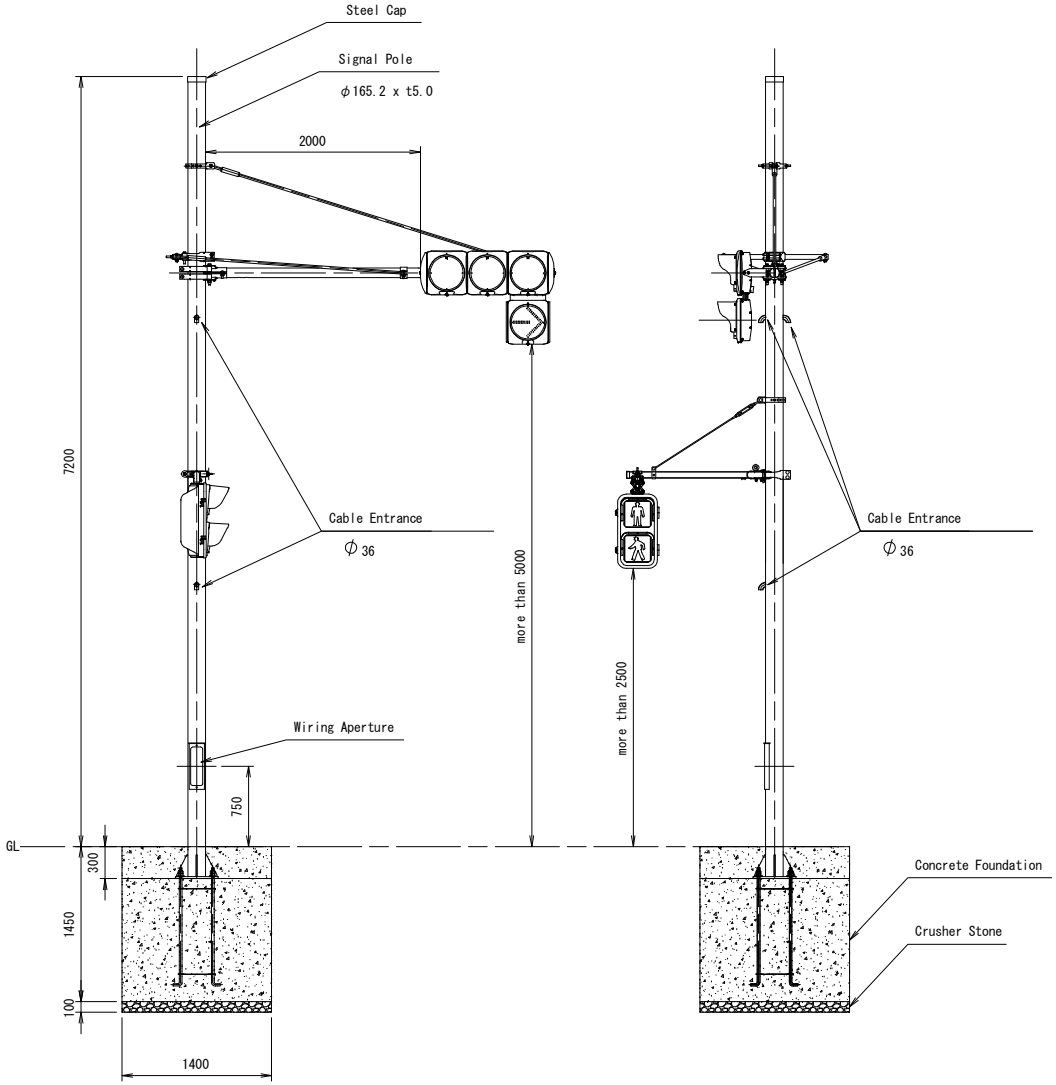
Ancillary Works Structure (6)



Detail of Anchor Volt (S=1/25)



Detail of Base Plate (S=1/25)



