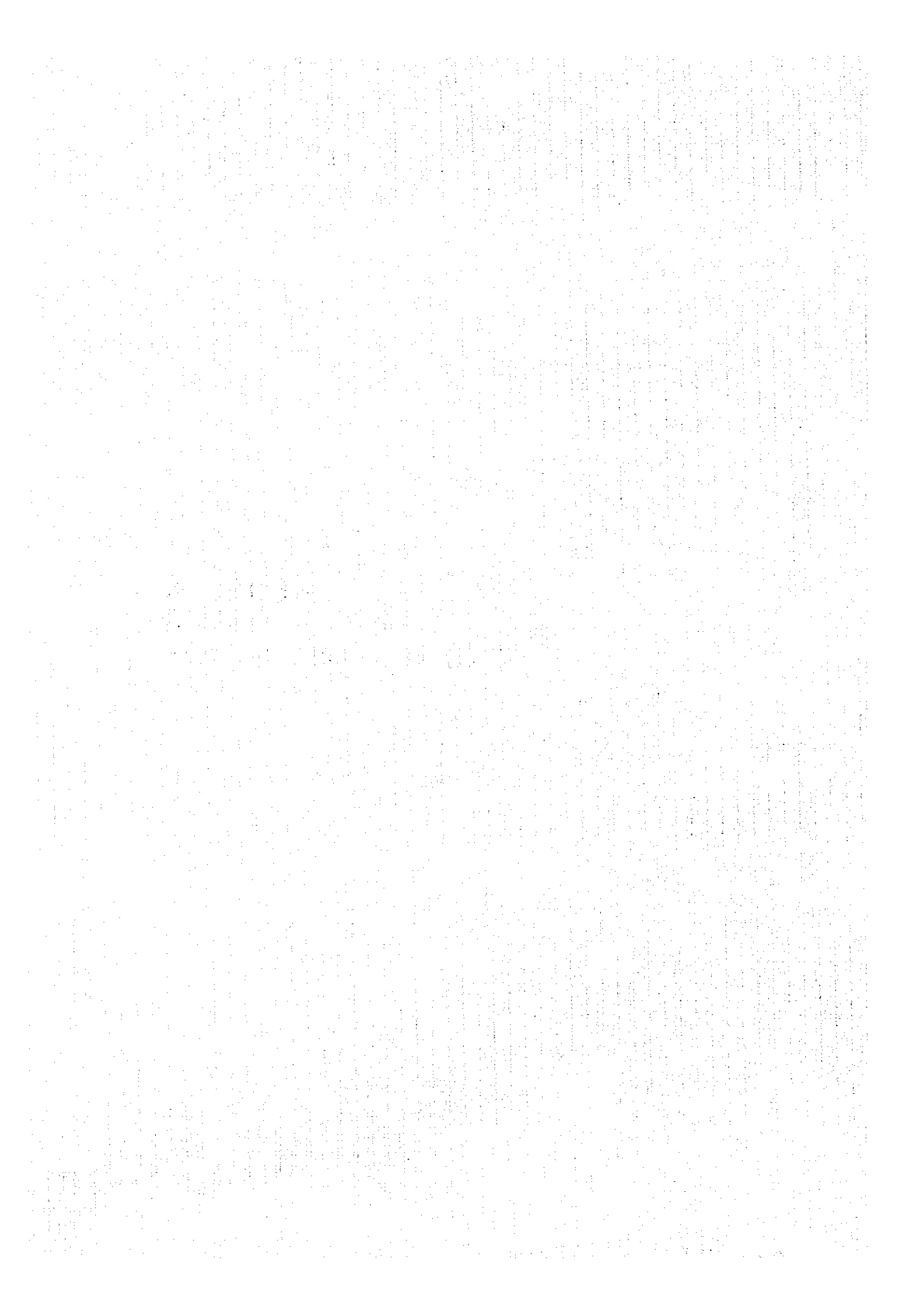


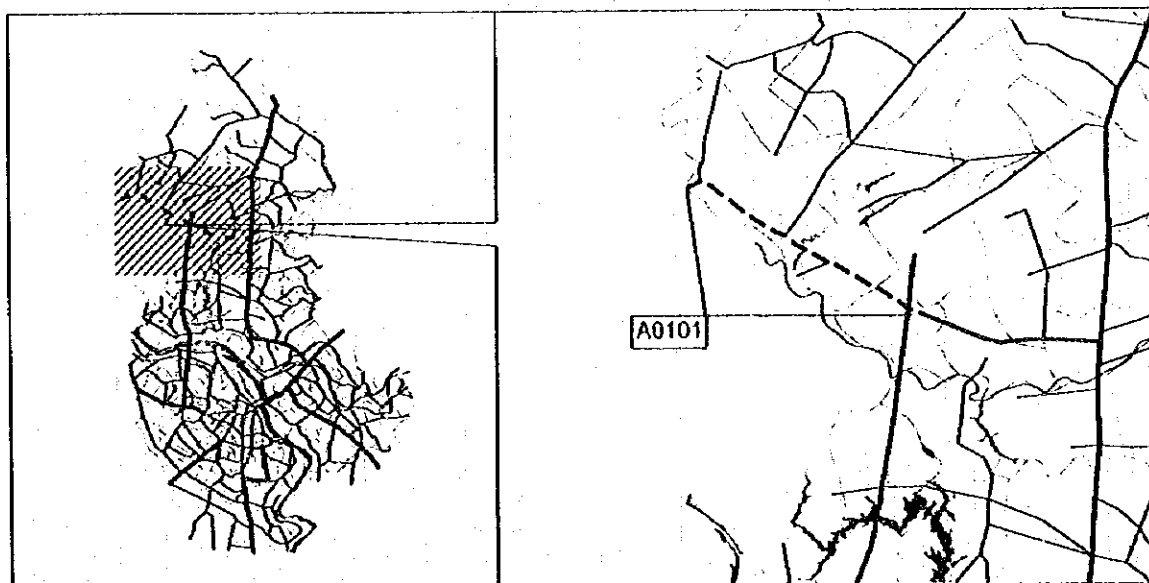
**APPENDIX C**  
**PROJECT PROFILE**  
**ROAD NETWORK PROJECTS**



**PROJECT PROFILE**

Project No. A01

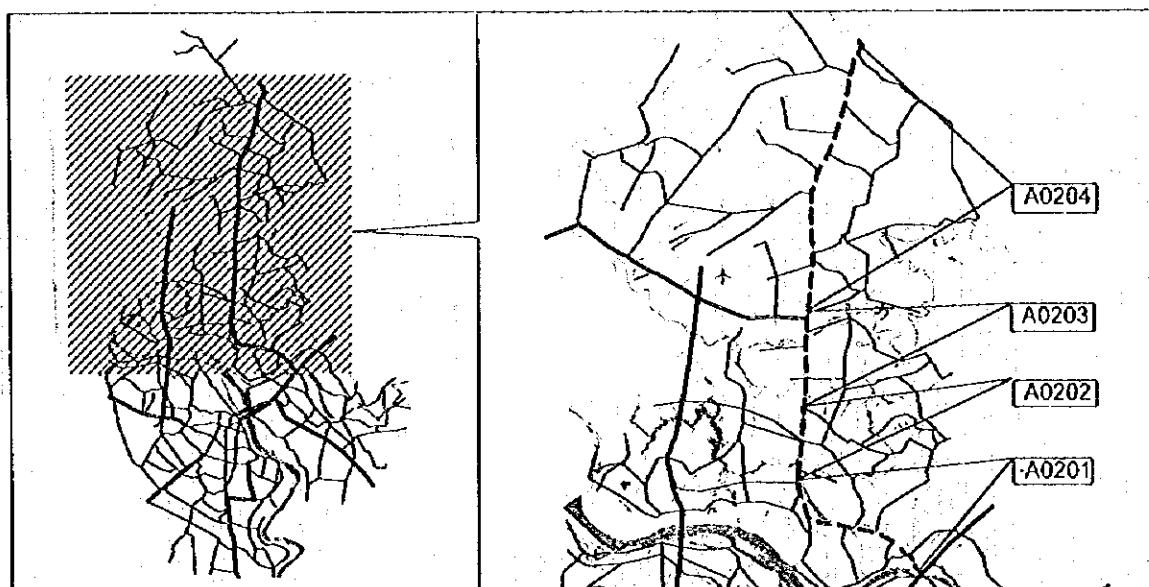
Project Name		National Highway No. 2 Improvement Project		
Existing Condition		The existing road requires improvement works to increase its capacity as it will serve the new industrial areas near the international airport north of Hanoi. It is also a strategic road in the national highway network connecting the western and eastern provinces with its extension with national highway No. 18. - Carriageway width: 8 - 14 m                      - Shoulder width: 2 - 3 m		
Objective		<ul style="list-style-type: none"> <li>- To support development schemes of northern areas in Hanoi city</li> <li>- To promote the regional development of the industrial and agricultural sectors</li> <li>- To serve the increasing transport demand between Hanoi and northern and eastern provinces as well as the international airport.</li> </ul>		
Segment		A0101		Total
Location	From To	Noi Bai Expressway Hanoi Boundary		
Length	(meter)	5500		5500
Traffic Volume	Year	2015		
	Bicycle	77,900		
	Motorcycle	75,200		
	Bus	6,200		
	P.Car Truck	5600 10,300		
Work Item:				
Road widening to 4+2 L (m)		5500		5500
Bridge widening to 4+2 L (m)		60		60
Cost (billion VND):				
Direct Cost		59.7		59.7
Eng. & Supervision		7.2		7.2
Compensation		29.8		29.8
Total		96.6		96.6
Priority Rank		C-2		
Implementation	From	2006		
	To	2007		
Economic Return	B/C			
Remarks:				



