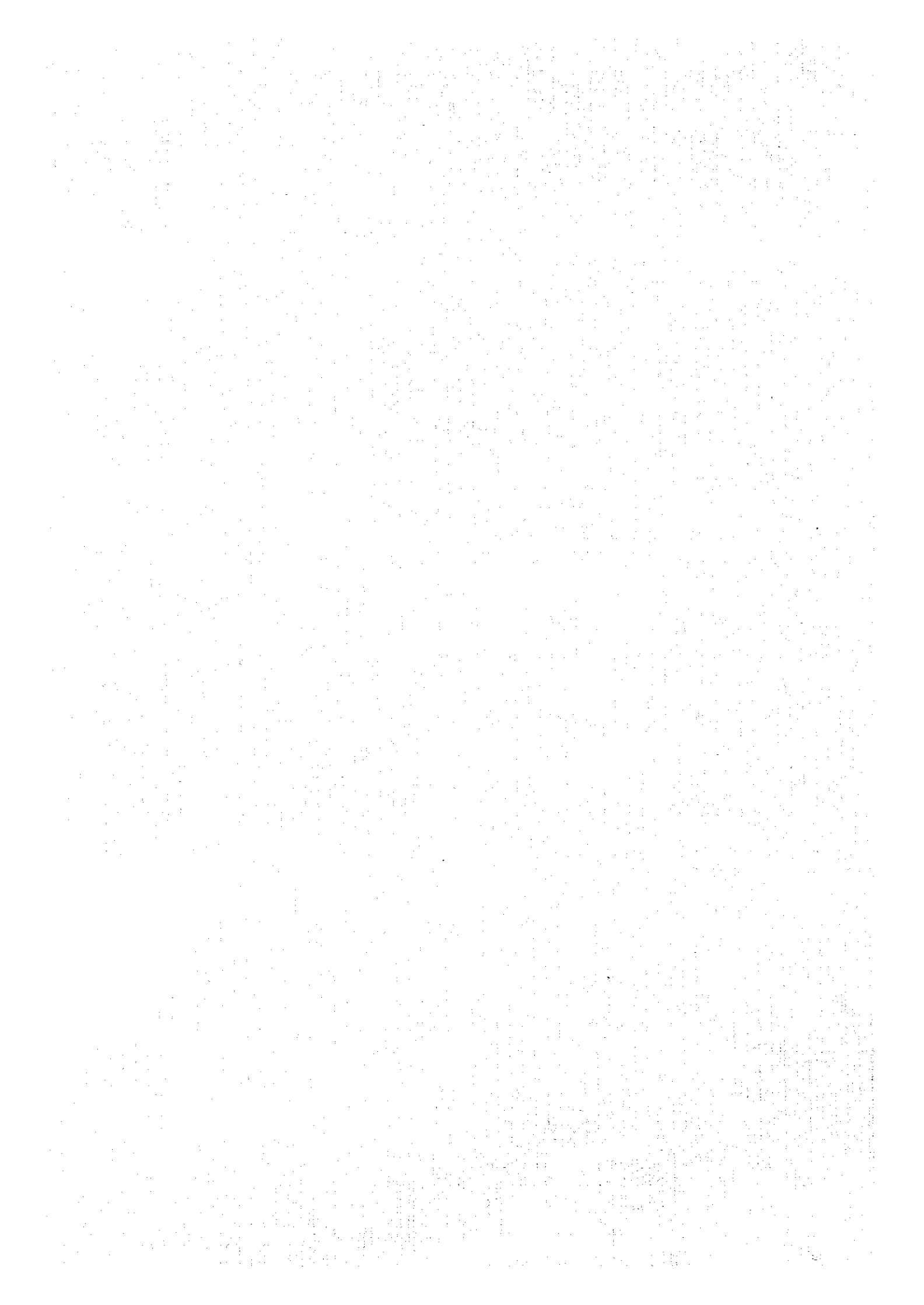


5. 収集資料リスト



収集資料リスト

番号	資料の名称	形態(図書・ビデオ・地図・写真等)	発行機関
1	PRE-F/S ON THAN TRI BRIDGE	コピー	MOI
2	RING ROAD N03 - HANOI THANH TRI BRIDGE SUMMARY REPORT ON PRE - FEASIBILITY STUDY 1000H3 - C1 - 01	コピー	TONG CONG TU VAN THET KE G.T.V.T BO GIAO THONG VAN TAI(TEDI)
3	DUONG OTO VANHDA3 - HANOI CAU THANH TRI DU AN NGHIEN CUU TIEN KHA THI 1000H3 - C1 - 01	コピー	BO GIAO THONG VAN TAI (TED)
4	HANOI Atlas TOURIST MAPS	地図	THE GIOI PUBLISHERS
5	THU YET MINH DU AN NGHIEN CUU TIEN KHA THI DUONG OTO VANH DAI 3 (DIAPHAN THANH PHO HANOI)	コピー	BO GIAO THONG VAN TAI TEDI
6	VIETNAM NATIONAL ATLAS	図書	IMEGEA
7	ヴィエトナム統計年鑑 1995	図書	General Statistical Office
8	LAW ON ENVIRONMENTAL PROTECTION	図書	NEA
9	ENVIRONMENTAL IMPACT ASSESSMENT	図書	NEA
10	THU MOI THAM GIA DU AN BOT DUONG VANH DAI 3 HANOI	コピー	BO GIAO THONG VAN TAI

6. Ring Road No.3 – Hanoi Thanh Tri Bridge Summary Report on Pre-Feasibility Study

MINISTRY OF TRANSPORT
TRANSPORT ENGINEERING DESIGN INCORPORATED

**RING ROAD N^o 3 - HANOI
THANH TRI BRIDGE**

**SUMMARY REPORT ON
PRE - FEASIBILITY STUDY**

1000H3 - C1 - 01

Project M : *Dr Lê Văn Tú*
Director of Britec : *Dr Phan Khắc Lê*
Checked by : *Eng Phạm Hữu Sơn*
Manager of Ringroad No 3 Project : *Eng Mai Đình Nhung*

Date : Jun, 21st 1996

SUMMARY REPORT ON PRE-FEASIBILITY STUDY (PFS) THANH TRI BRIDGE - HANOI RINGROAD N^o3 PROJECT

CHAPTER I - PREAMBLE

Based on many projects had been decided by Ministry of Transport (MOT) which included the feasibility - study of Hanoi Ring road No 3 .

The Thanh Tri Bridge is lying on the Ring road No3 alignment , which was also assigned by MOT to establish the PFS . This is a special Major bridge spanning over the Red river , and locating in the Thanh Tri and Gia lam district territories.

The Thanh Tri bridge is a point of convergence of the Ring road No3 and the other important highways such as : National Road No1A . The project study on Thanh Tri bridge building for road traffic is a significant work to meet the immediate demands as well as long term study on economic, technical and masterful - planning aspects of Hanoi Capital .

The content of ThanhTri bridge PFS project is composed firstly the general reviewed evaluation on the fields of Socio - Economy, transportation and its forecasting development in the influenced area. On the said basis , the scope and form of investment , and the other matter concerning the construction shall be examined in order to set forth the direction on appropriate investment to meet the immediate and future needs .

CHAPTER II BASED FOR DETERMINATION OF THE NECESSITY ON THANH TRI BRIDGE CONSTRUCTION INVESTMENT.

II-1. Legal bases and concerned documents

1. Legal Bases :

- According to the decision No 2356/KHDT dated August 15, 1995 issued by MOT on the PFS and FS of Hanoi Ring road No3 (especially Thanh Tri Bridge only takes into account on the Bridge location)

- The decision Re.N°236/KHDT dated January 1st, 1996 of MOT is the approval to carry out the PFS of Thanh Tri Bridge on the Hanoi - Ring road No3

2. Concerned documents

- The documents relating to topographic - Plane survey and geological investigation had been done by TEDI in 1995 and 1996 .

II-2. Vietnam General review on transport sector system

1. Road :

- Road network concentrated on the Red river delta and the Mekong delta.
- The length of national highway is 10.800km.
- The length of rural road is 15.300km.
- There are 5.600 bridges and 135 ferrier lying on the National highway and Provincial Roads with total lengths of 12.100 meters and 30.000 meters .

2. Railway :

- The existing railway network is mainly 1.00m standard gauge and it is very low condition . On the Railway alignment include 1500 bridges and 40 of small and Major tunnels. Almost of bridges are steel structure and many of them are in bad condition.
- Many bridges are used for both railway and road.

3. Waterway :

- Viet nam is one of countries in the world possessing a lot of big rivers and canals so :

- The cargo transport by waterway plays an important role , with navigable transport distance is approximately 9000km in wich 40% is under management of the Government .

- Main products transported by waterway are : coal, general goods construction materials and fertiliser

- - Sea ports belong to maritime department which include : SaiGon port, HaiPhong port, DaNang port, QuyNhon port, Quang ninh port . Besides the afore mentioned ports , there are coal port , B12petrol base port,Cailan port,(is under construction which are) belonging to another institutions .

4.Civil aviation : (By air transportation)

There are two international airports : Noibai, Tan Son Nhat and domestic airports as Cat Bi (Hai Phong), Nha Trang, Buon Me Thuot, Phu Quoc in Viet Nam.

II-3.Briefing overview on the Road network in the Project area

Ha Noi city is a biggest clue of transportation in Viet Nam which includes : road, railway and inland waterway.

1. Road :

- National highway N^o3 : From Cao Bang through ,Bac Can,Thai Nguyen to HaNoi

- National highway IA : From Lang Son - Ha Noi - Ho Chi Minh city

- National highway 2 : From Lao Cai - Vinh Yen - Ha Noi

- National highway N^o6 : From Hoa Binh to Ha Noi

- National highway N^o32 : From Moc Son - Son Tay - Ha Noi

- National highway N^o5 : From Hai Phong - Hai Duong to Ha Noi

In addition above mentioned Highway there are highwayNo 18A from Bac Ninh - Tien Yen.HighwayNo 10 from Ninh Binh - Hai Phong - Quang Ninh

2. Railway :

- Hanoi is a clue of concentration all railway alignment , in which includes

1. Ha Noi - Ho Chi Minh line with the length of 1730km

2. Ha Noi - Hai Phong line - length of 102km

3. Ha Noi - Lao Cai line length of 283km

4. Ha Noi - Lang Son line length of 148km

5. Ha Noi - Thai Nguyen line length of 75km

6. Thai Nguyen - Bai Chay line length of 166km

3. Inland waterway :

Waterway network includes Red river, Duong river, Da river, Day river.