Signal Pole (S=1/50)

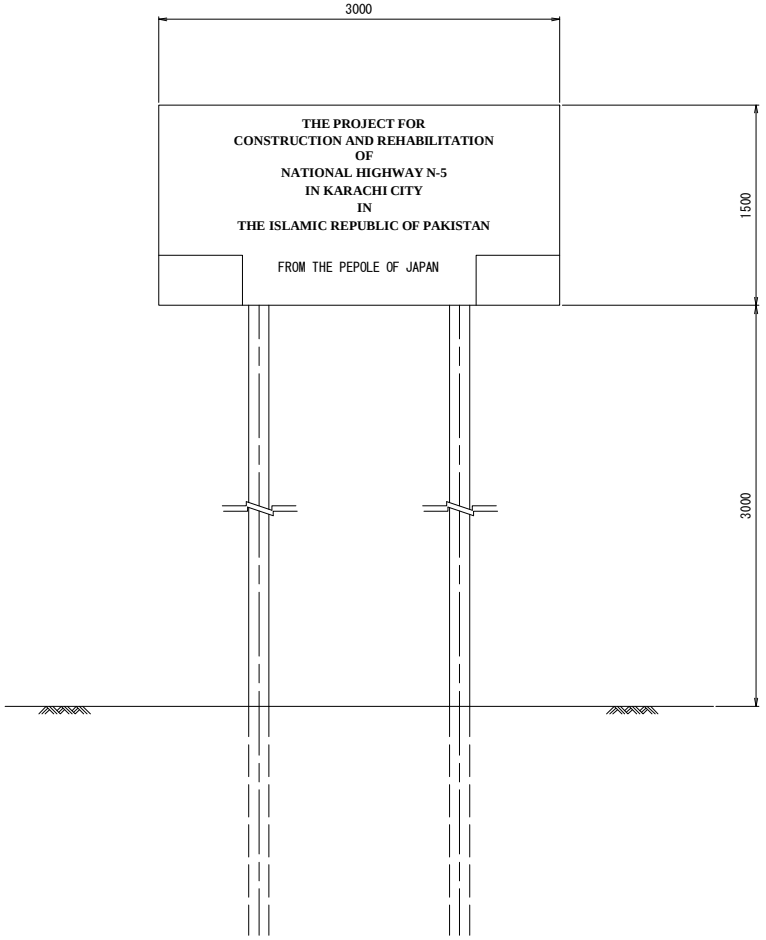
JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGEROSEC Corporation Eight-Japan Engineering Consultants Inc	PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project
	KARACHI METROPOLITAN CORPORATION		DRAWING TITLE: Ancillary Works Structure (6)

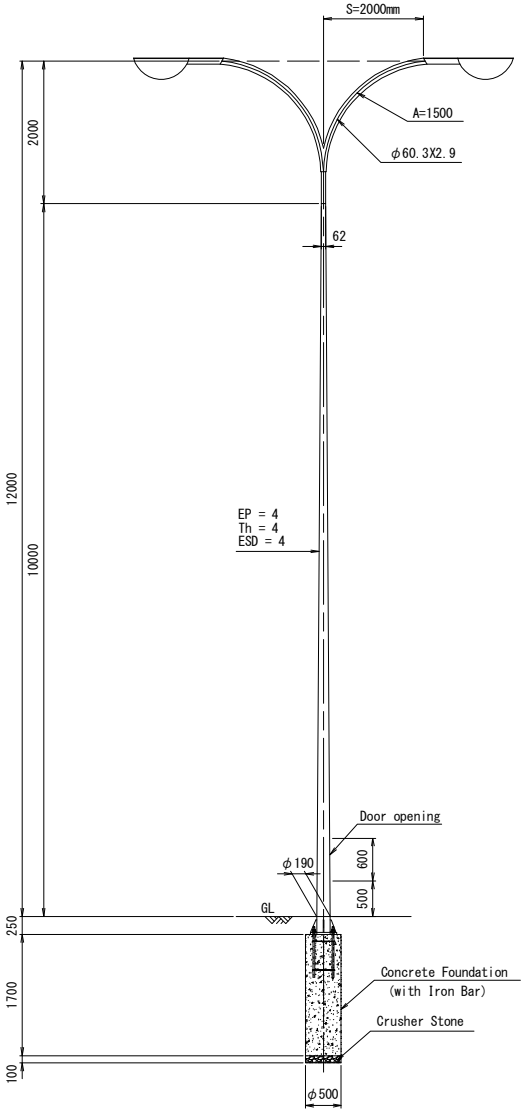
	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