**PROJECT PROFILE**

Project No. A02

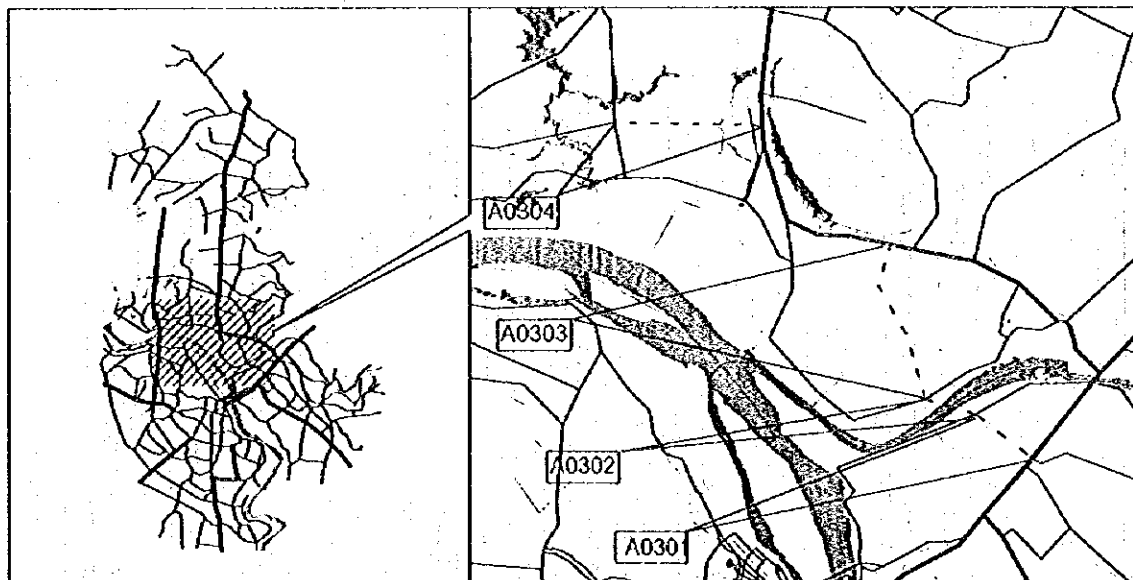
Project Name		National Highway No. 3 Improvement Project				
Existing Condition		The road has an important role in handling the transport demand between Hanoi and northern provinces. The section in Hanoi city handles heavy traffic volumes mostly composed of large-sized trucks. It is connected to other national highways and serves the newly developed industrial areas.				
Objective		<ul style="list-style-type: none"> <li>- To support future development projects of Hanoi city</li> <li>- To promote the regional development</li> <li>- To serve the increasing transport demand between Hanoi and northern provinces.</li> <li>- To strengthen the national road network in the northern region.</li> </ul>				
Segment		A0201	A0202	A0203	A0204	Total
Location	From	NH 1	DA 4	RR 3	NH18	
	To	DA 4	RR 3	NH18	Hanoi boundary	
Length	(meter)	9000	2500	6000	15000	32500
Traffic Volume	Year	2015	2015	2015	2015	
	Bicycle	2,900	7,400	8,500	8,900	
	Motorcycle	21,100	66,900	45,600	21,200	
	Bus	5,500	15,400	12,400	7,800	
	P.Car	2,200	5,700	2,900	2,100	
	Truck	7,200	13,500	6,700	6,500	
Work Item:						
Road widening to 6+2 L (m)		9,000	2500		15000	11500
Road widening to 4+2 L (m)				6000		21000
Bridge widening to 6+2 L (m)			60			90
Bridge widening to 4+2 L (m)				60		60
Cost (billion VND):						
Direct Cost		139.6	38.8	65.1	162.8	243.5
Eng & Supervision		16.8	4.7	7.8	19.5	29.3
Compensation		67.2	17.5	31.5	77.6	116.2
Total		223.6	60.9	104.4	26	388.9
Priority Rank		A-2	A-2	A-2	A-2	
Implementation	From	2000	2000	2000	2000	
	To	2005	2005	2005	2005	
Economic Return	B/C					
Remarks:						



**PROJECT PROFILE**

Project No. A03

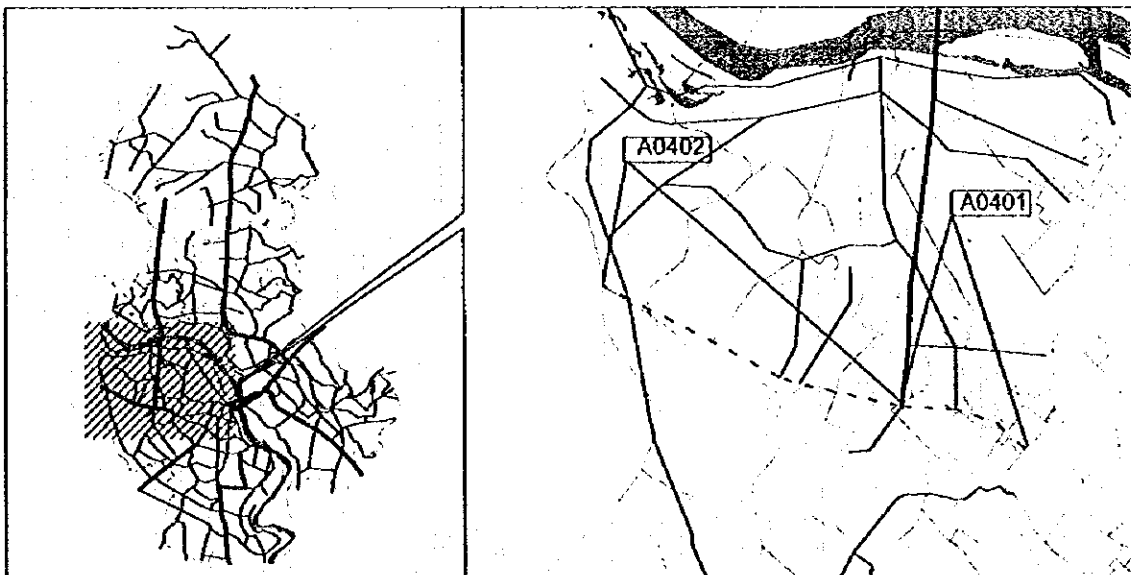
Project Name		National Highway 5 Extension Construction Road				
Existing Condition		NH-5 Improvement Project is being implemented to connect Hanoi with Haiphong with a high level-of-service highway. New alignment is required up to the Duong River, then the district road DA-7 should be upgraded.				
Objective		-To provide new arterial To the road network of Hanoi -To directly connect eastern and northern areas -To decrease the heavy traffic on NH-1 and NH-3 near Hanoi -To support development activities in Gia Lam and Dong Anh				
Segment		A0301	A0302	A0303	A0304	Total
Location	From To	NH 1 Duong Bridge	Duong Bridge	DA7	DA4	
Length	(meter)	1900	550	1250	7000	10700
Traffic Volume	Year	2015	2015	2015	2015	
	Bicycle	19,000	5,100	5100	1900	
	Motorcycle	67,200	56,100	56100	26800	
	Bus	12,500	12,500	12500	4200	
	P.Car	5600	5000	5000	1400	
	Truck	18,000	16,300	16300	3700	
Work Item						
Road construction to 6+2 L (m)		1900				1900
Bridge construction to 6+2L (m)			550			550
Road widening to 4+2 L (m)				1250	7000	8250
Cost (billion VND)						
Direct Cost		31.1	294.8	19.4	108.6	325.9
Eng. & Supervision		3.7	35.4	2.3	13	39.1
Compensation		75.2	0	8.8	44.7	75.2
Total		110	330.2	30.6	166.3	440.2
Priority Rank		B-2	B-2	B-2	B-2	
Implementation	From	2003	2003	2003	2003	
	To	2006	2006	2006	2006	
Economic Return B/C						
Remarks:						