4. Civil aviation :

Noi Bai airport (international and domestic airport), Gia Lam airport (army and domestic airport), Bach Mai airport (not used).

5. Hanoi internal transport infrastructure

- The in down-town of hanoi city, there are 340 roads with total lengths of 200 km, 45% of urban roads have the width from 10 to 15 m
- Road average length is 550m and there is one intersection per each 380m.
- There are 23 cross section where volumes are of about 400cars/hour.
- Some directions there are axial main roads as highway IA, 6.
- Average rate of annual growth travel demands of the people is 4,2% in which : 7% for cars, 15-20% for motorcycles, 12-20% for bicycles

Ratio of people using public buses is 2.3%, 86.3% motorcycles and other facilities ~ 17%, pedestrian 9.7 %

II-4. Forecast on socio - economic development in interested area

1. Population in the year 2000 : 30.10^6
2010 : $35.4.10^6$ growth rate 1,65%

2. Gross domestic product (GDP)
In the year : 2000 : 20.603 billion VND
2010 : 62.306 billion VND

3. Forecasting annual average GDP growth rate form the year 2000 to 2010 of the provinces in Region I is 9% to 15 % . As for Hanoi GDP itself in the year 2000 will be 1,800 million USD . In the year 2010 will be 6,386 million USD, the growth rate to be increased 13.5% per year on average

II-5. Masterplan of construction and transportation development for Hanoi area .

1. Master plan of construction industrial zones for Hanoi city :

-SocSon Export Processing Zone- Area : 600ha; population:160.000inhabitan

- SaiDong EPZ - Area : 400ha, population:120.000
- DongAnh industrial zone - Area : 350ha, population:35.000
- South of ThangLong industrial zone - Area : ~ 100-150ha.

2. Master plan of Transport Development for hanoi

- The Hanoi RingRoad No3 starting from South of ThangLong bridge intersects the National highway No 1A at Phap Van crossed Red river at Thanh Tri, then links to highway N^o5, Duong bridge, Yen Vien and North Thang Long - Noi Bai at Dong Do. With the total length is about 65km

-The Lang - Hoa Lac road project is 28km long.

- The national Highway 1A (Section Ha Noi - Vinh) it will be rehabilitated and upgraded by foreign funds.

- The Highway N^o5 Ha Noi - Hai Phong is under construction of 6lanes Road

- The Highway No 1A section Ha Noi - Lang Son.Including Duong bridge project is being studied by DMJM-JOC for investment preparation

-The road section South Thang Long - BaDinh is provided for 4 lanes carriageway

Besides the above mentioned Road there are some highway projects which are being invested or preparing for investment to upgrade relating to Hanoi transport network such as :

- Road No 183, national Road No18 national road No10

- The RingRoad N^o1 (passing through Dai Co Viet, O Cho Dua, Cau Giay).

- The RingRoad N^oII (From Vinh Tuy ramp- Nga Tu Vong - Cau Giay) is preparing for in order to link3 axial centripetal roads : national No1A , National road No6 , national Road No32 to Hanoi city .

II-6. Investigation of actual urban Transport systems

1. Investigation on traffic flow to Ha Noi

Thanh Tri bridge lies on RingRoad N^o3 so , all investigative data have a close relation to the Ring road No3 . Acording to results of traffic count investigation of Transport sector review project coded VIE 88/040 the traffic flow reaches to Hanoi and from Hanoi which runs through inter provincial Roads. The master plan of transport development for the North Region which was done JICA and OD (origin - detination) investigation at 8 station surrounding Hanoi (Road No6Phap van , Highway N5, Highway No1A , South of Duong bridge , Noibai road , National Road No2, Mai dich Road , the old road leading to Noibai)

TABLE 1 : TRAFFIC COUNT RESULTS AT SOME TYPICAL LOCATION

Station	Duraffon	Bicycle	Motorblke	Automobiles
Phap Van (Highway 1A - Ha Noi)	9/1994 7-19h	2373	3645	2660
Phu Thuy (Highway N ^o 5-Ha Noi)	9/1994 7-19h	2326	4982	2624
South of Duong bridge (Bac Ninh - Ha Noi)	9/1994 7-19h	6870	9140	2624

TABLE 2 :THE CONVERTED TRAFFIC VOLUME IN HANOI AREA
Average Daily Traffic (ADT)

Year	Direction	Section 1-2	Section 2-4	Section 4-5	Section 5-6	Section 6-7	Section 1-9
1994	Internal province routes	6854	5554	6420	7164	5328	5856
	Inter province routes	1923	1923	2053	884	884	1943
	Total	8777	7477	8473	8048	6292	7349

TABLE 3 : TRAFFIC COUNT DATA AT CAU CHUI - GIA LAM (ADT)

Average Daily Traffic (ADT)

Date time	Direction (two lanes)	Bicycle and other motoris ed vehcles	Motorbi- ke	Auto- mobiles (multi - kinds)	Percentage autorbike for each direction.	Motorbike rate of 2 wheels vehicle for directions
21/3/95 6-22h	Hanoi-Haiphong	4701	9074	4601	38.8	19.8
	Hanoi-cauDuong	19200	29737	5378	45.4	70.5
	CauDuong-hphong	2489	4225	1885	16	9.7
	Total	26390	43036	11864		

Based on traffic volume survey results of Chui flyover - Gia Lam threeway intersection , the conclusion is as follows :

- The traffic volume of Ha Noi - Duong bridge direction is the biggest volume and it is the main direction.

- The Duong bridge - Hai phong direction is sub-direction because traffic volume less than main direction (16%).

At peak hours :

Traffic volume :

+ Automobiles : 1055 vehicles/h (9-11h)

+ Motorbike : 6663 units/h (7-8h, 16-18h)

Average traffic volume as below:

+ Automobiles : 742 vehicles/h

+ Motorbike : 4339 units/h

Then traffic volume at peak hours is bigger than average traffic volume 15 times.

II-7. Traffic volume forecast by the years 2010 and 2020 :

Traffic volume forecast was carried out by Frata method, which based on average daily traffic unit/night day of the basic year (1994) and planning data (population, population density, GDP/year). (22 areas shown in figure N^o2).

TABLE 4 : TRANSPORT DEMAND FORECAST AT SAI DONG-THANH TRI
(Section I-2)

Year	ADT Inigh, day (24 hours) or VPD (Vehicles per day)				
	2000	2005	2010	2015	2020
Inter-province routes	4974	11265	26034	33480	42873
Urban -province routes	10489	15216	21870	28124	360016
Total	15643	26418	47904	61604	

II-9. Conclusion about the needs of construction for Thanh Tri bridge

From the results which are briefly analysed above , it is shown that the necessity on Thanh Tri bridge construction is needed to be invested with the reason as below :

- In general, Hanoi city is the Transport - centre of the whole country, and it is also the centre of transportation of the Northern (Bac Bo) Delta, and the 1st region in particular the economic development of the years after 2000 in the whole country. The Northern Delta and 1st region, together with the transport network development will be the urgent necessity in order to meet the transport requirements.

- Hanoi transport network plans to construct. In which the Ringroad N^o3 is an important project. The Thanh Tri bridge is lying on the Ring road No3, the construction of Thanh Tri bridge therefore, is combining to the master plan Ring road No3

- The Thanh Tri bridge is a convergent location of several main road alignments in the Hanoi transport system such as: National Road No1A, national road No5, National road No18. So the construction of Thanh Tri bridge is also joining to the master plans of National Road No1A and National road No5.

According to the results of transportation forecast indicates the transport demands through the Sai Dong - Thanh Tri road section will be much increased. The Chuong duong bridge could not satisfy the transport requirement after the year 2000 therefore the Thanh Tri bridge shall be constructed to serve the interprovincial traffic is the most necessary matter.

CHAPTER III

THE CHARACTERISTICS OF BRIDGE PROJECT AREA

III-1. Topography:

The location geomorphology of proposed bridge is flat and wide. The main flow is straight, in the dry season the width of main flow is about 600-700m. The distance between two dikes is 2200-2300m long.

III-2. Climate and Meteorology

1. The monthly amount of rainfall

- From I - IV rainfall is roughly 30 - 200mm
- From V - IX rainfall is roughly 200 - 600mm
- From X - XII rainfall is roughly 50 - 100mm

2. Storm:

In the North Vietnam every year, storms usually occur in Aug., Sep., Nov. (70%). The annual average there are 3 storms with the percentage 45% and in 1994 there were 6 storms (the maximum occurrence)

The maximum speed of wind and its probability

{	40m/s is 13%
	30 - 40m/s - 16%
	20m/s - 28%

3. Temperature :

Absolute minimum temperature is 3° - 5° (Jan. and Dec.)

Absolute maximum temperature is 40° - 43° (May and July)

III-3. Hydrological hydrodynamic regime of Red river :

1. Change of river bed

According to investigated results (from 1890 to 1975) the main flows of Red river section (From Son Tay to Giang Cao) had been changed by time period (after flood). The location where main flows had been rarely changed is Chem (Thang Long bridge). Ai Mo (Chuong Duong bridge) near Thanh Tri sanitary wares factory (site alternative III). At proposed Thanh Tri highway bridge site (alternative IA) the width of the current main flows is 600m. The distance of main flow moving is 1300-1500m. Before 1936, main flows was in Gia Lam river side and from 1936 - 1952 the main flow gradually moved to Thanh Tri direction. The current main flows of alternative I A during 40 year ago there is no considerable change

2. The influence of Hoabinh and Thac Ba lakes impacted to Red river water level. According to results computed meteorological and hydrological Institute which are shown that the decrease of Red river water levels at Hanoi are as follows :

Max : $\Delta H = 1.69^m$

Min : $\Delta H = 0.39^m$

Average : $\Delta H = 1.12^m$

3. Hydrological and hydrodynamic data will be used for bridge design.

- Max water volume : $Q_{max} = 22,000m^3/s$.

- Max water level : $H_{max} = 12.9m$

- Navigable clearance water level (Probability 5%) $H = 12.2m$

- Min water level $H_{min} = 1.6m$

- Minimum spanning space required for water flow at the bridge location

$L \geq 1800m$.

III. Geological feature :

Four bore holes had been carried out at the site of alternative IA in 1971. Following data collection the depth of one bore hole is 45m.

