

- A type of retaining wall has been designed and applied in many places in the project which uses boulders set in concrete instead of set in mortar. Nepalese labours are familiar with masonry using crushed rocks set in mortar, but they have no experience to set in concrete. Therefore, aiming to technical transfer to use boulders set in concrete, Japan senior bricker shall be assigned at the initial stage of construction.

3.2.1 Notes for the Construction

A. Construction during the Rainy Season

During the rainy season from June to September, heavy earth works may be impossible by the muddy access road and slope failures, and also, works beside the river should be avoided from the safety point of view. Furthermore, it will be expected that the isolation of sites by the closure of access road due to slope failures. Therefore the implementation plan should be established to ensure the availability of such works as it uses a lot of materials conveyed from Dhulikhel, for example, large scale of concrete works. The works which can be executed during rainy season, may be limited to the minor job with small excavation.

B. Countermeasure for Environment Impact during the Construction

The possible environment impacts will be (a) the change of circumstances of local community and destruction of forest due to migration of labours, (b) damage to agricultural product and destruction of slope plantation due to cutting, waste soil disposal and closure of irrigation channel.

[Matter on Labour Control]

The Project (Section II-3) is expected to create four million or more in total of employment, and consequently about five thousand of labours will migrate to the project area from outside. This may cause impacts over the regional communities by, for example, giving unstable social safety. The Nepalese labours working at the construction site usually stay in tent or shanty, cooking by themselves. If those five thousand of labours were allowed to stay without any control, they may cause serious problems by such activities as cutting trees for firewood or throwing away their waste. Therefore, it is strongly requested for the contractor to

provide site camps with adequate interval and control labours offering food and accommodation in well managed manner.

[Matter on Construction Supervision]

To avoid the waste soil disposal which will damage plantations on the slopes, the specification shall be provided which clearly instruct the sections where the side spoil is allowed or restricted. In the restricted sections, earth works shall be limited in use of shovel and damp combination instead of bulldozer work. Although it might be difficult to eliminate the dust pollution caused by construction vehicle, the effort to minimise it by operating exclusive use of water tank trucks should be requested to the contractor. It is required for the contractor to confirm the existing function of regional water channel before starting the construction, and maintain the required function during the construction.

C. Temporary Access Road and Bridges

The temporary access road is required at the following points:

- The sections requiring the diversion from project route due to the access difficulty by the steep terrain condition along Rosi River.
- The embankment section on the river reservation requires temporary road, about 3 m width, beside the construction area.

Temporary bridge is required at the following points;

- At the very beginning of the construction, the contractor needs to approach to the construction site through the existing road from Banepa. As the existing bridges on the road over Rosi River have not enough strength against the load of construction equipment, two temporary bridges with approaches are required.
- The points where the temporary access crosses Rosi River.

The temporary access and bridge required on the existing road near Banepa as shown in Figure 3.5 may need the land preparation by DOR during the required period of approximately 12 months as the sites are located in the distance from where the villager understand as the project site.

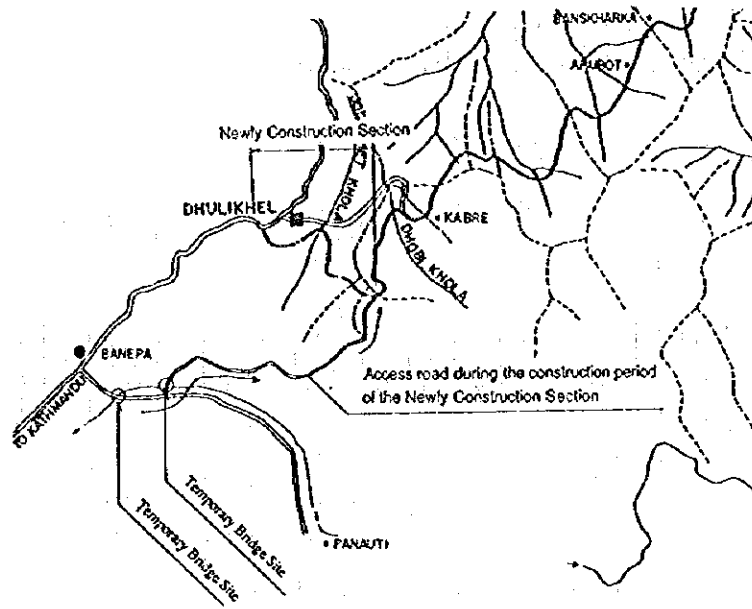


Figure 3.5 Location Map of the Temporary Bridge near Banepa

3.2.2 Scope of works

A. Scope of Work to be Executed by the Japanese Side

(1) Construction of Road Facilities

- To carry out the detailed design and preparation of tender documents
- To undertake the construction of Sindhuli Road (Section II-3: Nepalthok - Dhulikhel), about 51 km in Road length) as described Chapter 2.
- To carry out the maintenance of road surface of the partial handed-over section and/or the completed section where the contractor uses as access road to the construction site of the Project (Section II-3)

(2) Procurement of Equipment and Materials

- To procure the equipment and tools for maintenance works as described in Section 2.3.5 and convey them up to the store yard of Banepa Maintenance Office.

B. Undertaking by HMG/N and DOR

- Provision of necessary land for construction of Sindhuli Road (Section II-3) including provisional bus-stop area at Dhulikhel and the land for two temporary bridges and its approach road.
- Relocation of the existing drinking water supply systems.
- Provision of appropriate countermeasures in case the regional water channel system is used for the drinking water supply, in order to recover the required functions.
- Demolition and/or removal of obstacles within the project area such as existing electric poles or wires (if necessary)
- Planning and construction of the Banepa Maintenance Office
- Maintenance of the partial handed-over sections and/or completed sections (if the sections are used as access road for the construction, the maintenance of road surface shall be undertaken by the Japanese side).

3.2.3 Construction Supervision

A. Basic Concept

As stated in Section 2.2.1 A, maximum considerations for the mitigation measures against environmental impacts and road disasters will be taken during the construction stage. Therefore, the consultants for the construction supervision is required to realise the concept and design policy on the B/D Study and the Detailed Design on the bases of the general construction supervision works.

Since the project road will be constructed in the severe mountainous terrain, it is assumed that the design change will be required frequently, due to the unexpected change of geological conditions, or aberration of topographical maps and survey. The additional cost due to design change may be borne by HMG/N because the Japanese Grant Aid Scheme does not allow it after the commitment by E/N. However, as HMG/N has also budgetary limitation, such request to disburse the additional cost induced by the design change will be hardly accepted. Therefore, the consultant have to carry out the change of design not to exceed the committed amount for the project cost.

It is assumed that the consultant for the construction supervision of Section II-3, may also in charge of the supervision of Section II-1 and Section II-2 which may be implemented simultaneously or just after the Section II-3 completion. Therefore, the consultant will be requested to undertake the supervision not only for the Section II-3, but also for the entire section of the Sindhuli Road Construction Project with the consistent understanding.

Furthermore, the consultant will be requested to be involved with the operation and maintenance works extended over the handed-over sections which will be carried out by DOR or the contractor through the advice to the PM or instructions to the contractor. Therefore, the consultant have to keep the close contact with PM.

Taking into account the above mentioned points, the construction supervision shall be carried out based on the following concepts:

- To materialise the concept of "Environmental Friendly Construction of Sindhuli Road" at the construction site.

- To correspond flexibly with the change of site condition, considering the balance of the project cost strictly.
- To establish the efficient organisation which will monitor the entire project situation, realise the consistent project qualities, cooperate between each construction site of the Sections, and establish the close relation with the Project Manager of DOR.

B. Staffing Plan

According to the concepts for the construction supervision, the consultant will establish the central office and site offices as described in Section 3.1.1, and dispatch the following experts:

- **Team Leader**
Responsible for all aspects of the consulting services, during the Project he will station in the central office or Japan
- **Contract Specialist**
Responsible for supporting the DOR on the Tendering stage
- **Resident Engineer**
Responsible for supervising the construction work staying in the site office.
- **Bridge Engineer**
Responsible for supervising the bridge superstructure construction work during the construction of superstructure
- **Materials Engineer**
Responsible for the control/advice on specified material quality and strength used for the road and structures during the beginning stage of construction and construction of DBST.
- **Road Engineer**
Responsible for the change of design at the time required.

3.2.4 Procurement Plan for Materials and Equipment

A. Construction Materials

According to the concept of Basic Design, most of the materials are procured in Nepal except the materials relating to the steel superstructure of Bridges.

Table 3.1 Procurement Schedule of construction Materials

Materials	Nepal	Thai	Japan
Cement	o		
Water reduced agent	o		
Straight asphalt	o		
Asphalt emulsion	o		
Crusher run	o		
Sand	o		
Plywood Form	o		
Wood	o		
Gasoline	o		
Light oil	o		
Heavy oil	o		
Gabion wire	o		
Steel Girder		o	
Associated material to the bridge			o

B. Construction Equipment

Truck base equipment will be procured from India as those are familiar in Nepal. Dump truck and other general equipment will be procured from Singapore which is the nearest heavy equipment market. Crushing and batcher plant which are special equipment and not available in the market will be procured from Japan.

Table 3.2 Procurement Schedule of Construction Equipment

Equipment	India	Singapore	Japan
Truck, Water Tanker, Trailer, etc.	o		
Dump truck		o	
Other Equipment		o	
Crushing Plant			o
Batcher Plant			o

3.2.5 Implementation Schedule

A. Implementation Schedule of the Project (Section II-3)

As stated in Section 2.3 Basic Design, the Section II-3 will be implemented by following two phases:

- Phase-1 (1) STA. 150 - end (Dhulikhel), 36 km in road length
- (2) Procurement of the maintenance equipment for road surface and transportation
- Phase-2 (1) (Nepalthok) STA. 0 - STA. 150, 15 km in road length
- (2) Procurement of the maintenance equipment

The detailed design for the Phase-1 and 2 requires 9 months (including preparation of tender documents for the Phase-1) and 30 months for the Phase-1 construction. As for the Phase-2, two months is required for the preparation of tender documents and 30 months for the construction. Figure 3.5 show in implementation schedule of Phase-1 and 2.

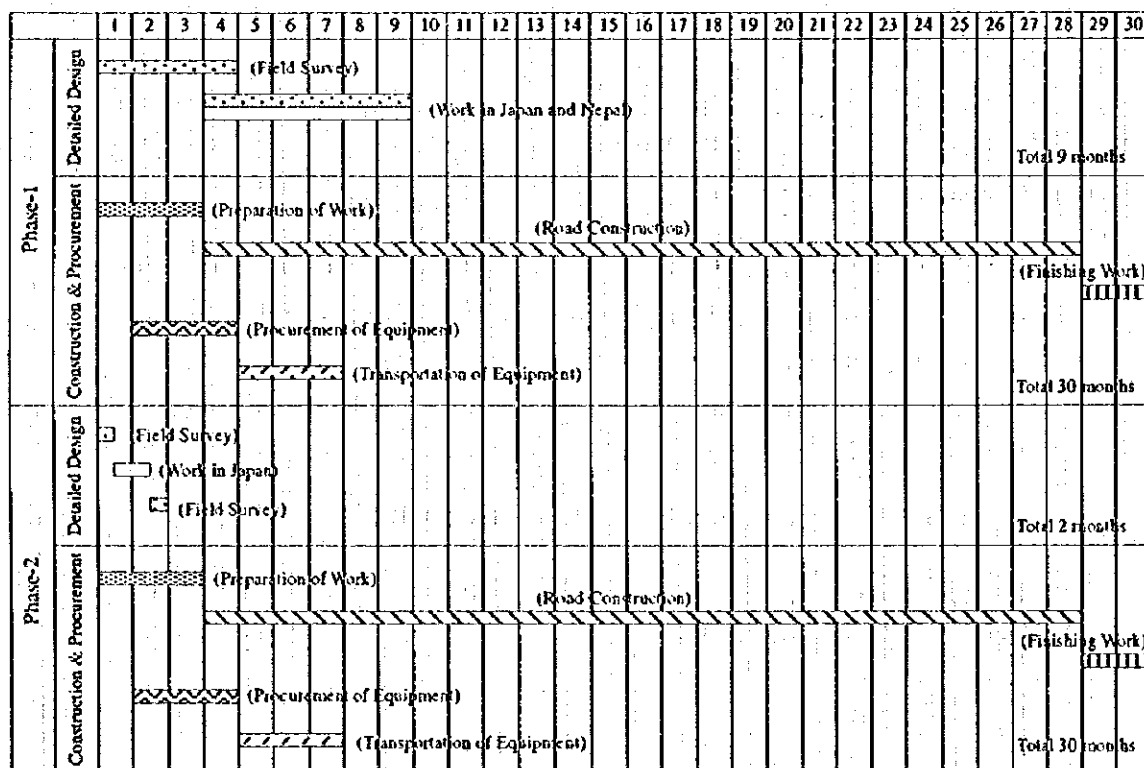
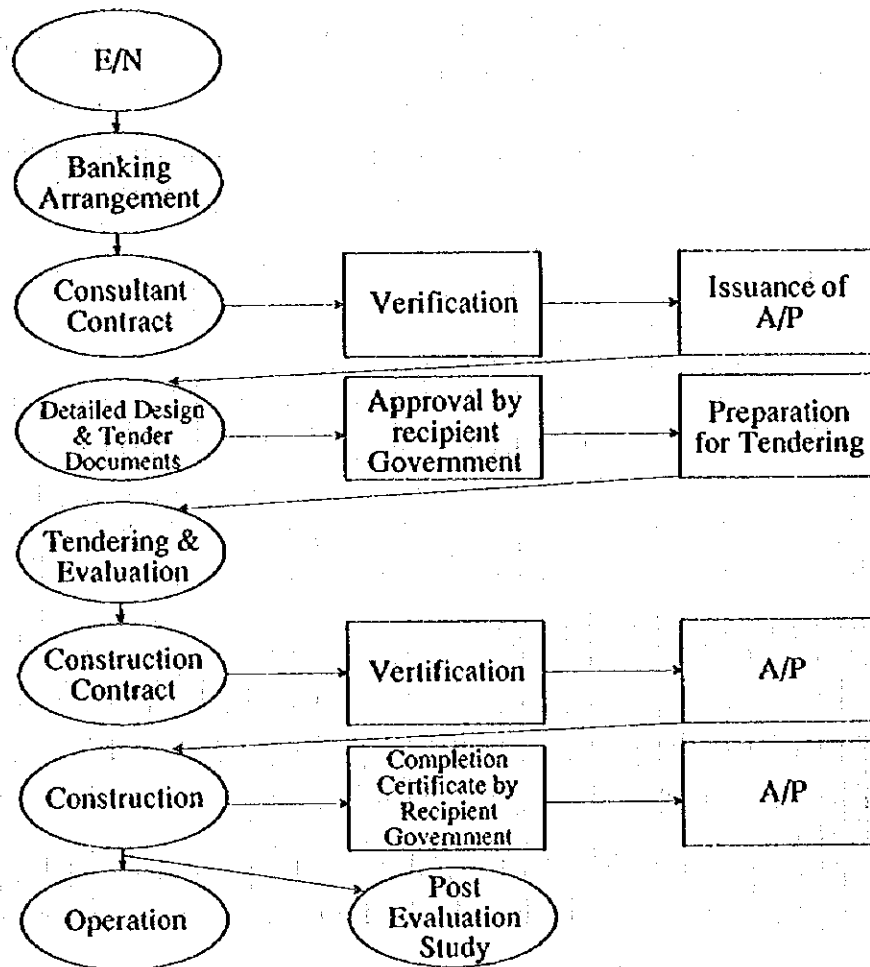


Figure 3.5 Overall Implementation Schedule

B. Implementation Schedule under Japanese Grant Aid System

The Project (Section II-3) shall be implemented as shown in Figure 3.6 taking into consideration the procedure of the Japanese Grant Aid System.



Note (1) E/N : Exchange of Note
 (2) A/P : Authorization to Pay

Figure 3.6 Procedure of Japanese Grant Aid Program

3.2.6 Obligation of Recipient Country

For the implementation of the Project, the Government of Nepal will undertake the followings:

- (1) To provide data and information necessary for the Project
- (2) To secure and clear the site required for the project prior to the Project implementation.
- (3) To provide the temporary site with no charge to a general contractor for the construction of temporary bridges (two places) at Banepa as shown in the attached drawing.
- (4) To allow a general contractor to collect the river gravel for road construction with no charge.
- (5) To replace or protect at the cost of the government of Nepal the existing utilities including local water supply system, telephone cable, power cable etc., which might be affected by the construction of the road, prior to the commencement of the work.
- (6) To allow a general contractor to use the maintenance equipment for road surface, trailers and wireless telephones which will be provided to the Nepalese side under the Project as a maintenance equipment for Section II-3.
- (7) To close the road for public traffic during the construction and to open for traffic only after hand-over.
- (8) To bear commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorisation to Pay" and payment commission.
- (9) To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in Nepal and prompt internal transportation therein of the materials and equipment for the Project purchased under the Grant Aid.
- (10) To exempt Japanese juridical and physical nationals engaged in the Project from customs duties, internal taxes and other fiscal levies

which may be imposed in the Kingdom of Nepal with respect to the supply of the products and services under the verified contracts.

- (11) To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contact such facilities as may be necessary for their entry into Nepal and stay therein for the performance of their work.
- (12) To provide necessary permissions, licenses and other authorisations for implementing the Project, if necessary.
- (13) To assign appropriate budget and staff members for proper and effective operation and maintenance of the facilities constructed under the Project.
- (14) To maintain and use properly and effectively the facilities constructed and the equipment provided under the Project.
- (15) To bear all the expenses, other than those to be borne by the Japanese Grant Aid with the scope of the Project.
- (16) To coordinate and solve any issues related to the project which may be raised from third parties or inhabitants of the Project area during implementation of the Project.

3.2.7 Operation and Maintenance Plan

A. Operation and Maintenance Cost Borne by DOR

Items of the expenditure borne by DOR according to the implementation of the Project.

- Land acquisition and house compensation cost and related administrative cost
- administrative cost for forest inventory
- Construction and design cost for the Banepa Maintenance Office and related administrative cost
- Operation and maintenance cost for partially handed-over and/or completed sections of the project road and related administrative cost

- **Administrative cost relating to the Grant Aid**

Table 3.3 shows the estimated annual expenditure borne by DOR according to the implementation schedule which was assumed by the A/C Study Report and other previous data. According to Table 3.3, the maximum annual expenditure is about 59 million Nrs. which is rated around 3.4% of the Development Budget of DOR, 1995/96, contributed by HMG/N. The assumed maintenance cost after opening of the Sindhuli Road is about 47 million NRs. and rated about 2.5% of the said budget.

At present, HMG/N is planning to collect the budget for maintenance of existing road from toll. In case this programme is realised, the expenditure for the periodic maintenance, which share the 15% of total budget, may be reduced, and DOR may disburse the additional budget to the Sindhuli Road Construction Project.

When the programme is not realised, the maximum annual expenditure for the Sindhuli Road Construction Project will exceed the maximum actual disbursement in 1995/96 which was allocated the amount of 60 million NRs to the Karnali Rajmarg construction project, financed by ADB. Therefore, it is anticipated that DOR may face the difficulty in his disbursement schedule. HMG/N is requested to have the special consideration such as preparing special budget to cope with the implementation of the Project.

B. Possibility of Collection of the Maintenance Budget by Toll

The required routine maintenance cost after opening of Sindhuli Road is assumed as approximately 43 million NRs. The future traffic demand of heavy vehicles is estimated about 1800 no./day in 2003. So it is roughly calculated that the toll of 70 NRs. per heavy vehicle at present value will cover the annual routine maintenance cost.

Table 3.3 Estimated Expenditure for the Sindhuli Road Construction Project borne by DOR.

