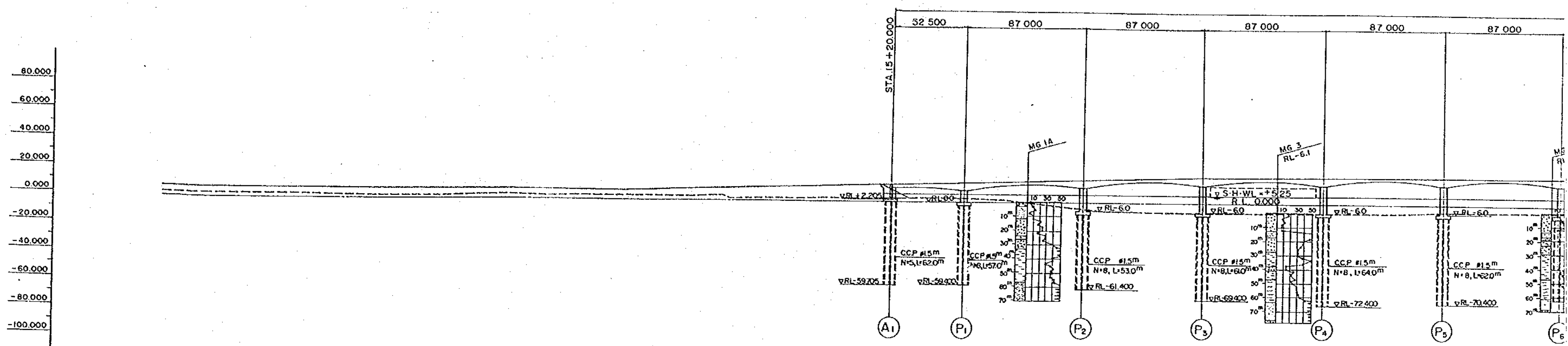
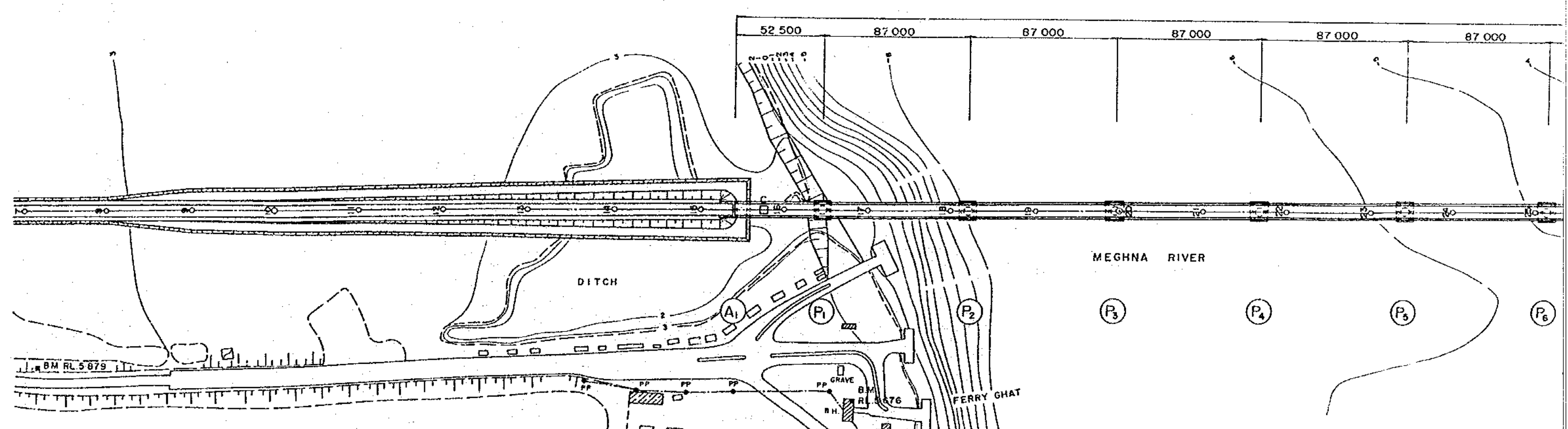


LONGITUDINAL GRADE	LEVEL L=579.840; (7.000); i=3.0% L=416.660; (19.500); i=0.3% L=522.0
PROPOSED HIGHT	7.000, 7.000, 7.000, 7.000, 7.000, 7.030, 7.369, 7.750, 8.083, 9.172, 10.605, 12.105, 12.705, 13.605, 14.280, 15.105, 16.604, 16.879, 17.912, 18.825, 18.882, 19.515, 19.750, 19.811, 19.961, 20.022, 20.111, 20.261, 20.283
GROUND HEIGHT	2.84, 2.83, 2.84, 2.84, 2.82, 2.76, 2.56, 2.10, 2.09, 2.50, 2.78, 2.45, 3.20, 3.30, 3.45, 3.90, 3.50, 1.90, 1.44, 1.90, 1.80, 1.95, 2.10, 2.65, 3.10, 2.40, 2.00, -1.00, -5.50, -6.40, -6.40, -6.40, -6.40, -6.20, -6.00, -6.10, -6.30, -6.20, -6.20, -6.00, -5.40, -5.30, -5.10, -4.90
DISTANCE	250.000, 300.000, 350.000, 400.000, 450.000, 500.000, 550.000, 579.840, 600.000, 650.000, 700.000, 750.000, 770.000, 800.000, 822.500, 850.000, 900.000, 909.500, 950.000, 996.500, 1000.000, 1050.000, 1083.500, 1100.000, 1150.000, 1170.500, 1200.000, 1250.000, 1257.500
STATION	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, +20 A1, 16, P1, 17, 18, P2, 19, P3, 20, 21, P4, 22, 23, P5, 24, 25, P6



BRIDGE LENGTH L = 1,410.000 m

87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 52 500

MG 1A | MG 3 RL -6.1 | MG 4 RL -4.9 | MG 5 RL +3.3 | MG 2

℄ S·H·WL = +5.25 RL 0.000

P2 CCP ϕ1.5m N=6, L=53.0m ▽RL -61.400
P3 CCP ϕ1.5m N=8, L=60.0m ▽RL -69.400
P4 CCP ϕ1.5m N=8, L=64.0m ▽RL -72.400
P5 CCP ϕ1.5m N=8, L=62.0m ▽RL -70.400
P6 CCP ϕ1.5m N=8, L=59.0m ▽RL -67.400
P7 CCP ϕ1.5m N=8, L=55.0m ▽RL -61.400
P8 CCP ϕ1.5m N=8, L=54.0m ▽RL -56.40
P9 CCP ϕ1.5m N=8, L=52.0m ▽RL -54.400
P10 CCP ϕ1.5m N=8, L=52.0m ▽RL -54.40
P11 CCP ϕ1.5m N=8, L=52.0m ▽RL -54.400
P12 CCP ϕ1.5m N=8, L=56.0m ▽RL -58.400
P13 CCP ϕ1.5m N=8, L=68.0m ▽RL -72.400
P14 CCP ϕ1.5m N=8, L=73.0m ▽RL -77.400
P15 CCP ϕ1.5m N=8 L=73.0m ▽RL -77.400
P16 CCP ϕ1.5m N=8 L=69.0m ▽RL -73.400

i = 0.3% L = 522.000 | 19.500 | 21.056 | i = 0.3% L = 522.000 | 19.500

PROFILE

1,410.000

87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 87 000 | 52 500

CHAR LAND

MEGHNA RIVER

GUMTI RIVER

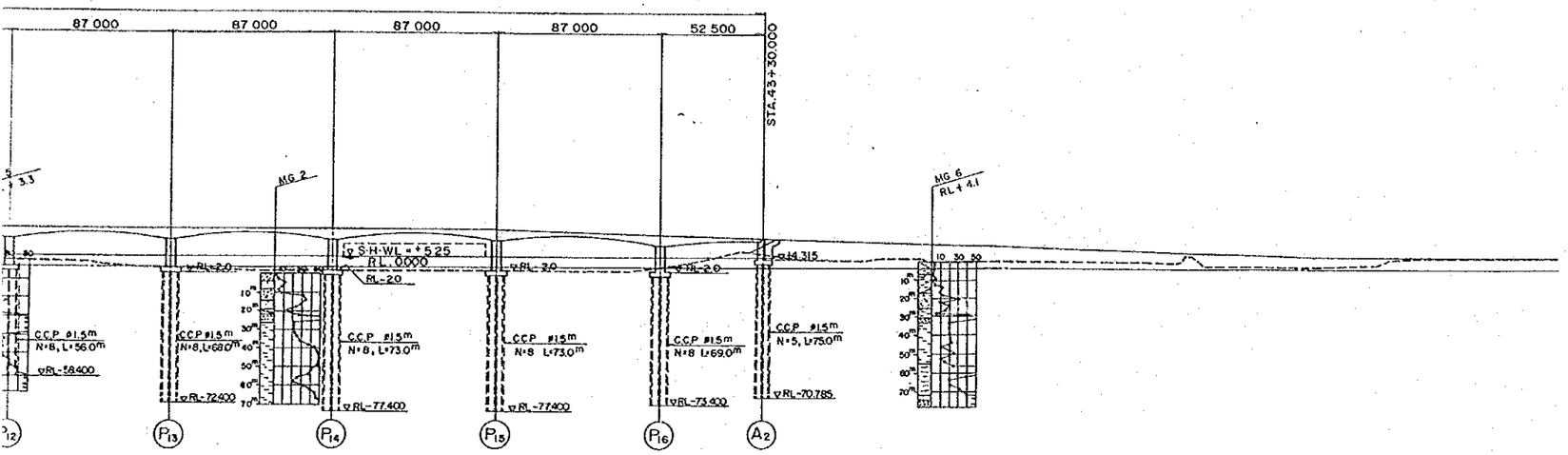
COMILLA - BANK

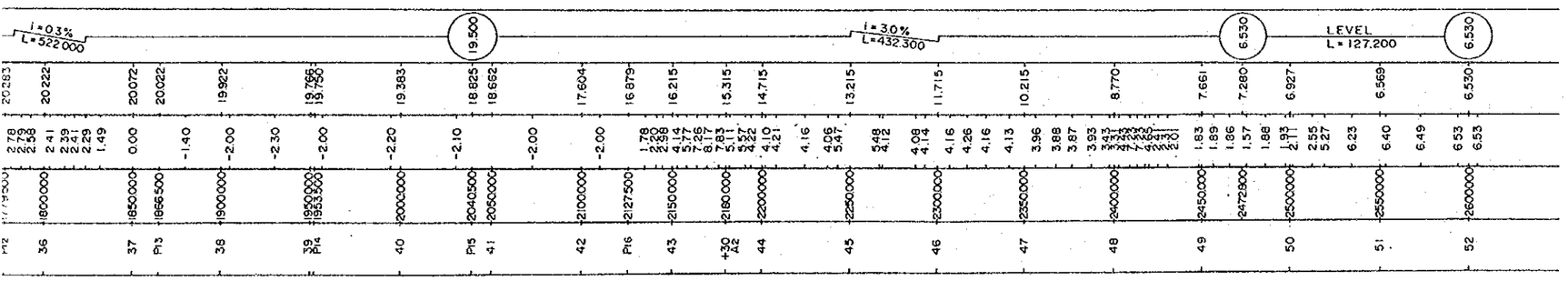
STONE

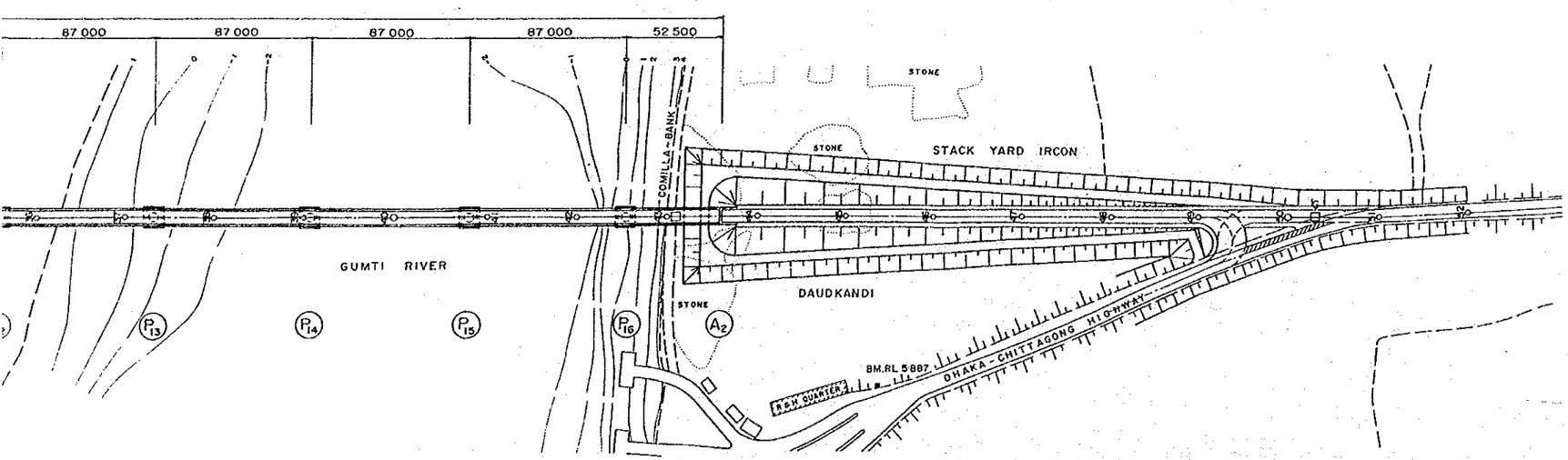
FERRY GHAT

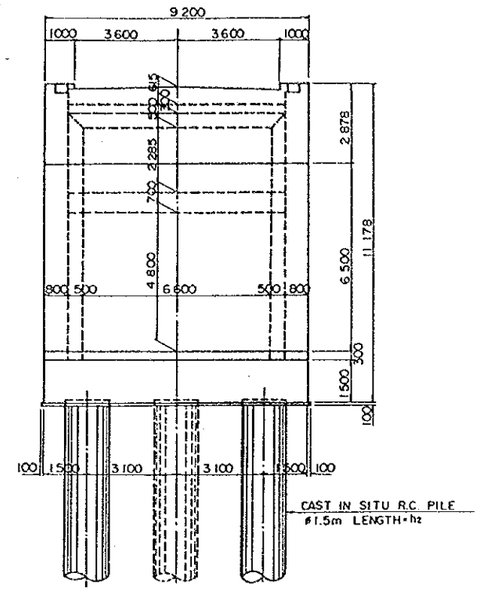
P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16