**PROJECT PROFILE**

Project No. A04

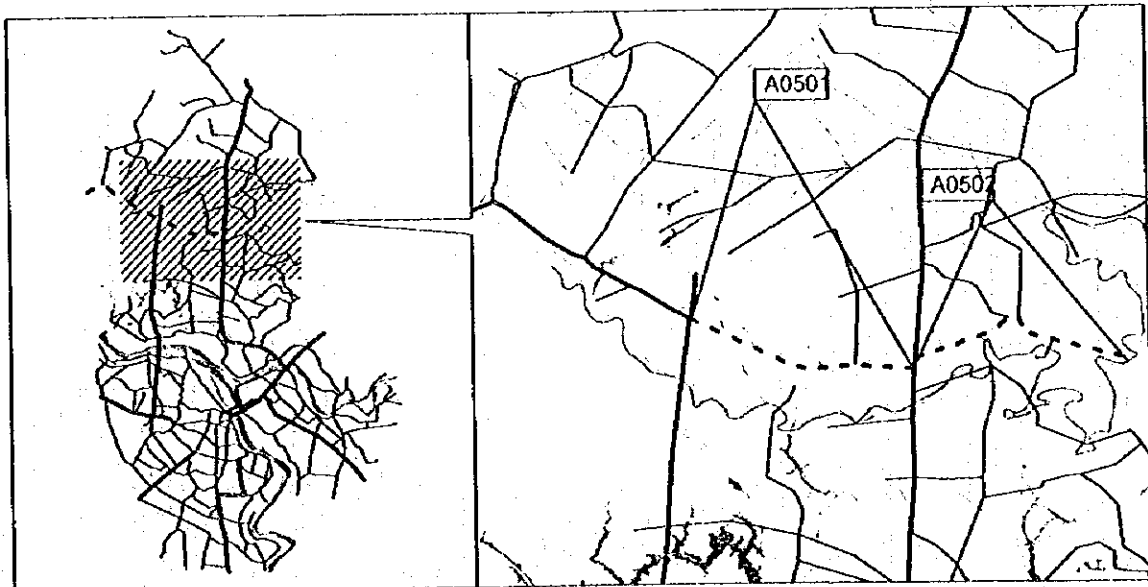
Project Name		National Highway No. 32 Improvement Project			
Existing Condition		The road serves heavy traffic volumes between central and western areas of Hanoi city. As the future high potential areas for urbanization are extended west of the city, the road is in urgent need for widening and upgrading projects. - Carriageway width: 5.5-12m - Shoulder width: 3-5m			
Objective		<ul style="list-style-type: none"> <li>- To support development plans of Hanoi city</li> <li>- To promote the extension of urbanization and industrialization to the western areas</li> <li>- To serve the increasing transport demand between Hanoi and northern/western provinces</li> <li>- To promote the regional development of the agriculture sector</li> </ul>			
Segment		A0401	A0402		Total
Location	From To	RR 2 RR 3	RR 3 Hanoi Boundary		
Length	(meter)	2500	6000		8500
Traffic Volume	Year	2015	2015		
	Bicycle	50,300	43800		
	Motorcycle	101,100	75,800		
	Bus	1,200	1900		
	P.Car Truck	3,200 4,700	3800 4,800		
Work Item:					
Road const' of 6+2 L (m)		2500	6000		7500
Bridge const' of 6+2 L (m)			71		71
Cost (billion VND)					
Direct Cost		49	93.1		142.1
Eng. & Supervision		5.9	11.2		17.1
Compensation		183.3	84.7		268
Total		238.2	188.9		427.1
Priority Rank		B-2	B-2		
Implementation	From	2004	2004		
	To	2005	2005		
Economic Return B/C					
Remarks:					