Calendar Year	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Total
Detailed Design and Construction (Grant Aid)	DD Sec 1										
Construction of Maintenance office & Maintenance of Section I and Handed Over Sections (HMO Force Account)											
Land Acquisition and House Compensation (HMO Force Account)											
Land Acquisition	Sec 1	5,500,000									5,500,000
	Sec B-1		1,600,000	8,600,000	8,620,000						25,820,000
	Sec B-2			2,720,000	2,720,000	2,720,000					23,170,000
	Sec B-3	6,130,000	6,130,000	6,130,000							20,560,000
Forest		240,000	480,000	480,000	480,000	240,000					1,920,000
Maint. Office Construction				15,300,000	15,300,000		3,100,000	3,100,000			37,260,000
Maint. Administration	36,000	180,000	2,556,000	2,556,000	2,556,000	4,716,000	3,904,000	4,984,000	8,136,000	8,172,000	41,796,000
Maint. Allowance & Expenditure	36,000	180,000	2,556,000	2,556,000	2,556,000	4,716,000	3,904,000	4,984,000	8,136,000	8,172,000	41,796,000
Material	Sec 1	478,000	478,000	478,000	478,000	478,000	478,000	478,000	478,000	478,000	4,780,000
	Sec B-1				792,000	252,000	503,000	503,000	503,000	503,000	2,518,000
	Sec B-2					206,000	413,000	413,000	413,000	413,000	1,858,000
	Sec B-3			463,000	463,000	658,000	658,000	658,000	658,000	658,000	4,220,000
Fuel	Sec 1	862,000	862,000	862,000	862,000	862,000	862,000	862,000	862,000	862,000	7,718,000
	Sec B-1				909,000	909,000	909,000	909,000	909,000	909,000	5,434,000
	Sec B-2					748,000	748,000	748,000	748,000	748,000	3,730,000
	Sec B-3			1,189,000	1,189,000	1,189,000	1,189,000	1,189,000	1,189,000	1,189,000	8,322,000
Labour	Sec 1	2,220,000	2,220,000	2,220,000	2,220,000	2,220,000	2,220,000	2,220,000	2,220,000	2,220,000	19,980,000
	Sec B-1				2,310,000	2,310,000	2,310,000	2,310,000	2,310,000	2,310,000	18,030,000
	Sec B-2					1,920,000	1,920,000	1,920,000	1,920,000	1,920,000	9,630,000
	Sec B-3			3,060,000	3,060,000	3,060,000	3,060,000	3,060,000	3,060,000	3,060,000	21,420,000
Spare	Sec 1	2,685,000	2,685,000	2,685,000	2,685,000	2,685,000	2,685,000	2,685,000	2,685,000	2,685,000	24,174,000
	Sec B-1				2,830,000	2,830,000	2,830,000	2,830,000	2,830,000	2,830,000	18,910,000
	Sec B-2					2,320,000	2,320,000	2,320,000	2,320,000	2,320,000	11,600,000
	Sec B-3			3,700,000	3,700,000	3,700,000	3,700,000	3,700,000	3,700,000	3,700,000	25,900,000
Total		32,000	19,196,000	23,281,000	31,932,000	51,423,000	43,778,000	41,742,000	43,902,000	43,176,000	379,617,000
Construction			Sec 1	Sec B-3 Phase 1	Sec B-1 Phase 1	Sec B-3 Phase 2	Sec B-1 Phase 2	Sec B-3 Phase 2			
Handing Over			Sec 1			Sec B-3 Phase 1	Sec B-1 Phase 1	Sec B-3	Entire Section		
Maintenance			Sec 1			Sec B-3 Phase 1	Sec B-1 Phase 1	Sec B-3	Entire Section		

C. Staffing Requirement for DOR

DOR is the organisation having approximately 3,000 of staff including 650 of technical staff. Table 3.4 shows the required staff for the implementation of the Project based on the proposal of the A/C Study and the actual record of DOR. The number of staff required for the Project is 228 person in total, increase 7.6% from the present number of staff, and 31 technical staff, increase 4.7%. These required staff for the Project will be absorbed to the new operation and maintenance body after the project completion. DOR has increased his staff by 87 persons from 1993/94 to 1994/95 and this number corresponds to 3% increment. Therefore, it is expected that DOR can manage to increase his staff for the Project spending several years. It is strongly recommended for DOR to reinforce his staffing to cope with the Project keeping pace with the project progress as given in Figure 3.5 which shows the recommended staffing schedule.

Position	Office		Main Office		Maintenance/Project Coordination Team (Section II-1)		Maintenance/Project Coordination Team (Section II-2 and II-3)			Total (*1)
	Coordination Team (Section I)	Bardibas Maintenance Office	Coordination Team (Section II-1)	Sindhuli Bazar Maintenance Office	Maintenance Office	Banepa Maintenance Office	Khurkot Field Unit	Nepalchok Field Unit		
Project Manager	1									1
Coordinator	1									1
Maintenance Engineer	1									2
Bio Engineer	1									2
Maintenance Overseer	2									5
Supervisor	2									10
MECHANICAL STAFF										
Mechanical Engineer	1									2
Senior Mechanics & Other	6									10
Senior Operator	5									17
Mechanics Others	14									49
Junior Mechanics	9									19
Helper	6									27
Driver/Heavy Driver	8									30
ADMINISTRATIVE STAFF										
Navab Subba	2									4
Khandar	1									5
Wireless Operator	1									5
Low Level (Peon, Guard etc.)	10									41

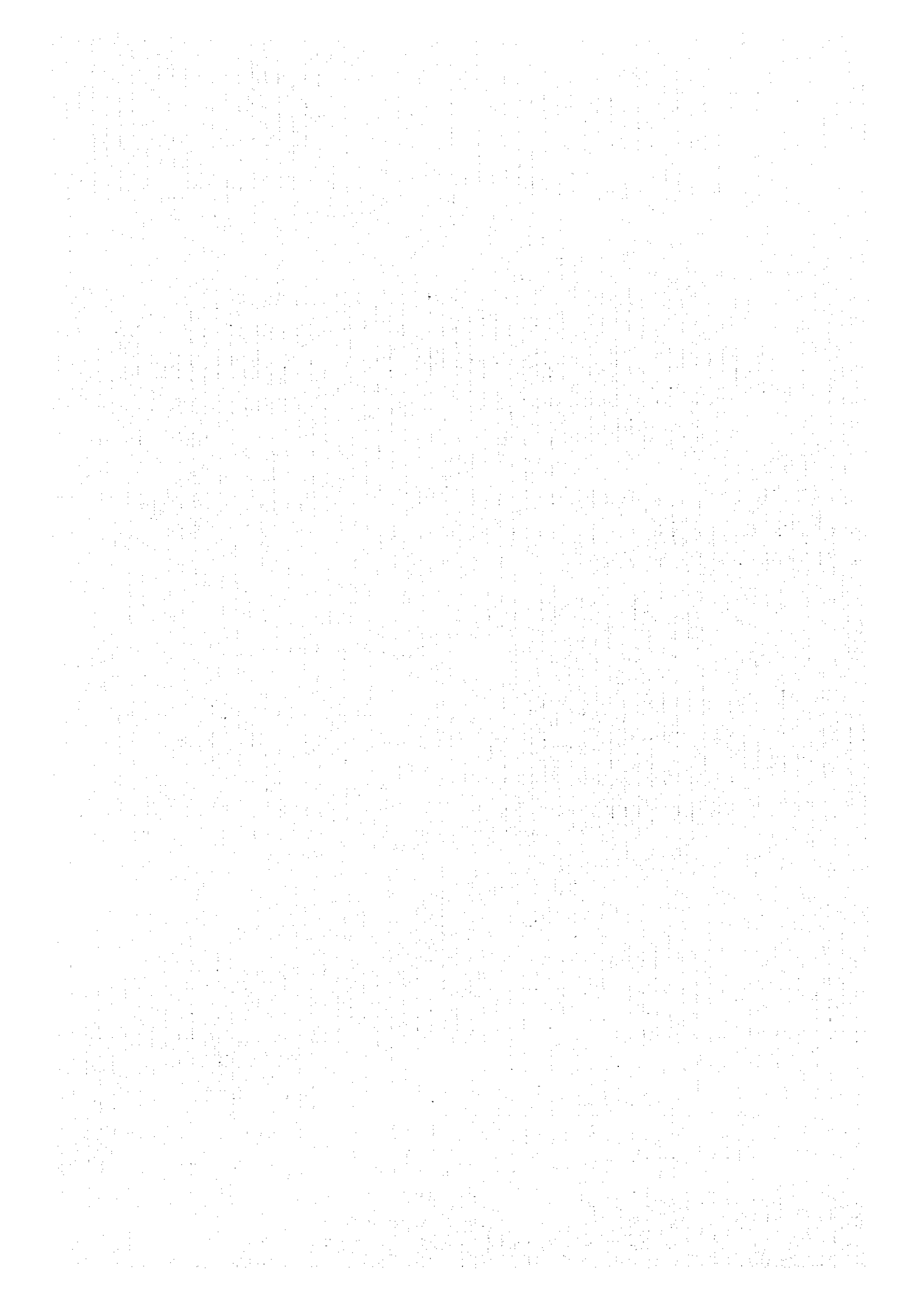
Note: (*1) The total number of members are calculated considering that some member in Bardibas Maintenance Office will be assigned to Sindhuli Bazar Maintenance Office during the Project (Section II-1)

Table 3.4 Recommended Staffing on the Project Office and the Maintenance/Project Coordination Teams

POSITION	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Max No. of Position
Project Manager	1	1	1	1	1	1	1	1	1	1	1
Coordinator	1	1	1	1	1	1	1	1	1	1	1
Maintenance Engineer	1	1	2	2	2	2	2	2	2	2	2
Bio Engineer			1	1	1	2	2	2	2	2	2
Maintenance Overster	2	2	2	2	2	4	4	4	5	5	5
Supervisor			2	2	2	4	6	7	9	10	10
MECHANICAL STAFF											
Mechanical Engineer	1	1	1	2	2	2	2	2	2	2	2
Senior Mechanics & Other			6	6	6	10	10	10	10	10	10
Senior Operator			5	5	5	8	11	14	17	17	17
Mechanics & Others			14	14	14	28	35	42	49	49	49
Junior Mechanics			9	9	9	16	17	18	19	19	19
Helper			6	6	6	12	17	22	27	27	27
Driver/Heavy Driver			8	8	8	16	22	26	30	30	30
ADMINISTRATIVE STAFF											
Nayab Subba			2	2	2	4	4	4	4	4	4
Kharchdar			1	1	1	2	3	4	5	5	5
Wireless Operator			1	1	1	2	3	4	5	5	5
Low Level (Peon, Guard etc.)			10	10	10	20	27	34	41	41	41
Total Man Year	1	5	71	72	72	133	166	196	228	229	

Table 3.5 Tentative Staffing Schedule of the Project Office and the Maintenance/Coordination Teams

CHAPTER 4



CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

4.1 Project Effect

The Sindhuli Road, when completed, will function as a second life line of Kathmandu, stimulating economic growth for the area and providing an alternative route from the viewpoint of national security. Furthermore, it will reduce the travel distance by about 200 km in the trip between Kathmandu and Eastern Development Region. This will reduce the traffic cost of all of the national. Besides the above, the Road will provide the linkage to the isolated areas and the existing road networks thereby intensifying regional economic activities, and will improve the basic human need in the areas. The population who receive the benefit from the Road will be great. These include 1.17 million population in the Districts along the route, 5.44 million population in the Kathmandu Valley and in Eastern Region as well as the passenger of busses and trucks between Kathmandu and the Eastern Region which is estimated at 30 thousands per day and totaling 10 million per year.

The Project (Section II-3) will be a second step to the goal of the Project completion, following the implementation of Section I. It has been justified as a linkage to the isolated areas such as northern part of Sindhuli District and southern part of Kavrepalanchok District where it takes more than two days for villagers to walk to the existing road.

The Project (Section II-3) Road has been planned to traverse the mountainous terrain which has steep slopes and fragile geology. Therefore, it is expected that the Project (Section II-3) after completion, will not function satisfactory without adequate maintenance works. Taking into account the importance of the maintenance and present maintenance capability of the DOR, the measures of strengthening the DOR's maintenance capability through such works as construction of the Maintenance office, organization of maintenance staff and procurement of maintenance equipment are to be executed as a part of the Project (Section II-3), so that, DOR could carry out the maintenance of the Project (Section II-3) by themselves.

As the about 50 percent of the road alignment passes along the existing feeder road, the Project (Section II-3) involves the demolition of about

hundred of houses. However the introduction of the road planning concept with "Environment Friendly Sindhuli Road Construction Project" and adequate and judicial compensation to be provide, it was estimated that there is no serious environmental impact requiring big change of the scope of works.

The Project (Section II-3) will be implemented within five years construction period in the area with risky natural disaster. In order to reduce the risk, the following implementation plan for the Project (Section II-3) are to be applied.

- To minimize the risks during the construction, shorten the construction period to three years by dividing the Project (Section II-3) into two phases, and hand over the completed section to DOR.
- DOR will have to maintain the handed-over sections by HMG/N budget using the equipment and organization procured and formulated in the Project (Section II-3).

Therefore, it was judged that the Project (Section II-3) can be implemented under the Japanese Grant Aid Program.

4.2 Recommendation

As mentioned above the Sindhuli Road Construction Project will provide great effect on the nation and will improve of basic human need along the route. Therefore, it is recommendable that the Project (Section II-3), which promote the early realization of the whole of the Sindhuli Road, should be implemented under Japanese Grant Aid Program. However, taking into consideration of the circumstance of the Project and in order to ensure the smooth progress of the Project (Section II-3), it is recommended HMG/N undertake the following measure.

- To carry out adequate an judicial land acquisition and houses compensation smoothly and complete it before construction.
- To appoint a project manager, who is responsible both the construction and the maintenance of the handed-over sections, from the commencement of the detailed design to ensure the smooth implementation.

- To establish the efficient organization and prepare budget for maintenance of the handed-over sections, including the maintenance of planting on slopes, following the progress of the Project (Section II-3).
- To limit the use of quarry areas and change of drainage along the road which affect the safety and stability of the road.

APPENDICES

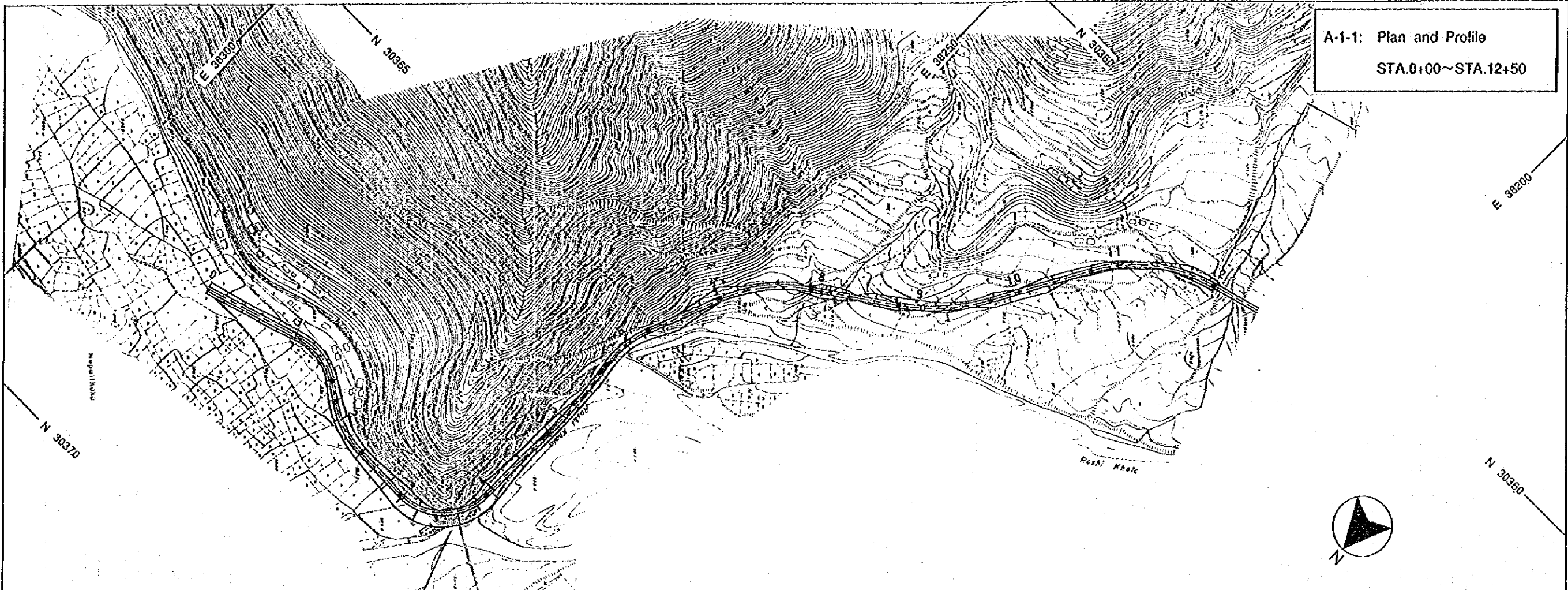
APPENDIX - A

DRAWINGS

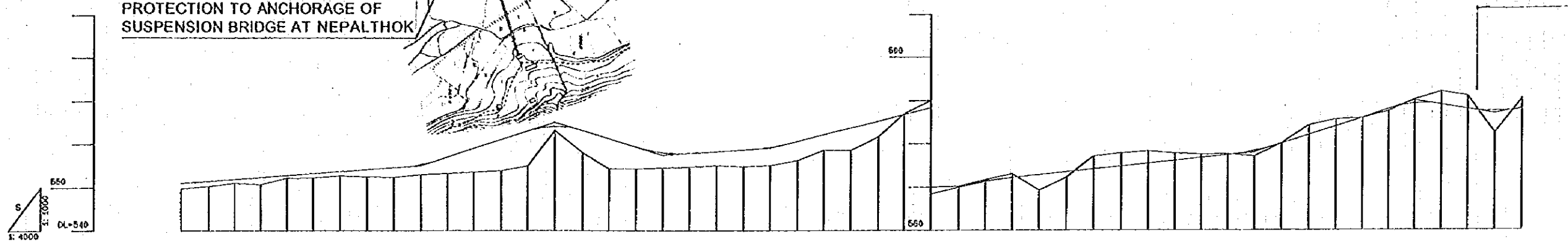
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A-1-1: Plan and Profile
 STA.0+00~STA.12+50

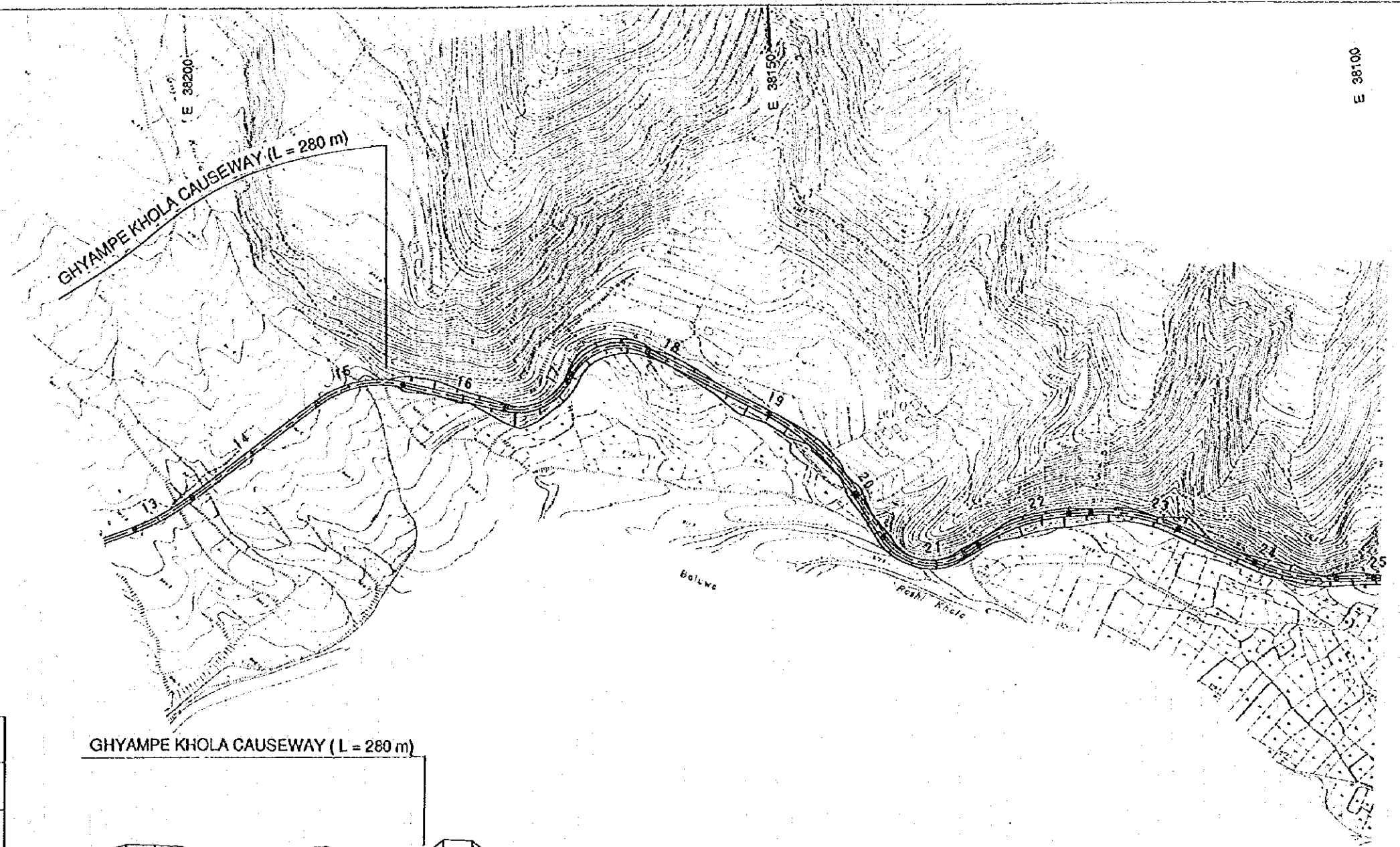


PROTECTION TO ANCHORAGE OF
 SUSPENSION BRIDGE AT NEPALTHOK

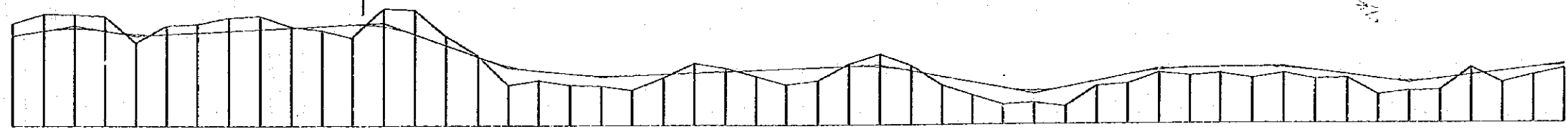
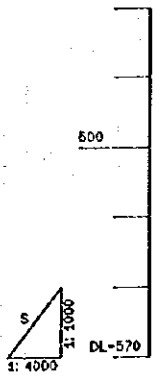