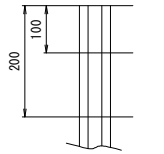
SCALE (A1) | SCALE (A3) | REV. | DRG. NO. 45/49

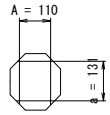
Ancillary Works Structure (7)

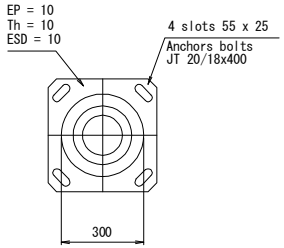
Project Information Board SCALE 1:40











A-109

JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGEROSEC Corporation Eight-Japan Engineering Consultants Inc	PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project
	KARACHI METROPOLITAN CORPORATION		

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

SCALE (A1) SCALE (A3)

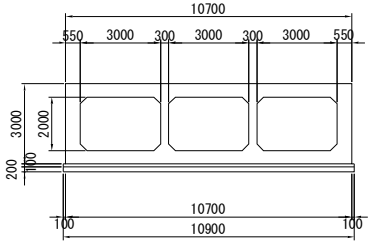
DRAWING TITLE: Ancillary Works Structure (7)

REV. DRG. NO. 46/49

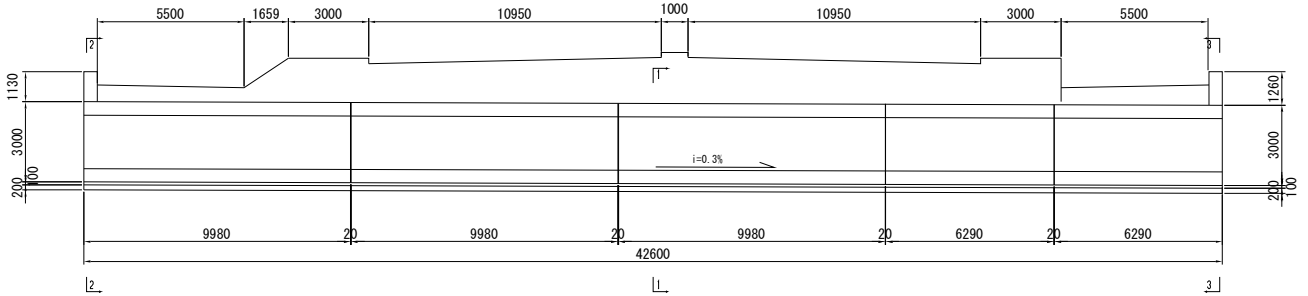
GENERAL DRAWING OF BOX CULVERT
(No. 0+874)