**PROJECT PROFILE**

Project No. A05

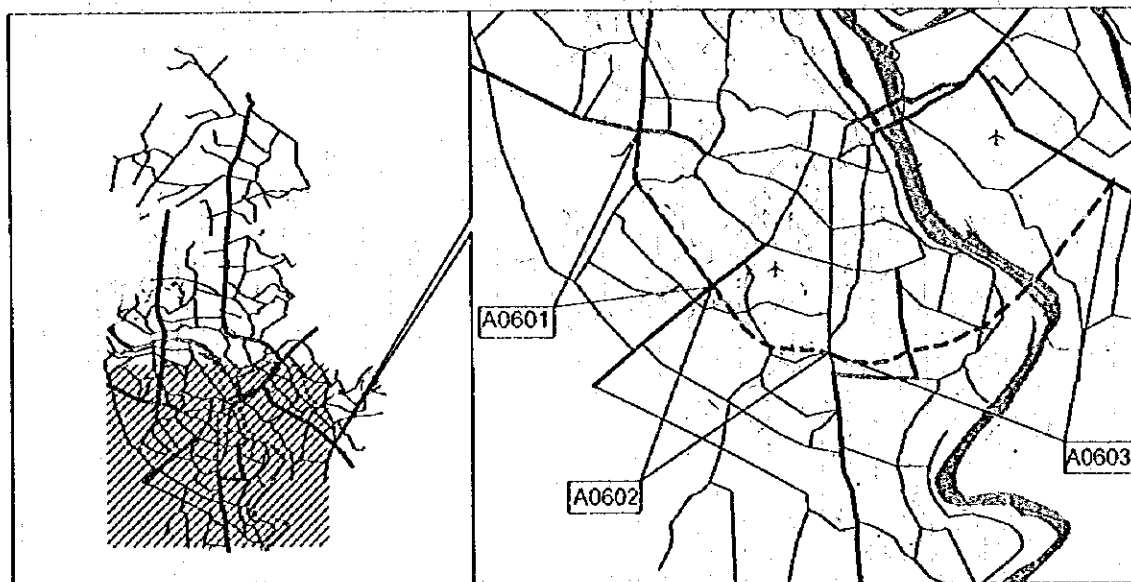
Project Name		National Highway No. 18 Construction Project			
Existing Condition		The road is currently under a feasibility study to replace the sub-standard existing road to a 4-lane national highway in order to support development in the northern areas and as a trade road between the international airport and seaports. - Carriageway width: 6-7m (laterite) - Shoulder width: 2-3m			
Objective		<ul style="list-style-type: none"> <li>- To support development of the new technology city.</li> <li>- To promote the extension of urbanization and industrialization to the western areas</li> <li>- To serve the increasing transport demand between Hanoi and western provinces</li> <li>- To promote the regional development</li> </ul>			
Segment		A0501	A0502		Total
Location	From To	Noi Bai Expressway NH 3	NH 3 Hanoi Boundary		
Length	(meter)	7,000	11,000		18,000
Traffic Volume	Year	2015	2015		
	Bicycle	11,700	800		
	Motorcycle	17,600	9,300		
	Bus	4,100	2,400		
	P.Car Truck	2,800 6,100	2,200 1,400		
Work Item					
Expressway const - 4+2 L (m)		7,000	11,000		18,000
Bridge const - 4+2 L (m)		41	44		85
Cost (billion VND)					
Direct Cost		97.9	153.8		251.7
Eng. & Supervision		11.7	18.5		30.2
Compensation		7.2	10.4		17.6
Total		116.8	182.7		299.5
Priority Rank		C-2	C-2		
Implementation	From	2008	2008		
	To	2009	2009		
Economic Return	B/C				
Remarks:					



**PROJECT PROFILE**

Project No. A06

Project Name		Lang Hoa Lac Expressway Construction Project			
Existing Condition		This road is planned to be constructed as an expressway between Hanoi and a new town for educational and high-tech activities beside Ba Vi at 30km distance west of Hanoi. The new town is one of the satellite cities planned to be developed around Hanoi.			
Objective		<ul style="list-style-type: none"> <li>- To support development of the new technology city.</li> <li>- To promote the extension of urbanization and industrialization to the western areas</li> <li>- To serve the increasing transport demand between Hanoi and western provinces</li> <li>- To promote the regional development</li> </ul>			
Segment		A0601			Total
Location	From To	RR 3 Hanoi Boundary			
Length	(meter)	2,750			2,750
Traffic Volume	Year	2015			
	Bicycle	7,700			
	Motorcycle	19,100			
	Bus	200			
	P. Car Truck	1400 300			
Work Item					
Expressway const' - 6+2 L (m)		2,750			2,750
Bridge const' - 6+2 L (m)					0
Cost (billion VND)					
Direct Cost		96.5			96.5
Eng. & Supervision		11.6			11.6
Compensation		5			5.0
Total		113.1			113.1
Priority Rank		A-2			
Implementation	From	1997			
	To	1998			
Economic Return	B/C				
Remarks:					