GRADE	PROPOSED HEIGHT	GROUND HEIGHT	STATION	CURVE ELEMENT
551.00	551.00	549.70	0	
+11.78% 225m	551.44	550.39	0+25	L=105.15
	551.89	551.00	0+50	
	552.35	550.70	0+75	
	552.78	552.20	1	R=50.00
	553.22	552.30	1+25	
	553.67	552.70	1+50	
	554.11	553.50	1+75	
	554.56	552.40	2	R=100.00
	555.01	553.00	2+25	
	555.46	553.20	2+50	
	555.91	553.30	2+75	
	556.36	553.90	3	R=50.00
	556.81	554.95	3+25	
	557.26	555.10	3+50	
	557.71	556.00	3+75	
	558.16	556.20	4	R=500.00
	558.61	556.80	4+25	
	559.06	557.50	4+50	
	559.51	558.40	4+75	
	560.00	559.00	5	R=100.00
	560.49	559.20	5+25	
	560.98	559.50	5+50	
	561.47	559.80	5+75	
	561.96	560.20	6	R=160.00
	562.45	560.90	6+25	
	562.94	561.80	6+50	
	563.43	562.80	6+75	
	563.92	563.00	7	R=200.00
	564.41	563.20	7+25	
	564.90	563.50	7+50	
	565.39	563.80	7+75	
	565.88	564.20	8	R=160.00
	566.37	564.70	8+25	
	566.86	565.20	8+50	
	567.35	565.90	8+75	
	567.84	566.60	9	R=100.00
	568.33	567.50	9+25	
	568.82	568.40	9+50	
	569.31	569.00	9+75	
	569.80	569.20	10	R=160.00
	570.29	569.50	10+25	
	570.78	569.80	10+50	
	571.27	570.20	10+75	
	571.76	570.70	11	R=100.00
	572.25	571.20	11+25	
	572.74	571.80	11+50	
	573.23	572.50	11+75	
	573.72	573.00	12	R=160.00
	574.21	573.40	12+25	
	574.70	573.80	12+50	

A-1-2: Plan and Profile
 STA.12+50~STA.25+00



GHYAMPE KHOLA CAUSEWAY (L = 280 m)

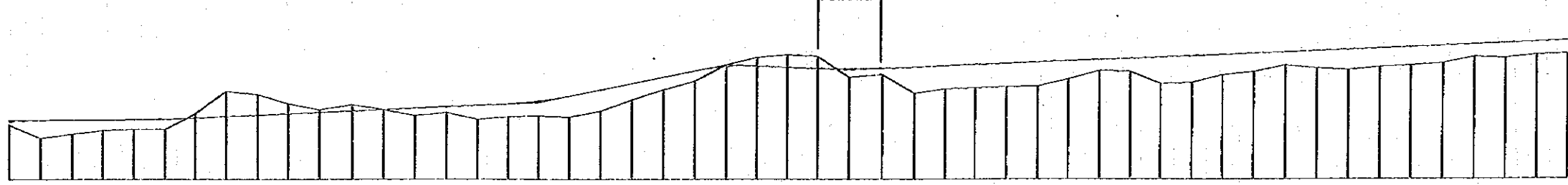
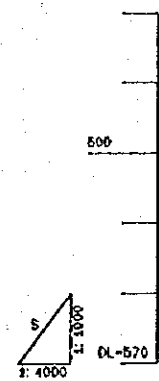


GRADE	PROPOSED HEIGHT	GROUND HEIGHT	STATION	CURVE ELEMENT
14.00% 75m	589.00	580.40	12+50	R=200.00
4.00% 50m	589.00	582.30	12+75	
4.00% 50m	589.50	582.20	13	
4.00% 50m	589.00	581.80	13+25	
4.00% 50m	588.50	586.60	13+50	
4.00% 50m	588.31	580.00	13+75	
4.00% 50m	588.63	580.30	14	
4.00% 50m	588.94	581.60	14+25	
4.00% 50m	589.25	581.90	14+50	
4.00% 50m	589.56	589.80	14+75	
4.00% 50m	589.86	589.00	15	
4.00% 50m	590.19	587.60	15+25	
4.00% 50m	590.50	583.40	15+50	
4.00% 50m	590.81	583.20	15+75	
4.00% 50m	591.12	587.90	16	
4.00% 50m	591.43	584.00	16+25	
4.00% 50m	591.74	578.00	16+50	
4.00% 50m	592.05	579.00	16+75	
4.00% 50m	592.36	578.00	17	
4.00% 50m	592.67	578.00	17+25	
4.00% 50m	592.98	577.80	17+50	
4.00% 50m	593.29	577.00	17+75	
4.00% 50m	593.60	579.50	18	
4.00% 50m	593.91	582.40	18+25	
4.00% 50m	594.22	581.40	18+50	
4.00% 50m	594.53	579.80	18+75	
4.00% 50m	594.84	578.10	19	
4.00% 50m	595.15	578.80	19+25	
4.00% 50m	595.46	582.20	19+50	
4.00% 50m	595.77	584.10	19+75	
4.00% 50m	596.08	581.80	20	
4.00% 50m	596.39	577.80	20+25	
4.00% 50m	596.70	575.80	20+50	
4.00% 50m	597.01	573.80	20+75	
4.00% 50m	597.32	574.20	21	
4.00% 50m	597.63	573.50	21+25	
4.00% 50m	597.94	577.50	21+50	
4.00% 50m	598.25	577.80	21+75	
4.00% 50m	598.56	577.80	22	
4.00% 50m	598.87	580.00	22+25	
4.00% 50m	599.18	579.00	22+50	
4.00% 50m	599.49	579.00	22+75	
4.00% 50m	599.80	578.80	23	
4.00% 50m	600.11	579.00	23+25	
4.00% 50m	600.42	575.80	23+50	
4.00% 50m	600.73	576.40	23+75	
4.00% 50m	601.04	576.30	24	
4.00% 50m	601.35	576.50	24+25	
4.00% 50m	601.66	581.00	24+50	
4.00% 50m	601.97	579.00	24+75	
4.00% 50m	602.28	579.50	25	
4.00% 50m	602.59	580.80		
4.00% 50m	602.90	581.53		
4.00% 50m	603.21	581.70		

A-1-3: Plan and Profile
 STA.25+00~STA.37+50

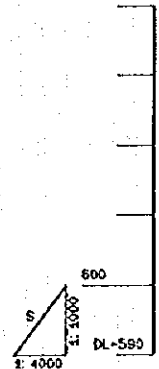
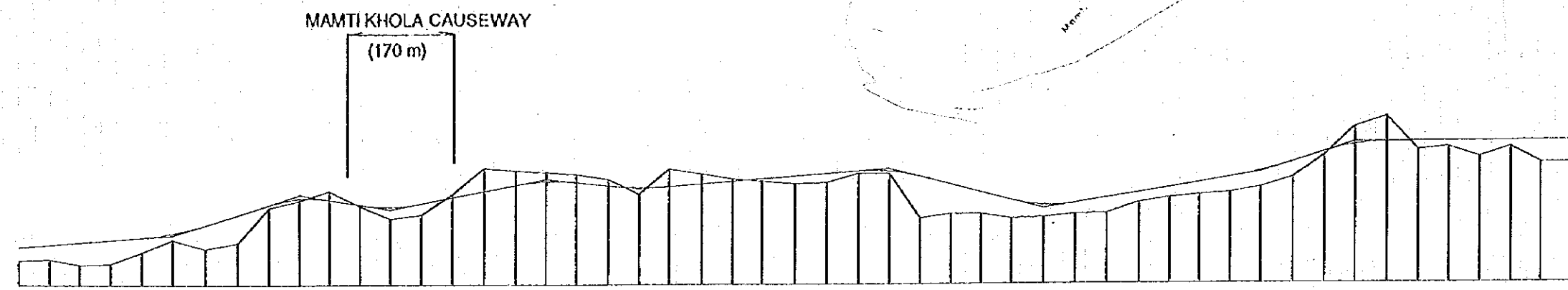
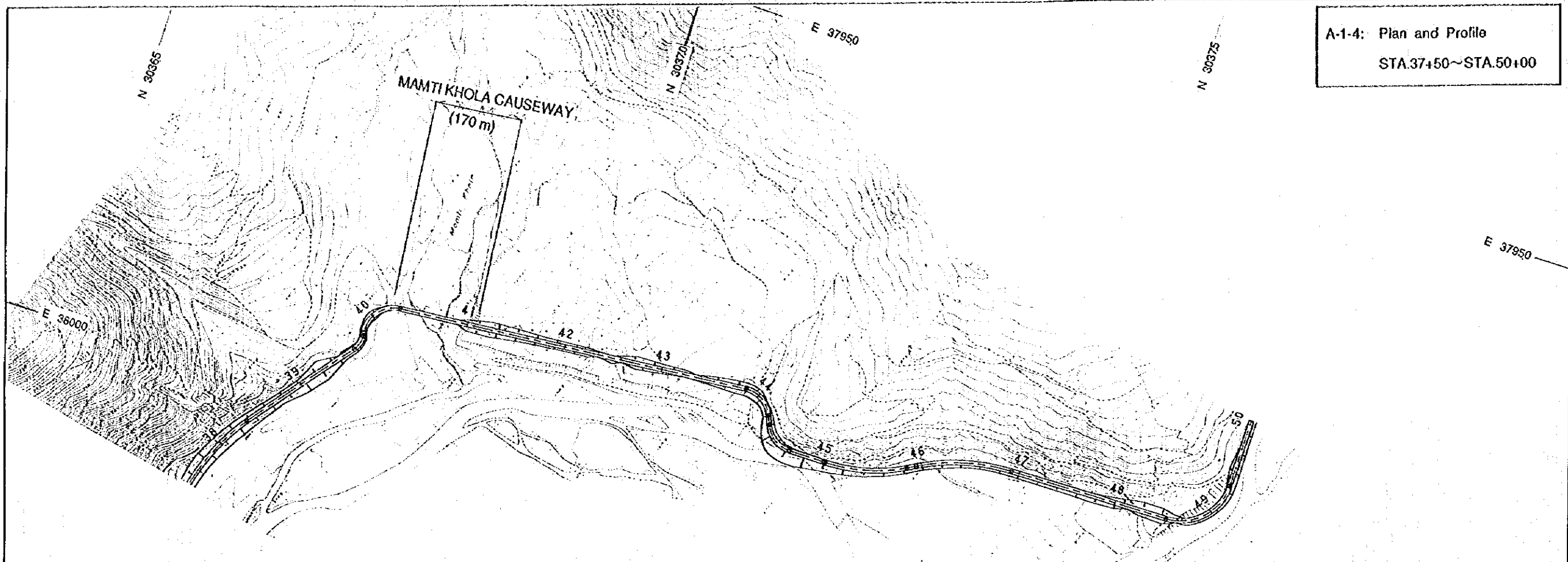


BOYKHE KHOLA CAUSEWAY (L = 112 m)
 BOYKHE KHOLA CAUSEWAY (L = 112 m)



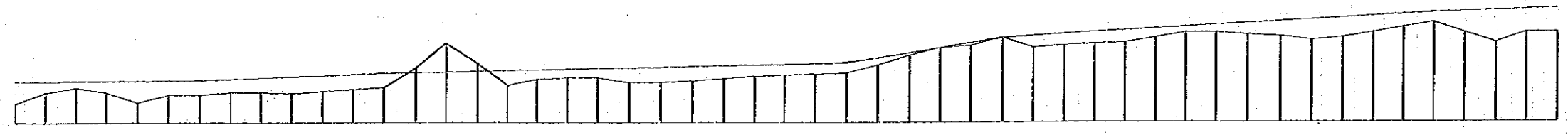
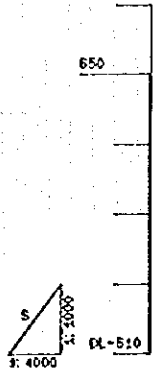
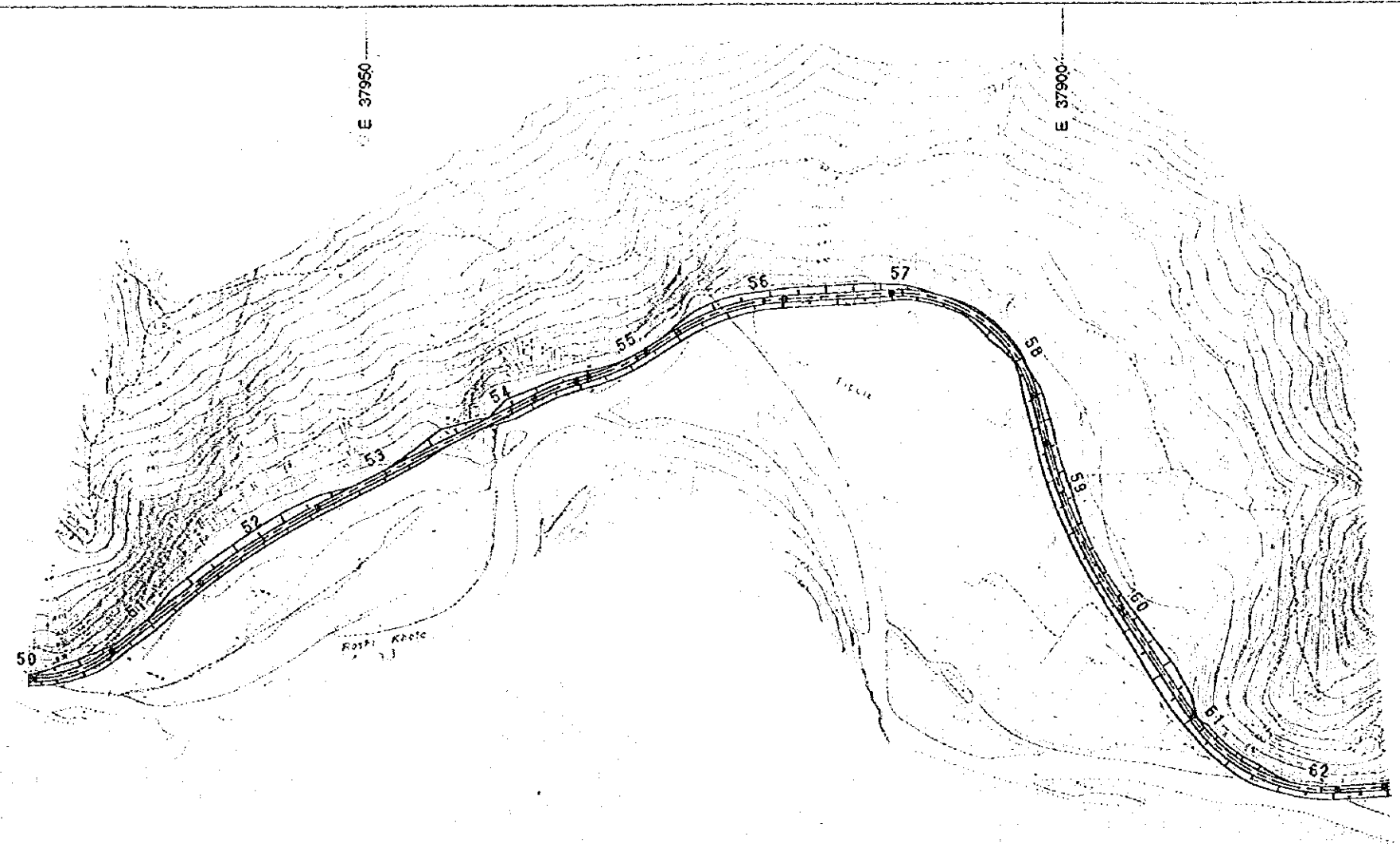
GRADE	581.70	10.24% 125m	582.00	11.10% 300m	585.30	12.00% 150m	592.80	-1.06% 100m	594.75	11.00% 575m	597.50																																								
PROPOSED HEIGHT	581.53	581.75	581.82	581.88	581.94	582.05	582.28	582.55	582.83	583.10	583.38	583.65	583.93	584.20	584.48	584.75	585.03	585.34	585.55	587.80	589.05	590.30	591.55	592.42	592.54	592.28	592.01	591.88	594.00	594.25	594.50	594.75	595.00	595.25	595.50	595.75	596.00	596.25	596.50	596.75	597.00	597.25	597.50								
GROUND HEIGHT	580.80	578.20	579.00	579.80	579.90	580.00	580.28	580.55	580.83	581.10	581.38	581.65	581.93	582.20	582.48	582.75	583.03	583.34	583.55	587.80	589.05	590.30	591.55	592.42	592.54	592.28	592.01	591.88	594.00	594.25	594.50	594.75	595.00	595.25	595.50	595.75	596.00	596.25	596.50	596.75	597.00	597.25	597.50								
STATION	25	25+25	25+50	25+75	26	26+25	26+50	26+75	27	27+25	27+50	27+75	28	28+25	28+50	28+75	29	29+25	29+50	29+75	30	30+25	30+50	30+75	31	31+25	31+50	31+75	32	32+25	32+50	32+75	33	33+25	33+50	33+75	34	34+25	34+50	34+75	35	35+25	35+50	35+75	36	36+25	36+50	36+75	37	37+25	37+50
CURVE ELEMENT	R=200.00		L=183.84										R=150.00			L=74.61		R=150.00		L=107.31										R=100.00		L=79.17		R=200.00																	

A-1-4: Plan and Profile
 STA.37+50~STA.50+00



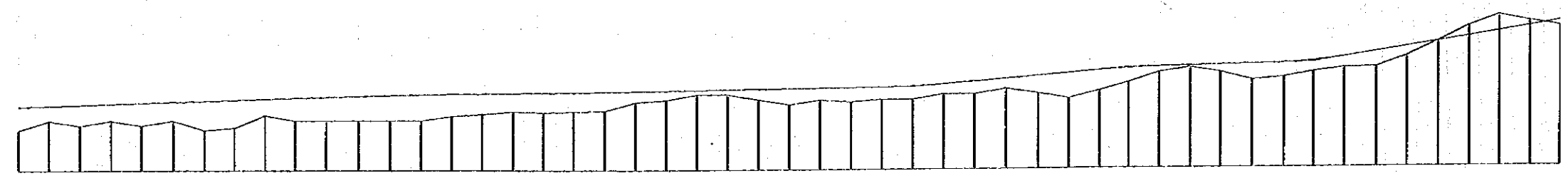
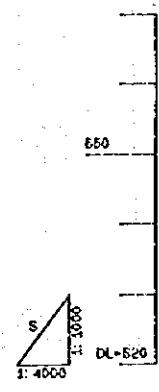
GRADE	PROPOSED HEIGHT	GROUND HEIGHT	STATION	CURVE ELEMENT
597.50	597.56	594.20	37+50	R=200.00
12.00% 125m	598.00	595.10	37+75	L=127.03
800.00	598.30	594.00	38	R=20.00
16.00% 100m	599.00	594.20	38+25	R=30.00
800.00	599.50	595.50	39+50	L=355.82
4.00% 75m	600.30	599.00	39+75	R=30.00
805.00	600.36	599.20	40	R=30.00
805.00	604.00	598.40	40+25	R=30.00
14.80% 125m	605.35	605.50	40+50	R=30.00
805.00	605.20	604.00	40+75	R=30.00
807.40	607.40	606.00	41	R=30.00
808.80	608.80	612.70	41+25	R=30.00
811.00	609.80	612.70	41+50	R=30.00
-2.67% 75m	610.25	612.30	41+75	R=30.00
610.00	610.25	611.00	42	R=30.00
609.87	609.87	611.00	42+25	R=30.00
609.20	609.20	608.00	42+50	R=30.00
609.30	609.30	613.00	42+75	R=30.00
610.00	610.00	612.00	43	R=30.00
612.00	612.00	611.00	43+25	R=30.00
611.50	611.50	610.50	43+50	R=150.00
611.00	611.00	610.00	43+75	R=150.00
612.30	612.30	610.00	44	R=30.00
612.47	612.47	612.00	44+25	R=30.00
611.40	611.40	612.00	44+50	R=30.00
609.80	609.80	603.10	44+75	R=30.00
608.20	608.20	604.00	45	R=30.00
606.00	606.00	604.00	45+25	R=150.00
605.05	605.05	603.00	45+50	R=150.00
605.00	605.00	603.20	45+75	R=150.00
606.00	606.00	603.90	46	R=150.00
607.00	607.00	604.00	46+25	R=200.00
608.00	608.00	606.10	46+50	R=200.00
609.00	609.00	607.00	46+75	R=200.00
610.00	610.00	607.50	47	R=200.00
611.00	611.00	608.00	47+25	R=200.00
612.25	612.25	609.00	47+50	R=200.00
614.00	614.00	611.00	47+75	R=200.00
615.30	615.30	615.30	48	R=200.00
617.51	617.51	621.00	48+25	R=200.00
616.04	616.04	623.00	48+50	R=200.00
616.08	616.08	618.50	48+75	R=200.00
618.12	618.12	617.00	49	R=200.00
616.15	616.15	615.00	49+25	R=200.00
618.23	618.23	617.00	49+50	R=200.00
618.27	618.27	613.80	49+75	R=200.00
618.27	618.27	613.80	50	R=200.00