Cross Section

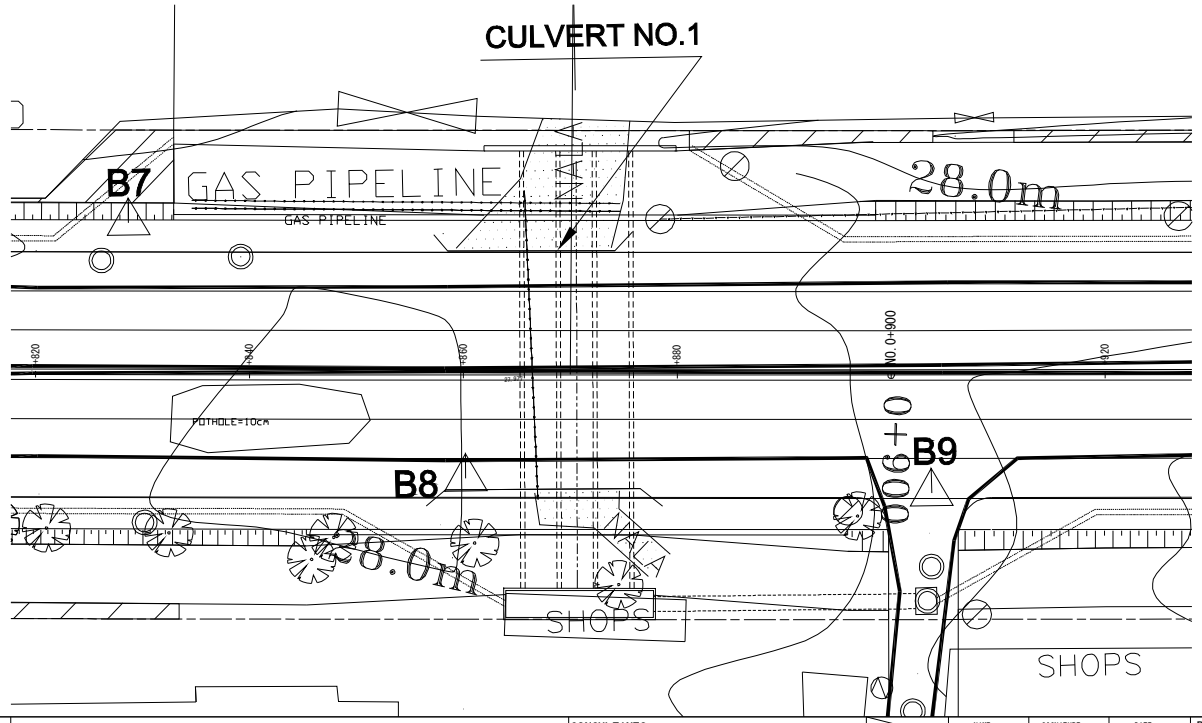
1 - 1



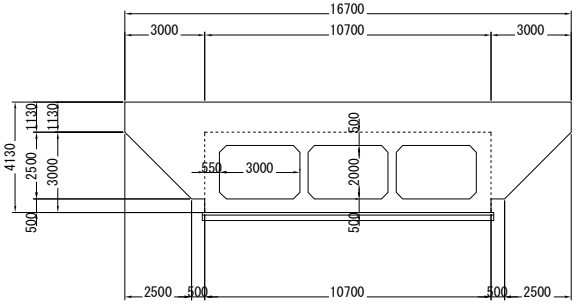
Side View



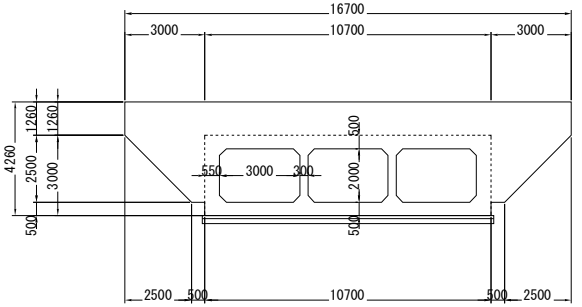
Plan



2 - 2



3 - 3



A-110

JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		NAME	SIGNATURE	DATE
	KARACHI METROPOLITAN CORPORATION		PREPARED BY			
			CHECKED BY			
			APPROVED BY			
			DESCRIPTION			

PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project

SCALE (A1) | SCALE (A3)