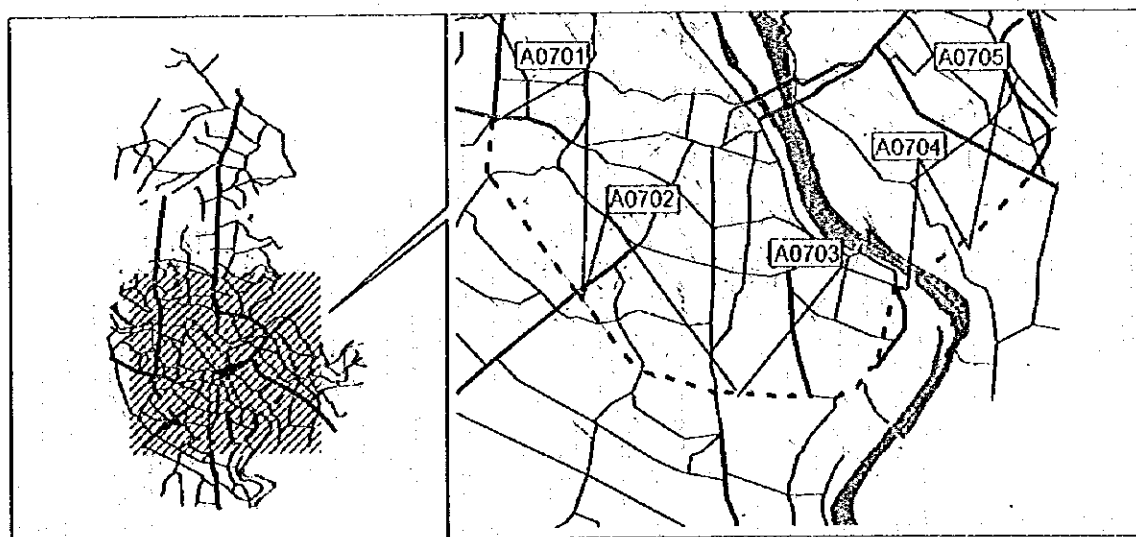




**PROJECT PROFILE**

Project No. A07

Project Name		South Ring Road No. 3 Construction Project					
Existing Condition		As the northern areas of Hanoi are planned for new socioeconomic development projects, the road network requires to construct this road not only to solve existing transport problems but also to support the national highway network and the economic and resettlement schemes in the region.					
Objective		<ul style="list-style-type: none"> <li>- To support development projects north of Hanoi city</li> <li>- To promote the extension of urbanization and industrialization in Soc Son District</li> <li>- To serve the increasing transport demand north of Hanoi</li> <li>- To handle the heavy traffic and cargo movement outside the urban area</li> <li>- To promote the regional development of the agriculture and industrial sectors</li> </ul>					
Segment		A0701	A0702	A0703	A0704	A0705	Total
Location	From	NH32	NH 6	NH 1	ThanhTri Bridge	ThanhTri Bridge	
	To	NH 6	NH 1	ThanhTri Bridge	Thanh Tri Bridg	NH5	
Length	(meter)	5,750	4,900	4,125	2,500	2,250	19,525
Traffic Volume	Year	2015	2015	2015	2015	2015	
	Bicycle	9,400	18,400	5,800	17,800	26,500	
	Motorcycle	44,300	64,400	26,200	93,300	79,600	
	Bus	2,200	1,500	2,500	7,800	6,700	
	P.Car	2,100	3,800	1,800	4,900	3,900	
	Truck	5,400	9,000	5,600	12,200	10,200	
Work Item							
Expressway cons'l - 8+2 L (m)		5,750	4,900	4,125		2,250	17,025
Expressway cons'l - 6+2 L (m)					2,500		2,500
Bridge cons'l - 6+2 L (m)		600		100			700
Cost (billion VND)							
Direct Cost		206.7	176.2	148.3	3400	80.9	4012.1
Eng. & Supervision		24.8	21.1	17.8	408	9.7	471.7
Compensation		102.2	86.9	75.1	0	40	264.2
Total		333.7	284.2	241.2	3,808.0	130.6	4,748.0
Priority Rank		A-1	A-1	A-1	A-1	A-1	
Implementation	From	1997	1997	1997	1997	1997	
	To	2003	2003	2003	2003	2003	
Economic Return		B/C					
Remarks:							



**PROJECT PROFILE**

Project No. A08

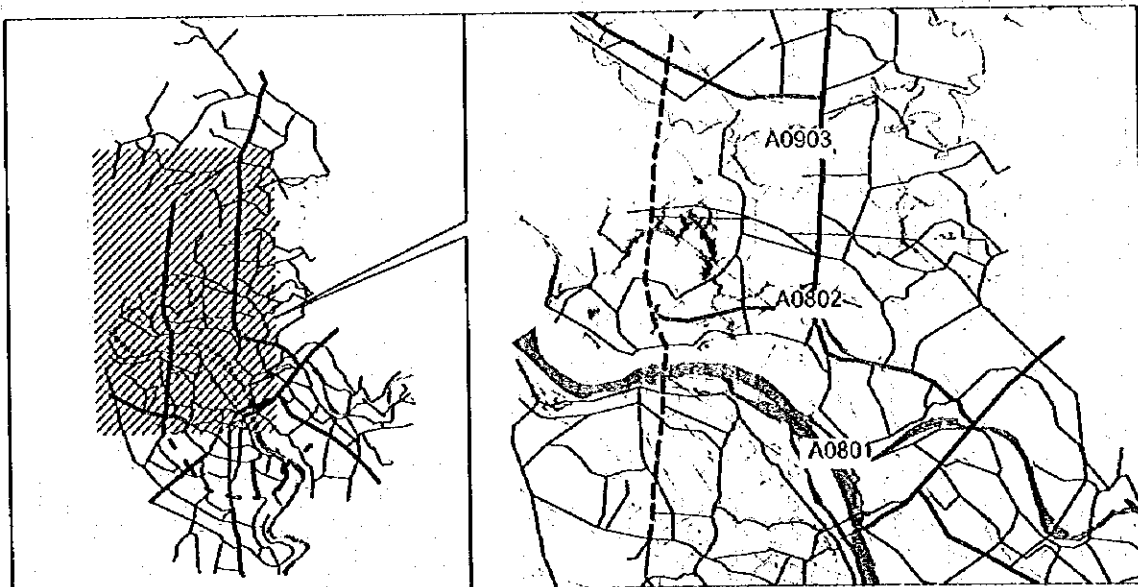
Project Name		North Ring Road No. 3 Construction Project					
Existing Condition		As the northern areas of Hanoi are planned for new socioeconomic developments projects, the road network requires to construct this road not only to solve existing transport problems but also to support the national highway network and the economic and resettlement schemes in the region.					
Objective		<ul style="list-style-type: none"> <li>- To support development projects north of Hanoi city</li> <li>- To promote the extension of urbanization and industrialization in Dong Anh District</li> <li>- To serve the increasing transport demand north of Hanoi</li> <li>- To handle the heavy traffic and cargo movement outside the urban area</li> <li>- To promote the regional development of the agriculture and industrial sectors</li> </ul>					
Segment		A0801	A0802	A0803	A0804	A0805	Total
Location	From	NH 5	Duong Bridge2	Duong Bridge2	NH 1	NH3	
	To	Duong Bridge2	Duong Bridge2	NH 1	NH3	Noibalexp way	
Length (meter)		1,750	2,300	5,750	11,000	7,900	20,800
Traffic V	Year	2015	2015	2015	2015	2015	
	Bicycle	5900	6,000	7800	4,300	1,200	
	Motorcycle	23000	16,300	10400	19,300	13,200	
	Bus	3000	2,700	1800	1600	1100	
	P.Car	2700	2200	2000	700	1,100	
	Truck	7400	6,500	6600	3,400	4,500	
Work Item							
Expressway cons't - 6*2 L (m)		1,750	2,300	5,750	11,000	7,900	28,700
Bridge cons't - 6*2 L (m)		600					600
Cost (bilion VND)							
Direct Cost		53.5	3000	175.7	336.1	244.4	3565.3
Eng & Supervision		6.4	360	21.1	40.3	29.3	427.8
Compensation		20.3	0	67.1	125.4	91.2	212.8
Total		80.2	3,360.0	263.8	501.8	364.9	4,205.9
Priority Rank		C-2	C-2	C-2	C-2	C-2	
Impleme	From	2012	2012	2012	2012	2012	
	To	2015	2015	2015	2015	2015	
Economic B/C							
Remarks							