Two bore holes TRI - 96 and TRII - 96, had been carried out in 4/1996. (The total lengths of under water drilling of 85.2m).

Based on the results of boring, standard penetration test (SPT) and laboratory test. The stratum from the top to the bottom can be divided into layers are as follows :

- + Layer N^o1 : Small black sand. Thickness 5.5m (TRII-96) allowable bearing capacity $[R] = 1.5\text{kg/cm}^2$; $N = 11-13$ (SPT value).
- + Layer N^o2 : Fine sand with desultory grain medium dense : Thickness (TRI-96) 7m ; $[R_0] = 1.0\text{kg/cm}^2$; $N = 13 \div 15$.
- + Layer N^o3 : Small sand and coarse sand. Thickness 2.3 - 9.1m;(TR II-96) $[R_0] = 1.5\text{kg/cm}^2$; $N = 21 - 23$
- + Layer 4 : Dustsand and fine grain .Thickness 8.7m (TRI - 96) $[R_0] = 1.0\text{kg/cm}^2$; $N=20-21$
- + Layer 5 : Coarse sand with gravel medium dense state. Thickness : 2.9m (TRII-96), $[R_0] = 3.5\text{kg/cm}^2$. SPT = 21-25.
- + Layer 6 : Small black sand. Thickness 4-5m ; $[R_0] = 1.5\text{kg/cm}^2$; $N = 19 - 24$.
- + Layer 7 : From soft to hard clay. Thickness 1.5m ; $[R_0] < 1.0$; $N = 23$.
- + Layer 8 : Gravel mix in to coarse sand . Thickness 5.5m (TRI - 96) ; $[R_0] = 3.5\text{kg/cm}^2$. $N=23 - 26$.
- + Layer 9 : Small sand. Thickness 3.8 - 8.6m (TRII - 96) ; $[R_0] = 1.5\text{kg/cm}^2$. $N = 30 - 41$.
- + Layer 10 : Gravel sand in grey colour and very dense state. Elevation of this bottom layer not defined yet . At the layer of 10 to 11.0meters deep of the borehole : $[R_0] = 10\text{kg/cm}^2$. $N > 50$. Piles will be based on this layer .

III-5. Alternatives on Bridge site :

Five alternatives on site of project bridge had been proposed by TEDI in 1995 - 1996 (Britec a dependent of TEDI).

- Alternative IA far from Thanh Tri sanitary wares factory about km in down stream direction
- Alternative I far from IA 60m in upstream direction.
- Alternative II far from IA 510m in upstream direction
- Alternative III far from IA 1,000m to upstream (next to Thanh Tri sanitary wares factory).
- Alternative II A far from IA in down stream direction 60m.

Proposed alternative is IA with advantages as follows :

- Suitable to Ringroad N^o3 master plan.
- Main flow located in middle of river bed.

- River bed was stabilized almost unchanged for 40 years ago.
- Conformed with railway bridge arrangement next to highway bridge.
- Low expenditure for housing compensation on both side of the river comparing with other alternatives
- The location of the bridge is far from Thanh Tri pagoda 60m, and pagoda located on Gia Lam side 110m long , and not influence to religeous peoples beliefs.

CHAPTER IV MAIN TECHNICAL PARAMETERS APPLIED TO BRIDGE STRUCTURE ALTERNATIVES

IV-1. Characteristic of existing bridges which are crossing Red river.

1. Thang Long bridge : 1974 - 1985

- The length of railway bridge : 5514m
- The length of highway bridge 3,122.26m. B = 20.14m.
- The length of non motorised line 2,663.92m.
- Elevation of deck : 36.13m

2. Chuong Duong bridge : 1982 - 1985

- Total length : 1,211 (distance between two river dikes)
- Bridge size : $B = 7.3 + 2 \times 5m$.
- Carriageway elevation at center line of +20.72m.

3. Long Bien bridge : Construction started in 1901.

The whole bridge there are 44 spans . The length of a span is about 25 - 40.6m. Among them include 8old spans , the other spans used for replacement the old ones; The TC6 spans are taking place for railway bridge , and YUKM spans for road traffic .

IV-2. Main technical data :

1. Scale : permanent bridge
2. Bridge size is selected on the basis of :
 - Size of road : highway of express ringroad N^o3.
 - Capacity traffic crossing Chuong Duong bridge.
 - Forecast traffic flow through Sai Dong Thanh Tri section.
 - Scope of highway N^o5 and highway N^o1A.

From the year 2010 $K = 4$ highspeed lanes + 2 mixed lanes. $\Sigma B = 24.5m$.

To the year 2020, $K = 6$ high-speed lanes, $\Sigma B = 24.5m$.

3. Design load : H30, XB80 on equivalent loading when applied foreign standard.

4. Seismicity : Degree 8 (Earthquake at degree 8)

5. Clearance space : $H = 10m$, $B = 80m$. Navigable water level (5%) = 12.2m

6. Longitudinal gradient and approach viaduct. $i_{max} = 3\%$. The clearance of overpass is 4.5m ($H = 4.5m$). Vertical curve at the point of alternating gradient on the bridge $R = 10,000m$

7. The length of main bridge is 1300-1500^m (depend on the moving width of the main flow)

8. Design standards :

+ Highway design standards TCVN 4054-85.

+ Technical design specification on urban streets 20 TCN 104-83 and TCVN 7529-1993 etc.

+ Bridge design standard TCVN 5664-1992, 22 TCN 221-95 and 1979 standard. Reference or application from foreign standards

IV-3. Structure alternatives :

1. Alternative I superstructure is prestressed concrete (proposed) double box.

Main span : 1.826 long performing cantilever techniques

Span clearance : $102 \times 12 = 1,440$. Pile with large diameter.

Viaduct span : The length of one span 40-50m.

Applied incremental launching method. Pile $\Phi 55$. Total length of bridge :

$\Sigma L = 2873$; $B = 24.5$

2. Alternative II

Cable stayed structure is includes : composing continuous spans.

$(150 + 366 + 150) \times 2 = 1332$. Pile with large diameters.

Viaduct slab : applied incremental launching method $l = 40-50m$.

IV-4. Total investment capital of bridge shown in table 5).

Alternative I : 1.418.572 million VND

II : 1.585.833 million VND

CHAPTER V ENVIRONMENTAL IMPACT ASSESSMENT

V-1. Present environment situation :

Environment condition and ecological condition at proposed bridge site are not important problems.

There are no people , big public construction, thei occupied area is silted bank and unvaluabe for construction.

The location of Thanh Tri bridge is suitable for special Major project.

V-2. Recommendations on environment impact while the Project is under construction

1. Ecological impacts caused by moving sand exploitation at the location of proposed bridge.

2. By the reason that Thanh Tri bridge located in the downstream of Ha Noi port, therefore the protecting measures should be taken in to account for avoidance from the striking of ships or boats to the pile while it is under construction

3. Methods resisted surface water pollution from oil spill of river transport, industrial waste water mainly from food processing industries.

4. Methods reduced noise while the bridge is under construction.

5. Methods of anti pollution for air from the hauling of construction materials

6. Methods of traffic organisation on the dike during the bridge under construction

7. Method of protection for the peoples healths while construction is carrying out .

V-3. Warning about environment impact after completion of the bridge

1. Arrangement for cluster of population at the location of bridge after completion

2. Measures of protection from boats striking to pier .

3. Protecting solution for anti pollution the corridor of bridge .

4. Management measures for traffic organising to avoi the accident occurring on the bridge

5. Effective measures for noise reduction , air antipollution, and traffic congestion on the bridge

CHAPTER VI PROJECTED FUND SOURCE AND INVESTMENT EFFECT ANALYSIS AND RISKS RELATED TO THE PROJECT

V-1. Fund source :

Total investment of Thanh Tri is very big, so the fund source should be examined following four ways as below :

1. Investment funding from big foreign company by Build Operation-Transfer forms (BOT).

2. Fund source from government budget in the investment preparation stage Main source are WB or ADB loans with preferential time of payment and rate of Benefit

3. Using a part of governments budget (about 30%). Remaining parts will be mobilized from foreign financing sources

4. Using a greater part of state budget following annual planning. The remaining part will find out from the loan of investion under the form of share - holder or giving them the right of operation in a few years

With the four ways above mentioned will be reimbursed by toll collection after the completion of the bridge

VI-2. Investment effect analysis :

Based on the predition of traffic volume (table 4) total expenditure for bridge construction (table 5) and period of construction from 1998 to 2000 .The benefits generated by the bridge up to the year 2020 as below :

Benefit index / Cost B/c = 1.43

Net profit : 680.69 billion

EIRR : 14.5%.

Economic criteria are shown that Thanh Tri bridge investment is much effective and should be invested as soon as possible

VI-3. Major risks related to the project

1. Transforming the main flows of Red river is the reasons which cause the unstability on scouring level and the depth of main pier foundations .

2. The depth of sedimentation is thick and small sand layer is very easy causing the scouring at the main pile foundation . Proposed bridge site near Ha Noi

port. There are many boats ships could hit to the piers during period of construction and operation.

3. Thanh Tri bridge project related closely with economic, technical and masterful planing developments of Ha Noi capital.

The investment policy and technical problems could be changed, that will impact to investment source and period construction.

4. Price changing in Viet Nam, it will influence to the construction cost .

5. The increase of traffic volume will interfere the criteria of the traffic in general .

6 Regarding major bridge and complicated technology like Thanh tri bridge , which required a qualified managerial team, construction supervisor , skill workers and experienced contractors of international stature . In Viet nam such cadre forces are not adequately available therefore when applying high techniques certainly will meet a lot of difficulties .

CHAPTER VII CONCLUSION AND PROPOSALS

VII-1. Conclusion :

Being one economic, politic, transport center of the whole country, the transport network and the master plan of Ha Noi city is synchronous developing. Thanh Tri bridge belong to RRN⁰³ is not only depending on the transport master plan of the city but to be a convergent location where intersected by several important highway National Road N⁰⁵, N^{1A}, 18, so the study on investment for the construction of Thanh tri bridge is the most necessary.

VII-2. Proposals :

1. *Proposed bridge site* : Alternative I^A (is far from Thanh Tri sanitary wares factory about 1km in down stream, from Ha noi port about 3,5km in down stream direction .