GENERAL VIEW

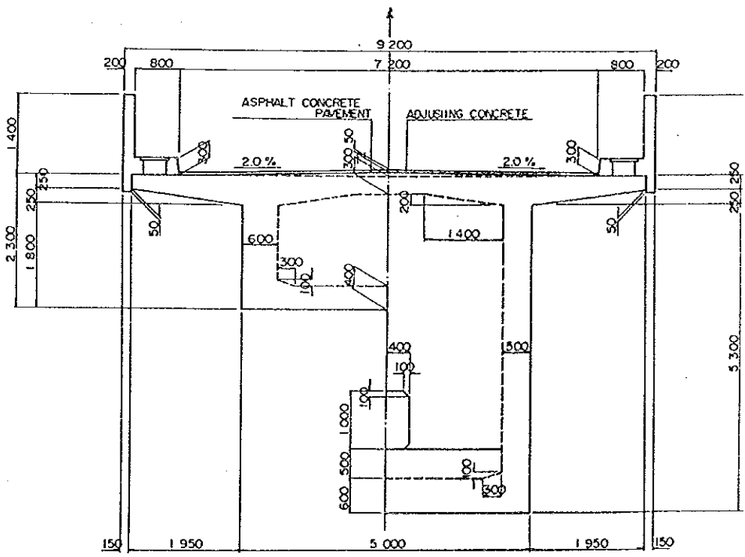






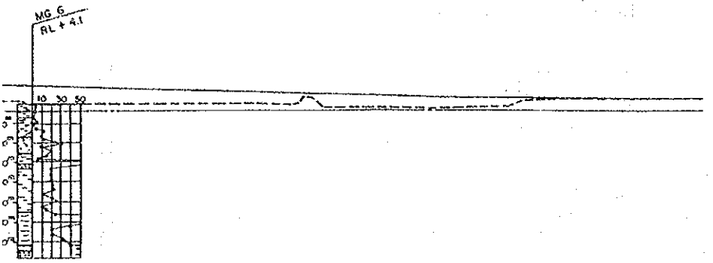


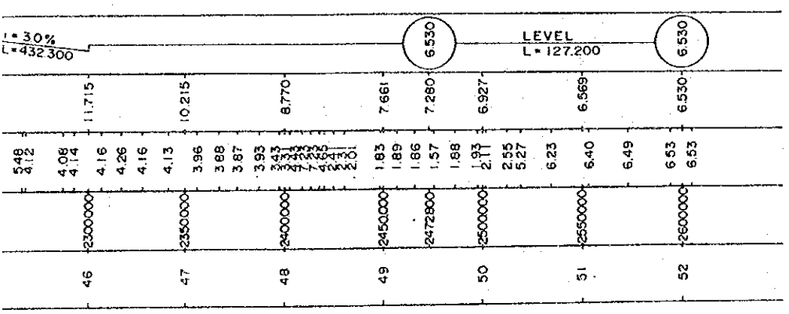
ABUTMENT

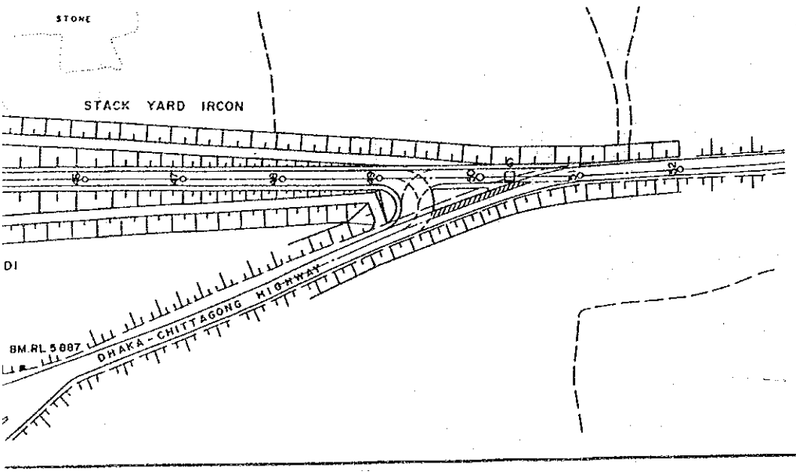


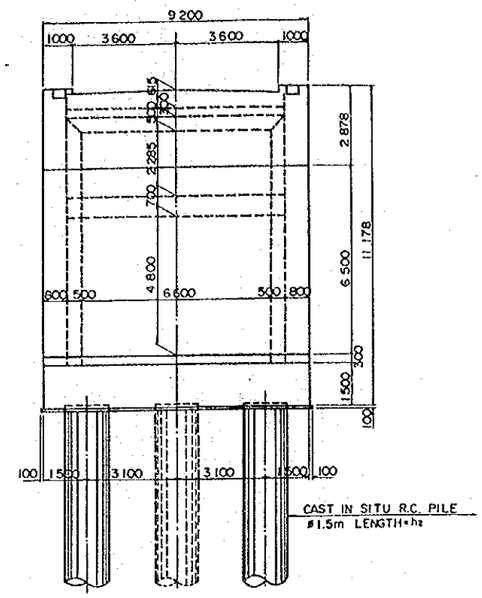
AT ABUTMENT AT PIER

PC BOX GIRDER

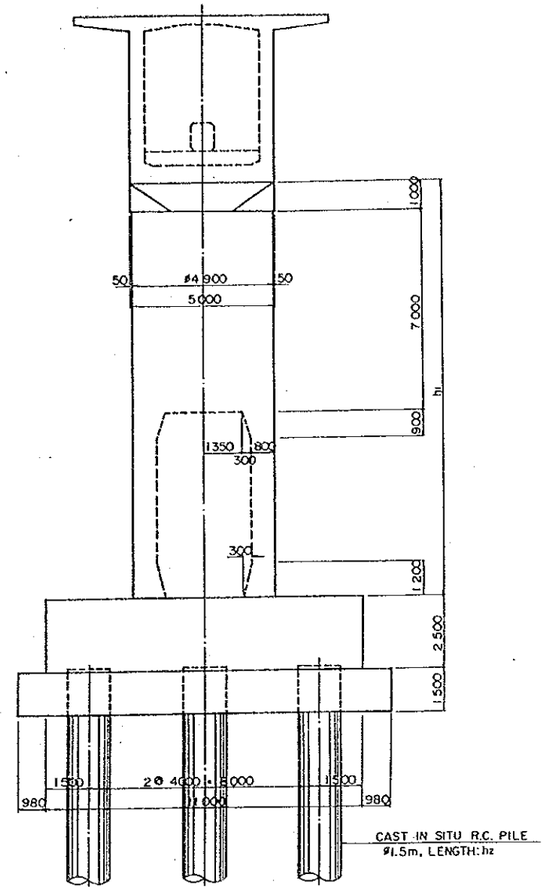




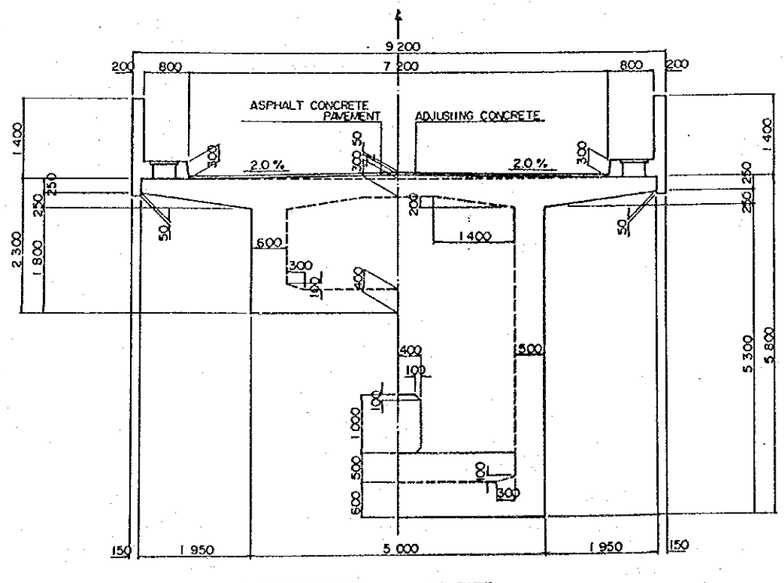




ABUTMENT



PIER

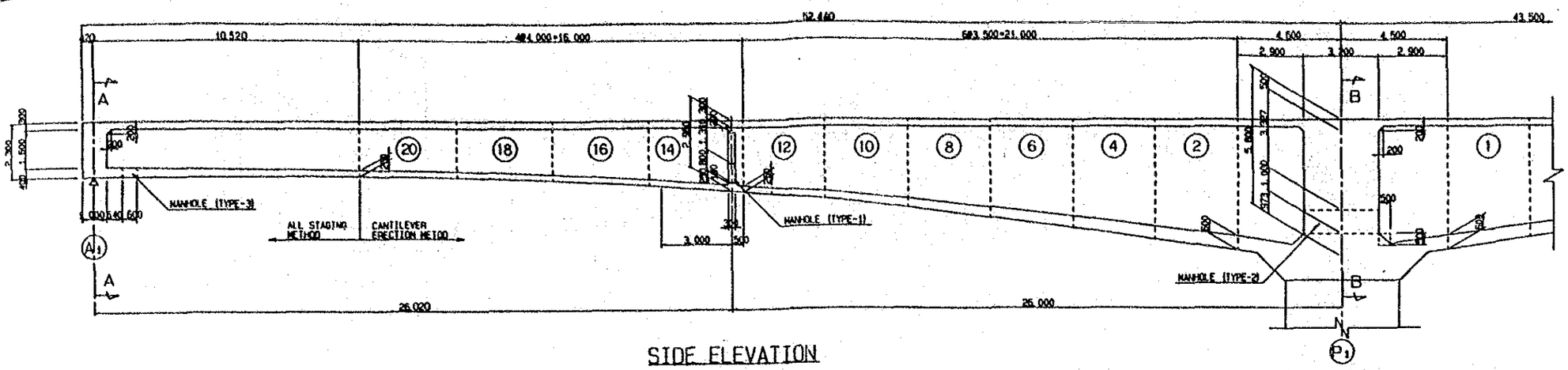


AT ABUTMENT AT PIER

PC BOX GIRDER

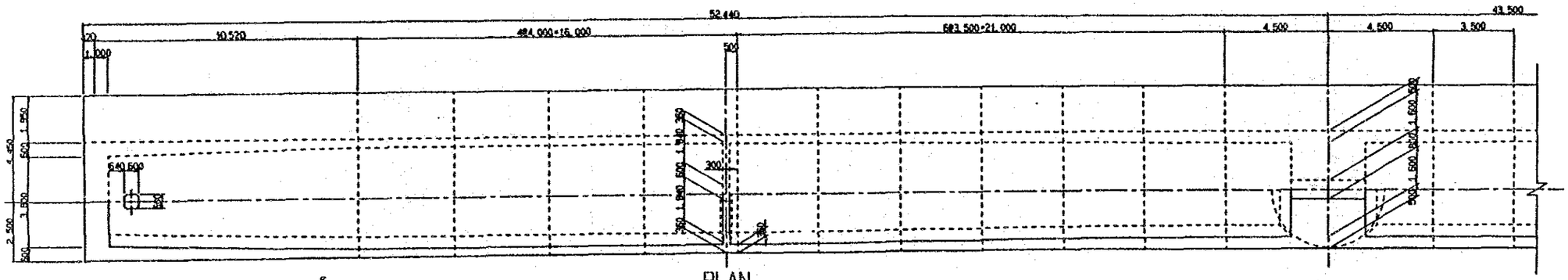
TYPICAL CROSS SECTION

GENERAL VIEW OF BRIDGE

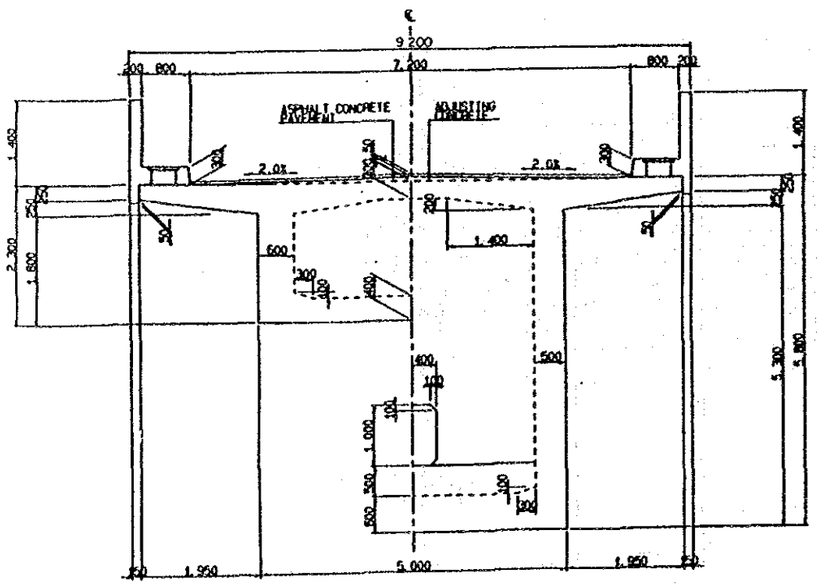


SIDE ELEVATION

UPPER SLAB	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
LOWER SLAB	400	250	250	250	250	250	308	367	425	483	542	600	600	600	600	600	600	542
WEB	600	350	350	350	350	350	393	407	436	453	477	500	500	500	500	500	500	477
DEPTH OF GIRDER	2.300	2.300	2.345	2.490	2.701	3.002	3.325	3.697	4.111	4.559	5.031	5.518	5.800	5.800	5.800	5.800	5.501	4.984



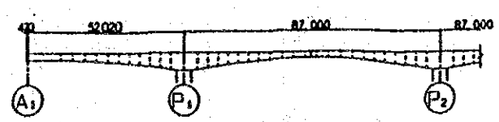
PLAN



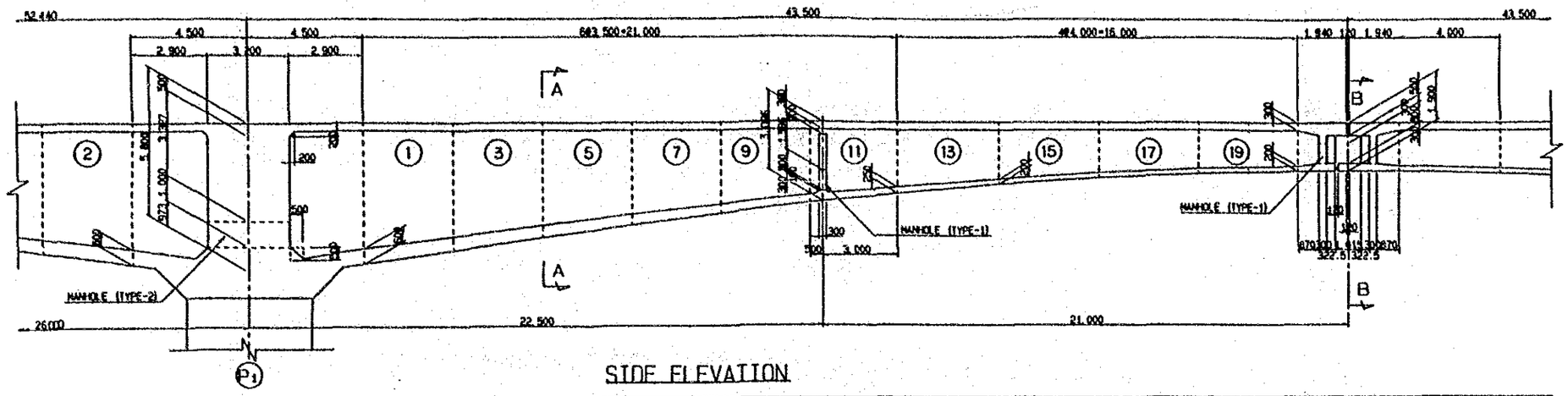
A - A B - B

CROSS SECTION

DIMENSIONS OF BOX GIRDER (1)