**PROJECT PROFILE**

Project No. A09

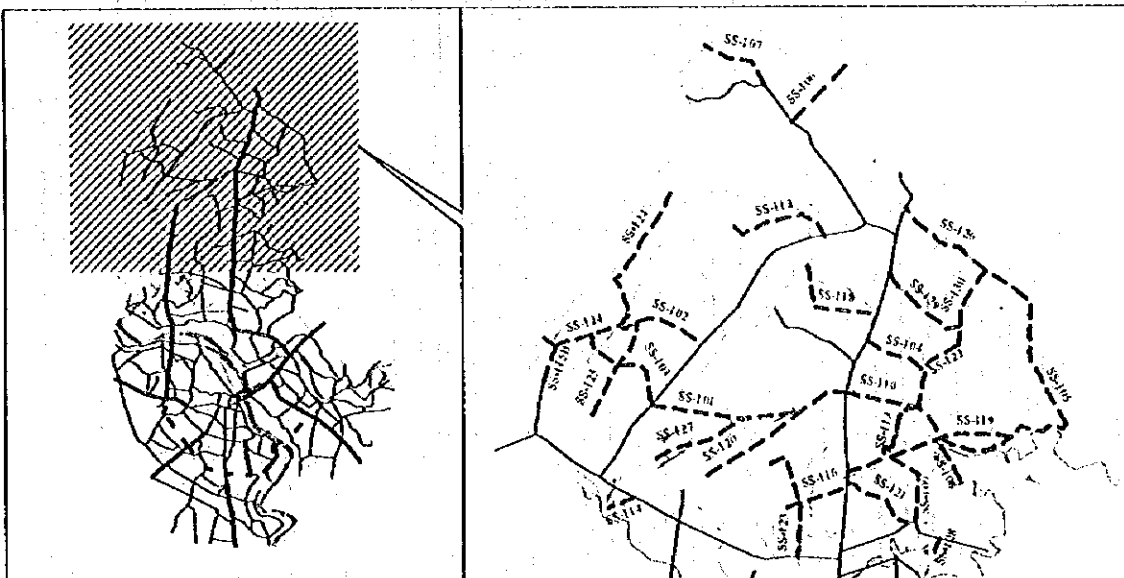
Project Name		Noi Bai Expressway Upgrading Project			
Existing Condition		The section from NH-32 to Thang Long Bridge is expected to have high traffic demand in the near future as it passes through the New CBD and will be a part RR-3. The existing four lanes for motorized traffic are planned to be widened to six lanes.			
Objective		-To support the New CBD development project -To handle the heavy future traffic demand -To keep high level-of-service access between Hanoi and Noi Bai International Airport			
Segment		A0901	A0902	A0903	Total
Location	From	NH 32	Thang Long Bridge	RR 3	
	To	Thang Long Bridge	RR 3	Noi Bai Airport	
Length	(meter)	6250	6300	8700	21250
Traffic Vol	Year	2015	2015	2015	
	Bicycle	28,400	59900	69200	
	Motorcycle	65,000	131,700	119200	
	Bus	5,700	10900	8300	
	P.Car	2,300	4500	4200	
	Truck	8,500	20,400	20500	
Work Item					
Road const' of 4+2 L		6250	6300	8700	21250
Bridge const' of 4+2 L (m)			71		71
Cost (billion VND)					
Direct Cost		167.3	168.9	190.1	526.3
Eng. & Supervision		20.1	20.2	22.8	63.1
Compensation		667.9	658.7	157.6	1484.2
Total		855.3	847.5	370.5	2073.3
Priority Rank		C-3	C-3	C-3	
Implement	From	2010	2010	2010	
	To	2011	2011	2011	
Economic	B/C				
Remarks:					



**PROJECT PROFILE**

Project No. B01

Project Name		Road Improvement Project in Soc Son District			
Existing Condition		The district has high potential of industrial and agricultural development with few paved roads in fair/good condition or with an adequate width 5m paved and 2m shoulder. A total of about 155 km requires to be paved with a minimum width of 7.0 m. In addition a rural road network linking all villages and suitable for motor vehicles will support the development plans in rural areas and improve the people's living standards.			
Objective		<ul style="list-style-type: none"> <li>- To support industrial development in the western areas and agriculture in the eastern areas of the district.</li> <li>- To provide all-weather and reliable rural road network linking all villages</li> <li>- To provide improved transport services for rural development</li> </ul>			
Roads Implementation Program		As in the attached sheet.			
Length (meter)		Short-term	Medium-term	Long-term	Total
		37,200	36,100	80,000	155,300
Work Item :					
Road widening 2-L (m)		37,200	36,100	80,000	155,300
Bridge widening 2-L (m)				92	92
Cost (billion VND)					
Right-of-Way		0.4	0.4	0.9	1.7
Construction		160.0	163.9	345.0	675.0
Engineering		19.2	20.4	41.4	81.0
Total		179.6	190.7	387.3	757.7
Implementation From To		1996 2000	2001 2005	2006 2015	
Remarks:					