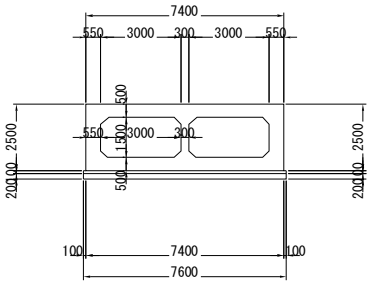
DRAWING TITLE: GENERAL DRAWING (No.0+874 Box Culvert)

REV. | DRG. NO. 47/49

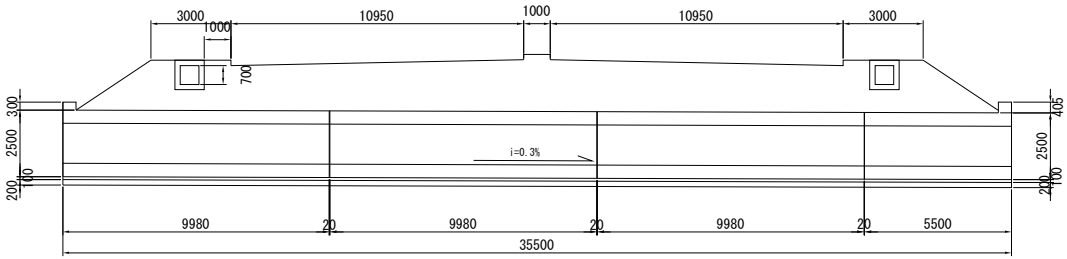
GENERAL DRAWING OF BOX CULVERT
(No. 6+524)