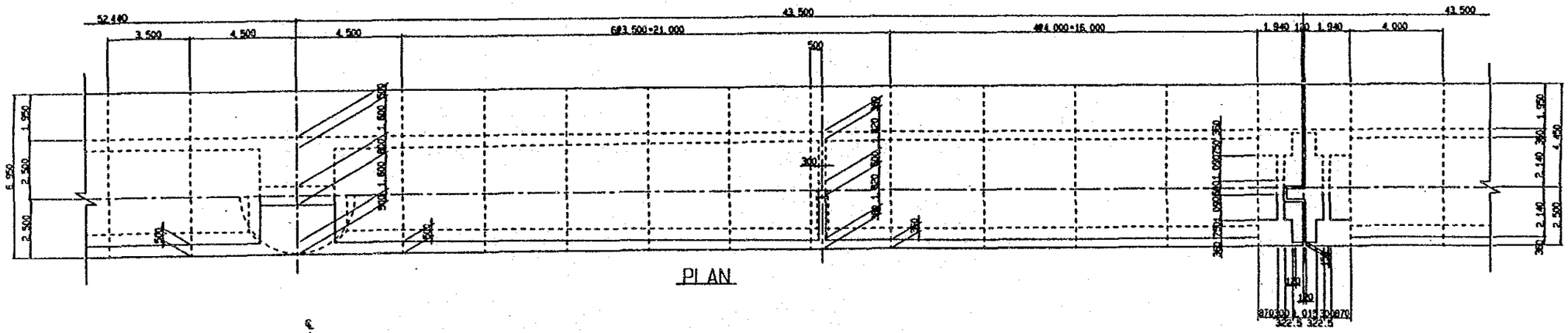


LOCATION MAP

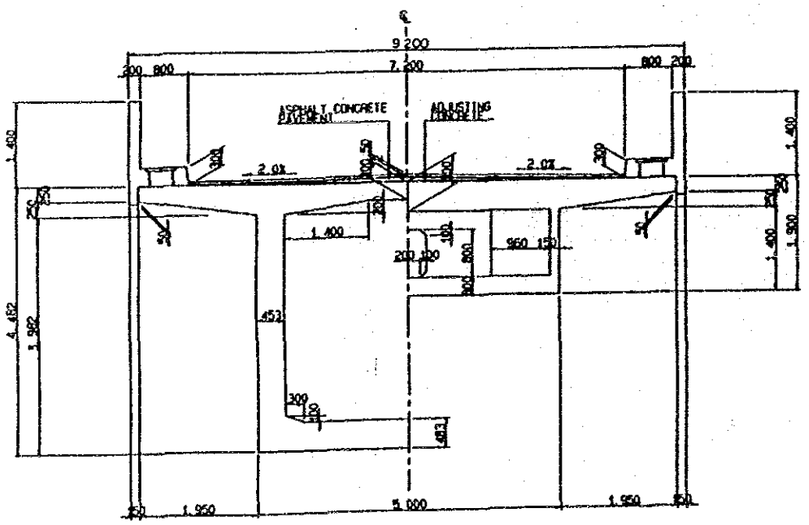


SIDE ELEVATION

UPPER SLAB	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
LOWER SLAB	542	600	600	600	600	600	542	483	425	367	308	250	200	200	200	200	200	200
WEB	477	500	500	500	500	500	477	453	430	407	383	360	360	360	360	360	360	360
DEPTH OF GIRDER	5.031	5.518	5.800	5.800	5.800	5.501	4.984	4.482	4.003	3.506	3.150	2.791	2.446	2.183	2.003	1.911	1.900	

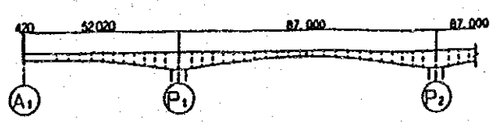


PLAN



CROSS SECTION

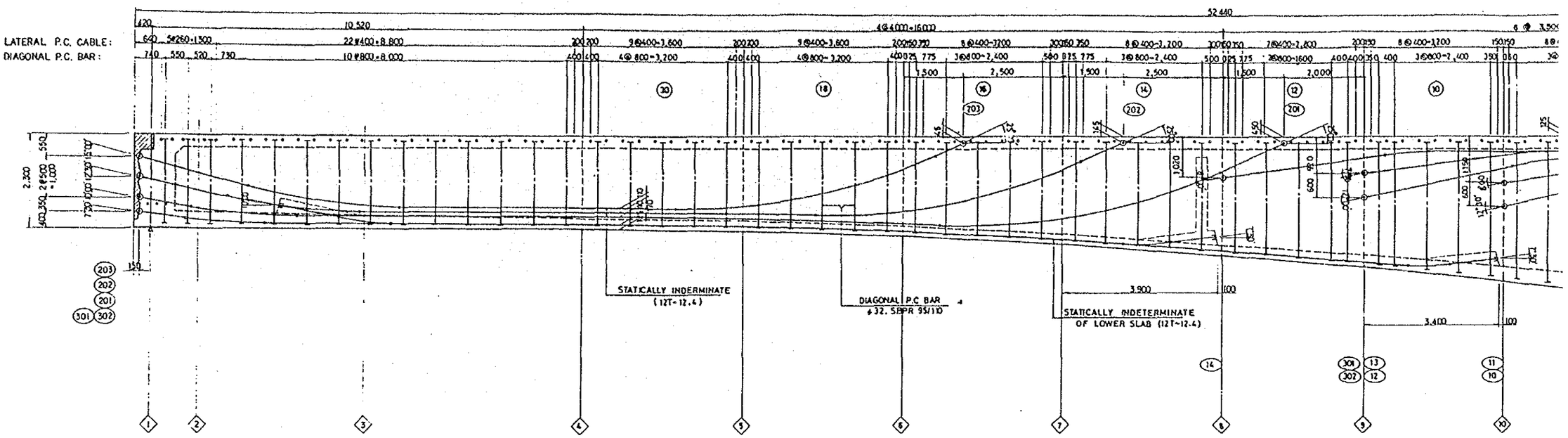
DIMENSIONS OF BOX GIRDER (2)



LOCATION MAP

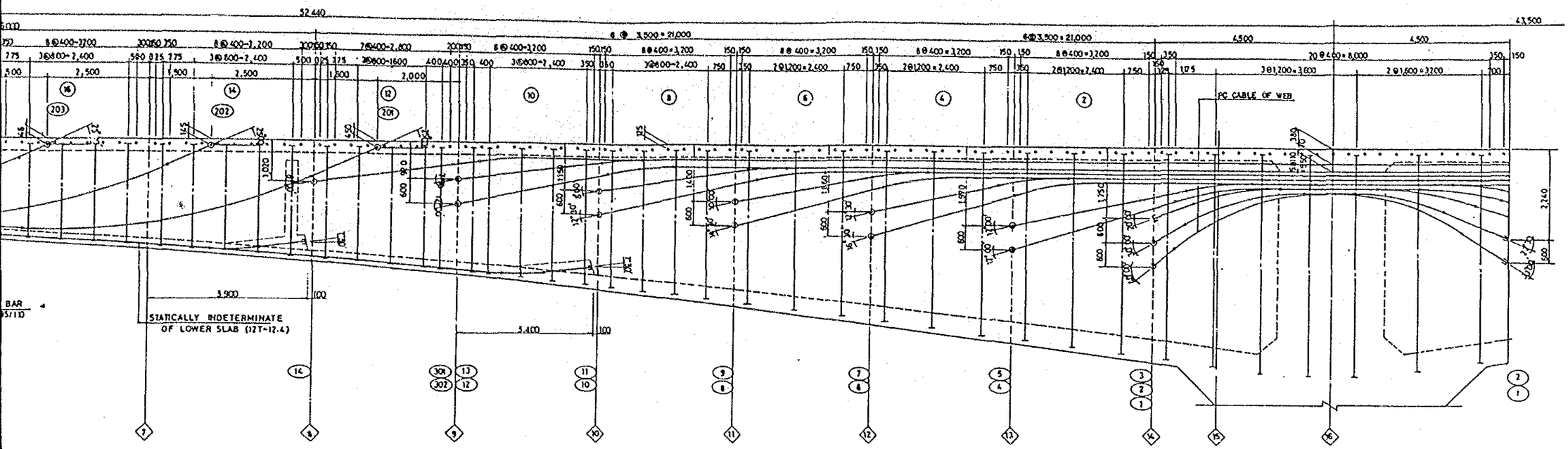
LONGITUDINAL SECTION

DIMENSION OF LATERAL P.C. CABLE:
DIMENSION OF DIAGONAL P.C. BAR:



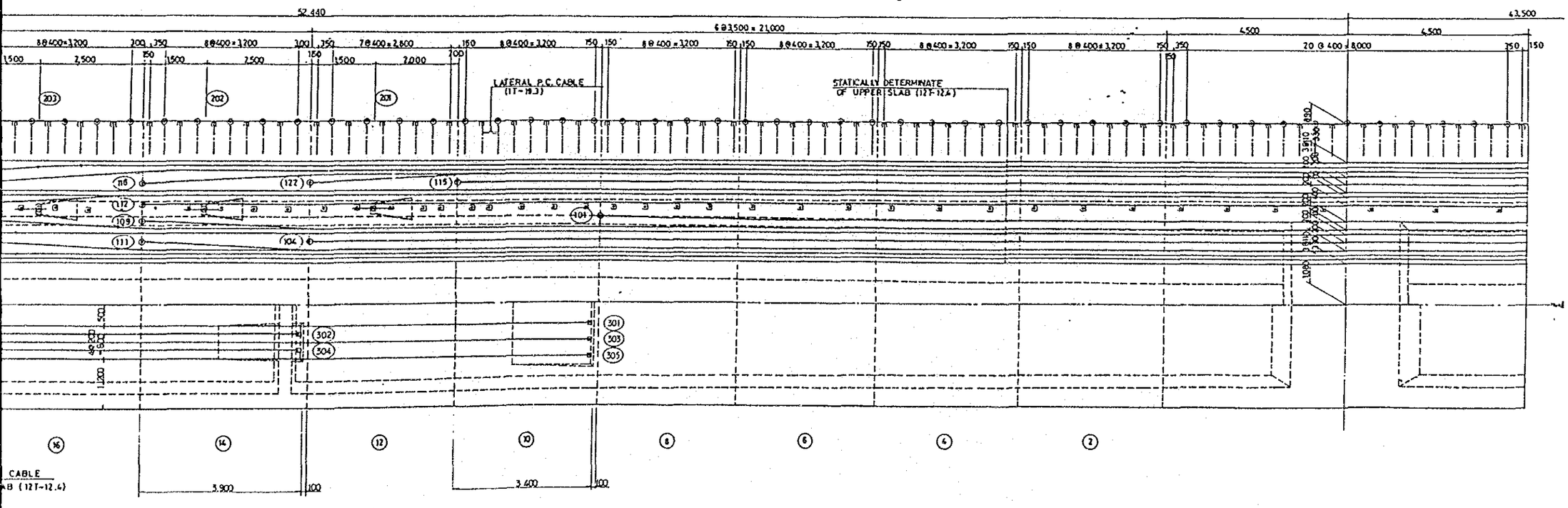
CABLE PLAN

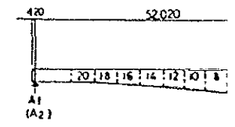
LONGITUDINAL SECTION



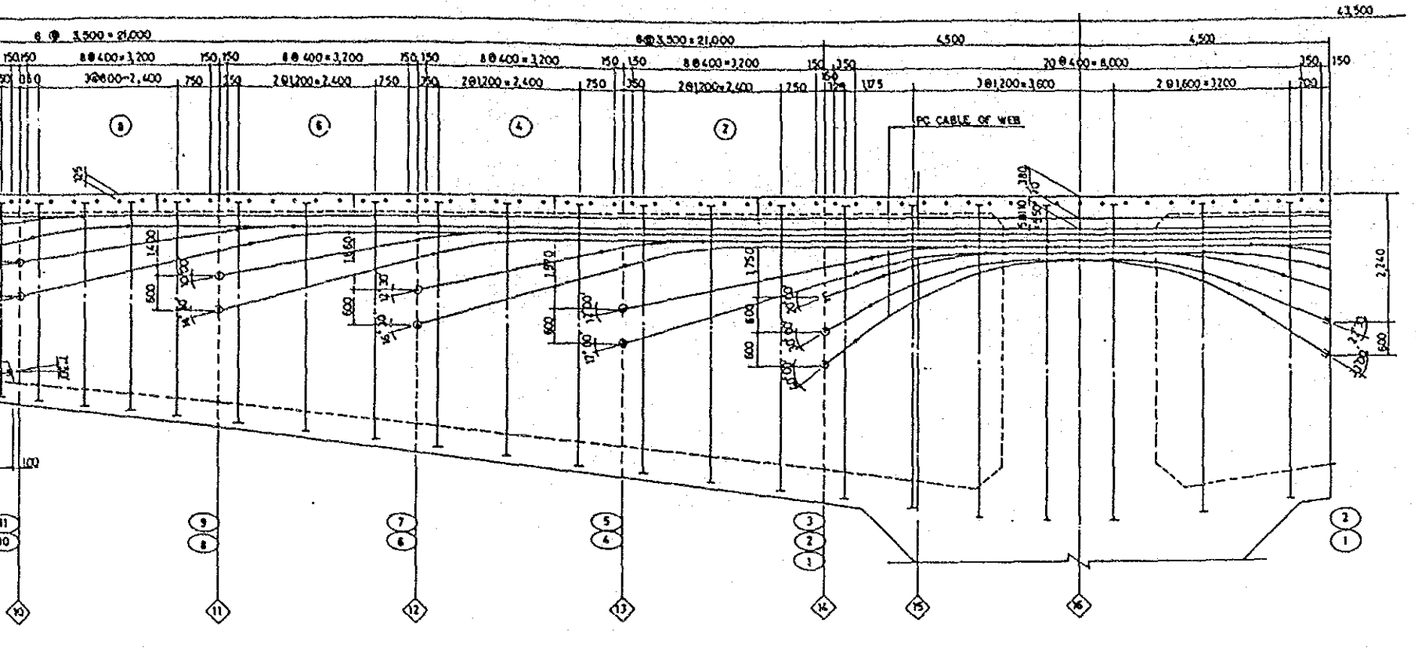
NOTES:
- Ⓝ : BLOCK NO.
- ◈ : SECTION NO
- Ⓡ : P.C. CABLE
- ⊙ : ANCHORAGE
- ⊣ : ANCHORAGE
- ▨ : RECESS FOR