2. *Main technical data* :

Scope of bridge : permanent bridge

Size bridge : K = 2 x 8 + 2 x 3 (m) (four high-speed lanes, plus two mixed lanes). $\Sigma B = 24.5$

- Design load: II 30, XB 80 or equivalent load when applied for standard.

- Seismicity : Degree 8 (Degree Earthquake)

- Navigable clearance space : H = 10, B = 80m

- Navigation water level (5%) = +12.2m

Bridge longitudinal gradient and bridge approaches , $i_{max} = 3\%$.

Speed : 120km/h (urban road - V = 80km/h).

The clearance of overpass is 4.5m. Vertical curve at the point of alternate gradient $R = 10,000m$

3. *Structure* : Proposed alternative is alternative 1, continuous prestressed concrete, double box structure . Total proposed length $L_{tc} = 2.873m$
 $B = 24.5$.

The estimated duration for construction will last 3 to 5 years. (Depend the capital mobilization) and will begin in 1998.

TABLE 5 - TOTAL INVESTMENT FUND FOR THANH TRI BRIDGE

(Unit : Million VND)

TT	Alternatives	Items	Length (m)	Deck area (m ²)	Unit Price (million/m ²)	Total (million VND)
I	<i>Alternative I</i>	Continuous main span of haunched beam bridge (Prestressed concrete)	1.826	44,737	24	1,073,688
		Approach viaduct (prestressed concrete)	1.047	256,51.5	13	333,470
		Site clearing compensation Total				11,414
II	<i>Alternative II</i>	Main span of (cable stayed bridge)	1.332	32,634	33	1,076,922
		Continuous approach viaduct (Prestressed concrete)	1.562	38,269	13	497,497
		Site clearing compensation Total				11,414