Cross Section

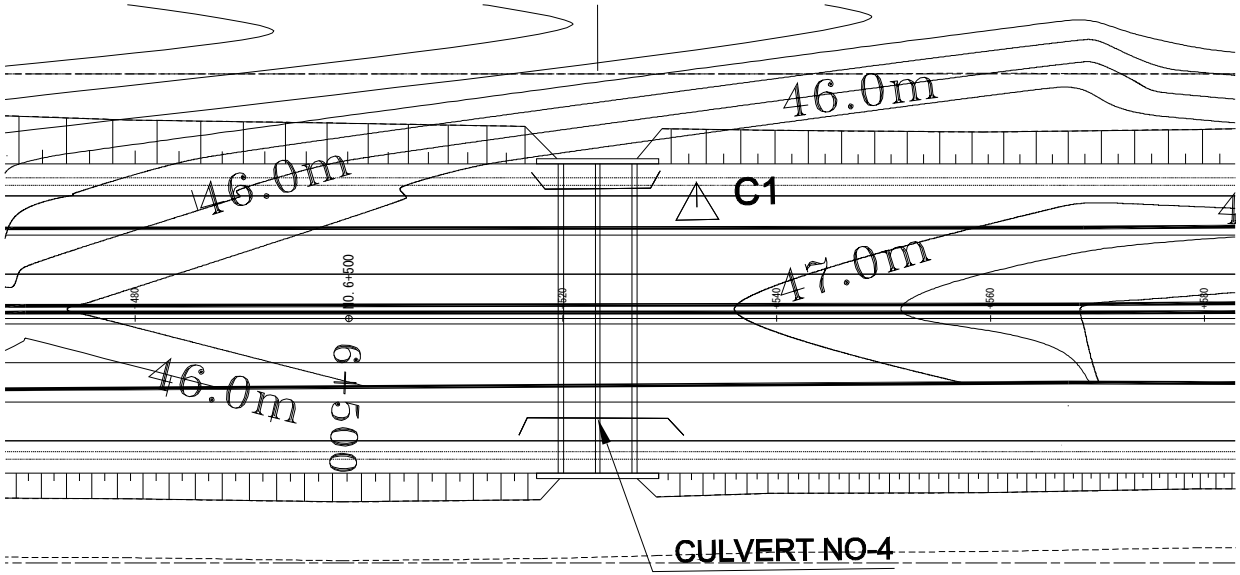
1 - 1



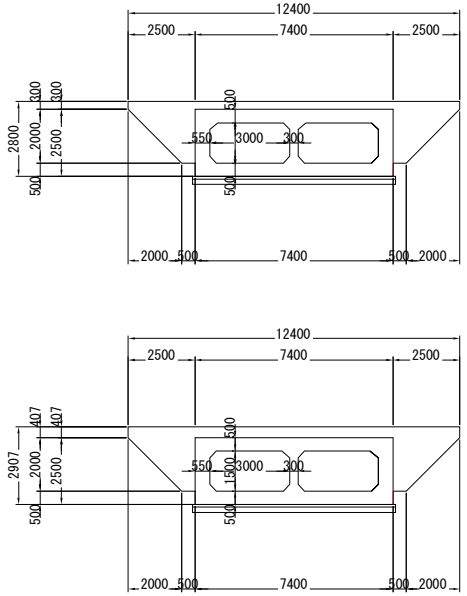
Side View



Plan



2 - 2



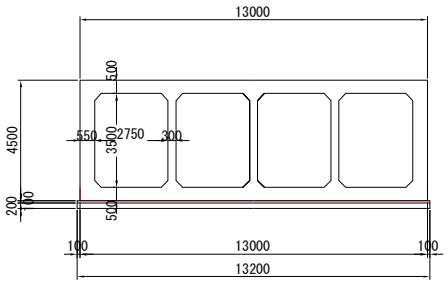
A-111

JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation Eight-Japan Engineering Consultants Inc		PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project	DRAWING TITLE: GENERAL DRAWING (No.6+524 Box Culvert)
	KARACHI METROPOLITAN CORPORATION		PREPARED BY / CHECKED BY / APPROVED BY / DESCRIPTION (NAME, SIGNATURE, DATE)	SCALE (A1) SCALE (A3)	REV. DRG. NO. 48/49

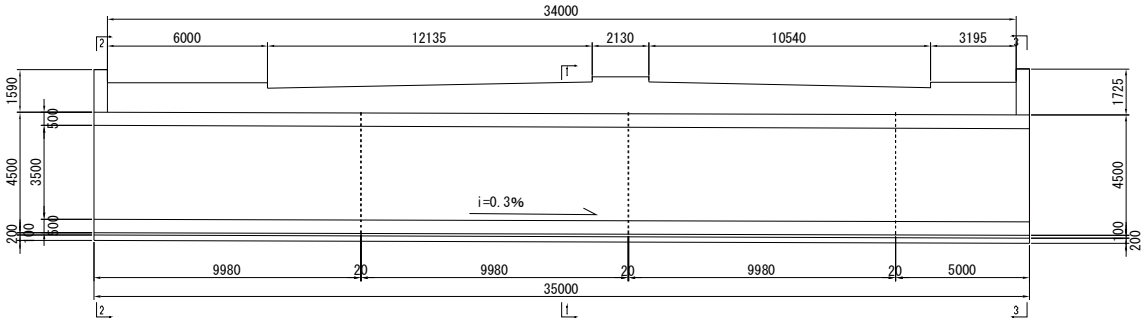
GENERAL DRAWING OF BOX CULVERT
(No.11+370.7)