A-1-5: Plan and Profile
 STA.50+00~STA.52+50



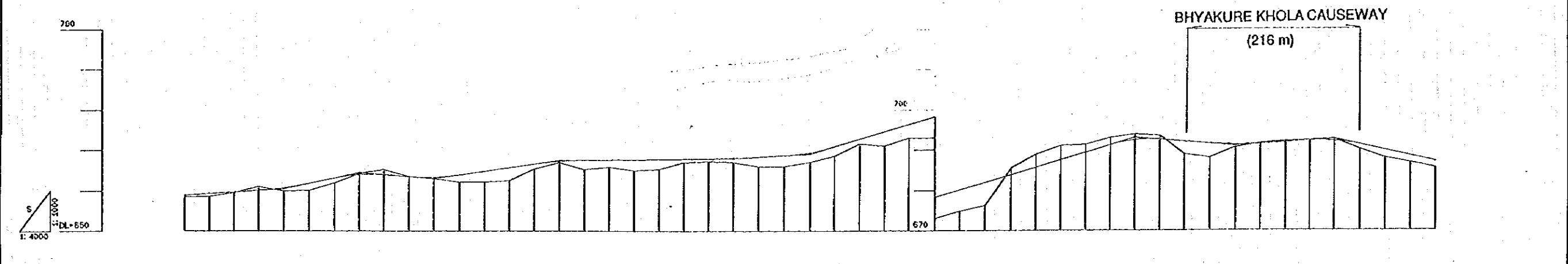
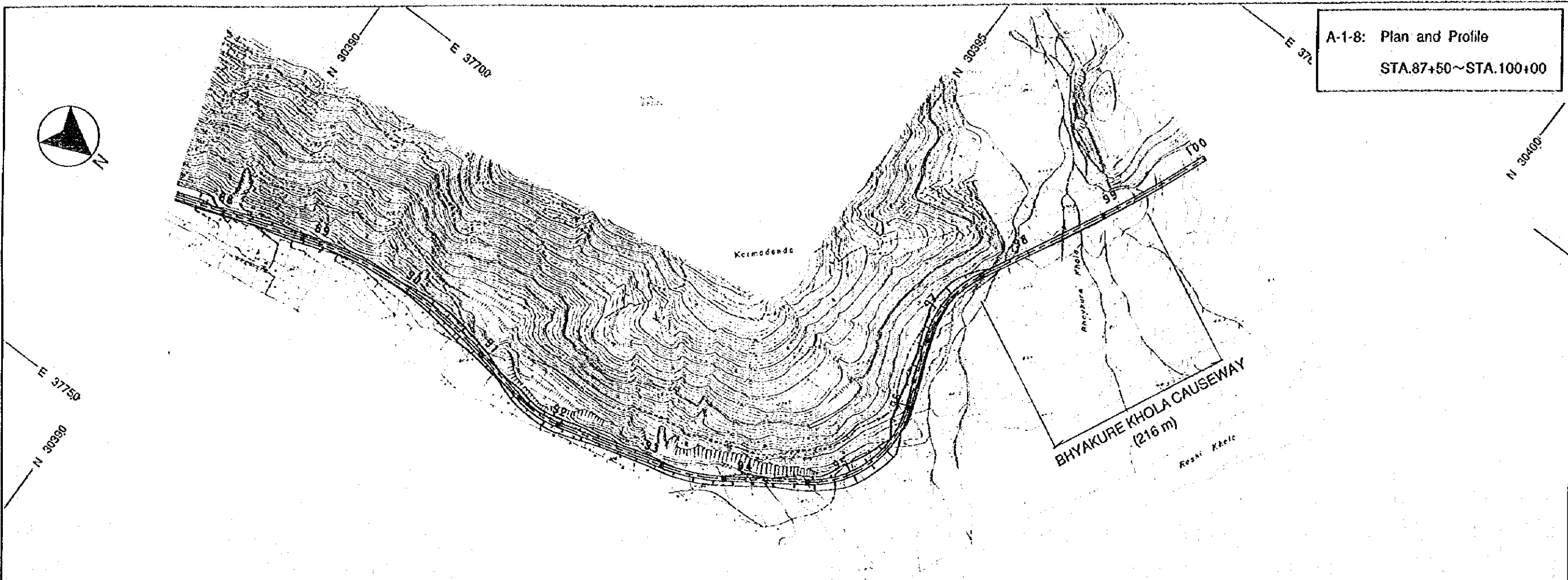
GRADE	PROPOSED HEIGHT	GROUND HEIGHT	STATION	CURVE ELEMENT
	618.27	613.80	50	R=90.00
	618.31	616.70	50+25	L=80.15
	618.35	617.00	50+50	R=500.00
	618.39	618.00	50+75	
	618.42	618.00	51	
	618.46	615.50	51+25	
	618.50	615.50	51+50	
	618.55	616.00	51+75	
	618.60	618.00	52	
	618.65	615.80	52+25	
	618.70	616.50	52+50	
	618.75	618.70	52+75	
	618.80	617.00	53	
	618.85	621.00	53+25	
	618.90	625.00	53+50	
	618.95	622.00	53+75	
	619.00	617.50	54	
	619.05	618.70	54+25	
	619.10	619.00	54+50	R=150.00
	619.15	619.00	54+75	
	619.20	618.00	55	
	619.25	618.00	55+25	
	619.30	618.40	55+50	R=150.00
	619.35	618.80	55+75	
	619.40	619.20	56	
	619.45	619.20	56+25	
	619.50	619.70	56+50	
	619.55	619.00	56+75	
	619.60	621.50	57	
	619.65	623.00	57+25	
	619.70	625.00	57+50	R=100.00
	619.75	625.00	57+75	
	619.80	627.00	58	
	619.85	625.00	58+25	L=35.01
	619.90	625.00	58+50	
	619.95	625.00	58+75	
	620.00	625.00	59	
	620.05	625.00	59+25	R=400.00
	620.10	625.00	59+50	
	620.15	625.00	59+75	
	620.20	625.00	60	
	620.25	625.00	60+25	L=24.24
	620.30	625.00	60+50	
	620.35	625.00	60+75	
	620.40	625.00	61	
	620.45	625.00	61+25	
	620.50	630.00	61+50	R=120.00
	620.55	628.00	61+75	
	620.60	628.00	62	
	620.65	628.00	62+25	
	620.70	628.00	62+50	R=30.00
	620.75	628.00	62+75	

A-1-6: Plan and Profile
 STA.52+50~STA.75+00



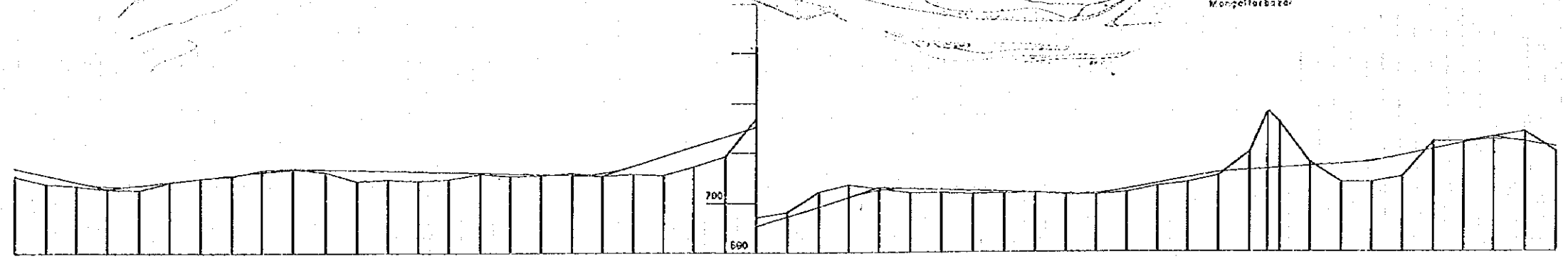
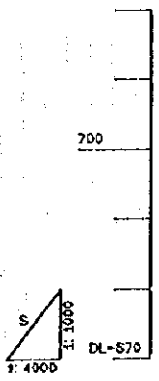
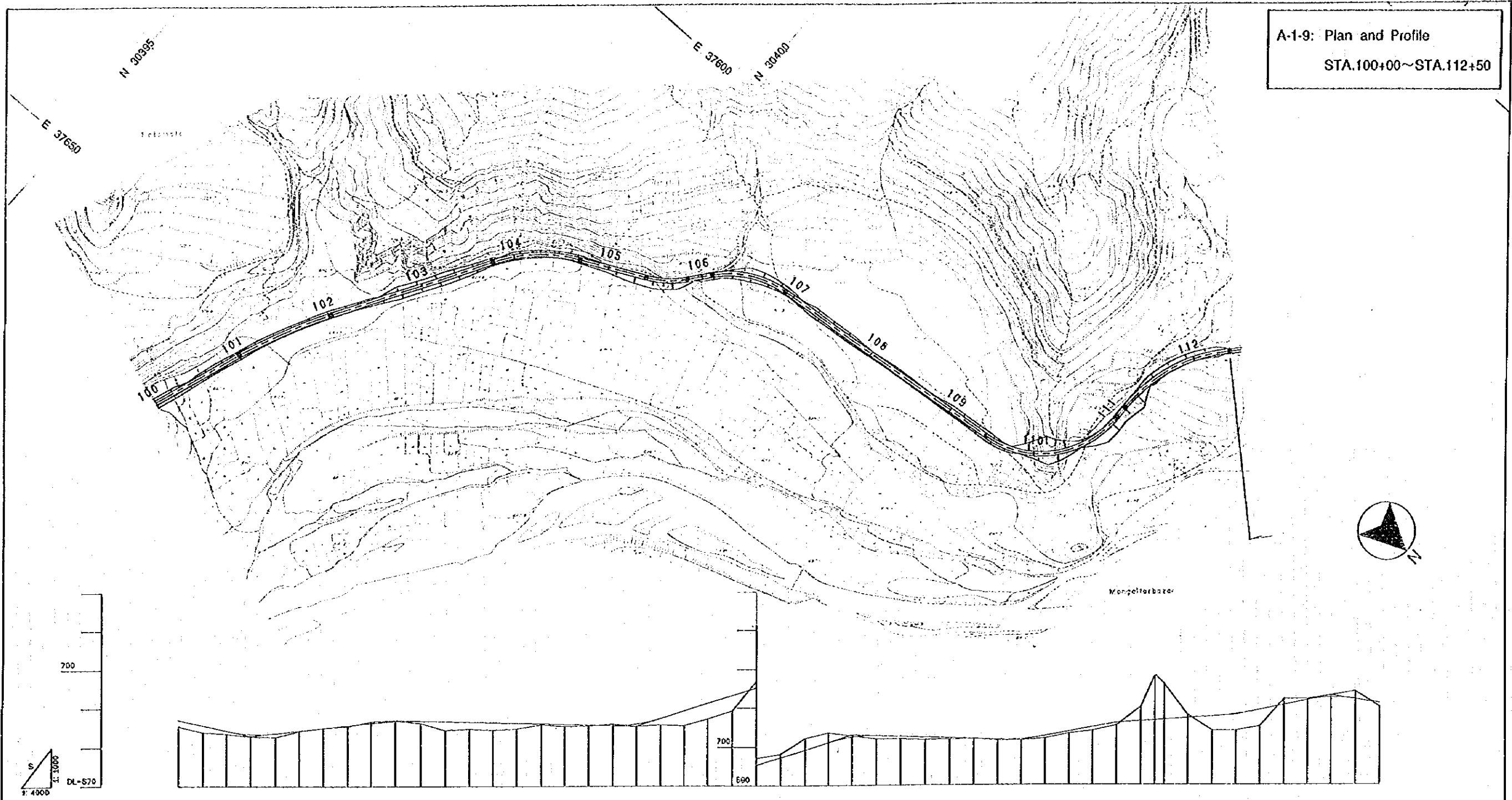
GRADE	10.73%		10.35%		12.00%		10.67%		14.00%																																																																																		
	300m		425m		175m		150m		250m																																																																																		
PROPOSED HEIGHT	632.80	632.86	633.17	633.35	633.53	633.72	633.90	634.06	634.27	634.45	634.63	634.82	634.96	635.09	635.18	635.26	635.35	635.44	635.53	635.62	635.71	635.79	635.88	635.97	636.06	636.15	636.24	636.32	636.41	636.50	637.00	637.50	638.00	638.50	639.00	639.50	640.00	640.17	640.33	640.57	640.83	641.23	642.00	643.00	644.00	645.00	646.00	647.00	648.00	649.00	649.10																																								
GROUND HEIGHT	628.00	630.00	632.00	633.00	634.00	635.00	636.00	637.00	638.00	639.00	640.00	641.00	642.00	643.00	644.00	645.00	646.00	647.00	648.00	649.00	650.00	651.00	652.00	653.00	654.00	655.00	656.00	657.00	658.00	659.00	660.00	661.00	662.00	663.00	664.00	665.00	666.00	667.00	668.00	669.00	670.00	671.00	672.00	673.00	674.00	675.00	676.00	677.00	678.00	679.00	680.00																																								
STATION	52+50	52+75	53	53+25	53+50	53+75	54	54+25	54+50	54+75	55	55+25	55+50	55+75	56	56+25	56+50	56+75	57	57+25	57+50	57+75	58	58+25	58+50	58+75	59	59+25	59+50	59+75	60	60+25	60+50	60+75	61	61+25	61+50	61+75	62	62+25	62+50	62+75	63	63+25	63+50	63+75	64	64+25	64+50	64+75	65	65+25	65+50	65+75	66	66+25	66+50	66+75	67	67+25	67+50	67+75	68	68+25	68+50	68+75	69	69+25	69+50	69+75	70	70+25	70+50	70+75	71	71+25	71+50	71+75	72	72+25	72+50	72+75	73	73+25	73+50	73+75	74	74+25	74+50	74+75	75
CURVE ELEMENT	R=30.00	L=55.93		R=400.00		L=56.24		R=1000.00				L=50.17		R=1000.00		L=46.81		R=500.00		L=78.12		R=150.00		L=45.80		R=100.00		L=24.22		R=500.00																																																													

A-1-8: Plan and Profile
 STA.87+50~STA.100+00



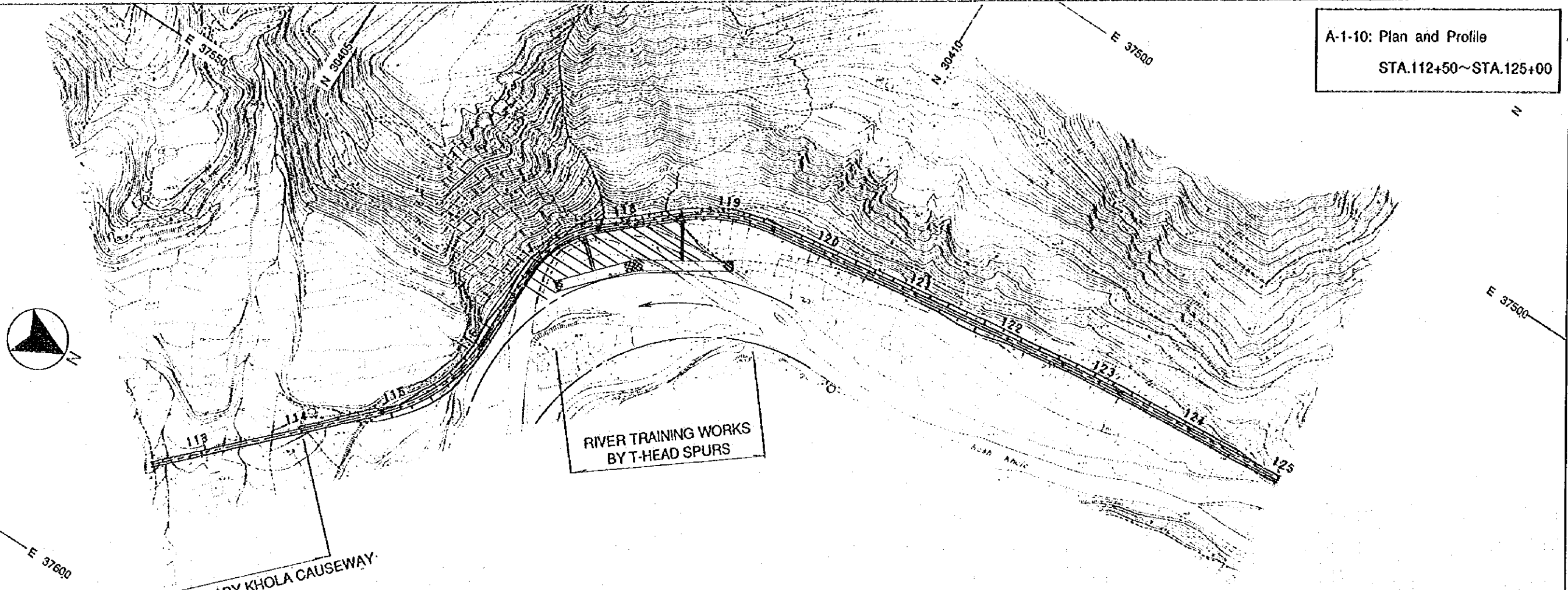
GRADE																				
PROPOSED HEIGHT	656.95	659.27	659.68	660.09	660.73	661.63	663.17	664.04	664.00	663.50	663.25	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00	663.00
GROUND HEIGHT	656.50	656.60	657.30	661.00	660.00	660.10	662.00	664.30	665.20	663.50	663.00	663.00	662.20	663.00	663.00	663.00	663.00	663.00	663.00	663.00
STATION	87+50	87+75	88	88+25	88+50	88+75	89	89+25	89+50	89+75	90	90+25	90+50	90+75	91	91+25	91+50	91+75	92	92+25
CURVE ELEMENT	L=265.33		R=400.00		L=58.00		R=100.00		L=111.72		R=200.00		L=31.42		R=100.00		L=59.90		R=1000.00	
	92+75	93	93+25	93+50	93+75	94	94+25	94+50	94+75	95	95+25	95+50	95+75	96	96+25	96+50	96+75	97	97+25	97+50
	97+75	98	98+25	98+50	98+75	99	99+25	99+50	99+75	100										

A-1-9: Plan and Profile
 STA.100+00~STA.112+50



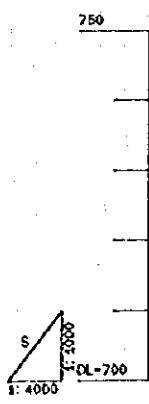
GRADE	-5.43% 176'		685.00	+2.57% 150'		687.00	-3.50% 260'		685.30	+7.78% 225'		703.00	-3.55% 176'		701.80	+4.50% 108'		705.00	+1.50% 125'		708.00	+5.03% 100'		713.00	-4.00% 76'		712.00																																								
PROPOSED HEIGHT	687.07	685.71	684.35	683.51	683.67	684.33	685.00	685.67	686.33	686.80	686.85	686.70	686.35	685.40	685.25	685.10	685.93	685.80	685.65	685.02	687.44	689.39	691.33	692.28	695.22	697.17	699.11	701.06	702.45	702.79	702.57	702.35	702.14	701.93	701.71	701.83	702.83	703.75	704.85	705.82	706.40	706.84	706.80	707.20	707.80	708.21	708.85	710.30	711.75	712.44	712.00	711.00	711.00														
GROUND HEIGHT	685.50	684.00	683.50	682.90	682.75	684.25	685.00	685.30	686.75	687.00	686.25	684.50	684.80	684.50	684.80	685.30	685.50	685.80	685.80	685.00	685.50	687.20	689.25	689.25	687.00	686.00	702.20	703.50	701.96	702.80	702.45	702.00	702.79	702.00	701.80	702.00	702.14	701.93	701.60	701.71	701.50	701.83	702.00	702.83	703.75	704.85	705.82	706.40	706.84	706.80	708.00	707.80	704.00	704.00	704.00	704.00	705.00	705.00	708.00	708.21	708.85	710.30	711.75	712.44	712.00	711.00	711.00
STATION	100	100+23	100+30	100+73	101	101+25	101+50	101+75	102	102+25	102+50	102+75	103	103+25	103+50	103+75	104	104+25	104+50	104+75	105	105+25	105+50	105+75	106	106+25	106+50	106+75	107	107+25	107+50	107+75	108	108+25	108+50	108+75	109	109+25	109+50	109+75	110	110+15	110+25	110+50	110+75	111	111+25	111+50	111+75	112	112+25	112+50	112+50														
CURVE ELEMENT	L=145.59		R=500.00		L=174.45		R=150.00		L=71.01		R=100.00		L=256.29		R=100.00		R=150.00																																																		