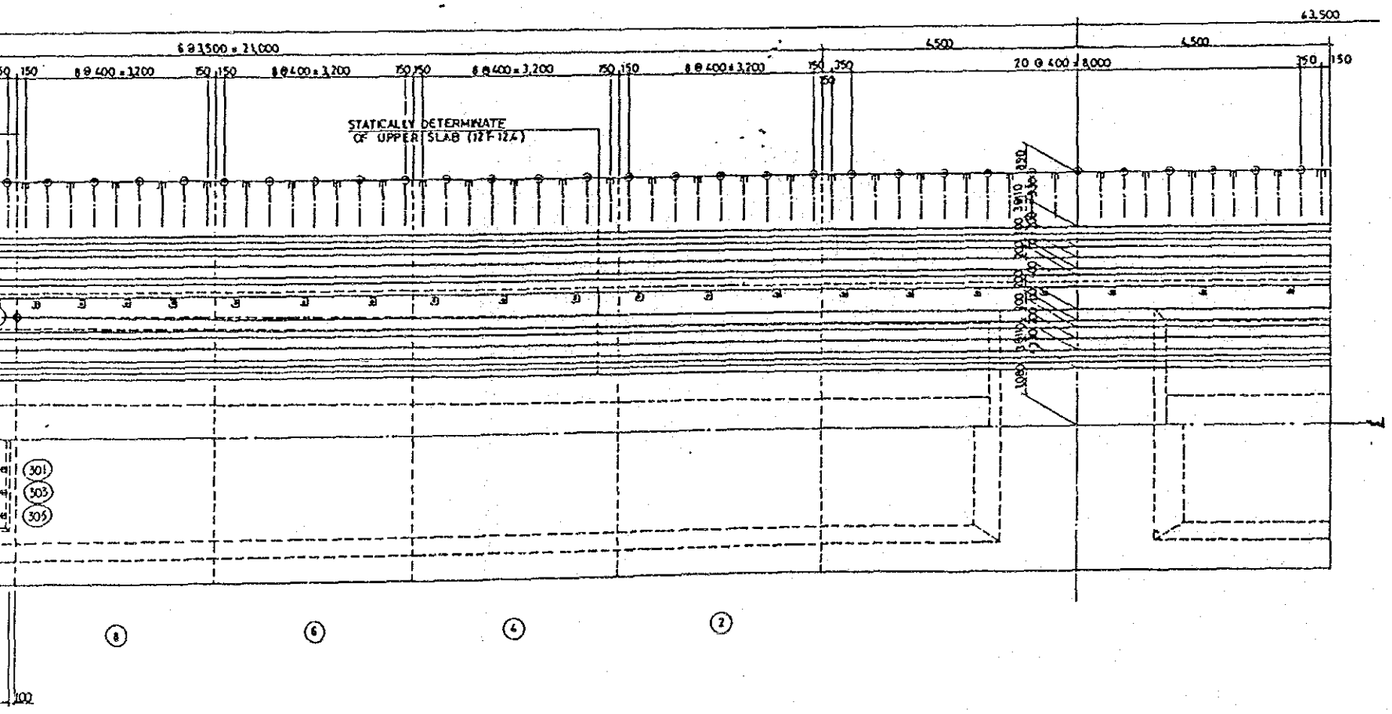
CABLE PLAN





LAYOUT PL

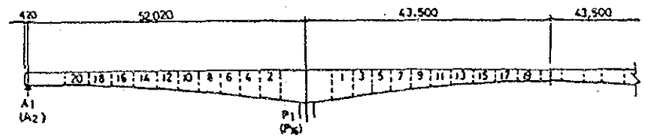




NOTES:

- Ⓝ : BLOCK NO.
- ◈ : SECTION NO. OF CALCULATION
- Ⓝ : P.C. CABLE NO.
- ⊙ : ANCHORAGE OF PRESTRESSING SIDE
- ⊣ : ANCHORAGE OF FIXING SIDE
- ▨ : RECESS FOR JACKING

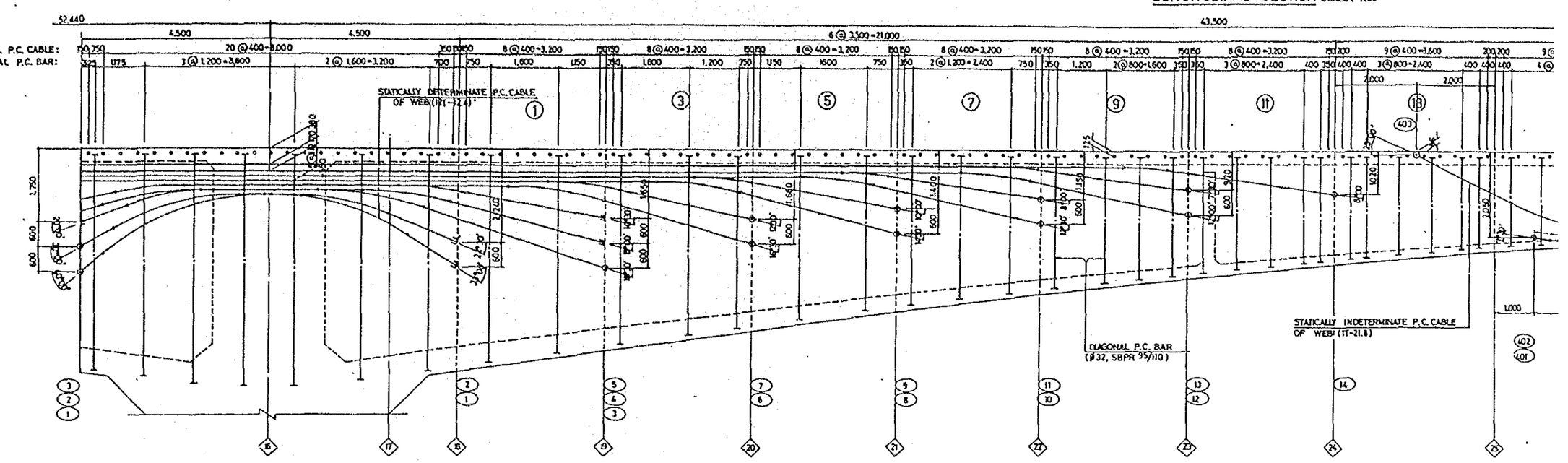
LOCATION MAP



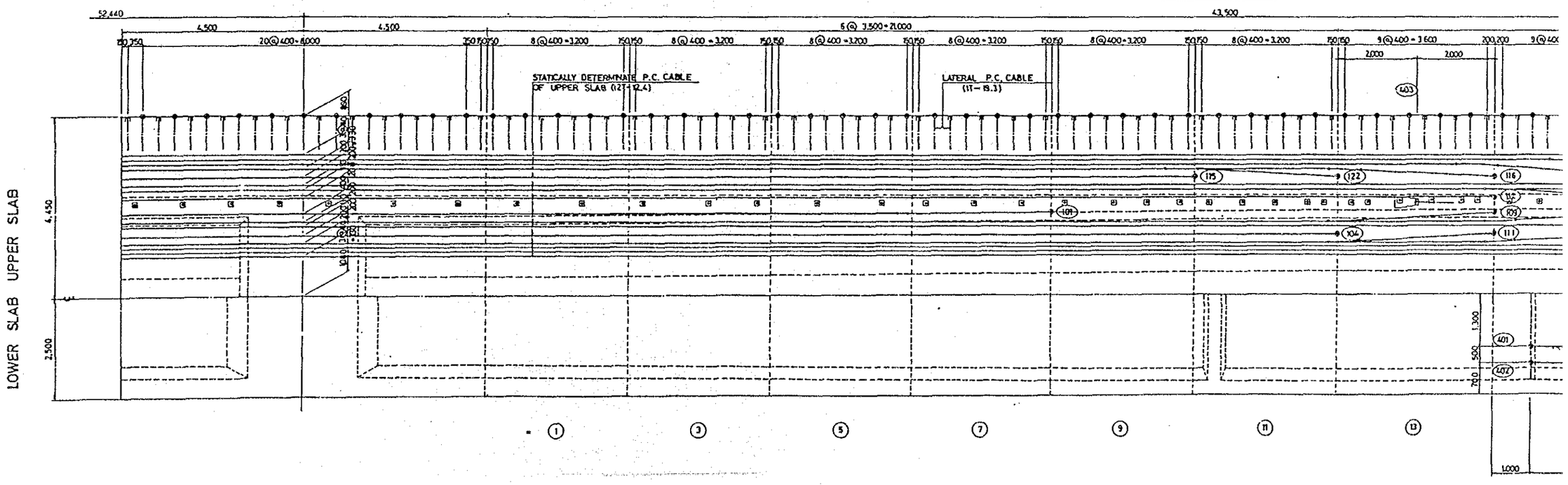
LAYOUT PLAN OF P.C. CABLES (1)

LONGITUDINAL SECTION SCALE : 1:50

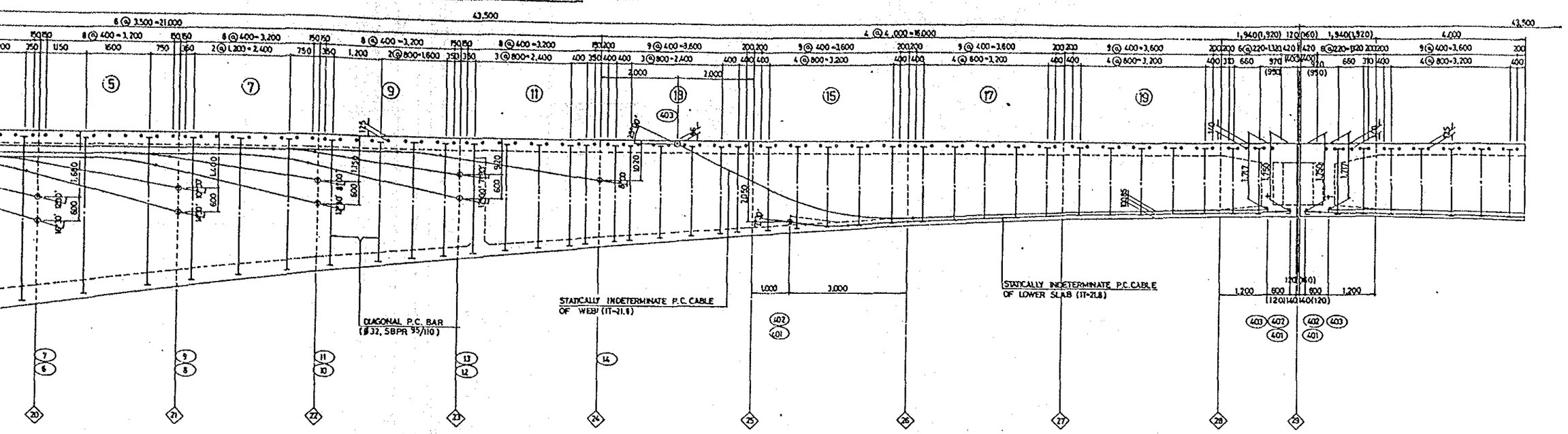
DIMENSION OF LATERAL P.C. CABLE :
DIMENSION OF DIAGONAL P.C. BAR :