MAP OF PRESENT MAIN TRAFFIC FLOW IN HA NOI CAPITAL

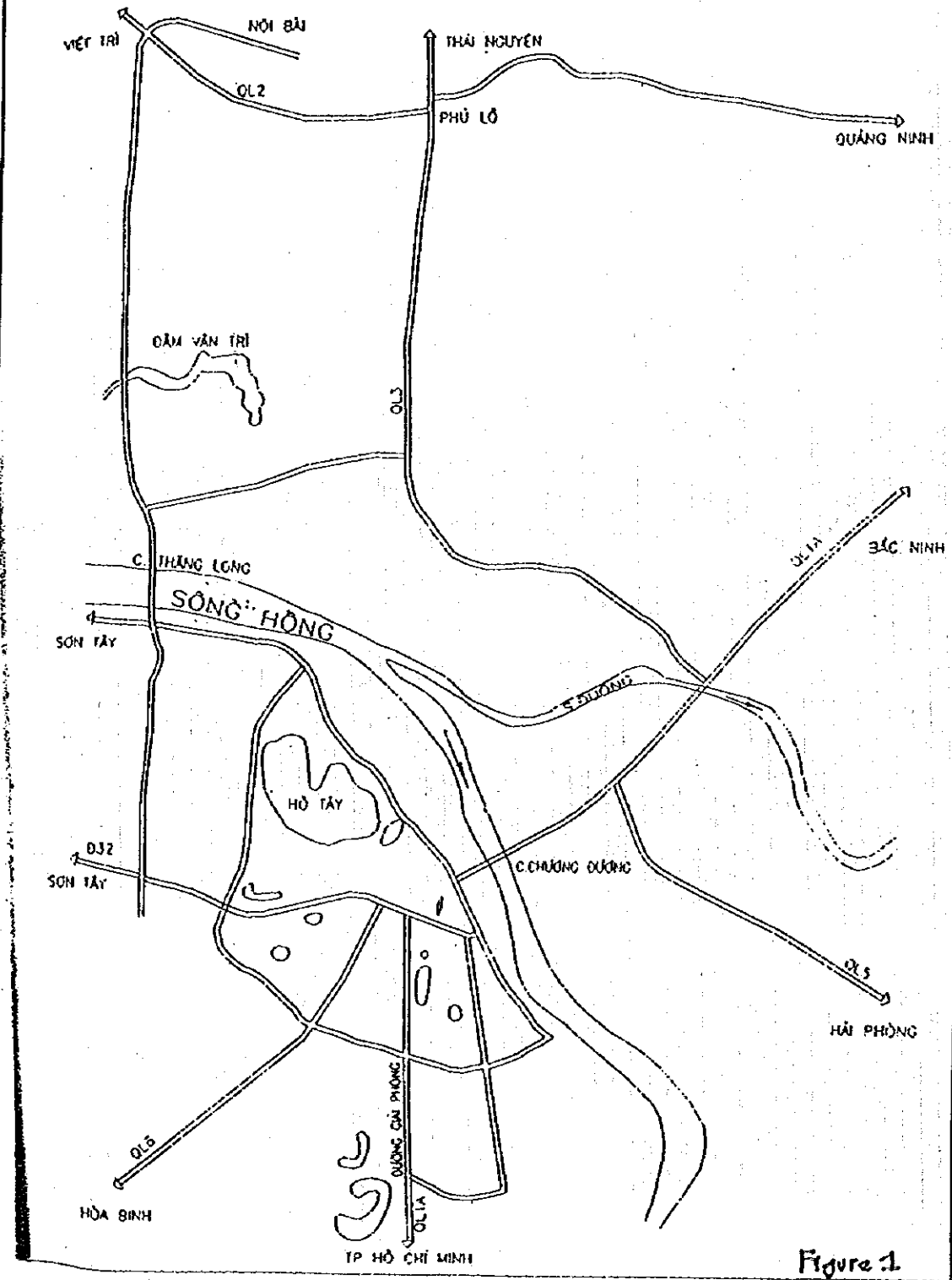


Figure 1

MAP OF LOCATION AND TRAFFIC FLOW IN YEAR 2010 - INTER-PROVINCIAL TRAFFIC FLOW

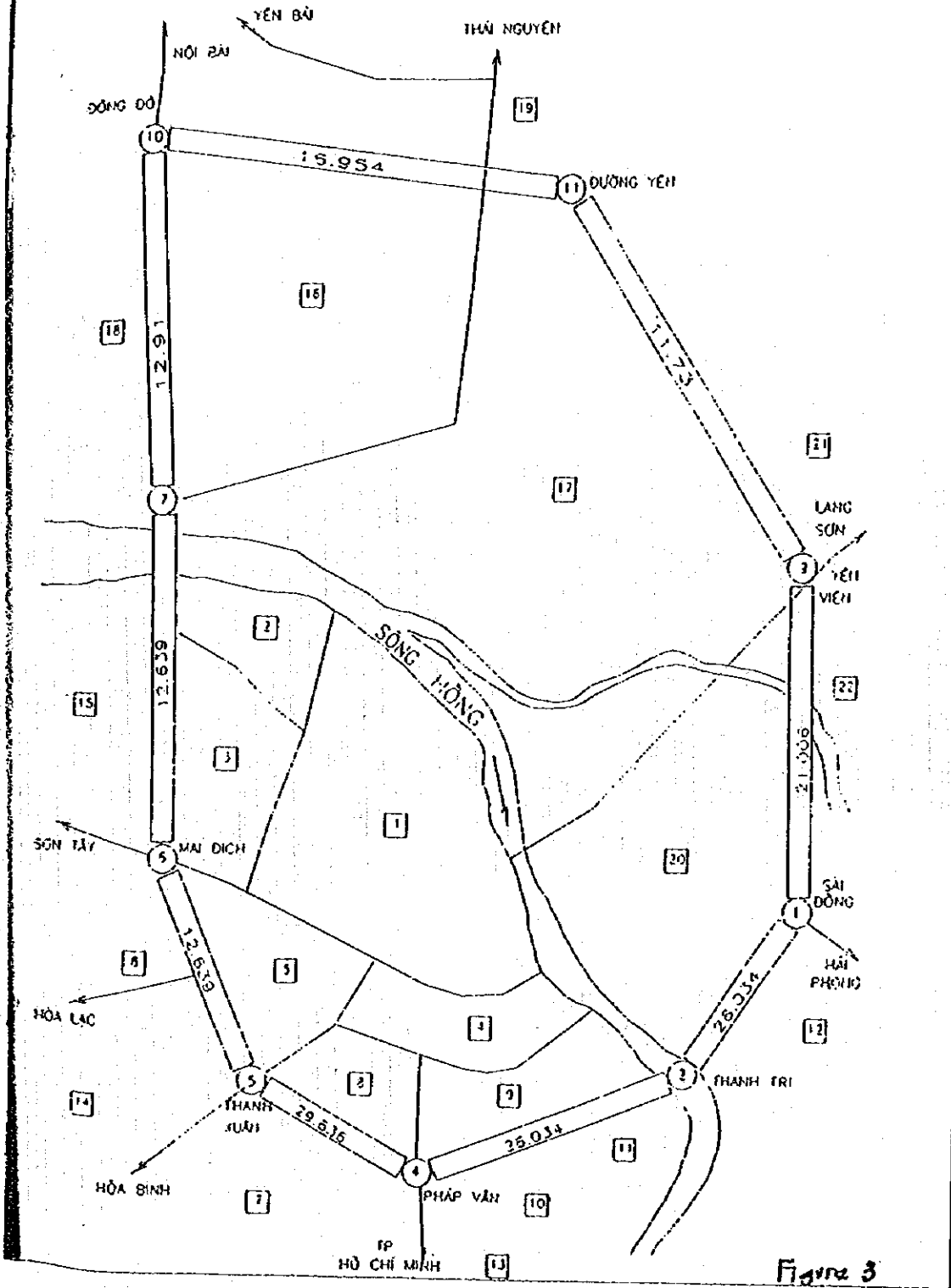


Figure 3

MAP OF LOCATION AND TRAFFIC FLOW IN YEAR 2020 - SYNTHETIC TRAFFIC FLOW

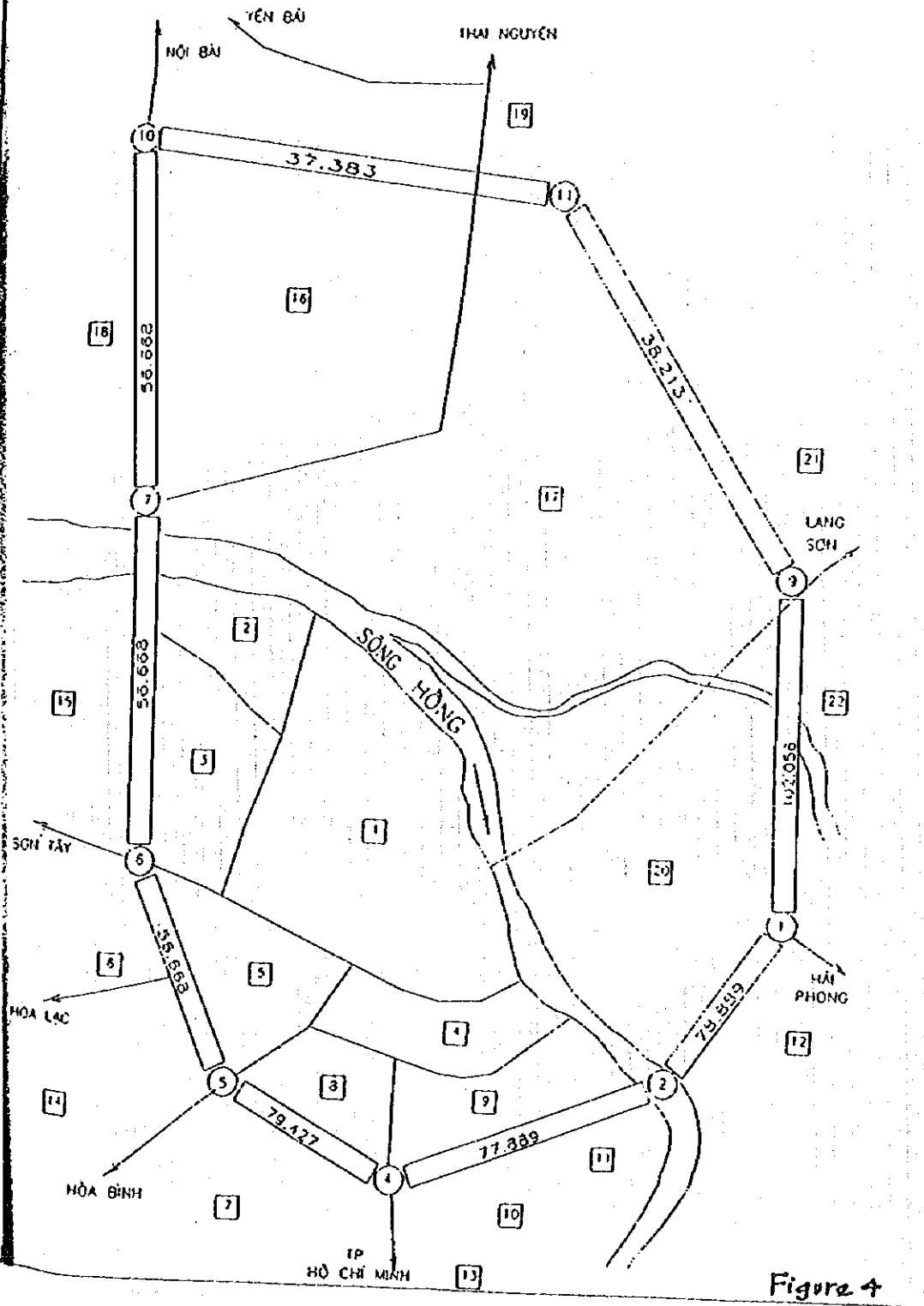


Figure 4

MAP OF LOCATION AND TRAFFIC FLOW IN YEAR 2020 - INTER-PROVINCIAL FLOW

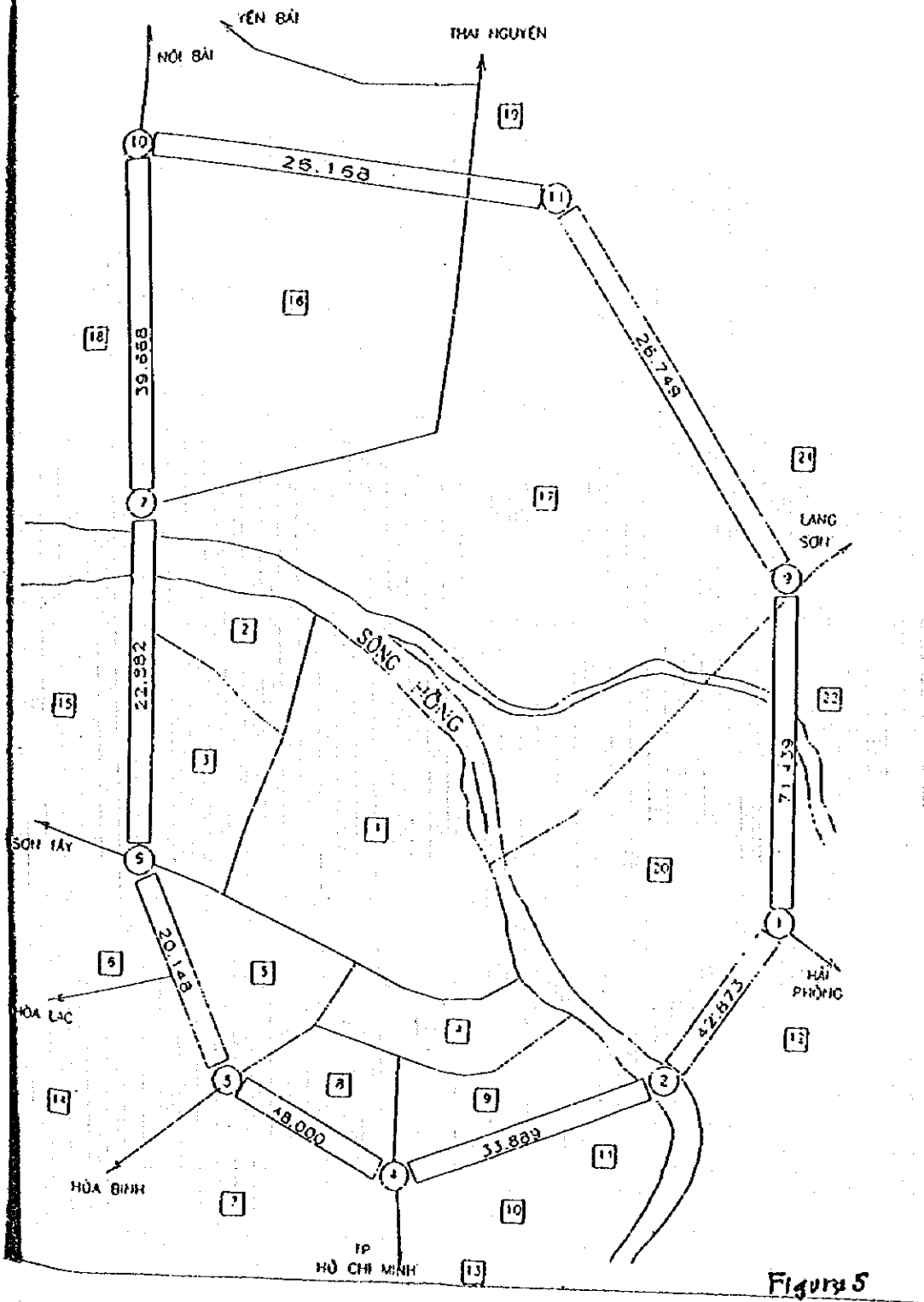


Figure 5

MAP OF HANOI TRANSPORTATION NETWORK WITH RINGROAD N°3 IN YEAR 2000

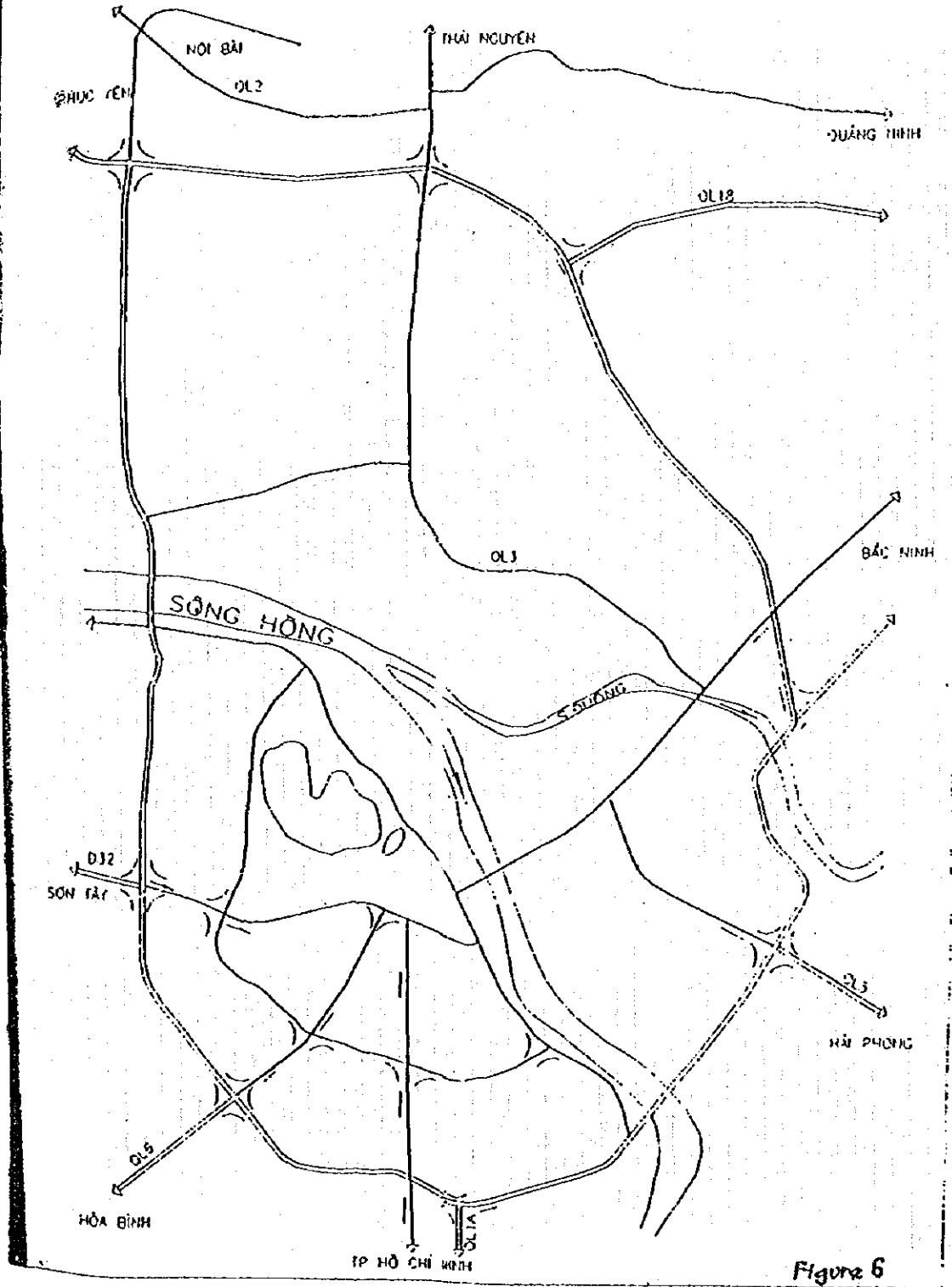
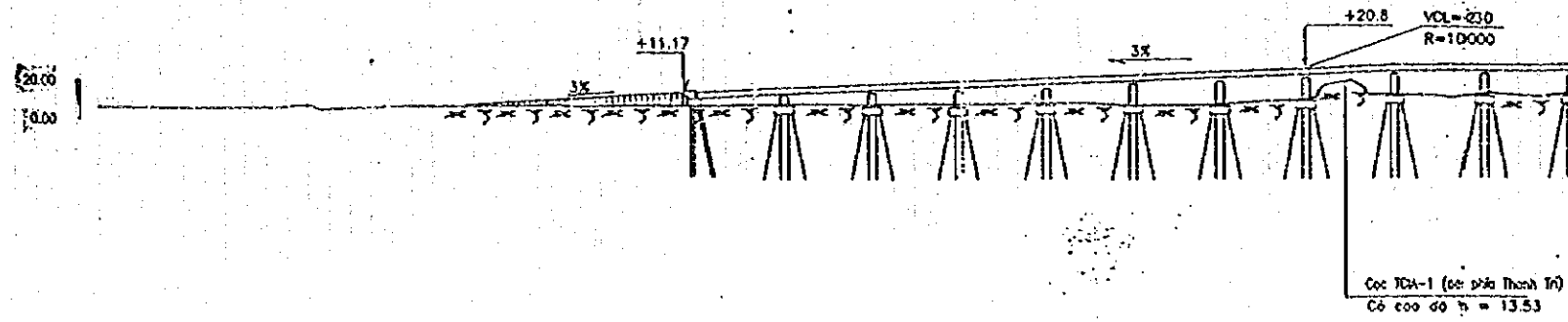
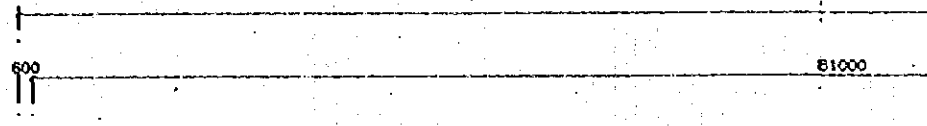
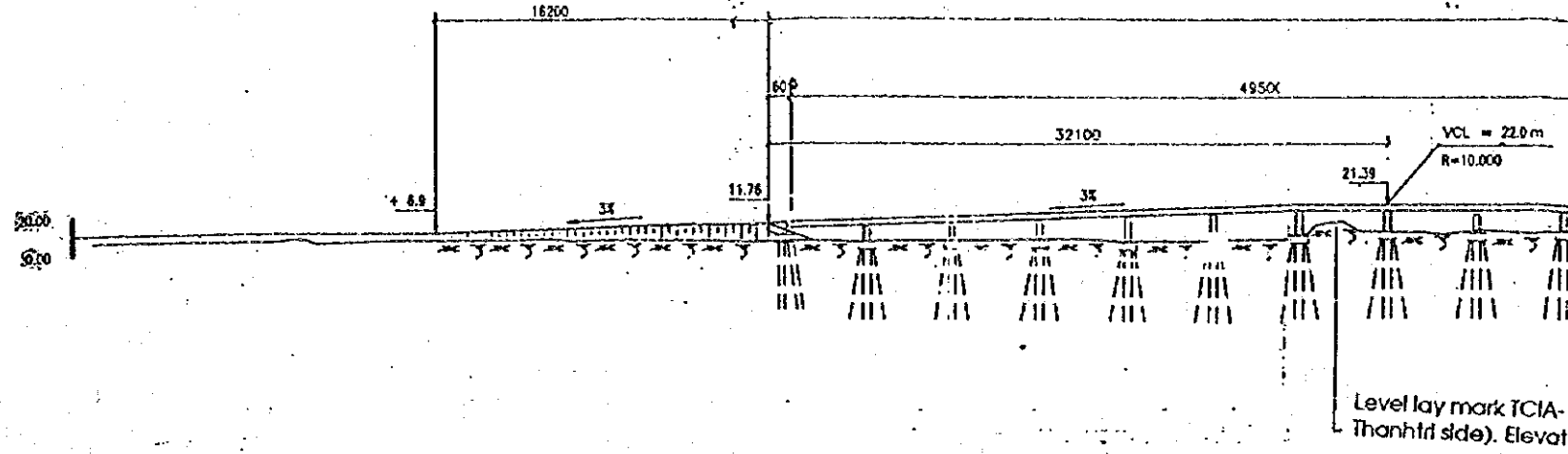


Figure 6