A-1-10: Plan and Profile
 STA.112+50~STA.125+00



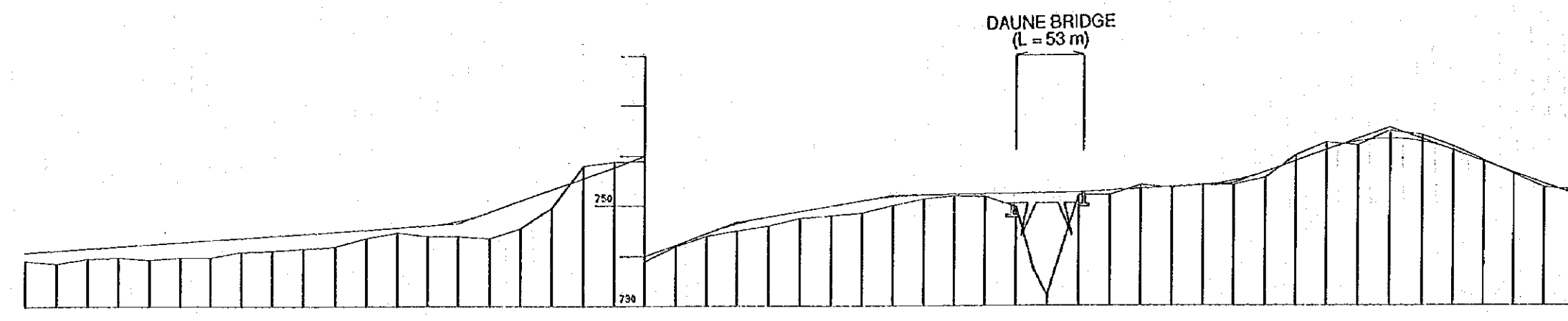
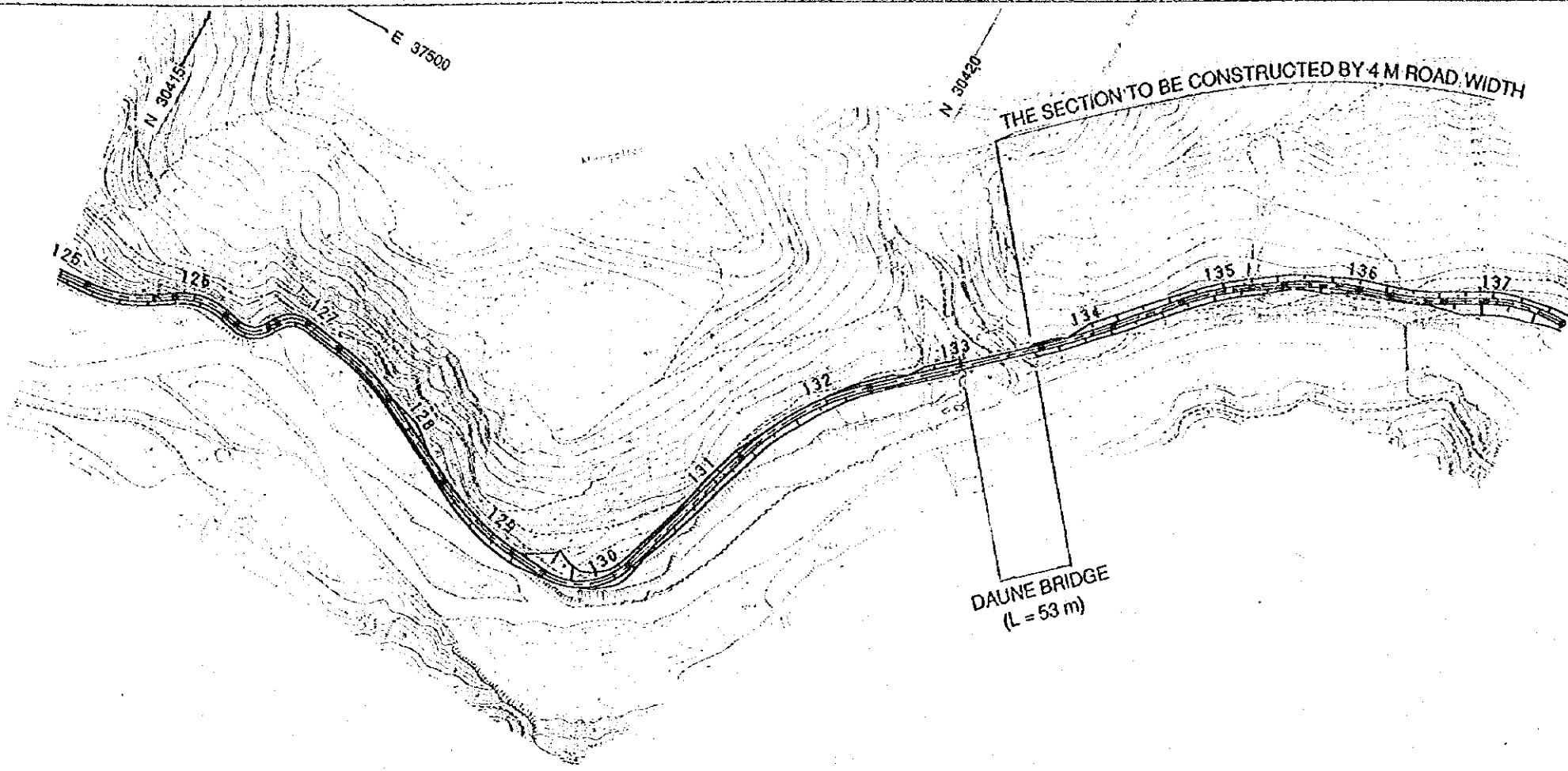
SANGU & PHAPY KHOLA CAUSEWAY
 (180 m)

SANGU & PHAPY KHOLA CAUSEWAY
 (180 m)



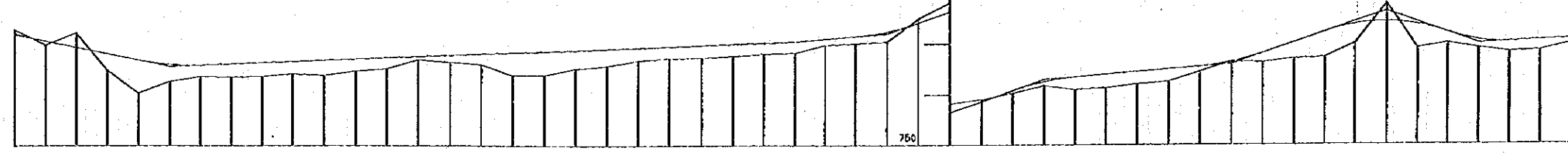
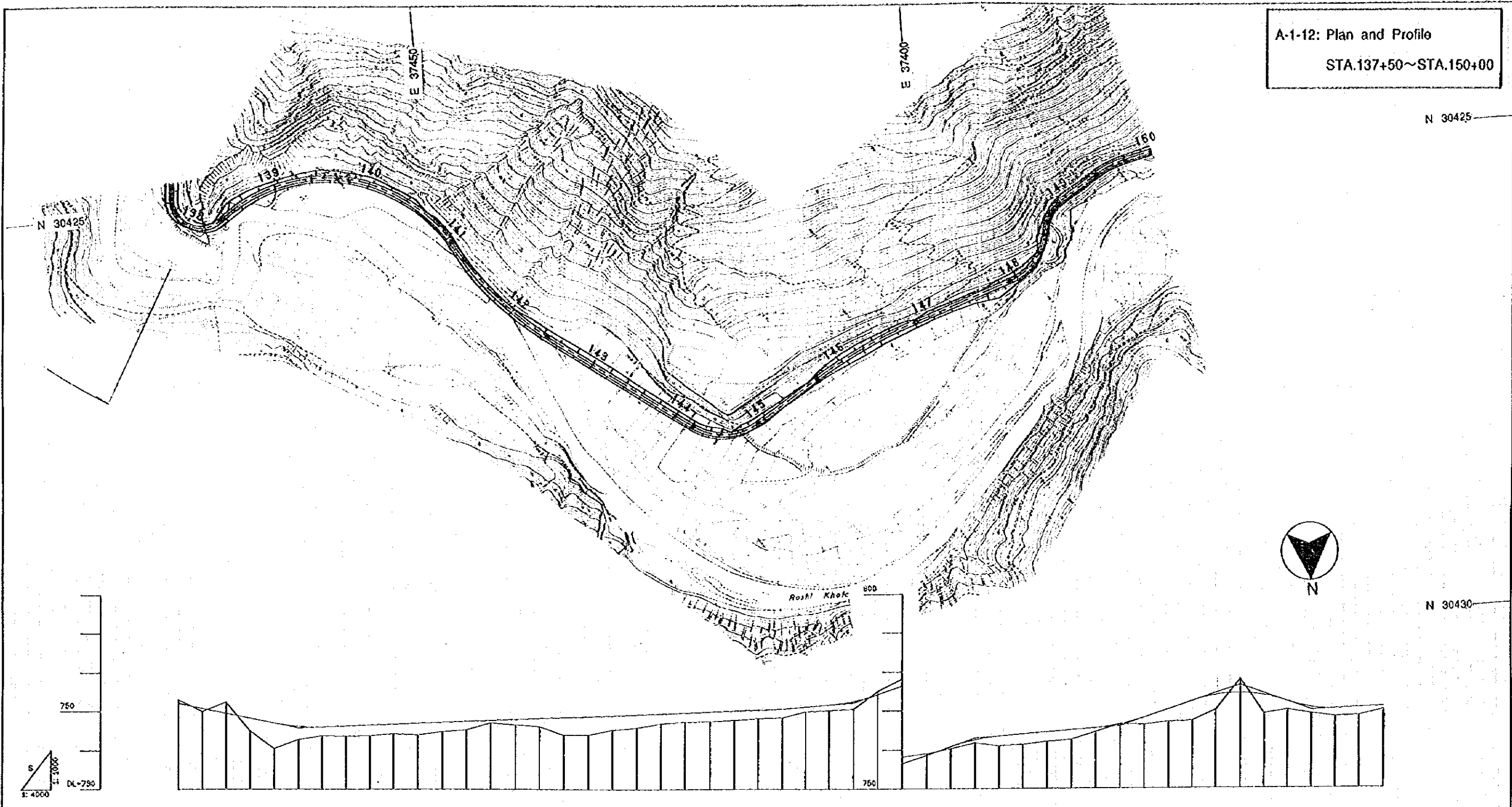
GRADE																																																																		
PROPOSED HEIGHT	711.00	710.41	710.83	711.25	711.66	712.09	711.50	710.90	708.50	708.50	707.77	707.68	707.95	708.05	706.14	706.23	706.32	706.41	706.76	706.93	710.75	711.88	712.79	713.01	713.01	714.22	714.22	715.43	715.43	716.74	716.74	716.35	716.35	716.85	716.85	717.26	717.26	717.57	717.57	717.87	717.87	716.17	716.17	716.48	716.48	716.78	716.78	719.09	719.09	719.39	719.39	719.70	719.70	720.03	720.03	720.41	720.41	720.81	720.81							
GROUND HEIGHT	710.00	710.00	711.50	711.25	711.80	712.50	712.25	711.50	711.60	708.50	708.50	706.70	706.50	705.00	707.77	707.68	704.00	707.95	708.05	705.30	706.14	705.50	706.23	705.80	706.32	705.30	706.41	705.50	706.93	710.75	711.88	712.79	713.01	713.01	714.22	714.22	715.43	715.43	716.74	716.74	716.35	716.35	716.85	716.85	717.26	717.26	717.57	717.57	716.17	716.17	716.48	716.48	716.78	716.78	719.09	719.09	719.39	719.39	719.70	719.70	720.03	720.03	720.41	720.41	720.81	720.81
STATION	112+50	112+75	113	113+25	113+50	113+75	114	114+25	114+50	114+75	115	115+25	115+50	115+75	116	116+25	116+50	116+75	117	117+25	117+50	117+75	118	118+25	118+50	118+75	119	119+25	119+50	119+75	120	120+25	120+50	120+75	121	121+25	121+50	121+75	122	122+25	122+50	122+75	123	123+25	123+50	123+75	124	124+25	124+50	124+75	125															
CURVE ELEMENT																																																																		

A-1-11: Plan and Profile
 STA.125+00~STA.137+50



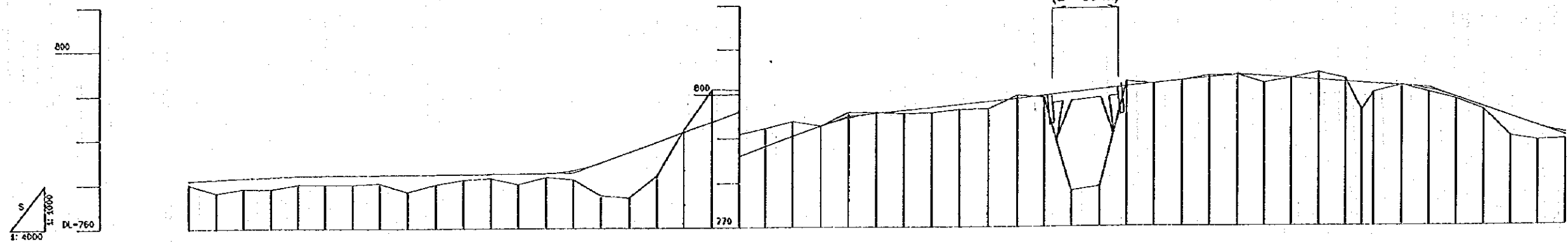
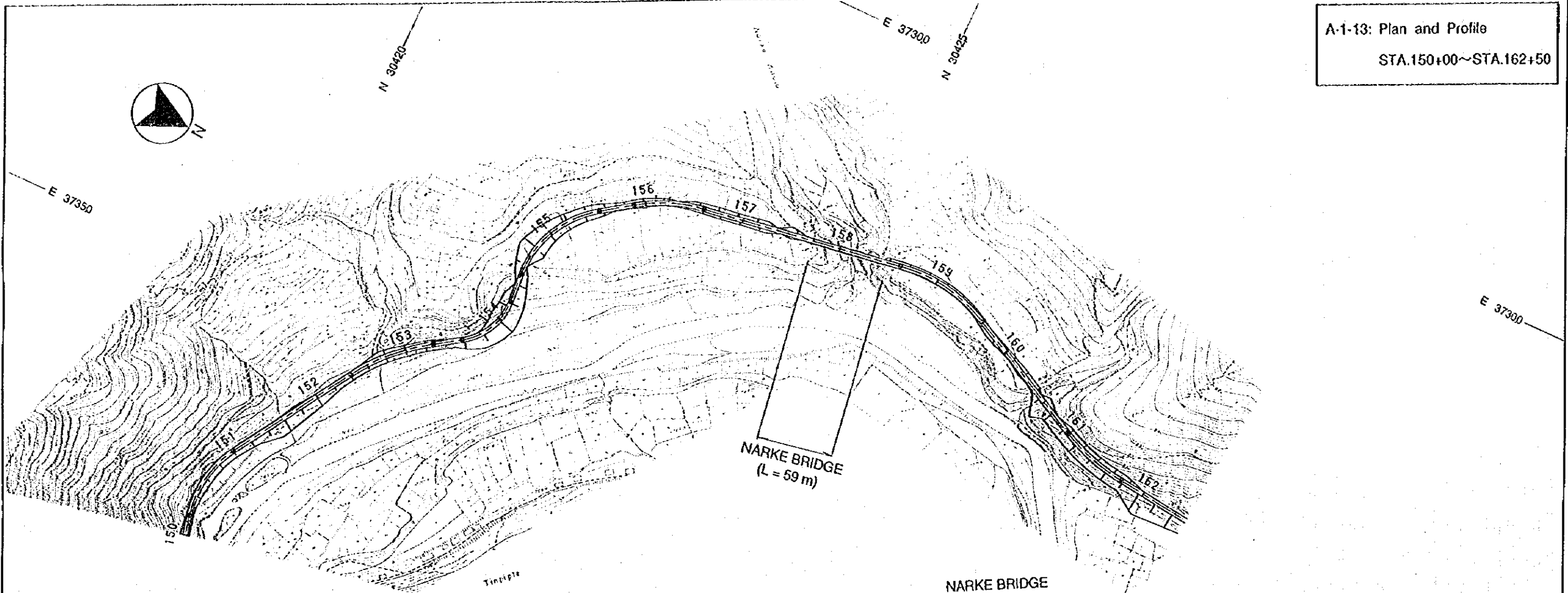
GRADE																																																																																																																																																																																																																																																																																										
PROPOSED HEIGHT	720.81	721.22	721.63	722.03	722.44	722.84	723.25	723.66	724.06	724.47	724.88	725.28	725.69	726.09	726.50	726.91	727.31	727.72	731.00	733.25	735.50	737.75	740.00	742.25	744.50	746.75	749.00	751.25	753.50	755.75	760.00	762.25	764.50	766.75	769.00	772.25																																																																																																																																																																																																																																																						
GROUND HEIGHT	719.10	718.60	719.90	719.70	722.44	719.70	723.66	721.10	724.06	721.50	724.88	723.70	725.69	724.70	726.09	724.00	726.91	725.50	731.00	729.00	738.00	738.80	738.90	740.00	742.00	744.00	745.00	746.00	747.00	748.00	749.00	750.00	751.00	752.00	753.00	754.00	755.00	756.00	757.00	758.00	759.00	760.00	761.00	762.00	763.00	764.00	765.00	766.00	767.00	768.00	769.00	770.00	771.00	772.00	773.00	774.00	775.00	776.00	777.00	778.00	779.00	780.00	781.00	782.00	783.00	784.00	785.00	786.00	787.00	788.00	789.00	790.00	791.00	792.00	793.00	794.00	795.00	796.00	797.00	798.00	799.00	800.00	801.00	802.00	803.00	804.00	805.00	806.00	807.00	808.00	809.00	810.00	811.00	812.00	813.00	814.00	815.00	816.00	817.00	818.00	819.00	820.00	821.00	822.00	823.00	824.00	825.00	826.00	827.00	828.00	829.00	830.00	831.00	832.00	833.00	834.00	835.00	836.00	837.00	838.00	839.00	840.00	841.00	842.00	843.00	844.00	845.00	846.00	847.00	848.00	849.00	850.00	851.00	852.00	853.00	854.00	855.00	856.00	857.00	858.00	859.00	860.00	861.00	862.00	863.00	864.00	865.00	866.00	867.00	868.00	869.00	870.00	871.00	872.00	873.00	874.00	875.00	876.00	877.00	878.00	879.00	880.00	881.00	882.00	883.00	884.00	885.00	886.00	887.00	888.00	889.00	890.00	891.00	892.00	893.00	894.00	895.00	896.00	897.00	898.00	899.00	900.00	901.00	902.00	903.00	904.00	905.00	906.00	907.00	908.00	909.00	910.00	911.00	912.00	913.00	914.00	915.00	916.00	917.00	918.00	919.00	920.00	921.00	922.00	923.00	924.00	925.00	926.00	927.00	928.00	929.00	930.00	931.00	932.00	933.00	934.00	935.00	936.00	937.00	938.00	939.00	940.00	941.00	942.00	943.00	944.00	945.00	946.00	947.00	948.00	949.00	950.00	951.00	952.00	953.00	954.00	955.00	956.00	957.00	958.00	959.00	960.00	961.00	962.00	963.00	964.00	965.00	966.00	967.00	968.00	969.00	970.00	971.00	972.00	973.00	974.00	975.00	976.00	977.00	978.00	979.00	980.00	981.00	982.00	983.00	984.00	985.00	986.00	987.00	988.00	989.00	990.00	991.00	992.00	993.00	994.00	995.00	996.00	997.00	998.00	999.00	1000.00
STATION	125	125+25	125+50	125+75	126	126+25	126+50	126+75	127	127+25	127+50	127+75	128	128+25	128+50	128+75	129	129+25	129+50	129+75	130	130+25	130+50	130+75	131	131+25	131+50	131+75	132	132+25	132+50	132+75	133	133+25	133+50	133+75	134	134+25	134+50	134+75	135	135+25	135+50	135+75	136	136+25	136+50	136+75	137	137+25	137+50																																																																																																																																																																																																																																							
CURVE ELEMENT																																																																																																																																																																																																																																																																																										

A-1-12: Plan and Profile
 STA.137+50~STA.150+00



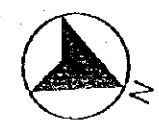
GRADE	-4.96% 125ft		10.64% 50ft		12.00% 75ft		18.80% 125ft		12.00% 150ft		-8.40% 125ft		-8.67% 75ft		11.14% 175ft																																																			
PROPOSED HEIGHT	752.25	750.76	749.32	748.78	747.04	745.80	745.04	743.87	743.51	743.74	744.00	745.98	747.21	747.45	747.88	747.92	748.15	748.39	748.82	748.86	749.00	749.33	749.36	749.80	751.00	751.30	752.43	754.20	756.40	758.80	760.80	762.57	763.40	763.30	764.00	764.90	765.00	765.40	766.00	768.19	770.20	772.30	773.87	774.37	775.80	777.17	777.61	777.29	777.57	777.86																
GROUND HEIGHT	753.00	750.00	752.30	745.00	740.30	742.00	743.80	745.04	745.85	746.27	746.51	744.30	746.74	744.00	745.98	744.80	747.21	749.25	747.45	747.88	749.30	748.15	748.39	744.00	748.39	744.00	748.82	745.20	748.86	745.75	749.00	748.80	749.33	747.30	749.36	747.70	750.03	748.30	750.37	749.80	751.00	751.30	752.43	754.20	756.20	758.80	760.80	762.57	763.40	763.30	764.00	764.90	765.00	765.40	766.00	768.19	770.20	772.30	773.87	774.37	775.80	777.17	777.61	777.29	777.57	777.86
STATION	137+50	137+75	138	138+25	138+50	138+75	139	139+25	139+50	139+75	140	140+25	140+50	140+75	141	141+25	141+50	141+75	142	142+25	142+50	142+75	143	143+25	143+50	143+75	144	144+25	144+50	144+75	145	145+25	145+50	145+75	146	146+25	146+50	146+75	147	147+25	147+50	148	148+25	148+50	148+75	149	149+25	149+50	149+75	150																
CURVE ELEMENT	R=20.00		R=150.00		R=300.00		L=175.76		L=75.79		R=50.00		R=500.00		L=105.55		R=30.00		L=48.85		R=100.00																																													