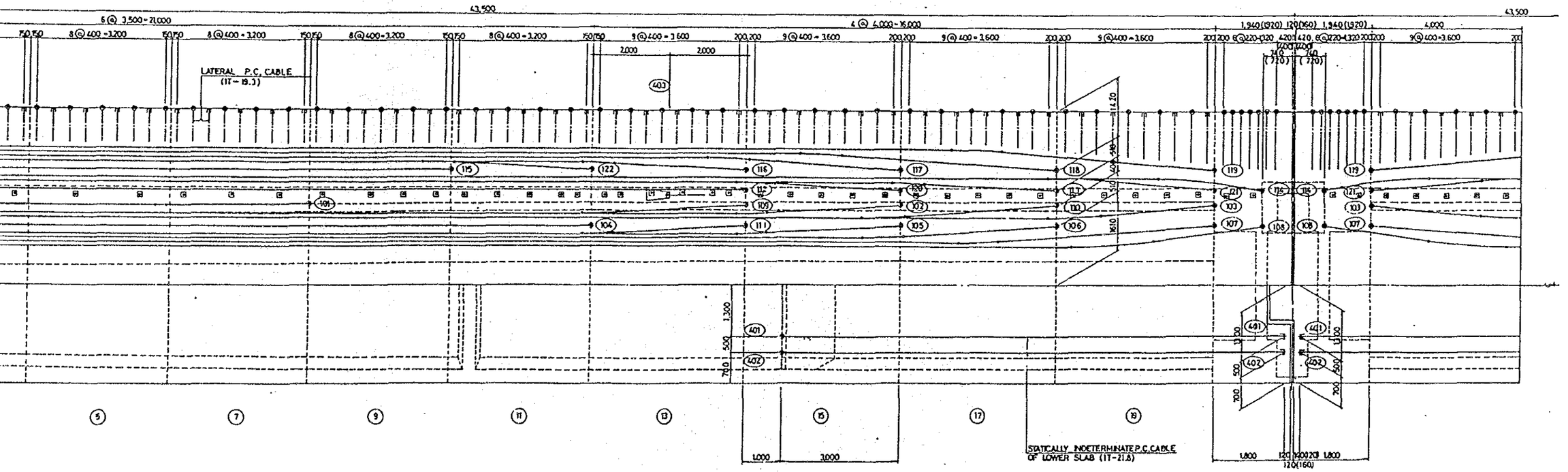
PLAN OF SLAB



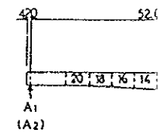
LONGITUDINAL SECTION SCALE: 1:50



PLAN OF SLAB

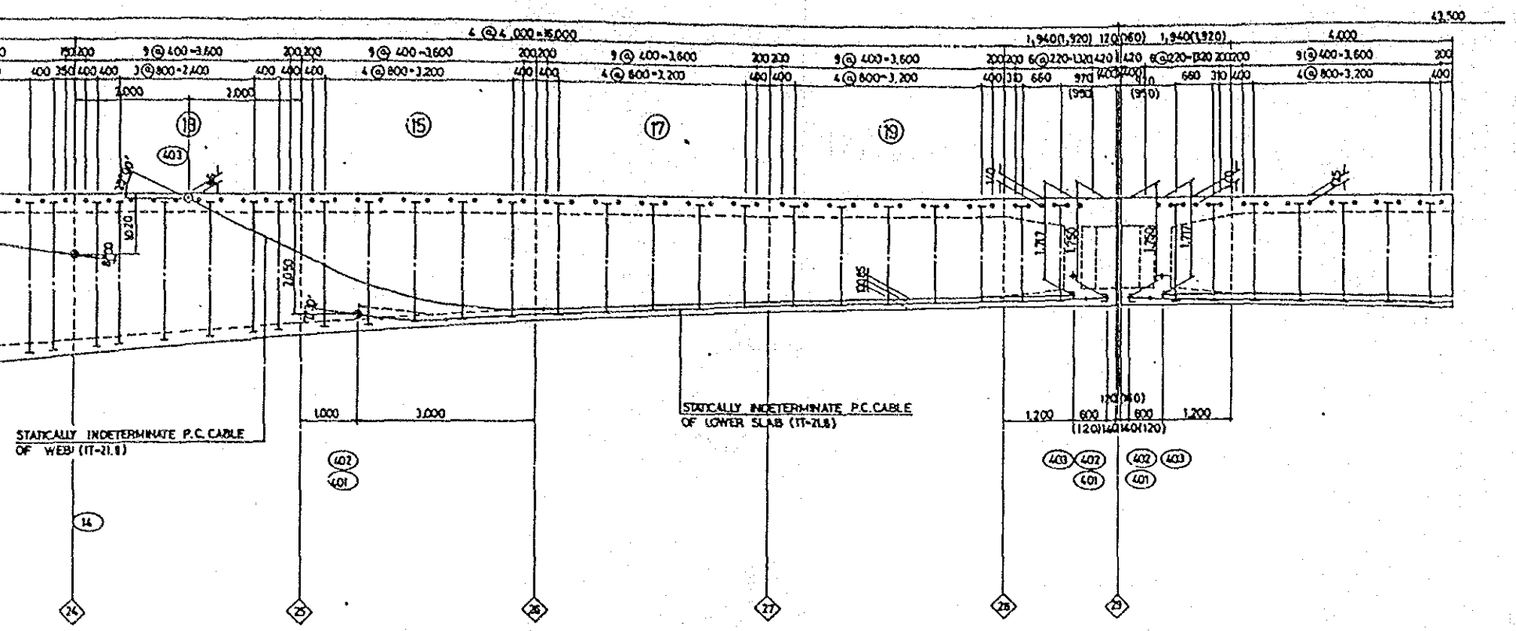


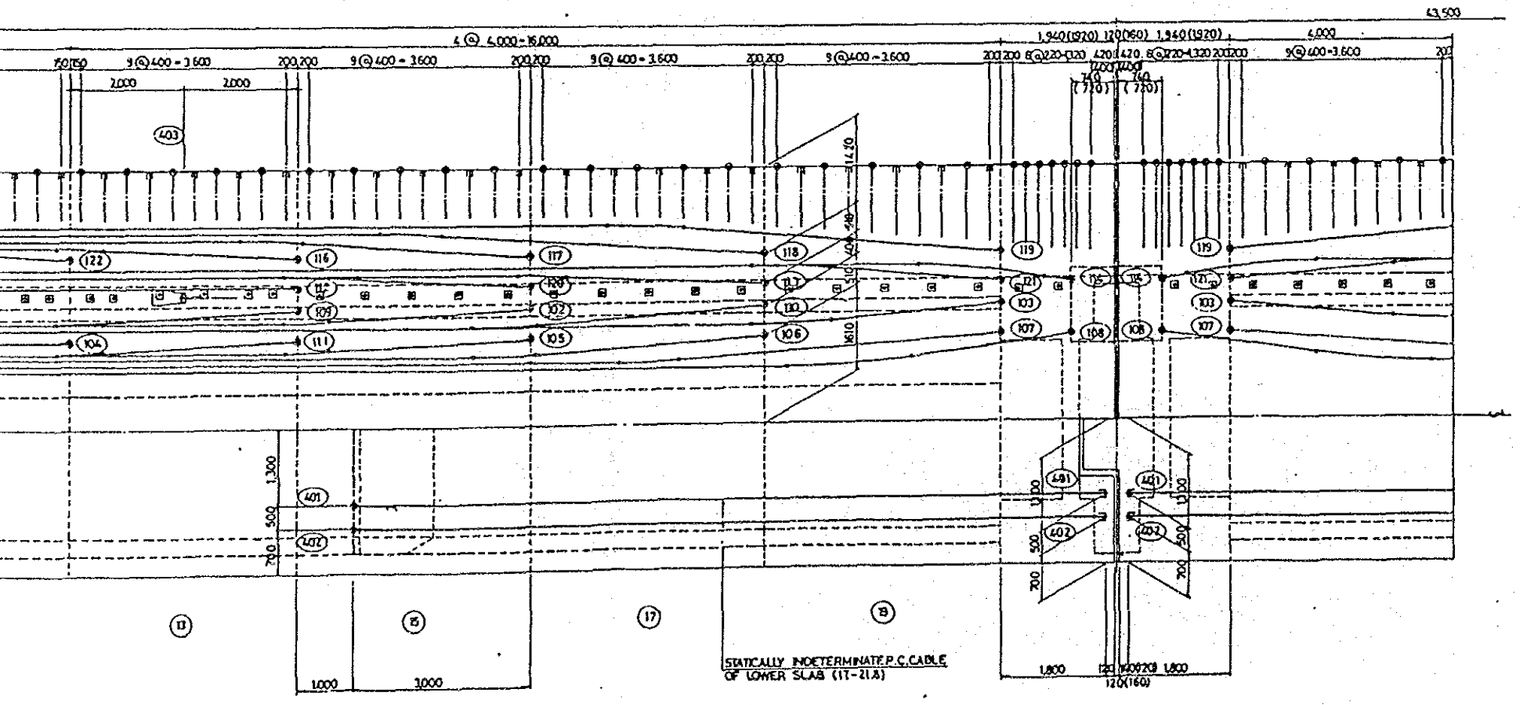
NOTE:
- ⓝ : BU
- ⓐ : SE
- ⓝ : P.C
- ⊖ : AN
- ⇒ : AN



LAYOUT

CTION SCALE : 1:50





NOTE;

Ⓝ : BLOCK NO.

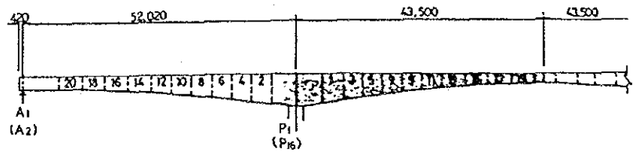
◈ : SECTION NO. OF CALCULATION

Ⓝ : P.C. CABLE NO.

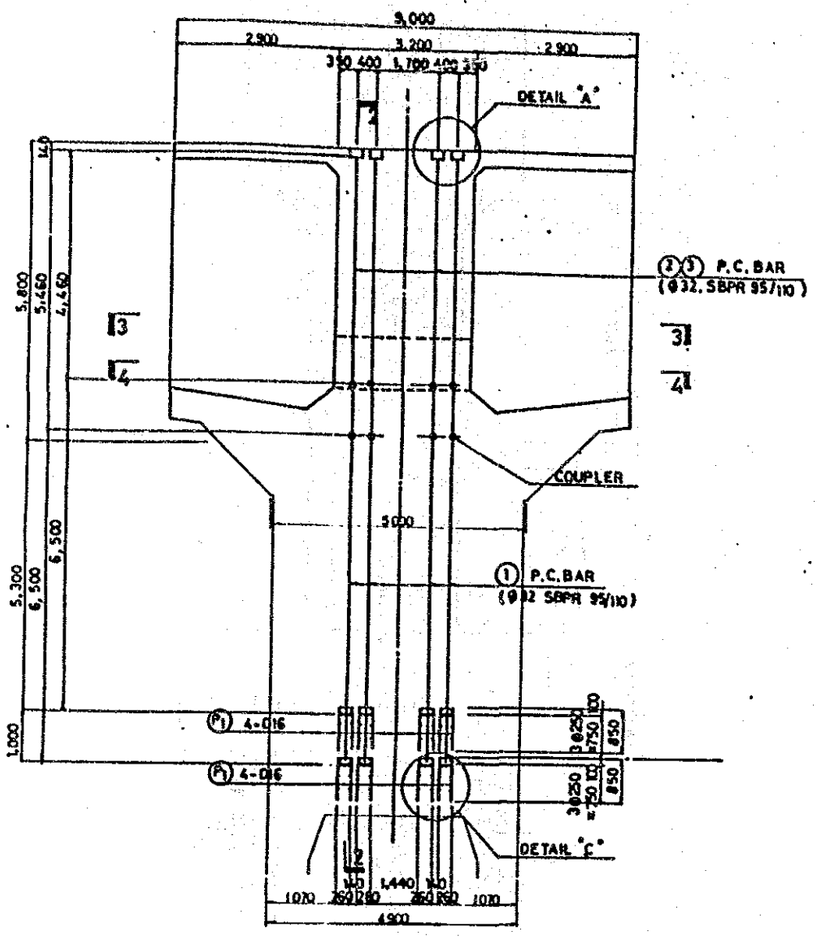
⊕ : ANCHORAGE OF PRESTRESSING SIDE

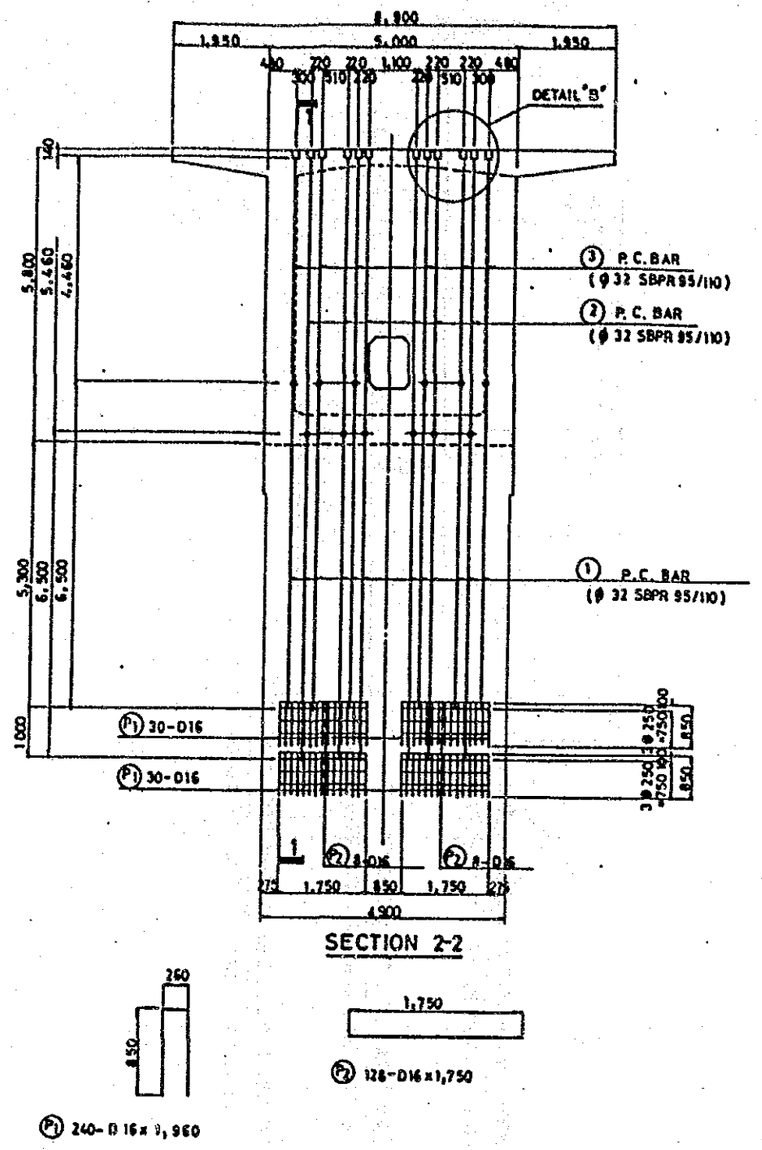
⊣ : ANCHORAGE OF FIXING SIDE

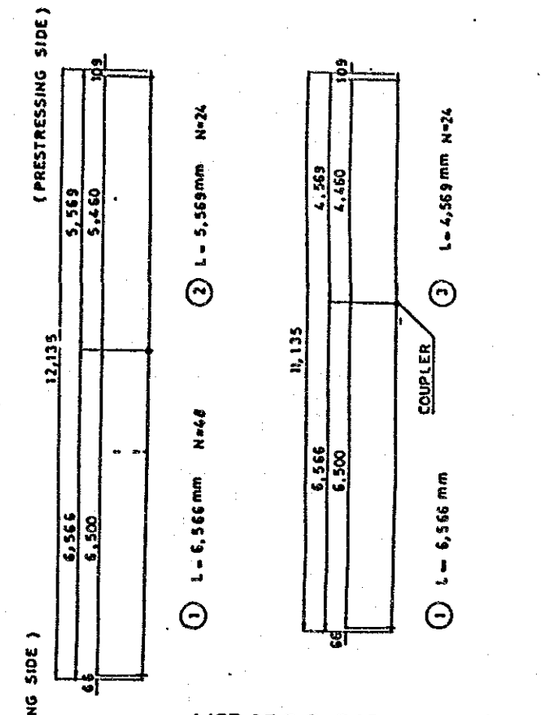
LOCATION MAP

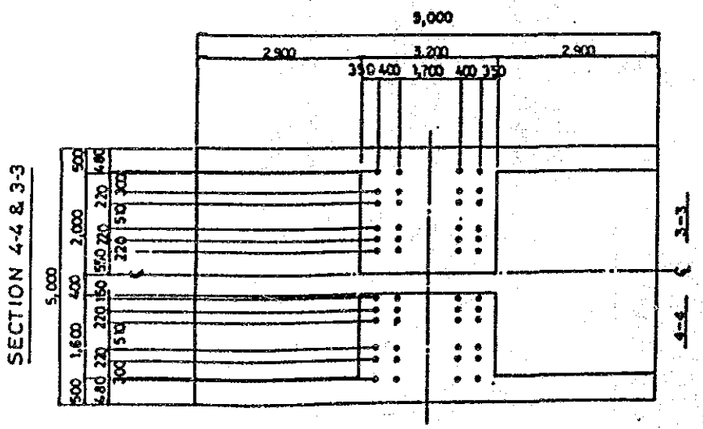


LAYOUT PLAN OF P.C. CABLES (2)



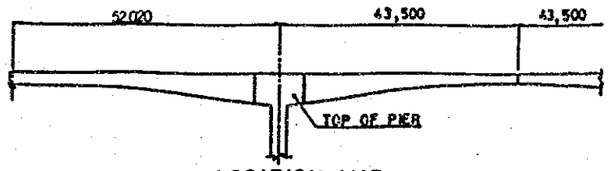






LIST OF REINFORCEMENT

MARK	SECTION	LENGTH mm	EACH	WEIGHT Kg/M	WEIGHT Kg/ONE	WEIGHT	REMARKS
P1	D16	1,960	240	1,578	3.09	742	⊓
P2	D16	1,750	128	1.578	2.76	353	—
						1,095	
TOTAL D16 — 1,095 kg							



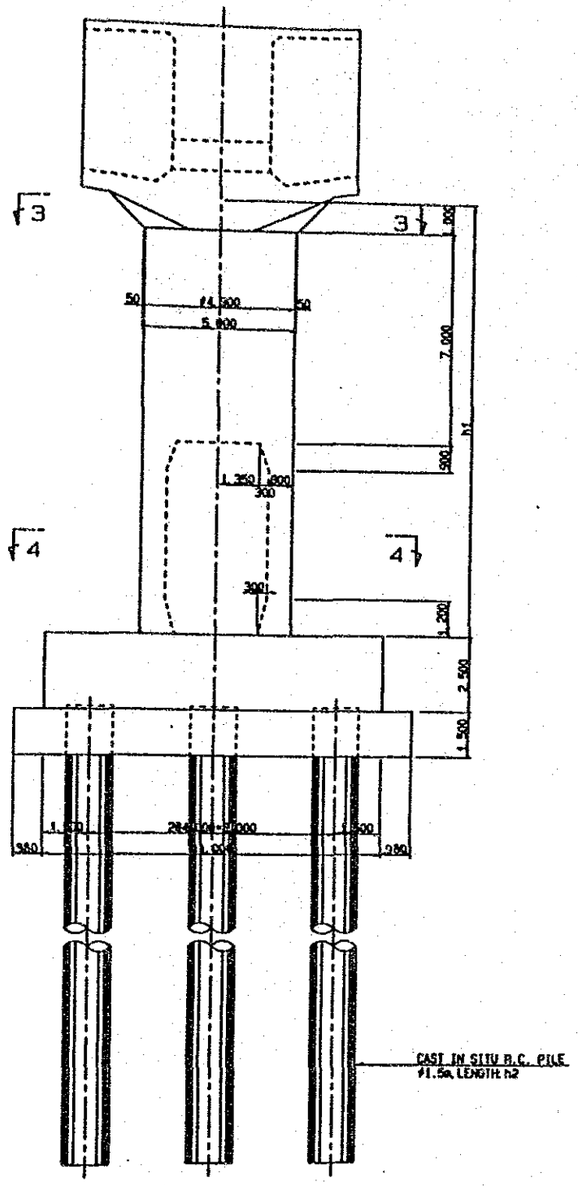
LOCATION MAP

LIST OF P.C. BAR

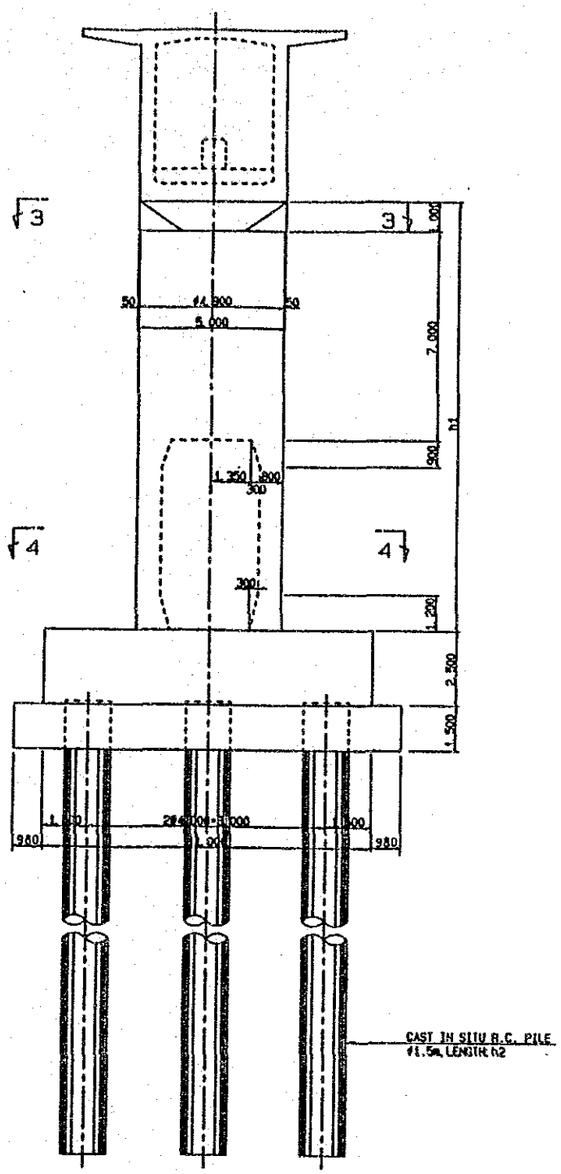
(φ32.SPBR 95/110)