Cross Section

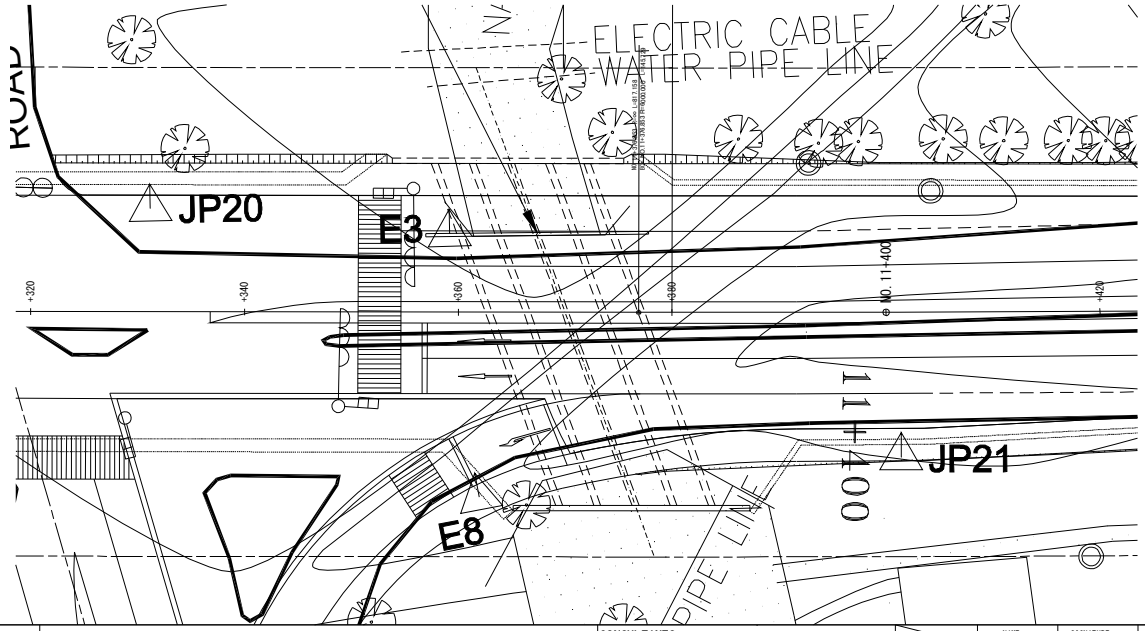
1 - 1



Side View



Plan



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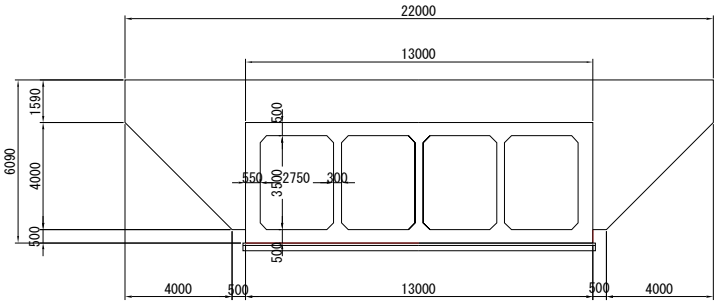

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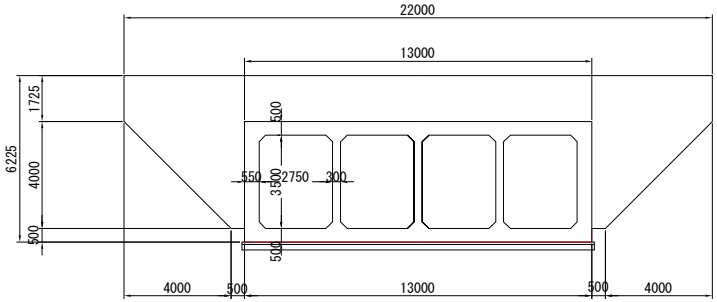

JICA	JICA INTERTATIONAL CORPORATION AGENCY	CONSULTANTS: INGÉROSEC Corporation, Eight-Japan Engineering Consultants Inc	PROJECT TITLE: The Project for Construction and Rehabilitation of National Highway N-5 in Karachi City, Japan Grant Aid Project
KMC	KARACHI METROPOLITAN CORPORATION		DRAWING TITLE: GENERAL DRAWING (No.11+370.7 Box Culvert)

	NAME	SIGNATURE	DATE
PREPARED BY			
CHECKED BY			
APPROVED BY			
DESCRIPTION			

SCALE (A1) | SCALE (A3)

REV. | DRG. NO. 49/49

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