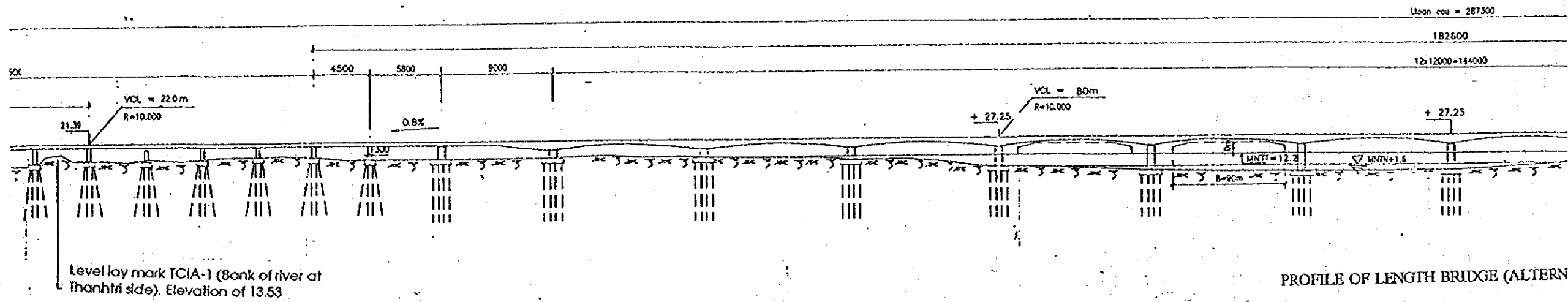


THANH TRI

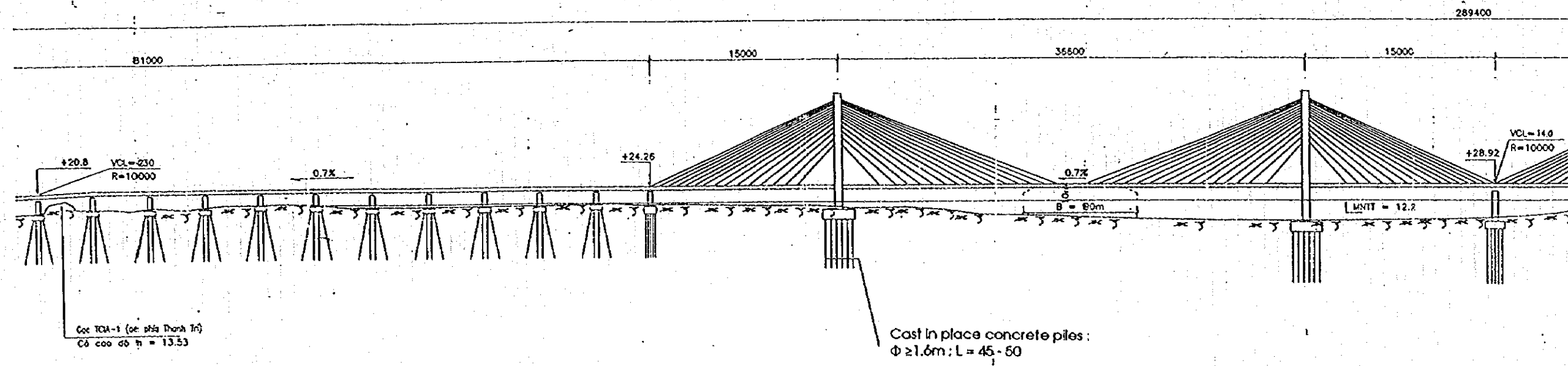


0.01	5.95	5.86	6.15	6.97	9.20	5.00	4.99	6.21	6.09	6.63	6.88	5.95	6.07	5.45	5.99	6.14	6.41	6.46	5.26	6.17	7.03	7.63	8.03	8.33	8.48	8.27	10.45	9.90	8.24	11.08	9.75	9.31
50.00	42.00	36.70	30.00	40.00	59.00	80.00	32.00	40.00	34.00	27.00	28.00	45.00	34.00	20.00	39.00	30.00	14.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
0.00	50.00	92.00	102.00	109.00	113.00	115.00	135.00	214.00	234.00	244.00	276.00	316.00	352.00	379.00	388.00	414.00	480.00	494.00	507.00	527.00	566.00	598.00	612.00	620.00	637.00	643.00	651.00	683.00	695.00	713.00	731.00	740.00

PROFILE OF LENGTH BRIDGE (ALTERN)

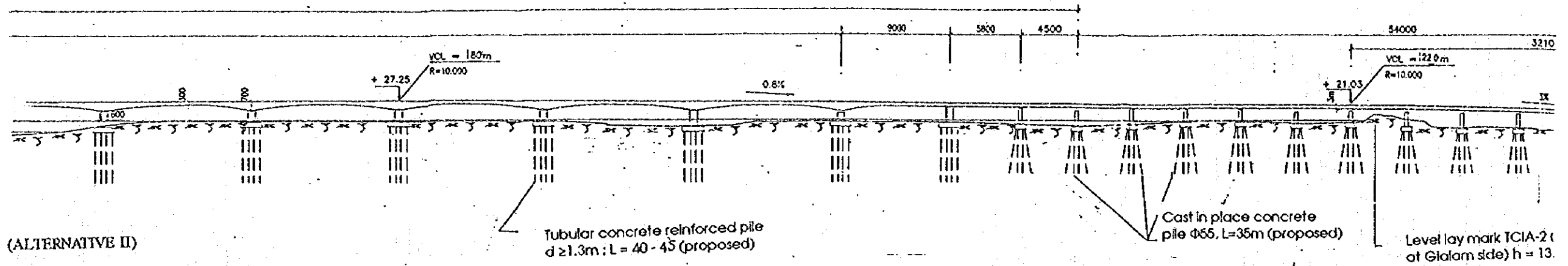


PROFILE OF LENGTH BRIDGE (ALTERN)