A-1-13: Plan and Profile
 STA.150+00~STA.162+50



GRADE	+1.14% 176m		+1.20% 250m		19.00% 250m		-1.67% 350m		-1.74% 375m		-6.72% 126m	
PROPOSED HEIGHT	770.86	771.14	771.43	771.71	772.00	772.28	772.56	772.84	773.12	773.40	773.68	773.96
GROUND HEIGHT	770.00	769.00	768.00	767.00	766.00	765.00	764.00	763.00	762.00	761.00	760.00	759.00
STATION	150	150+25	150+50	150+75	151	151+25	151+50	151+75	152	152+25	152+50	152+75
CURVE ELEMENT	R=100.00		L=140.75		R=200.00		R=50.00		R=100.00		L=35.26	
									R=150.00		L=202.97	
											R=150.00	
											L=141.35	
											R=200.00	
											L=29.12	

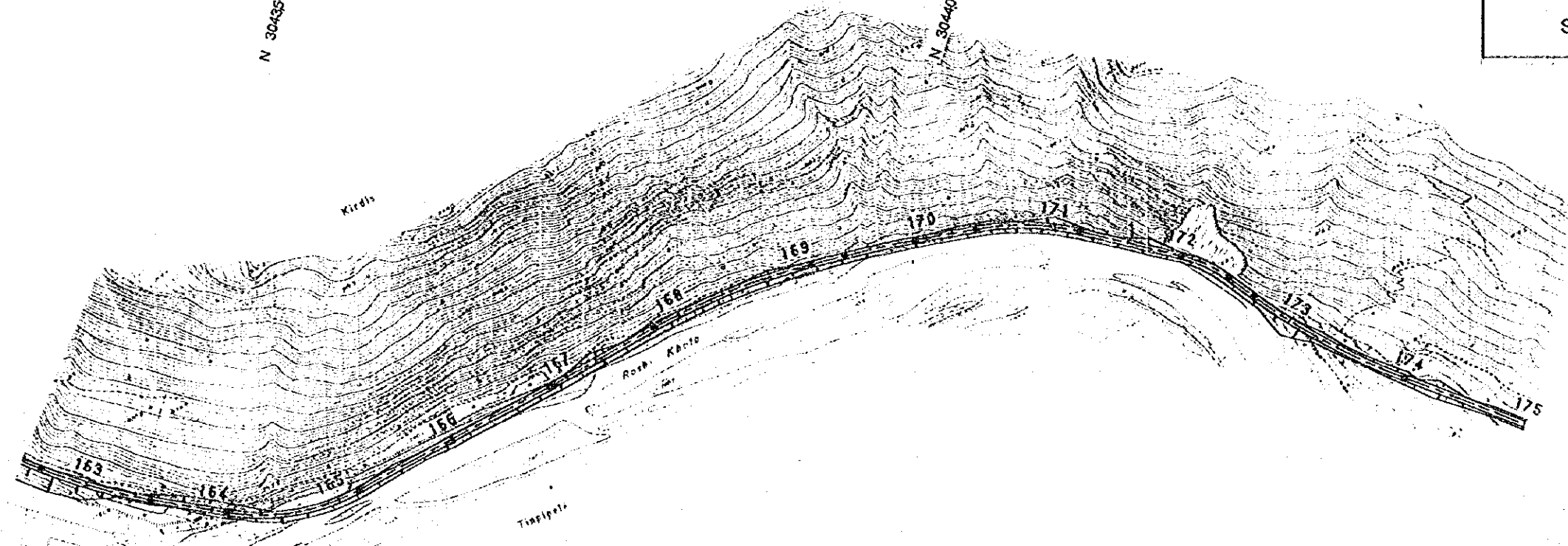
E 37300



N 30435

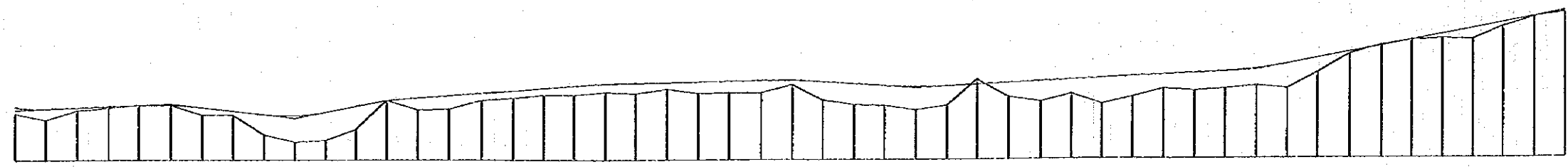
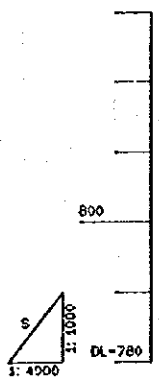
N 30440

A-1-14: Plan and Profile
STA.162+50~STA.175+00



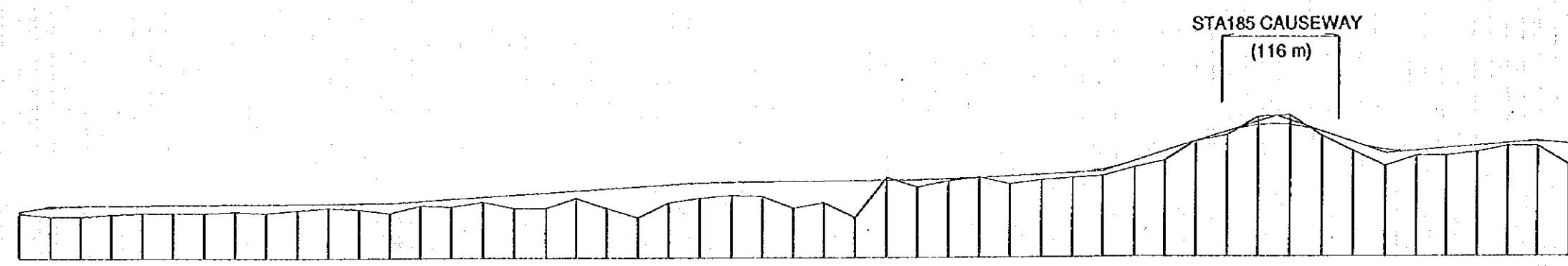
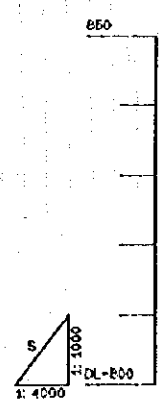
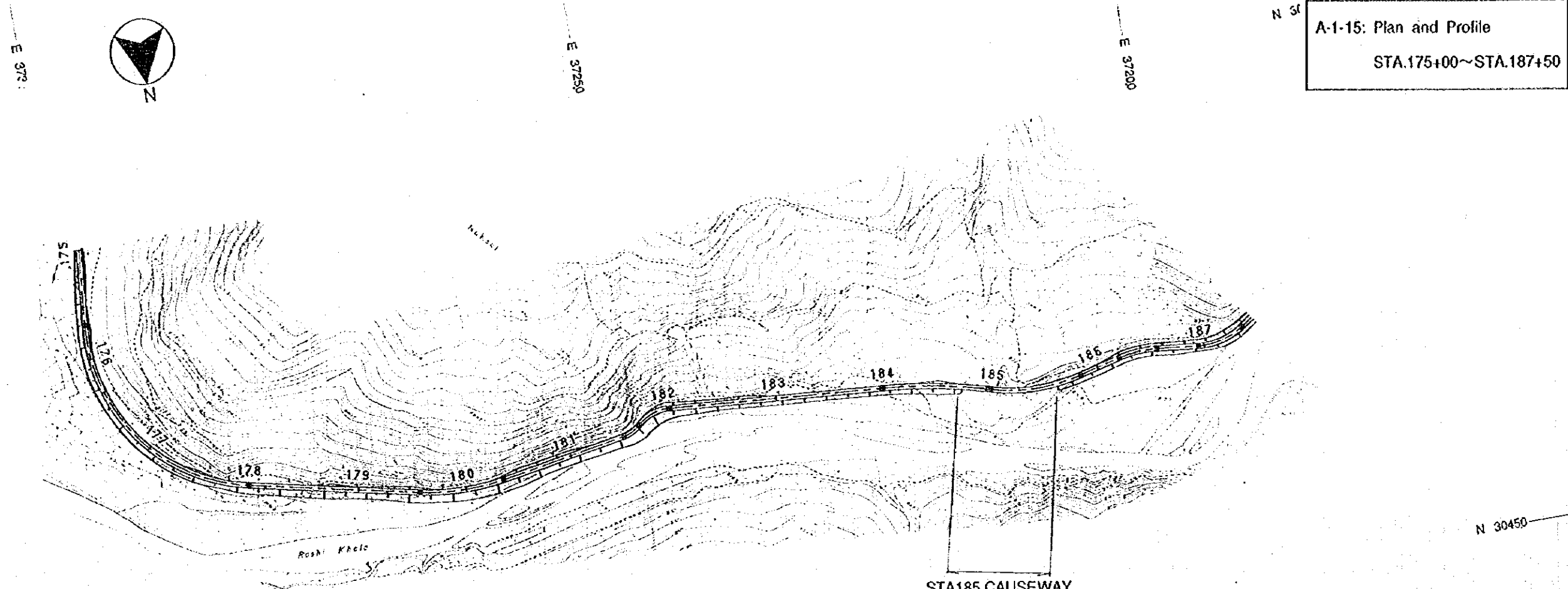
E 37300

E 37350



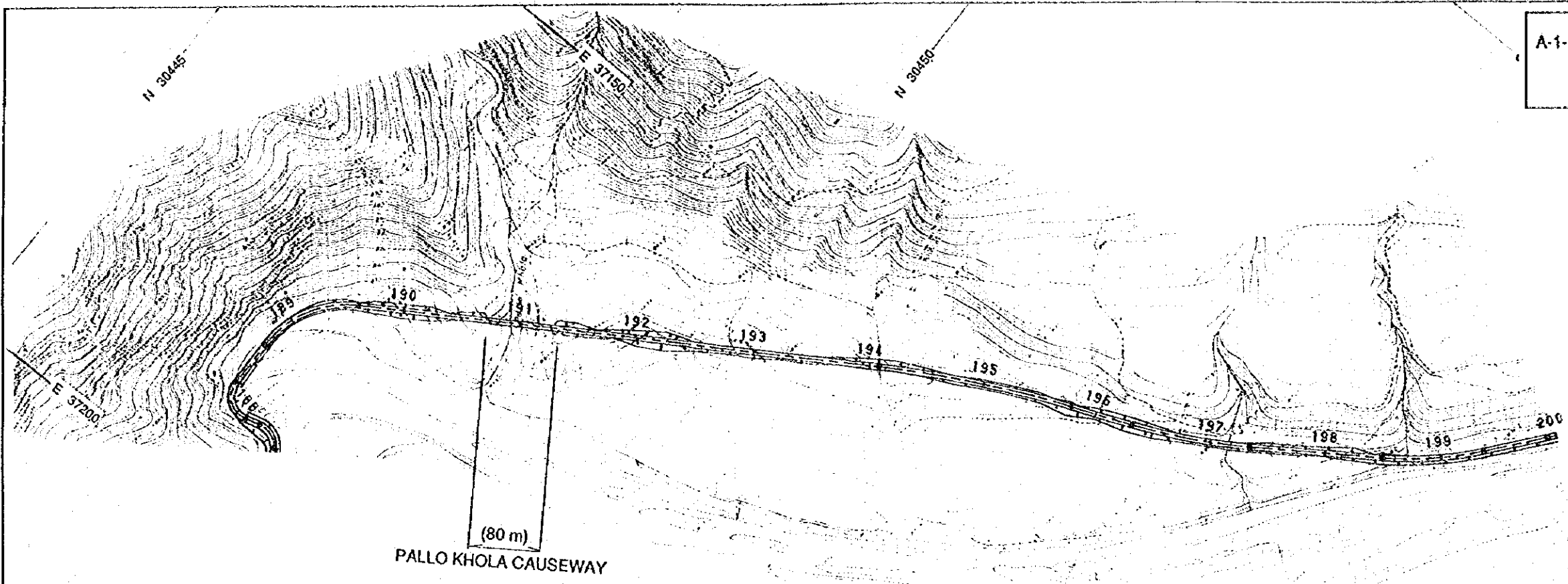
GRADE	PROPOSED HEIGHT	GROUND HEIGHT	STATION	CURVE ELEMENT
790.10	790.70	790.30	162+50	R=400.00
10.65% 125m	790.32	789.00	162+75	
790.54	790.00	790.00	163	
790.75	790.50	790.50	163+25	
790.95	790.95	791.00	163+50	
791.20	790.87	791.00	163+75	
-2.80% 100m	790.50	789.00	164	L=59.51
789.80	789.80	789.00	164+25	R=150.00
44.80% 15m	789.10	789.00	164+50	
788.40	788.88	789.60	164+75	
789.80	789.80	789.00	165	
790.80	790.80	790.00	165+25	
792.00	791.82	792.00	165+50	
11.85% 175m	792.47	790.10	165+75	L=155.12
792.04	792.04	790.20	166	
792.41	792.41	792.00	166+25	
793.80	793.80	792.40	166+50	
794.35	794.35	793.00	166+75	
794.83	794.83	792.00	167	R=500.00
795.21	795.21	793.50	167+25	
795.42	795.42	793.30	167+50	
795.53	795.53	794.20	167+75	
795.85	795.85	795.30	168	
795.77	795.77	795.40	168+25	R=500.00
795.87	795.87	795.00	168+50	
795.80	795.80	792.00	168+75	
795.20	795.20	791.00	169	R=500.00
794.80	794.80	790.50	169+25	
794.50	794.50	790.00	169+50	
794.70	794.70	790.10	169+75	
795.00	795.00	790.00	170	L=47.59
795.20	795.20	790.00	170+25	
795.30	795.30	792.50	170+50	
795.80	795.80	791.50	170+75	
795.90	795.90	793.00	171	R=200.00
796.20	796.20	791.00	171+25	
796.50	796.50	792.40	171+50	L=81.79
796.80	796.80	794.00	171+75	
797.10	797.10	793.80	172	R=100.00
797.40	797.40	794.00	172+25	
797.52	797.52	794.90	172+50	
798.85	798.85	794.00	172+75	
800.03	800.03	797.00	173	
801.19	801.19	800.80	173+25	
802.35	802.35	802.60	173+50	
803.52	803.52	803.50	173+75	
804.85	804.85	803.80	174	R=500.00
805.85	805.85	803.60	174+25	
807.01	807.01	805.10	174+50	
808.17	808.17	808.00	174+75	
809.34	809.34	809.00	175	L=159.42

A-1-15: Plan and Profile
 STA.175+00~STA.187+50

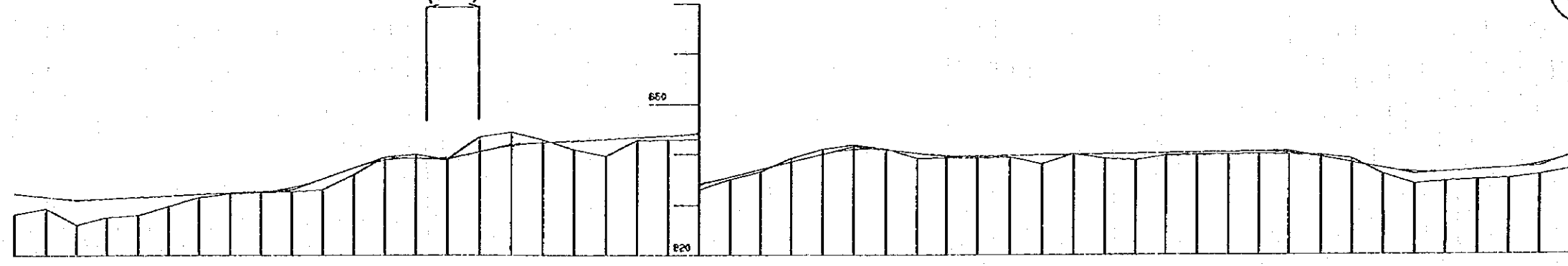
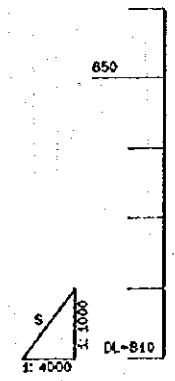
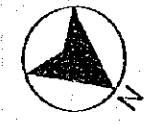


GRADE																																																																														
PROPOSED HEIGHT	809.34	810.22	810.35	810.59	810.84	810.96	810.73	810.77	810.82	810.86	810.91	810.95	811.09	811.40	811.80	812.20	812.80	813.80	814.20	814.80	814.92	815.00	815.15	815.22	815.30	815.36	815.45	815.53	815.65	815.88	816.16	816.44	816.72	817.42	818.96	820.90	822.89	824.86	824.86	826.17	826.16	824.88	821.71	821.16	821.00	821.50	822.00	822.00	822.50	822.71	823.00	822.71	822.33																									
GROUND HEIGHT	809.00	808.40	808.40	808.80	809.00	809.00	809.00	809.30	809.77	809.00	810.82	809.80	810.86	810.10	810.91	809.80	810.95	809.00	811.09	811.40	810.30	811.80	812.20	812.80	813.80	814.20	811.00	814.80	812.50	815.08	812.30	815.15	810.00	815.22	811.00	815.30	808.00	815.36	815.45	814.10	815.53	815.20	815.85	816.00	815.88	814.60	816.16	815.40	816.44	815.80	816.72	810.10	817.42	817.80	818.96	819.00	820.90	823.00	822.89	824.86	824.86	827.80	826.17	826.16	824.00	821.00	822.71	819.00	821.16	820.00	821.00	821.50	822.00	822.00	822.50	822.71	821.00	822.33
STATION	175	175+25	175+50	175+75	176	176+25	176+50	176+75	177	177+25	177+50	177+75	178	178+25	178+50	178+75	179	179+25	179+50	179+75	180	180+25	180+50	180+75	181	181+25	181+50	181+75	182	182+25	182+50	182+75	183	183+25	183+50	183+75	184	184+25	184+50	184+75	185	185+25	185+50	185+75	186	186+25	186+50	186+75	187	187+25	187+50																											
CURVE ELEMENT	L=169.42		R=150.00														R=200.00		L=117.50		R=30.00		R=40.00		L=194.14				R=500.00		L=39.61		R=100.00		L=37.00		R=50.00																																									