BAR NO	KIND	LENGTH (mm) ONE	EACH	LENGTH	REMARKS
①	φ32	6,566	48	315.168	
②	φ32	5,569	24	133.656	
③	φ32	4,569	24	109.656	
TOTAL LENGTH				558.480m	
TOTAL WEIGHT				558.480 x 6.31 = 3,524.009 Kg.	
ANCHORAGE				96 SETS	
SHEATH LENGTH (φ24)				550.080m	
COUPLER				48 PIECES	
COUPLER SHEATH (L=250)				48 PIECES	

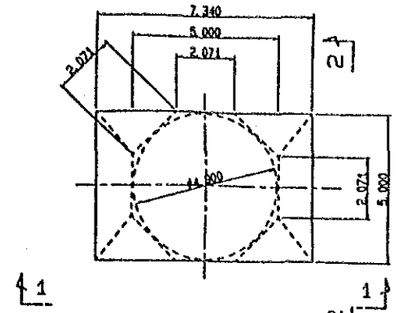
P.C. BAR ARRANGEMENT OF PIER TOP SEGMENT



SECTION 1-1



SECTION 2-2



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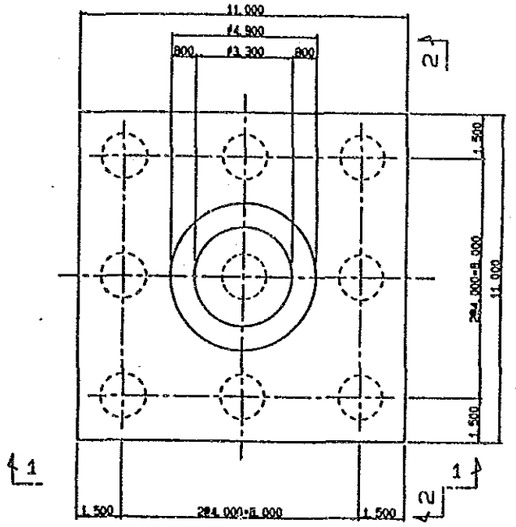
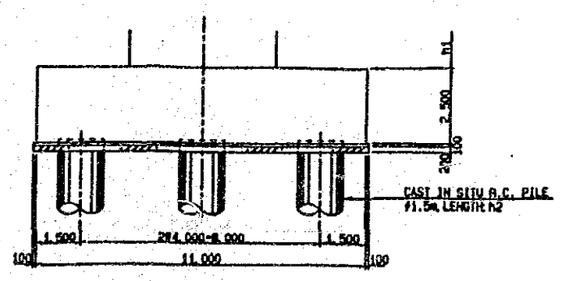


SECTION 4-4

	橋脚高 h1	杭長 h2	シールコンクリート (t=1.500)	内部コンクリート (t=100)	基礎砕石 (t=200)
P1	8.358	63.0	—	O	O
P2	16.957	58.0	O	—	—
P3	18.903	67.0	O	—	—
P4	19.828	70.0	O	—	—
P5	20.100	68.0	O	—	—
P6	20.361	65.0	O	—	—
P7	18.622	61.0	O	—	—
P8	14.880	59.0	—	O	O
P9	14.994	57.0	—	O	O
P10	14.880	57.0	—	O	O
P11	14.522	57.0	—	O	O
P12	14.361	62.0	—	O	O
P13	15.100	75.0	O	—	—
P14	15.828	80.0	O	—	—
P15	14.903	80.0	O	—	—
P16	12.957	76.0	O	—	—



P1, P8~P12

GENERAL PLAN OF SUBSTRUCTURE

CHAPTER 6 : IMPLEMENTATION PLAN

CHAPTER 6 IMPLEMENTATION PLAN

6-1 General

(1) Implementation

i) Responsible agency for the Project is the RHD of the Bangladesh Government

ii) Financial sources will be grant aid from the Japanese Government consisting of the technical cooperation for the detailed design, and the Project construction and supervision.

iii) The method of selecting Consulting Engineering firms will be directly appointed by RHD based on a recommendation from JICA. Contractors will be selected through competitive tendering among qualified Japanese contractors.

iv) The maximum utilization of Bangladesh sources, such as concrete materials, technicians, and labour, shall be considered.

(2) Work Components of the Project

Project construction work components are classified into the following groups:

Group 1 - Preparation Work
Group 2 - Approach Road
Group 3 - Substructure of Bridge
Group 4 - Superstructure of Bridge
Group 5 - Ancillary Work
Group 6 - Equipment Supply

6-2 Construction Conditions

(1) Basic Conditions to be Considered

The construction method and sequence have been planned to take into account the expected mode of construction and the construction target period.

In addition to the above, by taking into consideration such construction conditions as availability of construction forces, weather conditions geological site conditions and the topographical site conditions, the mechanized construction method as utilized in the Meghna Bridge construction will be applied principle.

(2) Construction During Rainy Seasons

The rainy season from June to November is considered in the Project area. Foundation work during rainy seasons is generally impossible due to the deep flood flow exceeding 10.0 m in elevation.

In the Meghna-Gumti Bridge site, there is a sandbar in the middle of the Meghna Branch and the Gumti Tributary where the water depth is less than 4.0 m even in flood seasons. Accordingly it is possible to construct the pier foundations on the sandbar during the rainy seasons provided that a construction access way is prepared by means such as a temporary channel or temporary staging.

It is noted that movement/cycle of river stages by seasons is recorded in the range from E.L. 0.7 m to E.L. 6.0 m as follows:

- The lowest period from January to March shows less than E.L. 2.0 m
- The highest period from July to September shows more than E.L. 4.0 m

Other periods (from April to June/from October to December) are transition periods between low levels and high levels. The above movement of the river stages is a key factor in planning the construction methods.

(3) Meandering Protection at Dhaka Side Riverbank

According to the river section survey of June 1990, it was observed that the Dhaka side riverbanks of the Meghna Branch were being eroded due to meandering toward the Dhaka side at the upstream side from the proposed abutment site. Other riverbanks were observed as being stable.

Considering the above, the proposed main construction yard at the Dhaka side riverbank will be effective protection against erosion of the abutment provided that sheet piles are driven along the water line of the

construction yard which will be embanked by dredging up to the level of E.L. 6.0 m.

The main reasons why the main construction yard is proposed at the Dhaka side riverbank are as follows:

i) It is convenient for transporting construction materials from the Dhaka market by road.

ii) For transporting imported construction equipment and materials from the Khulna-Mongla port by vessels.

iii) For transporting concrete aggregate, such as stone, shingles and sand from Sylhet by ships.

(4) Shorter Construction Period

The 5-year construction period for the Meghna-Gumti Bridge Project was proposed in the 1985 Feasibility Study. However, based on the experience gained from the Meghna Bridge construction (opened in July 1990) which was a 4-year construction period, the same period as for the Maghna Bridge, is proposed as the result of the review of the basic design for the Project in 1990.

The basic factors for proposing a shorter period than the original one are mentioned below.

i) The six pier-foundation work can be constructed on the sandbar during rainy seasons.

ii) The other two pier foundations near the abutments can be constructed in rainy seasons due to shallow water depths.

iii) The remaining eight pier foundations can be constructed in two dry seasons, which means that the substructure of the bridge can be constructed within 2-years after commencement of the main work.

iv) Each construction period for each work item was confirmed by reviewing the Meghna Bridge's monthly reports which made the period shorter than estimated.

6-3 Implementation Method

(1) Preparation Work in Pre-Contract Periods

i) Detailed Design

The detailed design of the Meghna-Gumti Bridge Project is scheduled to start as soon as possible after completion of the Basic Design Study.

ii) Land Acquisition

The permanent and temporary land for the Project Roads and Bridge shall be acquired before 1992 when the contract for construction will be awarded. Consultants shall conduct the cadaster survey at the inception of the detailed design and hand it over to RHD who will be responsible for managing the land acquisition.

iii) Maintenance of Existing Facilities

The existing facilities that were built for the Meghna Bridge construction will be maintained by RHD until they are handed over to the Contractors and Engineers for the Meghna-Gumti Bridge Project.

The main existing facilities are listed below:

- Engineers' office
- Laboratory
- Engineers' site residences

iv) Replacement of Ferry Ghat

At the Dhaka side bank of the Meghna Branch there are four ferry ghats being operated. The most upstream one is located less than 20 m from the centerline of the Meghna-Gumti Bridge. Accordingly, it is requested that it be relocated to the downstream side. The cost of relocation shall be borne by RHD.

v) Possession of the Site

The Comilla side approach road is now serving for unloading construction materials and as the stockyard for the road rehabilitation project by ADB.

All work sites including the above shall be in the possession of the Contractor for the Meghna-Gumti Bridge Construction Project. RHD is requested to vacate all work sites before the Contract is awarded.

vi) Tendering

Tendering will be conducted by the Consultants through advertisement of the Project, explanation of the Project, tender opening and selection of the Contractor. The latter two events will be held with officials from Bangladesh Government in attendance.

The tender opening and selection of Contractor is generally held at the office of the Japanese Consultants in Japan.

(2) Preparation Work

i) Mobilization Route of Imported Sources

It was reported by the Meghna Bridge construction Contractor that the Chittagong port could not be used to import construction materials, goods and equipment due to the port being loaded over its capacity. The Contractor mobilized his imported construction resources through the Khluna-Mongla port which provides a more convenient inland waterway of 300 km up to the bridge site during dry seasons, and 200 km during rainy seasons. The Khluna-Mongla port will be the main importing port for the Project, the same as for the Meghna Bridge project.

ii) Site Preparation of Facilities for the Engineer

The Engineers' site office, the laboratory and the site residence for inspectors were built for the Meghna Bridge construction. It will be possible to use them for the Meghna-Gumti Bridge construction because they are only 15 km away. Engineers' site liaison office shall be newly constructed at the new campyard for the Meghna-Gumti Bridge site.

iii) Contractor's Campyard

The campyard was already discussed to be newly prepare at Dhaka side riverbank of the Meghna Branch, and main construction facilities, such as screen plant, crushing plant, batcher plant and asphalt plant, will be timely installed. However, it is recommended to install the batcher plant on a barge as was done during the Meghna Bridge project.

iv) Safety Control in the Site

The centerline of the bridge was designed to be parallel with the existing ferry route. Special attention to safety control will be required at the site to prevent ferry boats and construction barges from colliding.

The minimum safety device proposed is to place a buoy line around the sandbar between the ferry course and the construction area.

Navigable course for public use shall be indicated at the site by means of buoy lines.

(3) Borrow Pits for Approach Road

The borrow pit for the Dhaka side approach road was selected at the riverbed of the Meghna Branch. The method of earth hauling is to be determined together with the construction yard embankment work.

The borrow pit for the Comilla side approach road may not be indicated in the Specifications which requires the Contractor to negotiate the use of neighbouring borrow pits or to dredge soil from the Gumti riverbed.

(4) Substructure of the Bridge

i) Cofferdam

Prior to drilling for the foundation piles in the river, cofferdams shall be constructed for which structures are designed with steel piles of 0.8 m diameter and planned to repeatedly use the 6-set of cofferdams for the 16-pier group.

The cofferdams installed in the Meghna Branch shall be relocated prior to the end of May when the water levels will rise over R.L. 4.0 m. These cofferdams will be reused for the piers on the sandbar, during rainy seasons.

ii) Reverse Circulation Drill Pile

The cast-in-place concrete piles will be drilled with a 75 kw-class reverse circulation drill machine which will be mounted on a 300 ton barge.

The work progress is estimated at 10 piles to be driven a month. This will require the mobilization of two drilling fleets for the Project.

iii) Concreting of the Piers

After placing seal concrete, the cofferdam will be dewatered for the treatment of pile heads and concreting of pile caps. Concreting of substructures will be made with a concrete batcher plant ship. The maximum mixing capacity of the plant is required to be about 25 m^3 per hour which will enable completing the concreting of a pile cap to 90 m^3 within a day.

(5) Superstructure of the Bridge

i) Form Works by Vorbauwagen

The superstructure of the bridge is a box girder fixed to the pier and connected with hinges at midspan. The box girders are constructed with support of the Vorbauwagen which will be repeatedly used for two or three times until a total seventeen spans of the superstructure will be completed.

The construction method is called the "cantilever construction method" as applied to the Meghna Bridge. It starts symmetrically outwards from the piers simultaneously in order to avoid high asymmetric overturning moments to the piers. The cycle time of each

segment is expected to be 7 days for one cycle from shifting of forms, concrete placing, curing and tensioning PC cables. The concreting method is the same as for the substructure.

ii) Center Hinge Connection

The superstructure has fifteen center hinge connections at each midspan except for the two end spans. The required engineering is to control deflections caused by cantilever erection by travelling forms, by cast concrete, by prestressing, by load of pavement, handrails, walkways and kerbs, by creep and shrinkage in concrete, and by the elastic deformation caused by the self-weight of travelling forms.

The technology transfer for the above was made to Bangladesh engineers through the Meghna Bridge construction from 1989 to 1990.

6-4 Construction and Supervision Plan

(1) Construction Management

The selected Japanese Contractor will dispatch the following staff in order to manage the operation of each construction stage:

- Superintending Engineer
- Manager of Construction
- Manager of Administration
- Concrete Expert
- Reverse Circulation Pile Experts
- Structure Experts
- Prestressing Experts
- Plant-installation Expert
- Mechanics
- Dredging & Steering Experts

Office administration and engineering will be assisted by Bangladesh staff throughout the entire construction period.

The operation of each work item will be performed by the Bangladesh contractors to be recruited.

(2) Supervisioin Plan

The construction will be supervised by Consulting firms under independent contracts with RHD. The Consulting firms are generally the firms who will complete the detailed design of the Project.

After awarding the Contract, the Consulting firms will dispatch the following Japanese Engineers:

- Project Manager
- Deputy Project Manager
- PC Bridge Engineer
- Structure Engineer
- Highway Engineer
- Material Engineer
- Surveyor

In addition to the above, Bangladesh Engineers and administrative staff will be organized into a supervisory team similar to that formulated for the Meghna Bridge construction.