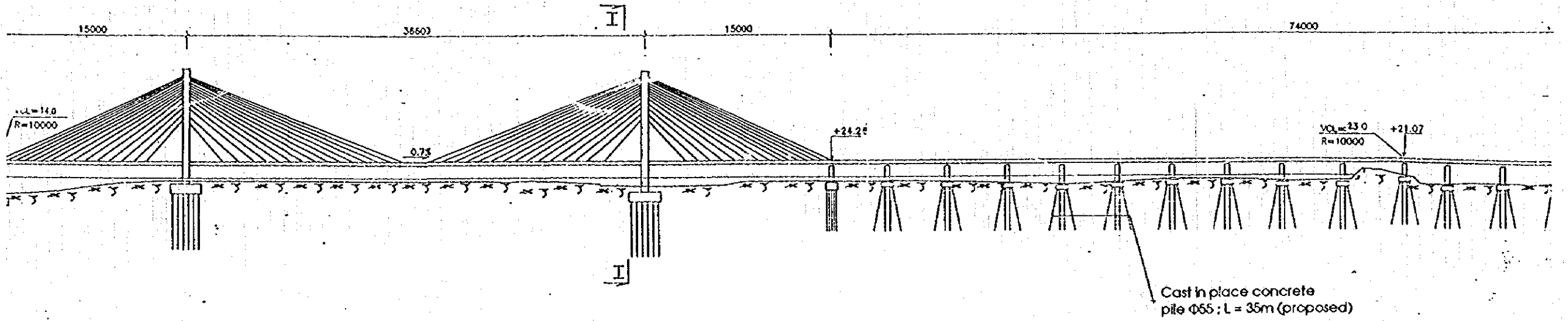


612.00	7.63	629.63	9.91	639.54	13.55	653.09	13.48	666.57	13.57	680.04	10.45	693.51	9.90	706.98	8.24	720.45	11.06	733.92	9.75	747.39	9.21	760.86	12.50	774.33	12.53	787.80	13.12	801.27	12.07	815.24	9.65	829.21	9.78	843.18	9.72	857.15	10.06	871.12	10.10	885.09	11.69	899.06	11.63	913.03	10.38	926.99	10.65	940.96	9.06	954.93	38.00	968.90	9.04	982.87	8.07	996.84	6.70	1010.81	7.45	1024.78	28.00	1038.75	24.00	1052.72	33.00	1066.69	0.32	1080.66	-0.28	1094.63	-1.47	1108.60	-3.06	1122.57	-4.07	1136.54	-4.56	1150.51	-4.39	1164.48	-4.04	1178.45	-3.59	1192.42	-2.50	1206.39	-0.36	1220.36	1.22
612.00	639.54	653.09	666.57	680.04	693.51	706.98	720.45	733.92	747.39	760.86	774.33	787.80	801.27	815.24	829.21	843.18	857.15	871.12	885.09	899.06	913.03	926.99	940.96	954.93	968.90	982.87	996.84	1010.81	1024.78	1038.75	1052.72	1066.69	1080.66	1094.63	1108.60	1122.57	1136.54	1150.51	1164.48	1178.45	1192.42	1206.39	1220.36																																														
TCIA-1																																																																																									

ALTERNATIVE I)

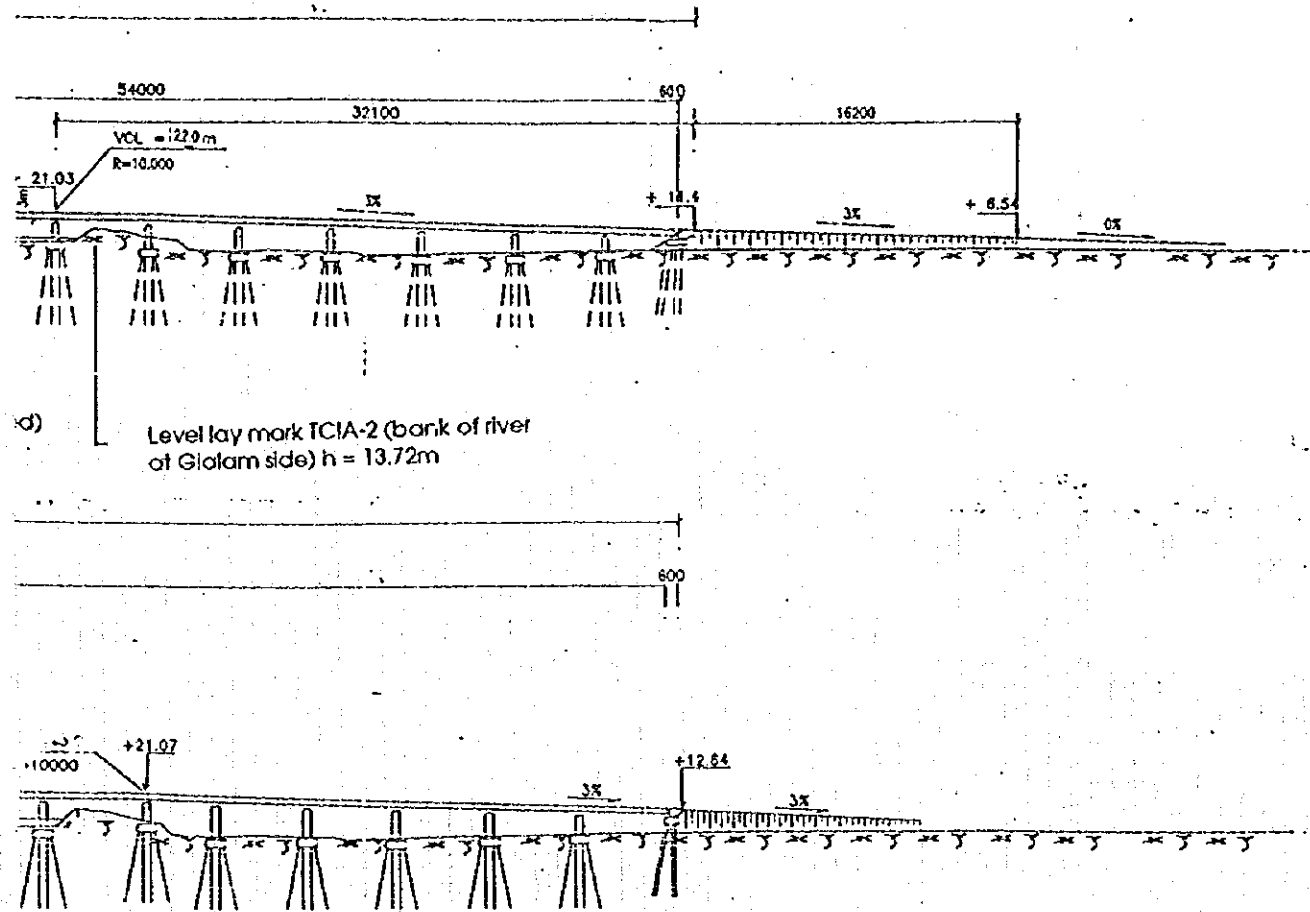


(ALTERNATIVE II)