A-1-16: Plan and Profile
 STA.187+50~STA.200+00

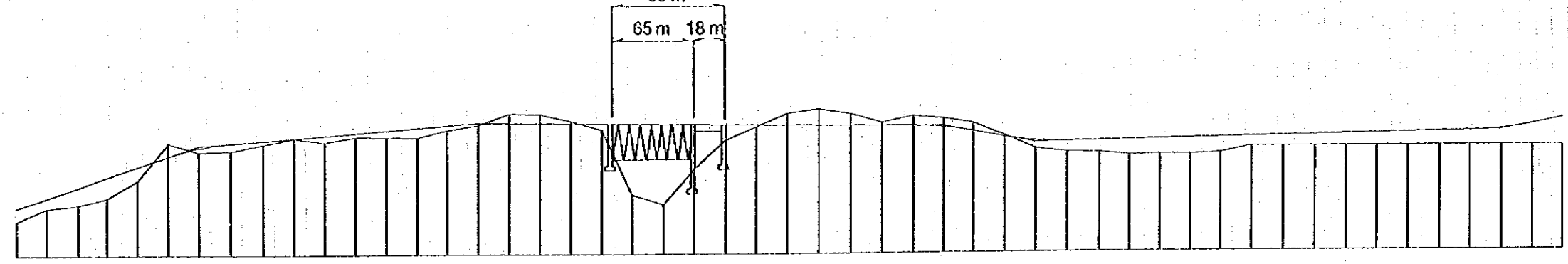
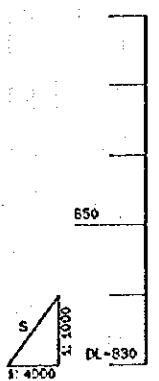
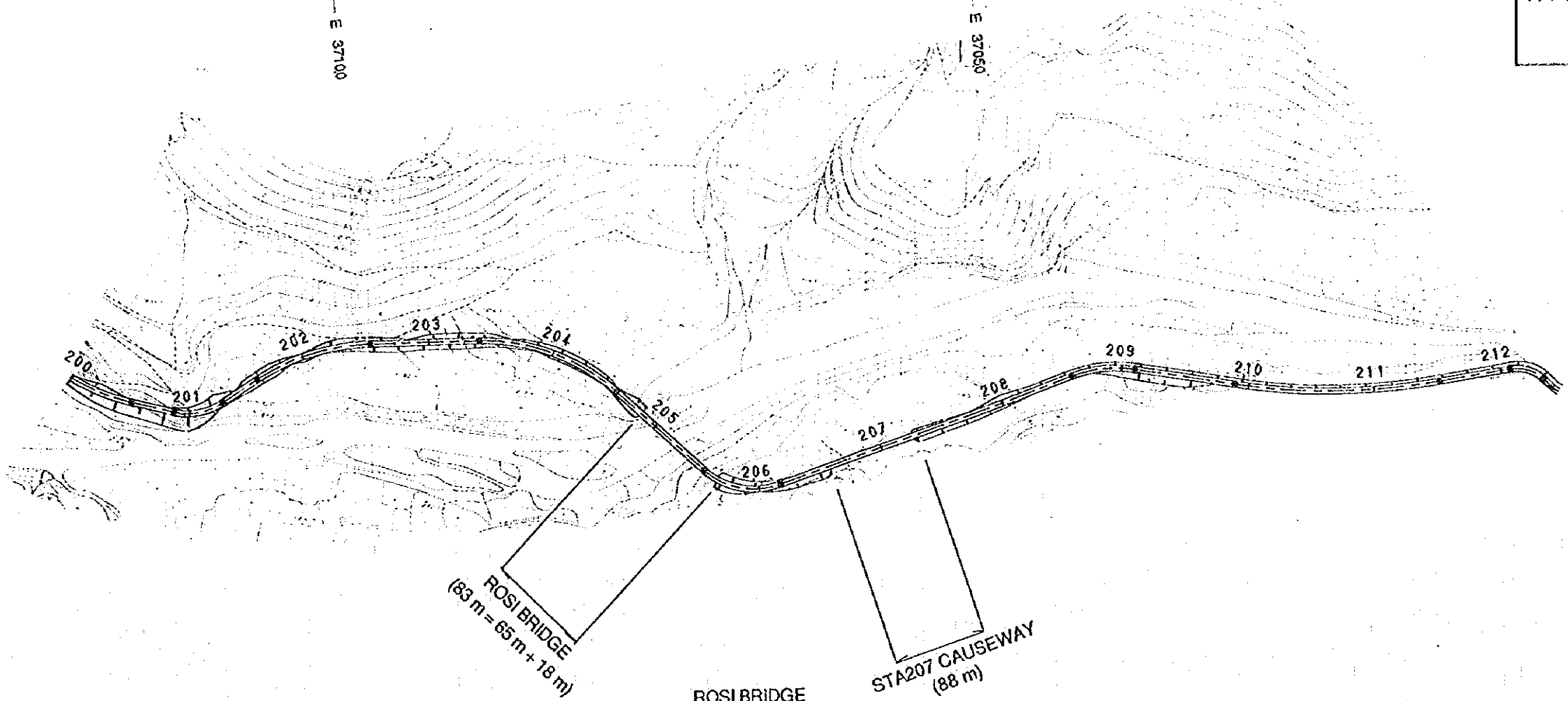


PALLO KHOLA CAUSEWAY
 (80 m)



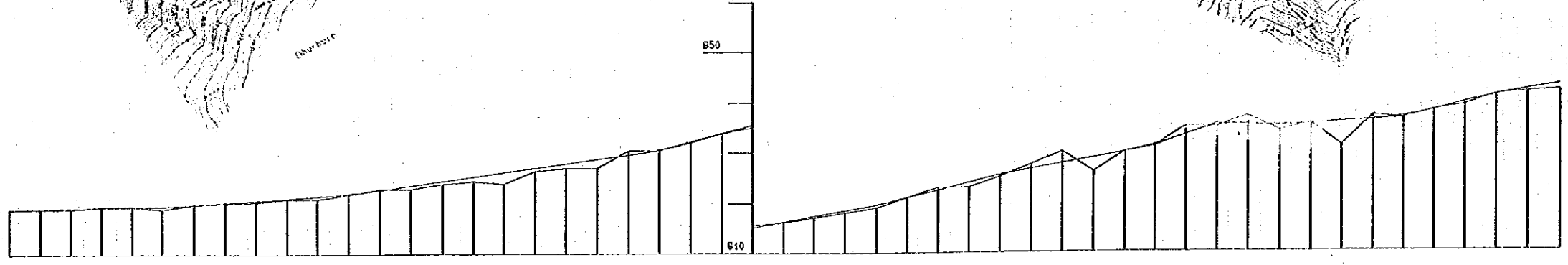
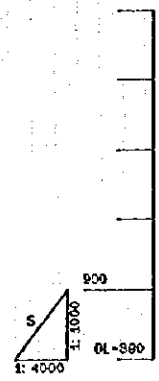
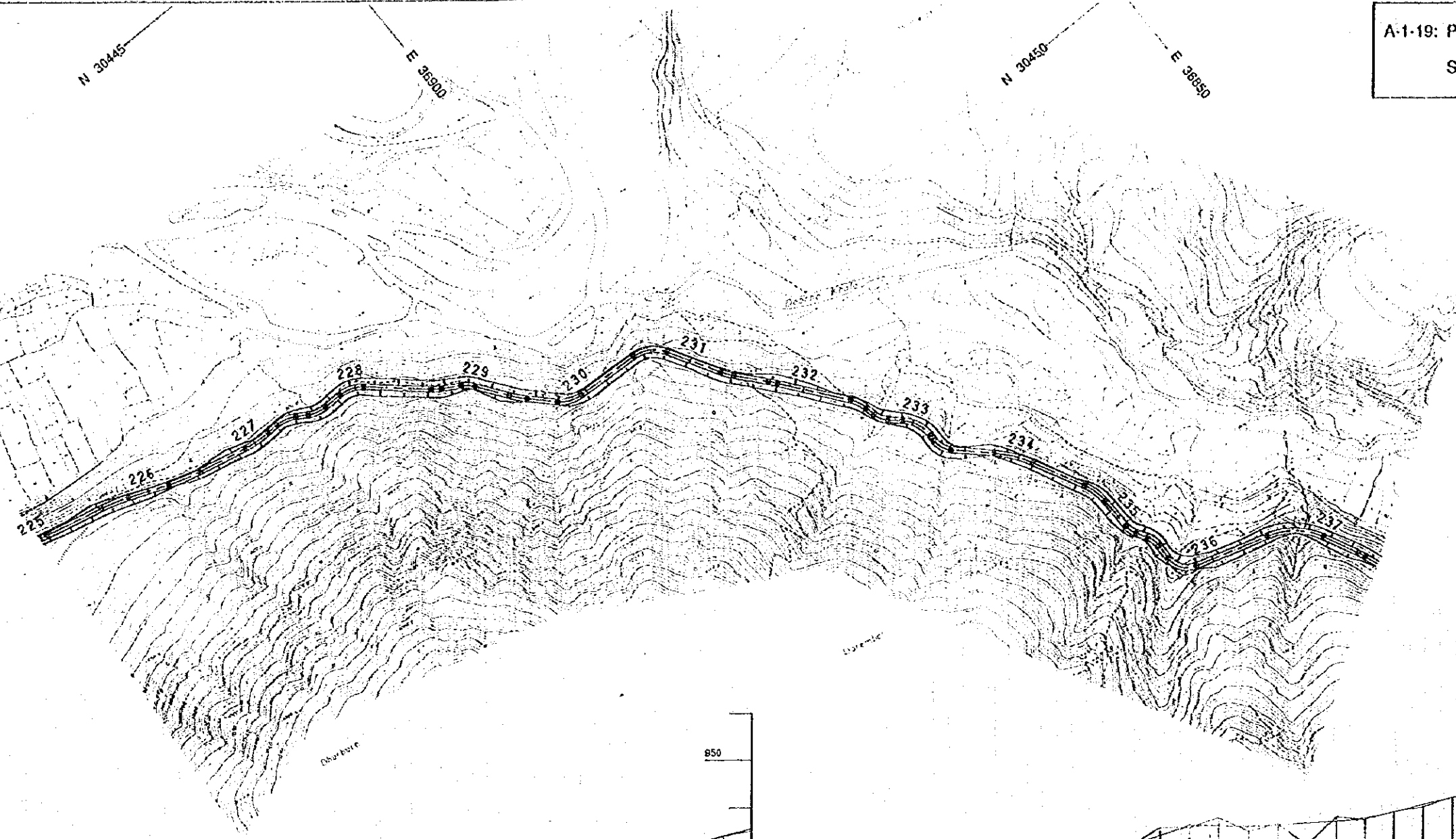
GRADE																																																														
PROPOSED HEIGHT	822.33	821.67	821.24	821.29	821.86	822.14	822.43	822.71	823.03	823.47	823.17	827.35	829.50	829.25	829.44	830.50	831.71	832.30	832.67	833.00	834.29	835.30	837.00	838.50	839.20	840.00	841.00	840.36	840.89	841.00	840.17	839.69	839.59	839.08	839.77	840.00	839.86	839.95	840.05	840.09	840.14	840.20	840.32	840.41	840.20	839.38	838.25	838.00	837.13	836.38	836.38	836.75	837.13	837.92	839.57							
GROUND HEIGHT	818.20	819.30	819.00	817.50	817.60	819.70	821.50	822.30	822.60	822.71	822.70	823.00	828.00	829.50	830.00	829.00	829.50	833.50	834.50	833.70	833.00	833.00	835.00	836.50	839.20	841.00	841.00	841.80	840.89	841.00	839.20	840.17	839.30	839.50	839.40	839.08	838.00	840.00	839.70	840.09	839.70	840.14	839.80	840.23	839.00	840.32	840.00	840.41	839.80	839.70	839.38	839.00	838.00	837.13	836.38	836.38	834.50	834.80	835.75	836.00	837.92	839.57
STATION	187+50	187+75	188	188+25	188+50	188+75	189	189+25	189+50	189+75	190	190+25	190+50	190+75	191	191+25	191+50	191+75	192	192+25	192+50	192+75	193	193+25	193+50	193+75	194	194+25	194+50	194+75	195	195+25	195+50	195+75	196	196+25	196+50	196+75	197	197+25	197+50	197+75	198	198+25	198+50	198+75	199	199+25	199+50	199+75	200											
CURVE ELEMENT	R=20.00		L=40.24		R=90.00		L=148.04										R=1000.00		L=53.67		R=500.00			L=115.73			R=300.00		L=55.27		R=160.00																															

A-1-17: Plan and Profile
 STA.200+00~STA.212+50



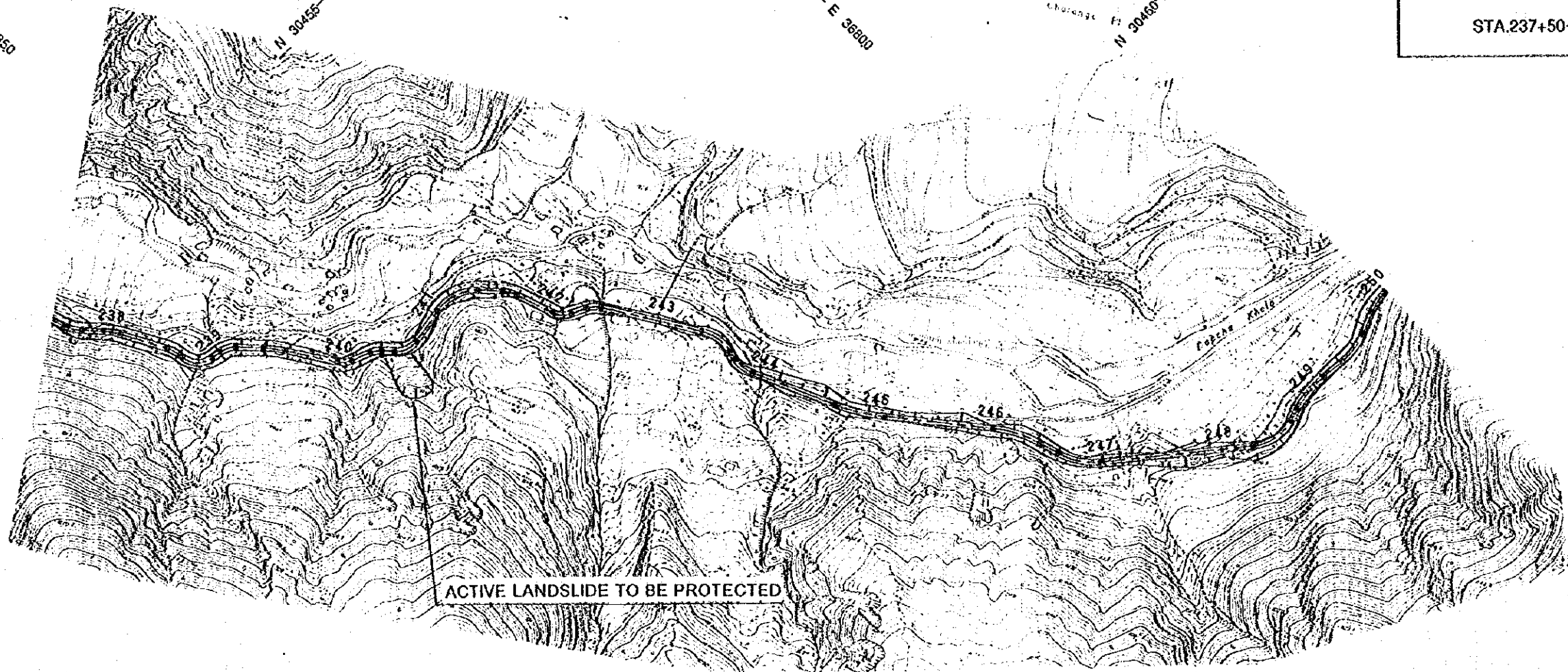
GRADE																								
PROPOSED HEIGHT	839.57	841.54	843.71	845.79	847.86	849.93	851.61	852.30	853.00	853.50	854.00	854.50	855.00	855.50	856.00	856.43	856.80	857.17	857.50	857.87	858.30	858.63	858.90	859.27
GROUND HEIGHT	838.80	839.30	840.20	841.30	842.00	842.50	843.00	843.20	843.50	843.70	843.80	843.90	844.00	844.10	844.20	844.30	844.40	844.50	844.60	844.70	844.80	844.90	845.00	845.10
STATION	200	200+25	200+50	200+75	201	201+25	201+50	201+75	202	202+25	202+50	202+75	203	203+25	203+50	203+75	204	204+25	204+50	204+75	205	205+25	205+50	206
CURVE ELEMENT	R=150.00	L=35.23	R=50.00	R=150.00	L=56.33	R=150.00	L=93.33	R=60.00	L=249.10	R=100.00	L=78.55	R=500.00	L=55.15	R=30.00	R=30.00									

A-1-19: Plan and Profile
 STA.225+00~STA.237+50

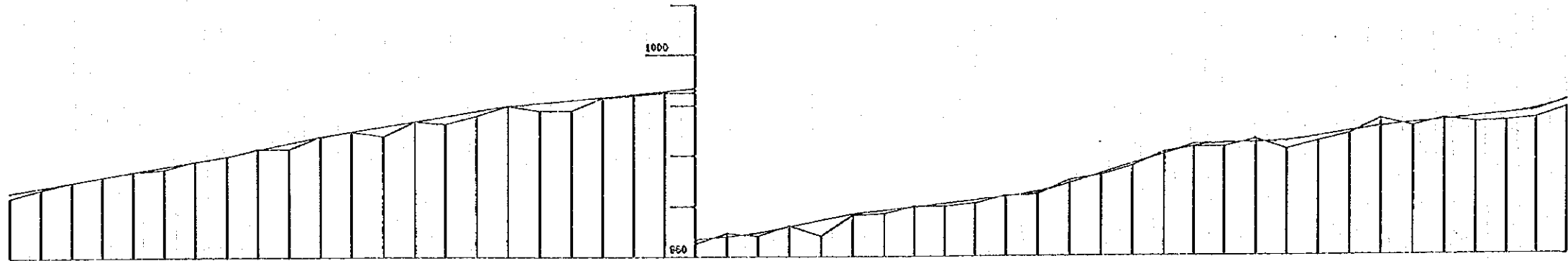
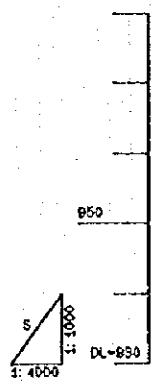


GRADE	PROPOSED HEIGHT	GROUND HEIGHT	STATION	CURVE ELEMENT
892.00	898.50	899.00	225	R=160.00
10.40% 125m	898.10	899.00	225+25	L=51.72
896.50	899.20	899.00	226+00	R=160.00
11.67% 150m	899.30	899.50	226+75	L=35.58
899.40	899.40	899.50	226	R=160.00
899.50	899.50	899.00	226+25	L=42.90
899.50	899.92	900.00	226+50	R=100.00
900.33	900.33	900.20	226+75	R=30.00
900.75	900.75	900.30	227	R=30.00
901.17	901.17	901.00	227+25	L=56.54
901.36	901.36	901.00	227+50	R=50.00
902.11	902.11	902.00	227+75	R=30.00
902.85	902.85	903.00	228	R=30.00
903.70	903.70	903.00	228+25	R=50.00
904.35	904.35	904.00	228+50	R=100.00
905.40	905.40	904.50	228+75	R=30.00
906.20	906.20	904.00	229	R=30.00
907.10	907.10	906.50	229+25	R=50.00
907.95	907.95	907.00	229+50	R=30.00
908.80	908.80	907.00	229+75	R=30.00
909.85	909.85	910.50	230	R=30.00
910.73	910.73	910.50	230+25	L=54.81
912.25	912.25	912.00	230+50	R=30.00
913.84	913.84	914.00	230+75	L=43.34
915.10	915.10	915.50	231	R=150.00
916.20	916.20	916.00	231+25	R=30.00
917.30	917.30	917.00	231+50	L=64.71
918.40	918.40	918.00	231+75	R=20.00
919.80	919.80	919.00	232	R=20.00
921.00	921.00	921.00	232+25	R=30.00
922.90	922.90	923.00	232+50	R=30.00
924.00	924.00	923.00	232+75	L=55.91
925.40	925.40	925.00	233	R=100.00
926.50	926.50	927.50	233+25	R=50.00
927.70	927.70	930.00	233+50	L=47.44
928.80	928.80	928.00	233+75	R=20.00
929.90	929.90	930.00	234	R=20.00
931.20	931.20	931.00	234+25	R=20.00
933.25	933.25	935.00	234+50	R=20.00
934.87	934.87	935.00	234+75	R=20.00
935.25	935.25	937.00	235	R=20.00
935.16	935.16	934.00	235+25	R=20.00
935.36	935.36	935.50	235+50	R=20.00
935.75	935.75	931.00	235+75	R=50.00
936.13	936.13	927.00	236	R=50.00
936.76	936.76	928.50	236+25	R=60.00
938.00	938.00	936.00	236+50	R=60.00
939.50	939.50	939.00	236+75	R=60.00
940.87	940.87	941.00	237	R=60.00
942.00	942.00	941.50	237+25	R=60.00
943.00	943.00	942.00	237+50	R=60.00