6-5 Procurement Plan

(1) Construction Materials and Equipment

The procurement of construction materials and equipment will be the same as for the Meghna Bridge as follows:

Materials and equipment procured from Japan

- PC tendon
- Admixture for concrete
- Steel forms
- Plants and equipment
- Steel structures fabricated for temporary facilities

Materials and equipment procured in Bangladesh

- Cement
- Steel bars
- Aggregate (stone, shingle, sand)
- Wooden forms
- Asphalt
- Equipment & Shaped steel (partially)

6-6 Implementation Schedule

(1) Pre-Construction Program

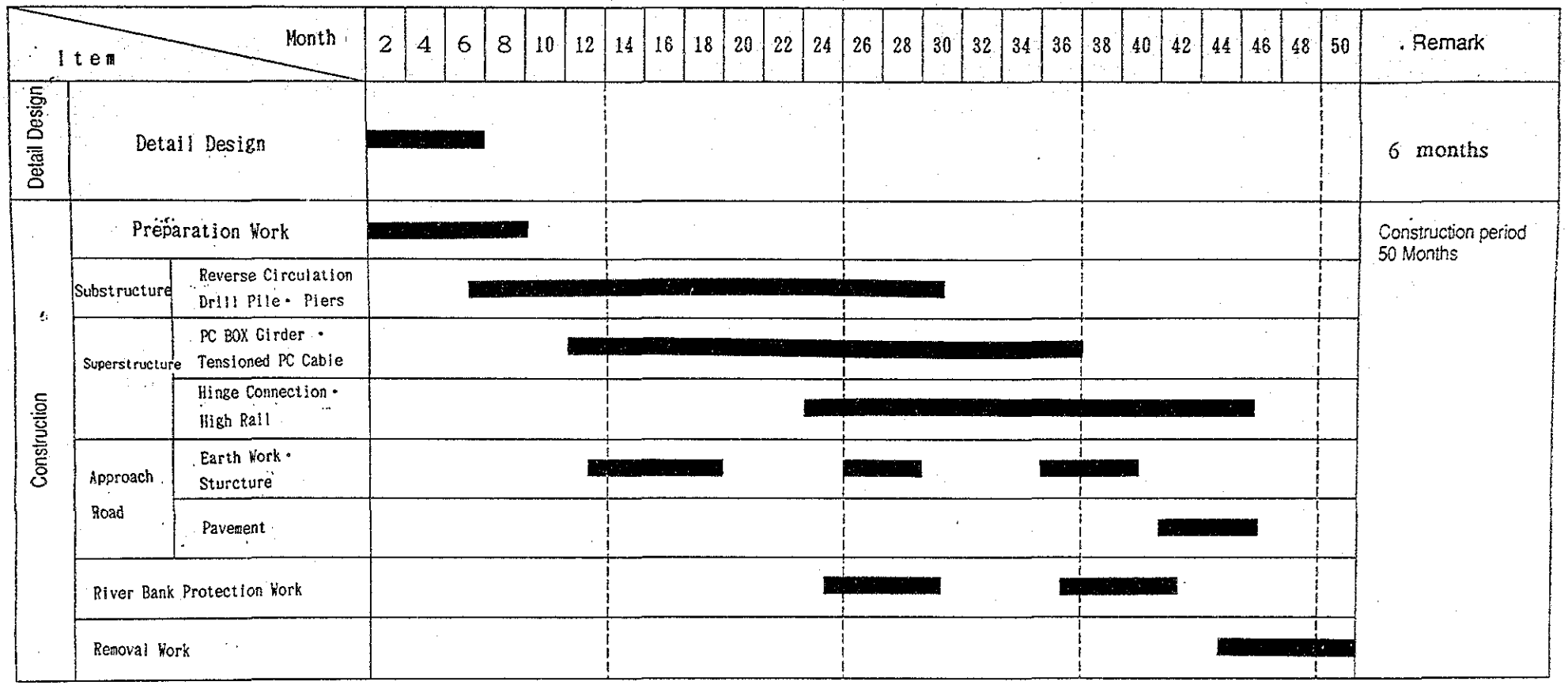
Pre-construction activities will comprise the preparation of the detailed design and tender documents, and for land acquisition, awarding of the supervision service contract, the prequalification of contractors, tendering, evaluation and award.

(2) Construction Schedule

The Project construction period is expected to be fifty (50) months.

Tentative Construction schedule shown in Fig. 6-1.

Fig. 6-1 BRIDGE CONSTRUCTION SCHEDULE



CHAPTER 7 : PROJECT EVALUATION AND CONCLUSION

CHAPTER 7 THE EFFECTS OF THE PROJECT AND CONCLUSION

7.1 The Effects of the Project

The construction of the Meghna-Gumti Bridge has brought about favourable economic effects to the entire southeast economic region where there is the largest concentration of the population, and is the most important area in Bangladesh. The Dhaka-Chittagong Road traverses this area which comprises 30% of the population (1981 Census) and 32% of the GNP (1987/88 statistics). Land transportation in Bangladesh originates in Dhaka and Chittagong, and is centered in the corridor connecting the two cities. 50% of the total freight transportation starts and terminates in Dhaka, and 30% is in Chittagong. For this reason, and due to the position of the bridge project on the Dhaka-Chittagong Road, the road handles the largest portion of passenger and freight transport in Bangladesh, and it goes without saying that it is the most important trunk road in Bangladesh. The road is the main artery for the economic activities in Bangladesh, and contributes to the vitalization of Bangladesh as a whole.

The effects that this project has brought to the country can be divided into direct and indirect results.

(1) The Direct Effects

The direct benefits that this project could bring to Bangladesh were outlined in the Meghna - Meghna-Gumti Bridge Project Report prepared in March 1984, in which report the following items were listed as some of the benefits which could be derived from this project:

- Savings in ferry investments
- Savings in ferry operations investments
- Savings in vehicle operating costs
- Time savings

The savings in investment in ferries can be listed as savings in cost of ferry boats, ferry docking facilities, and other ferry terminal expenses

which would become necessary with the increase in traffic in the future. The savings in ferry operational costs would be for the ferry operations, and vehicle operating costs, and the time savings.

The same report described the construction of the Meghna Bridge first, and then to construct the Meghna-Gumti Bridge subsequently, and reported that by not including the costs of construction and benefits, forecasted the economic effects would be as follows (assuming a project life of 30 years after completion of the project):

Internal Rate of Return	:	14.8%
Net Present Value	:	310.0 m Taka (discounted by 10%)
Cost to benefit Ratio	:	1.73 (discounted by 10%)

The results this study has revealed that the Pre-conditions of the economic analysis, the Transportation Planning Forecast Details have not changed even after 5 years after the time that the report was prepared. Also, the Traffic Volume Study Report now indicates that the forecasts made at that time are now far exceeded, and when it is considered that the total bridge has been shortened by approximately 70 meters, the results of the above mentioned economic analysis can be accepted as being accurate.

It has been an opportunity to be able to cooperate in the construction of the Meghna Bridge, and to be able to cooperate a second time in the Meghna-Gumti Bridge construction project doubles our efforts to cooperate in this project.

(2) Indirect Effects

The construction of the Meghna and the Meghna-Gumti Bridge projects will result in indirect effects. The results described above are the direct effects which the 3rd Five Year Plan established as the top priority and most important for the Road Sector, and the main objectives of the 3rd Five Year Plan to ① increase employment opportunities, ② accelerate economic growth (expand export capabilities) will be enhanced, and these positive effects must be taken notice. Employment and balance of payment are the most important matters for the Bangladesh economy, and this will required

improving the basic support of the social structure. In the following the indirect effects of this project will be described among others:

i) The Effects on Increasing Employment

In Bangladesh approximately 60% of the working populational is engaged in agriculture. It is almost impossible to increase employment by expanding agriculture since a great percentage of farmers do not own their own land, and the international aide organizations have started to increase their assistance for a composite agricultural development plan to include the development of commercial services industries and home industries.

The Comilla Prefecture which is located midway on the Dhaka-Chittagong Road ranks next to Dhaka in its industrial activities, and the GDP of 8.42 m Taka (1987 statistics by BSS) is next to the 12.25 m Taka of Dhaka, and is considered to be most favourable area for the development of the composite agricultural development. Since there is tendency of people flowing to Dhaka and Chittagong cities, so the development of industries in the Comilla Prefecture as a hinterland for the development of industries related to agriculture as the main feature highly anticipated.

Fig. 2-3 indicates that the truck traffic volume between Dhaka-Comilla sector is much smaller than that between Chittagong-Comilla sector since it is between the two bridges of Meghna and Meghna-Gumti. This project will remove the loss in traffic from the use of the ferry system. A constant flow of traffic will permit the accelerated growth of development and lead to expansion of investments to the developed areas and create a secondary growth and increased employment opportunities.

ii) The Effects of Accelerated Export Capabilities

In order to improve the balance of payments, it is essential to increase exports. At the present time garments, jute and leather goods comprise approximately 80% of the total exports, and the recent trend is the marked increase of garments over jute and leather goods, and

garments has taken away the top position of the traditional export items. These industries have indicated that they can hold a dominant position in the area of processed goods and labor intensive merchandise when compared with the other ASEAN countries.

An export processing area is being developed in the Chittagong area, but the export processing procedures and the centre of industries is in Dhaka, and it is becoming important to keep the Dhaka-Chittagong Road in a good state of repair to keep matters flowing smoothly. When the Meghna, Meghna-Gumti Bridges are completed, the travel time between Dhaka and Chittagong which requires some 12 hours will be reduced to about one-half this time, together with improved roads, which will contribute to reduction in the overall travel costs. This will permit the garment manufacturers to reduce costs since they must import their materials, process them into finished garments, while paying a high price for the transportation (about 35% of the export cost). Garments can be made at anywhere if the transportation costs can be reduced, and improve the opportunity for overseas investors, and favourably affect export.

iii) Other Indirect Effects

- There has been large amounts of sile deposited in the route of the Meghna-Gumti Ferry, which has caused difficulties in the operation and expansion of the ferry system. Construction of the bridge will make it unnecessary to perform any more improvement of the river stream.

- With the removal of the Meghna-Gumti Ferry, the large demand for funding of ferry boats and their docking facilities can transferred to other ferry system requirements where new investments have been deferred. In the overall picture, contributions can be made to the transportation system of Bangladesh as a whole. At the same time the removal of the Meghna-Gumti Ferry System can make it easier for navigation plying the Meghna-Gumti River.

- The implementation of large construction projects such as this, will provide a large impetus to the labour force, and create a large demand of local resources by procurement actions and will result in a large contribution to the local labour market by the recruitment of local labor.

7.2 Conclusion

In view of the above, the implementation of the Project will remove the Dhaka-Chittagon Highway's Meghna-Gumti ferry site and will permit the smooth flow of road traffic and will improve the living environment of those residents living in the vicinity of the ferry site. Furthermore, the Project bridge will contribute greatly to the activation of the economy and industries in the urban areas. Thus, the early implementation of the Project with grant aid from the Government of Japan is thought to be appropriate and worthwhile.

[APPENDICES]

APPENDICES

Appendix 1 Members of the JICA Teams

(1) The Basic Design Study Team for Field Survey (May 17 ~ June 30, 1990)

Name	Title	Present Position
Mr. Masaaki TATSUMI	Team Leader	Director, First Design Division Design Department Honshu-shikoku Bridge Authority
Mr. Shinya SUZUKI	Grant Aid	Grand Aid Division Economic Cooperation Bureau Ministry of Foreing Affairs
Mr. Akihiro MATSUMOTO	Coordinator	2nd Basic Design Study Division Grand Aid Planning and Design Department, JICA
Mr. Akira SHIKICHI	Chief Overall Design Management	Transportation & Development Department, Pacific Consultants International
Mr. Satoshi WATABE	Structural Engineer (Superstructure)	Transportation & Development Department, Pacific Consultants International
Mr. Junji MASHIBA	Structural Engineer (Substructure)	Transportation Engineering Department, Nippon Koei
Mr. Tohru KAWAKAMI	Construction Management	Transportation Engineering Department, Nippon Koei
Mr. Kazuo CHOSHI	Soils and Materials Engineer	Transportation Engineering Department, Nippon Koei
Mr. Toshinori OSHITA	Hydrologist	Water Resources Development Department, Pacific Consultants International
Mr. Takuro TERASHIMA	Geodetic Engineer	Transportation Engineering Department, Nippon Koei
Mr. Naoya OGAWA	Construction Cost Estimator	Transportation & Development Department, Pacific Consultants International

(2) The Basic Design Study Team for Explanation of the Draft Report
(September 22 - September 28,1990)

Name	Title	Present Position
Mr. Masaaki TATSUMI	Team Leader	Director, First Design Division Design Department Honshu-Shikoku Bridge Authority
Mr. Tetsuya SUZUKI	Coordinator	1st Project Management Division, Grand Aid Project Management Department, JICA
Mr. Akira SHIKICHI	Chief Overall Design Management	Transportation & Development Department, Pacific Consultants International
Mr. Tohru KAWAKAMI	Construction Management	Transportation Engineering Department, Nippon Koei

Appendix 2-1 Minutes of Discussions, June 21, 1990

THE MINUTES OF DISCUSSIONS ON
THE BASIC DESIGN STUDY ON
THE PROJECT FOR CONSTRUCTING MEGHNA - GUMTI BRIDGE IN
THE PEOPLE'S REPUBLIC OF BANGLADESH

In response to the request of the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct a basic design study on the Project for Constructing Meghna - Gumti Bridge (hereinafter referred to as the "Project"), and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the study team headed by Mr. Masaaki Tatsumi, Director, First Design Division, Design Department, Honshu-Shikoku Bridge Authority, to carry out the Study form 17 May to 30 June, 1990.

The team had a series of discussions on the Project with the officials concerned of the Government of the People's Republic of Bangladesh and conducted a field survey at the Project Site.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Dhaka 21 June, 1990

M. Tatsumi

Masaaki Tatsumi
Leader
Basic Design Study Team, JICA

21/6/90

M.A. Bari
Chief Engineer
Roads and Highways Department
Roads and Road Transport Division
Ministry of Communications

ATTACHMENT

1. Name of Project

The Project for Constructing Meghna - Gumti Bridge

2. Objectives of the Project

The objectives of the Project are to construct the bridge over the Meghna - Gumti River to provide for uninterrupted road transport between Dhaka and Chittagong and to contribute toward the enhancement of the nation's economic activities.

3. Implementing Body

The Roads and Highways Department (RHD), Roads and Road Transport Division (RRTD), Ministry of Communications is the Government agency responsible for the implementation of the Project.

4. Construction Site of the Project

The Construction Site of the Project is located at upstream of the existing Meghna - Gumti ferry ghats. General location of the construction site of the Project is shown in Annex I.

5. Implementation

RHD has confirmed that when the implementation of the construction of Meghna - Gumti Bridge started, no disruption to the construction schedule should occur. Necessary land acquisition and properties compensation will be completed prior to the start of the construction.