1024.00	1048.00	1072.00	1096.00	1120.00	1144.00	1168.00	1192.00	1216.00	1240.00	1264.00	1288.00	1312.00	1336.00	1360.00	1384.00	1408.00	1432.00	1456.00	1480.00	1504.00	1528.00	1552.00	1576.00	1600.00	1624.00	1648.00	1672.00	1696.00	1720.00	1744.00	1768.00	1792.00	1816.00	1840.00	1864.00	1888.00	1912.00	1936.00	1960.00	1984.00	2008.00	2032.00	2056.00	2080.00	2104.00	2128.00	2152.00	2176.00	2200.00	2224.00	2248.00	2272.00	2296.00	2320.00	2344.00	2368.00	2392.00	2416.00	2440.00	2464.00	2488.00	2512.00	2536.00	2560.00	2584.00	2608.00	2632.00	2656.00	2680.00	2704.00	2728.00	2752.00	2776.00	2800.00	2824.00	2848.00	2872.00	2896.00	2920.00	2944.00	2968.00	2992.00	3016.00	3040.00	3064.00	3088.00	3112.00	3136.00	3160.00	3184.00	3208.00	3232.00	3256.00	3280.00	3304.00	3328.00	3352.00	3376.00	3400.00	3424.00	3448.00	3472.00	3496.00	3520.00	3544.00	3568.00	3592.00	3616.00	3640.00	3664.00	3688.00	3712.00	3736.00	3760.00	3784.00	3808.00	3832.00	3856.00	3880.00	3904.00	3928.00	3952.00	3976.00	4000.00	4024.00	4048.00	4072.00	4096.00	4120.00	4144.00	4168.00	4192.00	4216.00	4240.00	4264.00	4288.00	4312.00	4336.00	4360.00	4384.00	4408.00	4432.00	4456.00	4480.00	4504.00	4528.00	4552.00	4576.00	4600.00	4624.00	4648.00	4672.00	4696.00	4720.00	4744.00	4768.00	4792.00	4816.00	4840.00	4864.00	4888.00	4912.00	4936.00	4960.00	4984.00	5008.00	5032.00	5056.00	5080.00	5104.00	5128.00	5152.00	5176.00	5200.00	5224.00	5248.00	5272.00	5296.00	5320.00	5344.00	5368.00	5392.00	5416.00	5440.00	5464.00	5488.00	5512.00	5536.00	5560.00	5584.00	5608.00	5632.00	5656.00	5680.00	5704.00	5728.00	5752.00	5776.00	5800.00	5824.00	5848.00	5872.00	5896.00	5920.00	5944.00	5968.00	5992.00	6016.00	6040.00	6064.00	6088.00	6112.00	6136.00	6160.00	6184.00	6208.00	6232.00	6256.00	6280.00	6304.00	6328.00	6352.00	6376.00	6400.00	6424.00	6448.00	6472.00	6496.00	6520.00	6544.00	6568.00	6592.00	6616.00	6640.00	6664.00	6688.00	6712.00	6736.00	6760.00	6784.00	6808.00	6832.00	6856.00	6880.00	6904.00	6928.00	6952.00	6976.00	7000.00	7024.00	7048.00	7072.00	7096.00	7120.00	7144.00	7168.00	7192.00	7216.00	7240.00	7264.00	7288.00	7312.00	7336.00	7360.00	7384.00	7408.00	7432.00	7456.00	7480.00	7504.00	7528.00	7552.00	7576.00	7600.00	7624.00	7648.00	7672.00	7696.00	7720.00	7744.00	7768.00	7792.00	7816.00	7840.00	7864.00	7888.00	7912.00	7936.00	7960.00	7984.00	8008.00	8032.00	8056.00	8080.00	8104.00	8128.00	8152.00	8176.00	8200.00	8224.00	8248.00	8272.00	8296.00	8320.00	8344.00	8368.00	8392.00	8416.00	8440.00	8464.00	8488.00	8512.00	8536.00	8560.00	8584.00	8608.00	8632.00	8656.00	8680.00	8704.00	8728.00	8752.00	8776.00	8800.00	8824.00	8848.00	8872.00	8896.00	8920.00	8944.00	8968.00	8992.00	9016.00	9040.00	9064.00	9088.00	9112.00	9136.00	9160.00	9184.00	9208.00	9232.00	9256.00	9280.00	9304.00	9328.00	9352.00	9376.00	9400.00	9424.00	9448.00	9472.00	9496.00	9520.00	9544.00	9568.00	9592.00	9616.00	9640.00	9664.00	9688.00	9712.00	9736.00	9760.00	9784.00	9808.00	9832.00	9856.00	9880.00	9904.00	9928.00	9952.00	9976.00	10000.00
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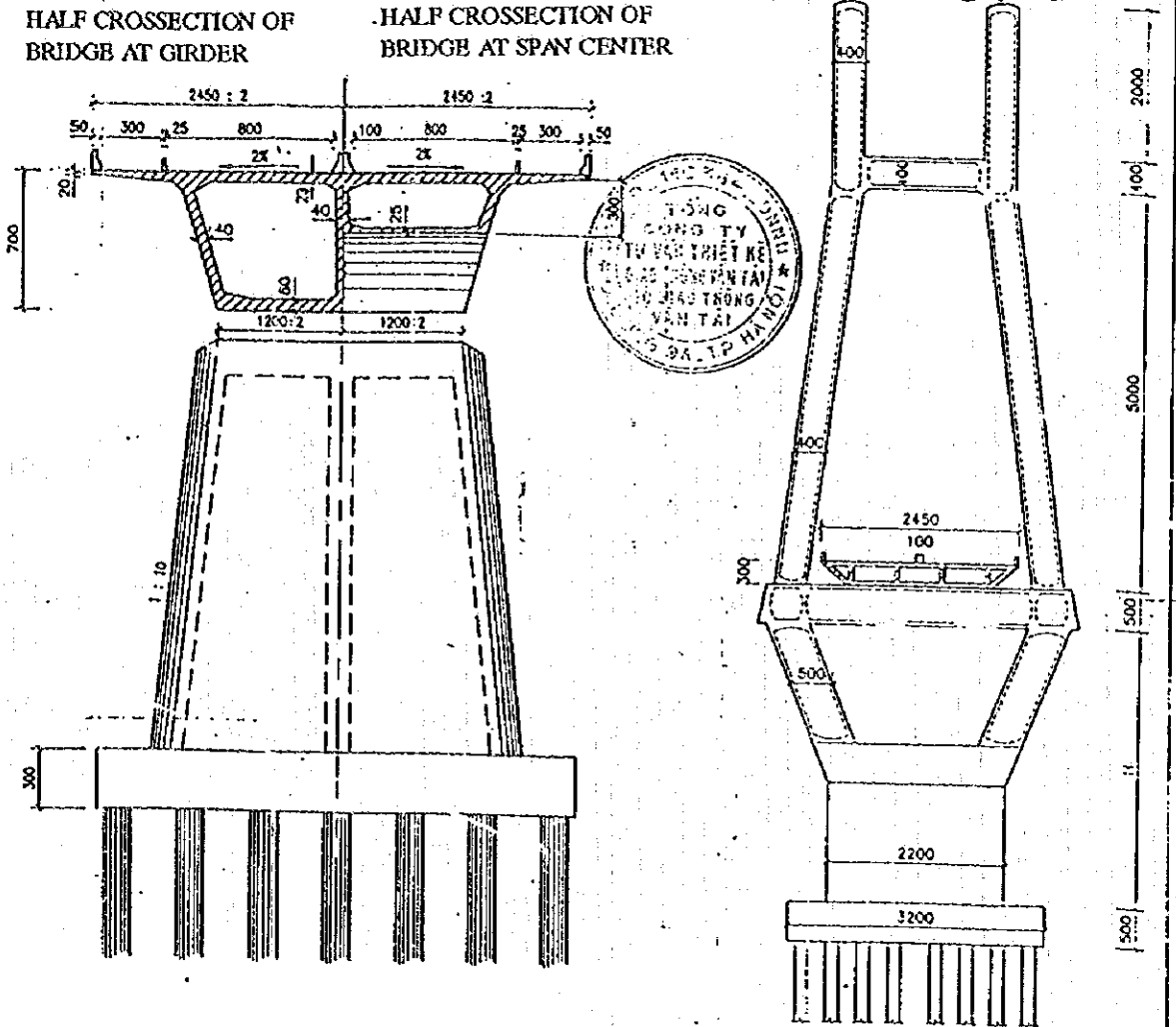


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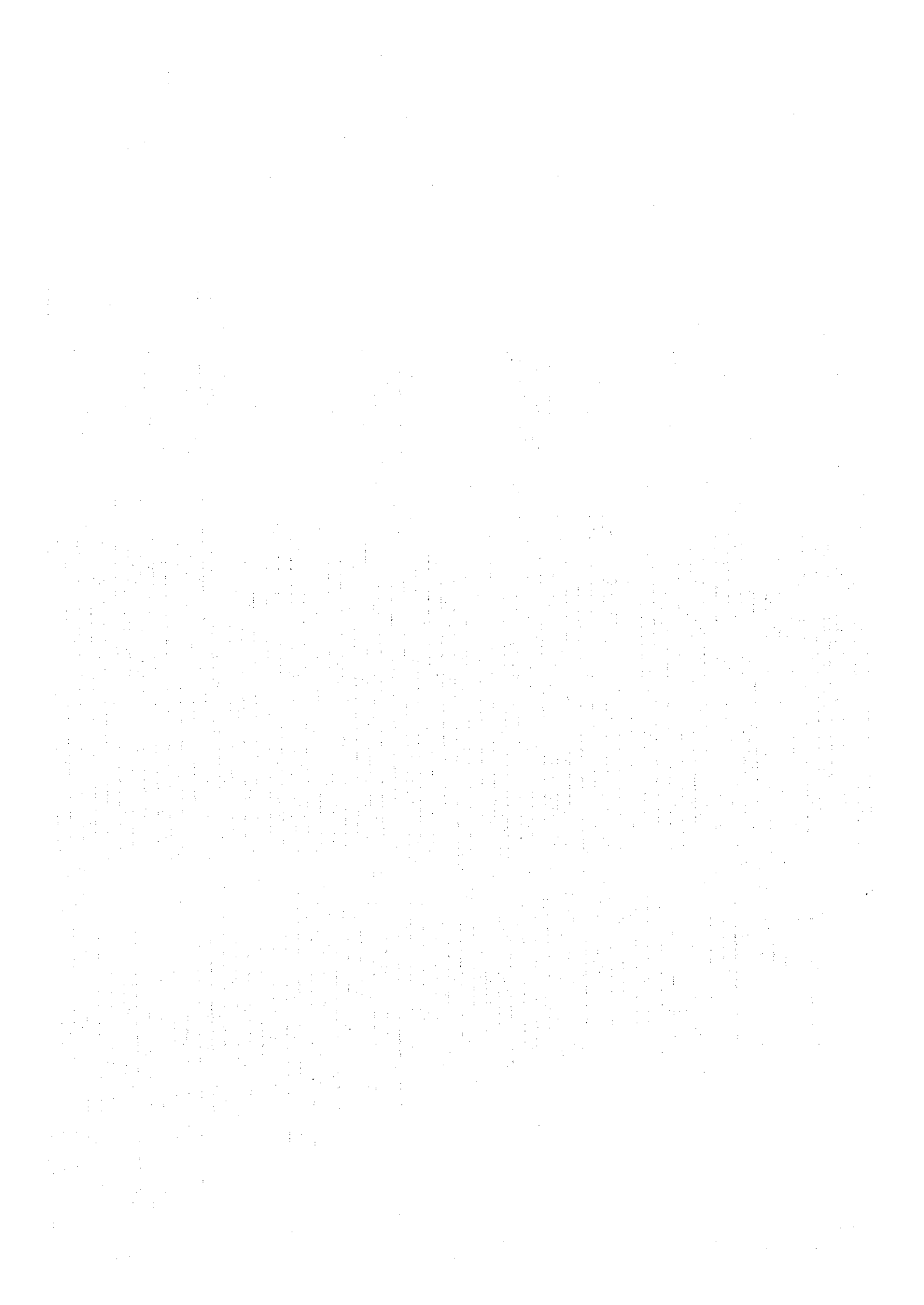
50	6.57	13.72	12.74	9.79	8.92	4.87	4.68	3.39	4.77	4.77	3.20	1.82	3.33	4.05	4.82	4.79	0.02	4.82	4.69	4.78	4.31	3.82	3.58
1006.00	2011.77	3328.00	4607.50	5586.50	6478.50	7265.50	8048.50	8827.50	9602.50	10373.50	11140.50	11903.50	12662.50	13417.50	14168.50	14915.50	15658.50	16397.50	17132.50	17863.50	18590.50	19313.50	20032.50
TCIA-2																							

CROSSECTION OF BRIDGE DECK (ALTERNATIVE I)

I-I CROSSECTION (ALTERNATIVE II)







JICA