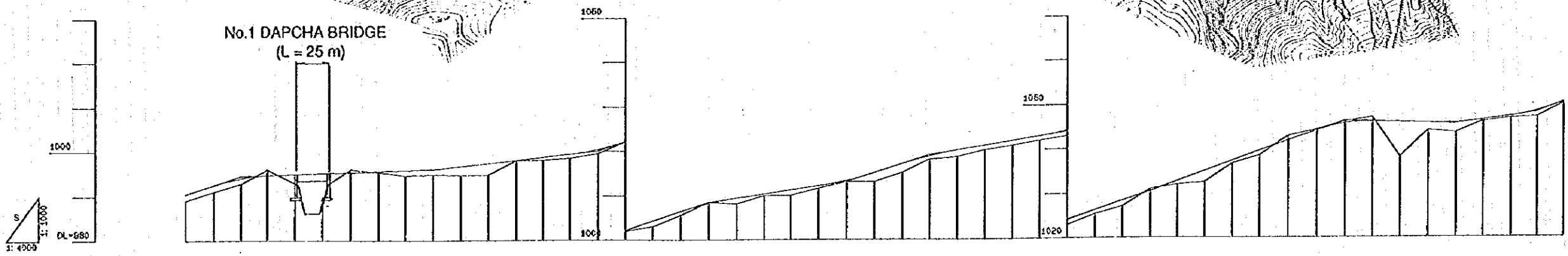
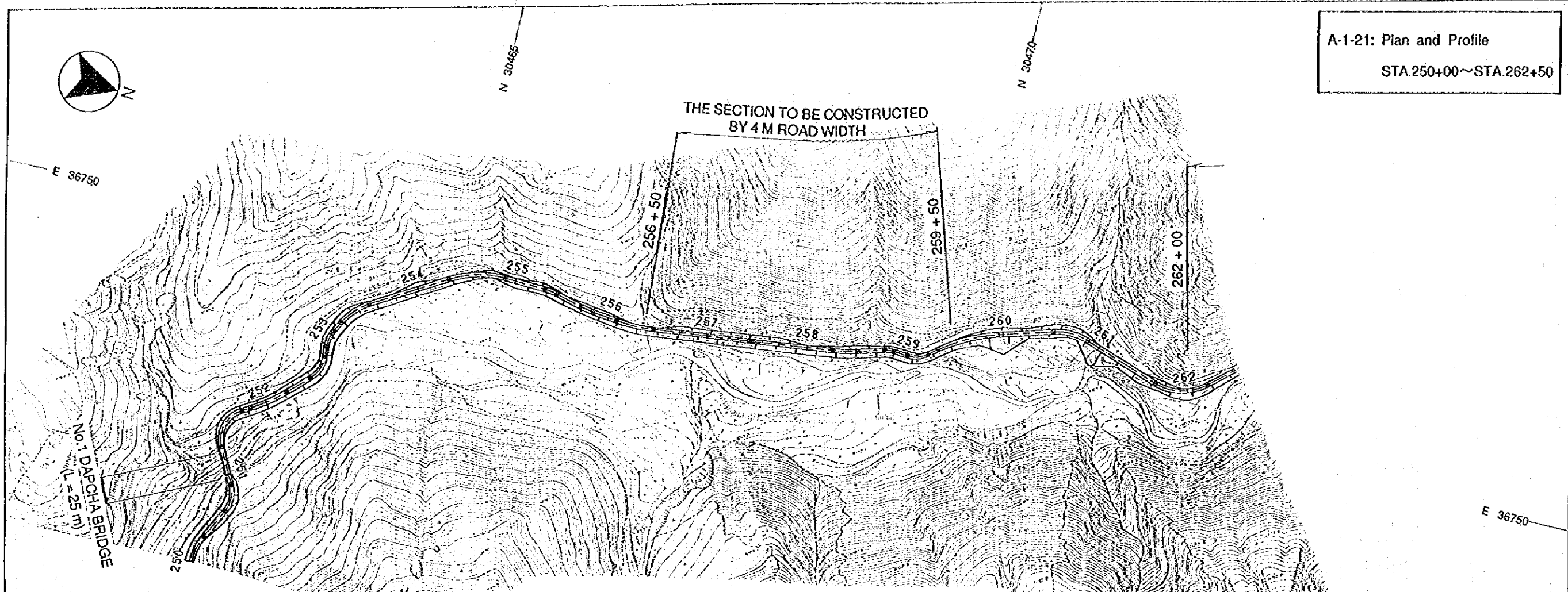
A-1-20: Plan and Profile
 STA.237+50~STA.250+00



ACTIVE LANDSLIDE TO BE PROTECTED



GRADE																																																								
PROPOSED HEIGHT	943.00	944.00	945.00	946.00	947.00	948.00	949.00	950.08	951.33	952.67	954.00	955.00	956.00	957.00	958.00	959.69	960.00	960.56	961.13	961.89	962.73	962.81	963.36	963.94	964.89	965.63	967.17	968.30	969.17	970.83	972.81	974.40	976.30	978.20	980.10	981.97	982.17	982.33	982.71	983.50	984.50	985.40	986.10	987.70	987.30	987.90	988.85	990.50								
GROUND HEIGHT	942.00	943.70	945.00	946.00	947.00	947.50	948.00	950.00	951.50	951.50	952.67	954.00	955.00	956.00	957.00	958.00	959.69	960.00	960.56	961.13	961.89	962.73	962.81	963.36	963.94	964.89	965.63	967.17	968.30	969.17	970.83	972.81	974.40	976.30	978.20	980.10	981.97	982.17	982.33	982.71	983.50	984.50	985.40	986.10	987.70	987.30	987.90	988.85	990.50							
STATION	237+50	237+75	238	238+25	239+50	239+75	239	239+25	239+50	239+75	240	240+25	240+50	240+75	241	241+25	241+50	241+75	242	242+25	242+50	242+75	243	243+25	243+50	243+75	244	244+25	244+50	244+75	245	245+50	245+75	246	246+25	246+50	246+75	247	247+25	247+50	247+75	248	248+25	248+50	248+75	249	249+25	249+50	249+75	250						
CURVE ELEMENT	R=40.00	R=60.00	R=30.00	R=20.00	R=100.00	R=20.00	R=20.00	R=20.00	R=20.00	R=40.00	R=30.00	R=20.00	R=40.00	R=30.00	R=20.00	R=40.00	R=30.00	R=150.00	R=100.00	L=41.52	L=43.85	L=37.00	L=73.13	L=94.51	L=128.37	R=50.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00	R=40.00	R=50.00	R=60.00

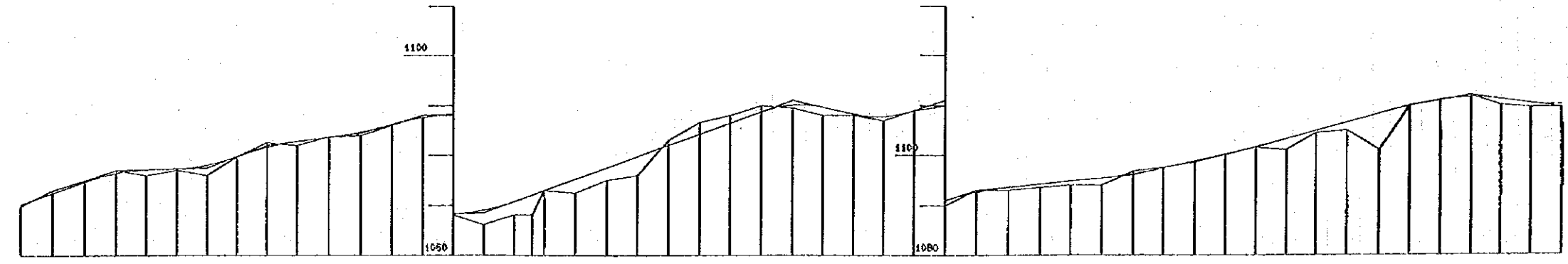
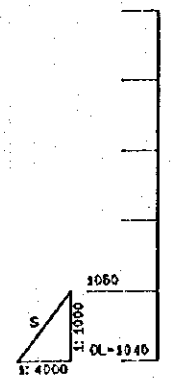
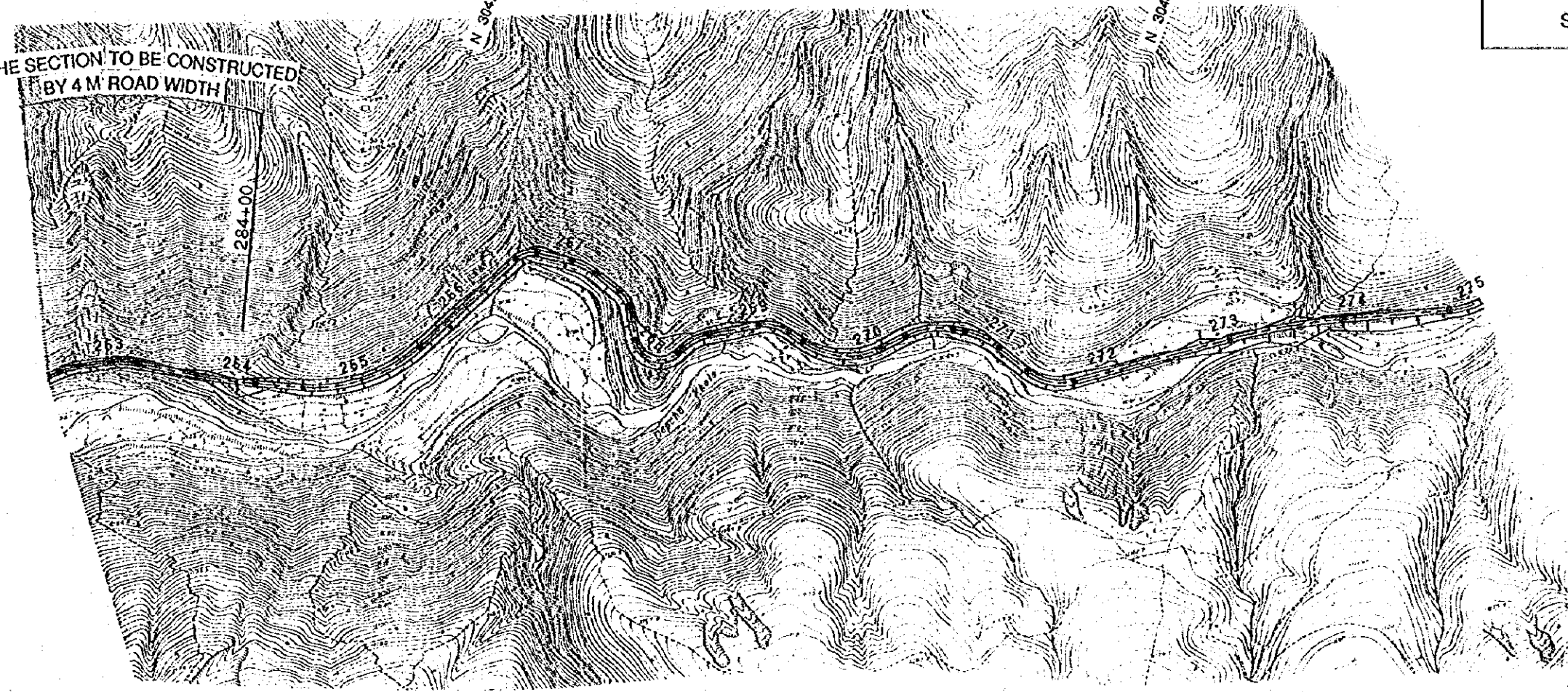


GRADE																																																																	
PROPOSED HEIGHT	999.50	992.50	984.05	984.71	984.85	985.14	985.36	985.57	985.79	986.11	986.67	987.33	988.00	988.67	989.33	990.00	1000.36	1006.36	1008.19	1009.40	1010.30	1011.20	1012.10	1013.28	1015.00	1017.00	1018.75	1020.00	1021.00	1022.00	1023.00	1024.20	1025.17	1026.35	1027.00	1028.35	1030.52	1030.90	1032.75	1032.75	1032.50	1033.60	1037.25	1039.50	1041.75	1044.00	1044.00	1045.64	1045.75	1045.89	1045.89	1045.89	1047.17	1047.17	1048.39	1048.39	1050.25	1050.25							
GROUND HEIGHT	989.00	991.00	992.86	995.80	995.00	995.14	995.36	995.40	994.60	984.80	984.70	984.66	986.00	988.00	988.00	986.41	989.50	1000.36	1008.50	1008.19	1008.00	1010.30	1010.30	1011.20	1013.00	1013.00	1015.00	1015.00	1017.00	1018.00	1018.50	1020.00	1021.00	1022.00	1023.00	1024.00	1024.20	1025.30	1026.17	1027.00	1028.35	1031.00	1030.52	1032.75	1032.50	1032.50	1033.60	1037.25	1039.40	1039.50	1042.75	1044.75	1044.23	1044.00	1045.00	1045.64	1045.75	1045.89	1045.89	1047.17	1047.17	1048.39	1048.39	1050.00	1050.25
STATION	250	250+25	250+50	250+75	251	251+25	251+50	251+75	252	252+25	253+00	253+75	254	254+25	254+50	254+75	255	255+25	256	256+25	257	257+25	258	258+25	259	259+25	260	260+25	261	261+25	262	262+25	262+50																																
CURVE ELEMENT																																																																	

A-1-22: Plan and Profile
 STA.262+50~STA.275+00

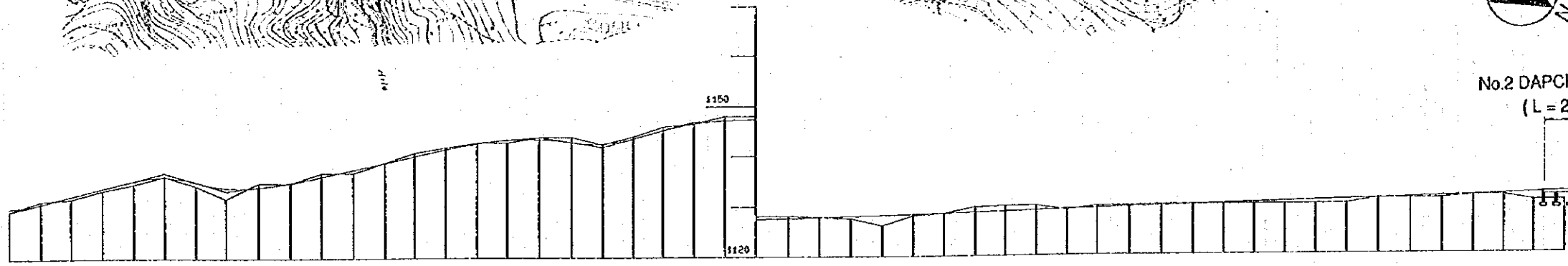
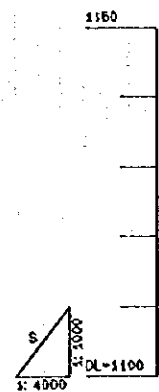
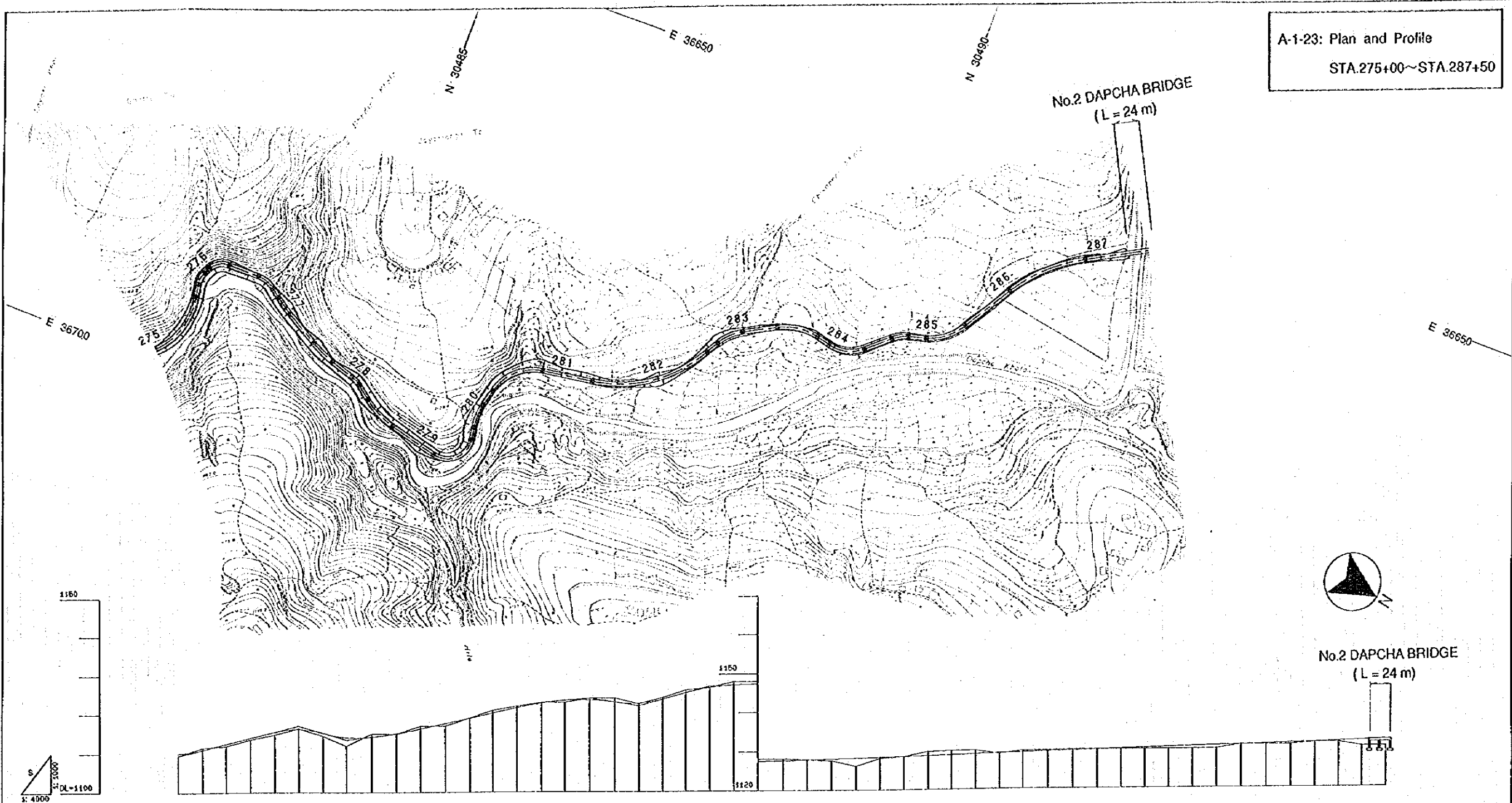


THE SECTION TO BE CONSTRUCTED
 BY 4 M ROAD WIDTH



GRADE																																																			
PROPOSED HEIGHT	1050.25	1050.30	1054.75	1056.48	1057.17	1057.35	1056.02	1059.75	1051.65	1052.63	1053.67	1054.73	1056.25	1057.62	1058.25	1059.00	1070.75	1072.10	1073.00	1073.25	1077.50	1079.75	1082.00	1084.25	1086.50	1088.75	1090.10	1087.00	1089.87	1093.35	1094.20	1095.40	1096.15	1097.36	1098.75	1100.15	1101.56	1102.80	1104.90	1106.80	1108.30	1109.62	1111.00	1113.34	1115.17	1116.50	1118.08				
GROUND HEIGHT	1050.00	1053.00	1055.00	1057.00	1056.00	1057.00	1056.00	1055.70	1052.50	1052.00	1053.70	1054.00	1056.00	1058.00	1059.00	1068.00	1070.00	1072.00	1073.00	1073.50	1075.00	1076.00	1079.00	1081.00	1083.00	1085.00	1086.00	1087.00	1088.00	1089.00	1092.00	1093.00	1094.00	1096.00	1097.00	1098.00	1099.00	1101.00	1101.00	1104.00	1105.00	1106.00	1108.00	1109.00	1110.00	1110.00	1112.00	1113.00	1115.00	1116.00	1118.00
STATION	262+50	262+75	263	263+25	263+50	263+75	264	264+25	264+50	264+75	265	265+25	265+50	265+75	266	266+25	266+50	266+75	267	267+25	267+50	267+75	268	268+25	268+50	268+75	269	269+25	269+50	270	270+25	270+50	270+75	271	271+25	271+50	271+75	272	272+25	272+50	272+75	273	273+25	273+50	273+75	274	274+25	274+50	274+75	275	
CURVE ELEMENT	R=50.00 R=50.00		L=40.15	L=38.66		L=102.31			R=20.00	R=50.00	R=20.00	R=40.00		R=30.00	R=50.00		R=50.00	L=127.63		R=500.00		L=55.17		R=70.00																											

A-1-23: Plan and Profile
 STA.275+00~STA.287+50



GRADE	PROPOSED HEIGHT	GROUND HEIGHT	STATION	CURVE ELEMENT
1109.90	1110.08	1109.90	275	R=70.00
16.06%	1111.00	1111.50	275+25	
12.2%	1112.90	1112.00	275+50	
	1114.00	1113.64	275+75	
	1115.50	1114.80	276	
	1116.19	1116.40	276+25	
7.6%	1115.25	1114.35	276+50	R=20.8620.00
3.00%	1114.13	1112.00	276+75	R=30.00
5.0%	1114.25	1115.00	277	L=38.24
	1115.15	1115.00	277+25	
	1116.33	1117.00	277+50	
15.33%	1117.87	1117.00	277+75	R=30.00
15.0%	1119.00	1119.00	278	
	1120.59	1121.00	278+25	
	1121.87	1122.00	278+50	
	1122.79	1123.00	278+75	
	1123.90	1122.00	279	L=50.70
	1124.62	1124.00	279+25	
	1125.00	1124.00	279+50	
	1122.67	1122.50	279+75	
	1123.87	1124.00	280	
	1125.85	1126.00	280+25	
	1126.63	1126.70	280+50	
	1127.19	1128.00	280+75	
	1127.38	1128.00	281	
	1127.50	1128.00	281+25	
	1127.75	1127.80	281+50	
	1127.04	1127.50	281+75	
	1128.13	1128.00	282	
	1128.31	1128.00	282+25	
	1128.50	1128.50	282+50	
	1128.86	1129.70	282+75	
	1129.04	1130.00	283	
	1129.21	1130.00	283+25	
	1129.59	1129.00	283+50	
	1129.97	1129.70	283+75	
	1130.11	1130.00	284	
	1130.53	1130.00	284+25	
	1130.75	1130.00	284+50	
	1130.29	1130.00	284+75	
	1130.46	1130.00	285	
	1130.64	1130.00	285+25	
	1130.82	1130.00	285+50	
	1131.00	1131.00	285+75	
	1131.19	1131.00	286	
	1131.38	1131.00	286+25	
	1131.56	1131.50	286+50	
	1131.73	1131.50	286+75	
	1131.94	1131.50	287	
	1132.13	1132.00	287+25	
	1132.33	1132.00	287+50	