6. Outline of the Project

1)	Bridge Length	:	Approximately 1.4 Kilometres
2)	Dhaka Side Approach Road	:	Approximately 1.0 Kilometre
3)	Comilla Side Approach Road	:	Approximately 0.5 Kilometre
4)	Superstructure	:	Prestressed Concrete

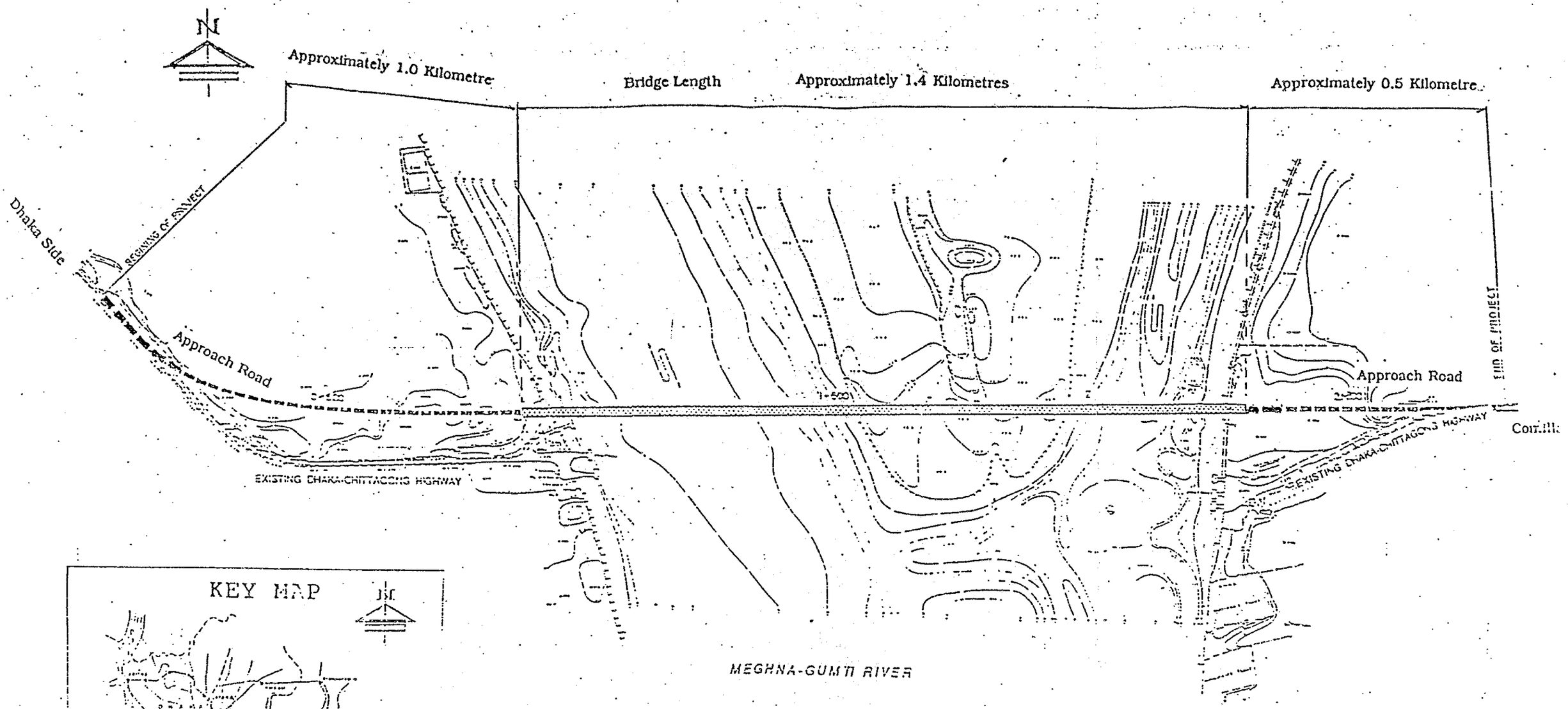
5)	Pier Colums	:	Reinforced Concrete
6)	Foundations	:	Cast-in-place Reinforced Concrete Piles
7)	Number of Lanes of Bridge and Approach Roads	:	Total 2 Lanes (One Lane Each Direction) and 1.0 Metre Sidewalk on Both Sides
8)	Lane Width of Bridge and Approach Roads	:	3.6 Metres for Bridge and 3.35 Metres for Approach Roads as shown in Annex IV
9)	Navigation Clearance	:	75 Metres Width x 7.5 Metres Height for Both Branch Meghna River and Gumti Tributary
10)	Material of Bridge	:	Concrete for Both Superstructure and Pier Columns
11)	Design Standard	:	Follows JICA Feasibility Study Report Submitted to the Government in 1985
12)	Vertical Alignment of Bridge	:	Vertical Alignment of the Bridge will be Determined Considering the Passages of Boat Traffic during Flood Season

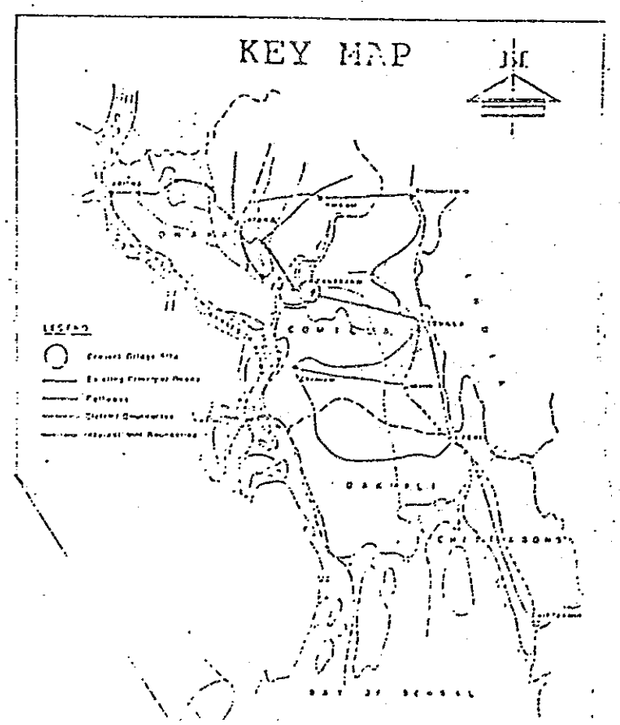
7. Budget for Bangladesh Side Undertaking

RHD has agreed to secure the budget for fulfilling the undertakings to be covered by Bangladesh side before the Project has commenced.

8. RHD has agreed to take the necessary measures listed in Annex II on the condition that the Grant Aid by the Government of Japan is extended to the Project.

9. Both sides confirmed that the Study Team explained the Japanese Grant Aid Programme and the schedule of Basic Design Study and the Bangladesh side understood it.





LEGEND

Meghna-Gumti Bridge, This Project

Approach Road, This Project

PROJECT LOCATION MAP

METRE 150 100 50 0 000 METRE

ANNEX II

Necessary measures to be taken by the Government of the People's Republic of Bangladesh.

1. To secure necessary land and to execute the construction works which are specified in the undertakings to be covered by the Bangladesh Side as shown in Annex III.

2. To ensure prompt unloading, tax exemption, customs clearance at ports of disembarkation in Bangladesh and prompt assistance in internal transportation, to be paid under the Grant, therein of the products purchased under the Grant.

3. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Bangladesh with respect to the construction and services under the verified contracts.

4. To accord Japanese nationals whose services may be required in connection with the construction and the services under the verified contract such facilities as may be necessary for their entry into Bangladesh and stay therein for the performance of their work.

5. To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant.

6. To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities.

7. To ensure prompt processing of required internal formalities to secure the implementation time schedule of the Project.

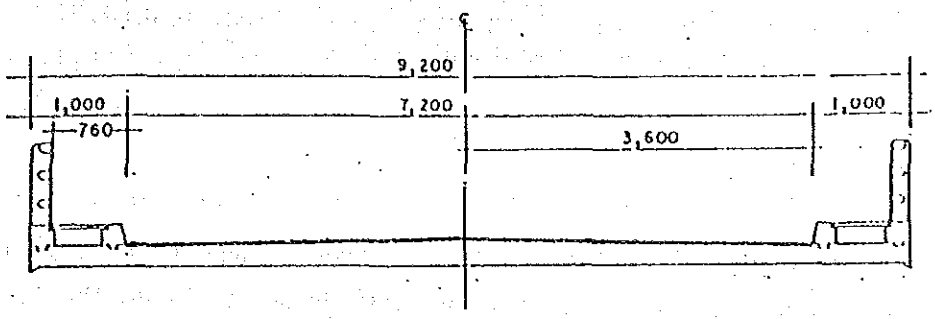
ANNEX III MAJOR UNDERTAKINGS TO BE TAKEN BY EACH GOVERNMENT

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1.	Land acquisition and property compensation for the construction of the bridge and approach roads including demolition/relocation of one (1) ferry jetty at Dhaka side		0
2.	Demolition and clearing the site		0
3.	Construction of bridge structures and approach roads including wrecker(s) for traffic accident	0	
4.	Land lease/acquisition of the spaces for the base camps (office, residence, stock yard and motor pool), aggregates processing and mixing plant and other necessary temporary works		0
5.	Control of ferry operation during the construction		0
6.	Exemption of RHD ferry charges and bridge toll levies which may be imposed with respect to the passages of vehicles and personnels working under the Grant.		0

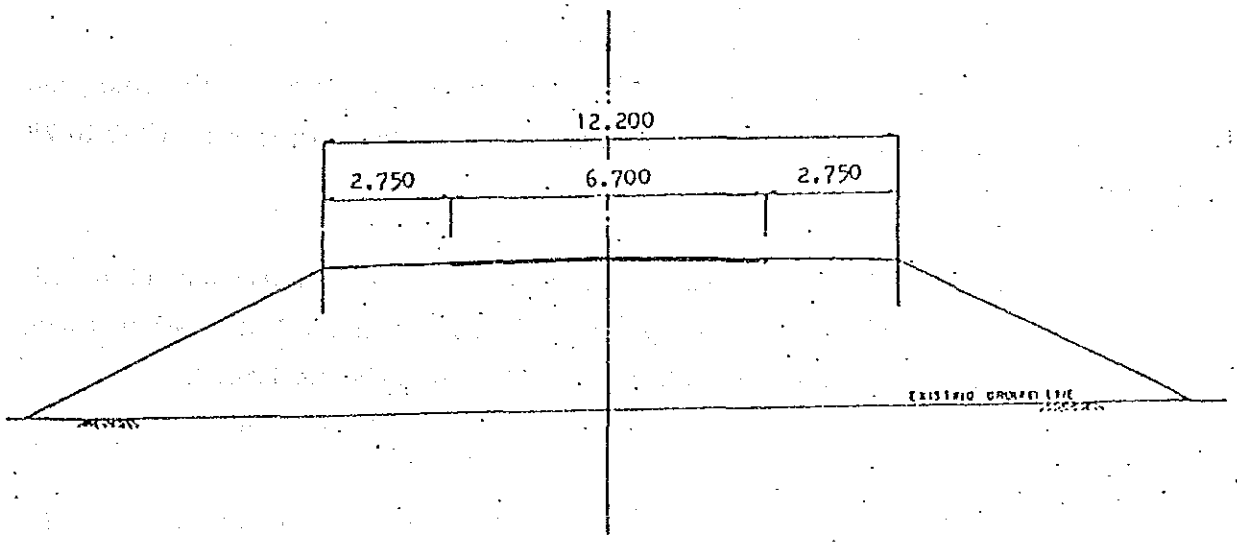
Note : Site means the construction site which comprises base camps and aggregates processing and mixing plant yards, refer to No. 4 in the above.

M.J

ANNEX IV - TYPICAL CROSS SECTIONS



BRIDGE DECK



APPROACH ROAD

NOTE: Dimensions are in millimetres.

Appendix 2-2 Minutes of Discussions, September 26, 1990

THE MINUTES OF DISCUSSIONS ON
THE BASIC DESIGN STUDY ON
THE PROJECT FOR CONSTRUCTING MEGHNA - GUMTI BRIDGE IN
THE PEOPLE'S REPUBLIC OF BANGLADESH

In response to the request of the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct a basic design study on the Project for Constructing Meghna - Gumti Bridge (hereinafter referred to as the "Project"), and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Bangladesh the study team headed by Mr. Masaaki Tatsumi, Director, First Design Division, Design Department, Honshu-Shikoku Bridge Authority, to carry out the Study form 17 May to 30 June, 1990.

As a result of the Basic Design Study, JICA prepared a Draft Final Report of the Study and dispatched a Mission to explain and discuss the Report from 22 September, 1990 to 28 September, 1990.

Both parties had a series of discussions on the Report and agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realisation of the Project.

Dhaka ,26 September, 1990

Masaaki Tatsumi
Leader
Basic Design Study Team, JICA

M.A. Bari
Chief Engineer
Roads and Highways Department
Roads and Road Transport Division
Ministry of Communications

ATTACHMENT

1. The Roads and Highways Department (RHD), Roads and Road Transport Division, the execution agency of the Project on behalf of the Government of the People's Republic of Bangladesh, agreed in principle on the basic design proposed in the Draft Final Report.

2. RHD reconfirmed the Summary of Discussions as annexed herewith .

3. Both sides reconfirmed their respective responsibilities as indicated in Annexes II and III of the Minutes of Discussions signed on 21 June,1990.

4. RHD agreed to be responsible for the budget allocation of the undertakings by the Government of the People's Republic of Bangladesh itemised in Annex III described in Paragraph 4 above.

   4.1 In particular it is expected to take an immediate action on budget allocation on land acquisition and property compensation for the construction of the bridge and approach roads and on land lease/acquisition of the spaces for the base camps, aggregates processing and mixing plant and other necessary temporary works.

   4.2 All land acquisition, land lease and compensation described in Subparagraph 4.1 above including relocation of one (1) ferry jetty at Dhaka side must be completed prior to the start of the construction of Meghna-Gumti Bridge.

5. RHD desired to be provided with a training course with regard to the Project under the Japanese Technical Cooperation Programme.

6. The Final Report (10 copies in English) will be submitted to the Government of the People's Republic of Bangladesh in November 1990.

ANNEX

Summary Of Discussions

1. The Japanese Team requested the immediate action on the execution of relocating the existing ferry ghat (Dhaka side, northernmost) to the south of existing southernmost ghat to provide the required working area for the construction of Meghna-Gumti Bridge.

RHD agreed and explained that it will take about 3 months for the relocation.

2. At present, right-of-way area for the Approach Road at Comilla side has been utilised for the stock yard of construction materials by the contractors working on the First Road Improvement Project. The Japanese Team suggested that RHD shall take necessary steps and give notice well in advance to the contractors to evacuate the area.

RHD understood the need to carry out the timely evacuation of the right-of-way area.

3. The Japanese Team pointed out that the beginning point of Daudkandi-Feni Section of the First Road Improvement Project and the beginning point of the Approach Road in Comilla side, this Project, are not identical and there is about a 1,200 metre gap between which is not covered by these projects and requested the RHD's consideration concerning this matter.

RHD explained that the necessary road betterment in this section (about 1,200 metre stretch) will be carried out in the framework of the First Road Improvement Project.

4. RHD requested 1.0 m height of bridge railing to secure the safety of pedestrians.

The Japanese Team agreed that the modification of the centre height of the top railing (100 mm ø galvanized steel pipe) from 90 centimetres to 100 centimetres will be incorporated in the Final Report.

16/9/96

Appendix 3 List of Persons Met

Japanese Side

Japanese Embassy in Bangladesh

Mr. Takeo Iguchi	Ambassador
Mr. Tetsurou Itou	Minister
Mr. Kenji Okada	First Secretary
Mr. Takeshi Ota	First Secretary
Mr. Ryoji Noguchi	Second Secretary

JICA Office in Bangladesh

Mr. Norio Matsuzawa	Resident Representative
Mr. Eiji Sato	Deputy Resident Representative
Mr. Takeshi Naruse	Deputy Resident Representative

Bangladesh Side

External Resources Department (ERD)

Mr. M. Nasim	Deputy Secretary, Japan Desk

Ministry of Communication ((MOC)

Mr. Nasimuddin Ahmed	Secretary
Mr. C.M. Mohsin	Joint Secretary

Roads and Highways Department (RHD)

Mr. M.A.Bari	Chief Engineer
Mr. Ataur Rahman	Additional Chief Engineer
Mr. F. Karim	Additional Chief Engineer
Mr. A. Hussain	Superintending Engineer, Meghna and Meguna-Gumti Bridge Construction Project
Mr. A.M.G.M. Chowdhury	Executive Engineer, Meghna and Meghna-Gumti Construction Project
Mr. M.A.Jaigirdar	Executive Engineer, Structural Design Division
Mr. A. Hashem	Subdivision Engineer, Meghna and Meghna-Gumti Construction Project
Mr. H. Rashid	Chief Economist

Development Design Consultant

Mr. M. Rafiquddin	Managing Director