**PROJECT PROFILE**

Project No. B02

Project Name	Road Improvement Project in Dong Anh District			
Existing Condition	The district has high potential of industrial and agricultural development with few paved roads in fair/good condition or with an adequate width over 6.0m. A total of about 56 km requires to be paved with a minimum width of 6.0 m. In addition, a rural road network linking all villages and suitable for motor vehicles will support the development plans in rural areas and improve the people's living standards.			
Objective	<ul style="list-style-type: none"> <li>- To support socioeconomic development in northern areas of Hanoi</li> <li>- To improve the living standards of local people</li> <li>- To provide all-weather and reliable rural road network linking all villages</li> <li>- To provide improved transport services for rural development</li> </ul>			
Roads Implementation Program	As in the attached sheet.			
Length (meter)	Short-term	Medium-term	Long-term	Total
	13,200	18,000	24,000	55,200
Work Item:				
Road widening 2-L (m)	13,200	18,000	24,000	55,200
Bridge widening 2-L (m)	35	32		67
Cost (billion VND)				
Right-of-Way	0.1	0.1	0.1	0.3
Construction	59.4	80.6	107.6	247.6
Engineering	7.1	9.7	12.9	29.7
Total	66.6	90.4	120.6	277.6
Implementation From To	1996 2000	2001 2005	2006 2015	
Remarks:				



**PROJECT PROFILE**

Project No. B03

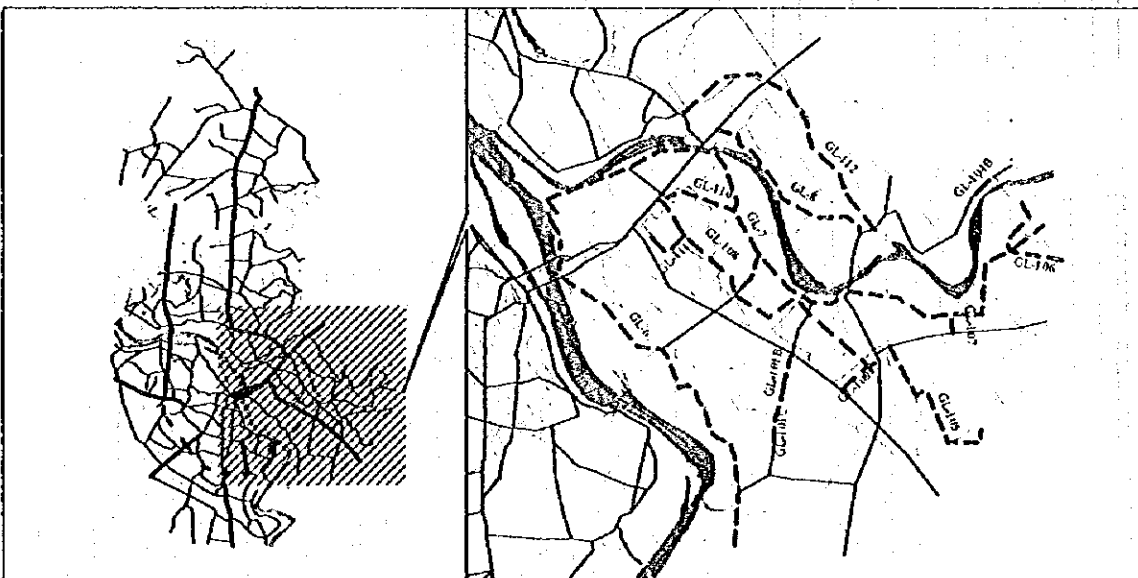
<b>Project Name</b>		Road Improvement Project in Tu Liem District			
<b>Existing Condition</b>		The district has high potential for future socioeconomic development with few paved roads in fair/good condition or with an adequate width over 6.0m. A total of about 25 km requires to be paved with a minimum width of 6.0 m. In addition, a rural road network linking all villages and suitable for motor vehicles will support the development plans in rural areas and improve the people's living standards.			
<b>Objective</b>		<ul style="list-style-type: none"> <li>- To support socioeconomic development in western areas of Hanoi</li> <li>- To improve the living standards of local people</li> <li>- To provide all-weather and reliable rural road network linking all villages</li> <li>- To provide improved transport services for rural and future urban development</li> </ul>			
<b>Roads</b>		As in the attached sheet			
<b>Implementation Program</b>		Short-term	Medium-term	Long-term	Total
<b>Length (meter)</b>		6,800	10,500	7,700	25,000
<b>Work Item :</b>					
Road widening 2-L (m)		6,800	10,500	7,700	25,000
Bridge widening 2-L (m)					
<b>Cost (billion VND)</b>					
Right-of-Way		0.2	0.2	0.2	0.6
Construction		29.3	45.2	33.1	107.6
Engineering		3.5	5.4	4.0	12.9
<b>Total</b>		<b>33.0</b>	<b>50.8</b>	<b>37.3</b>	<b>121.1</b>
<b>Implementation</b>		From	2001	2006	
		To	2000	2015	
<b>Remarks:</b>					



**PROJECT PROFILE**

Project No. B04

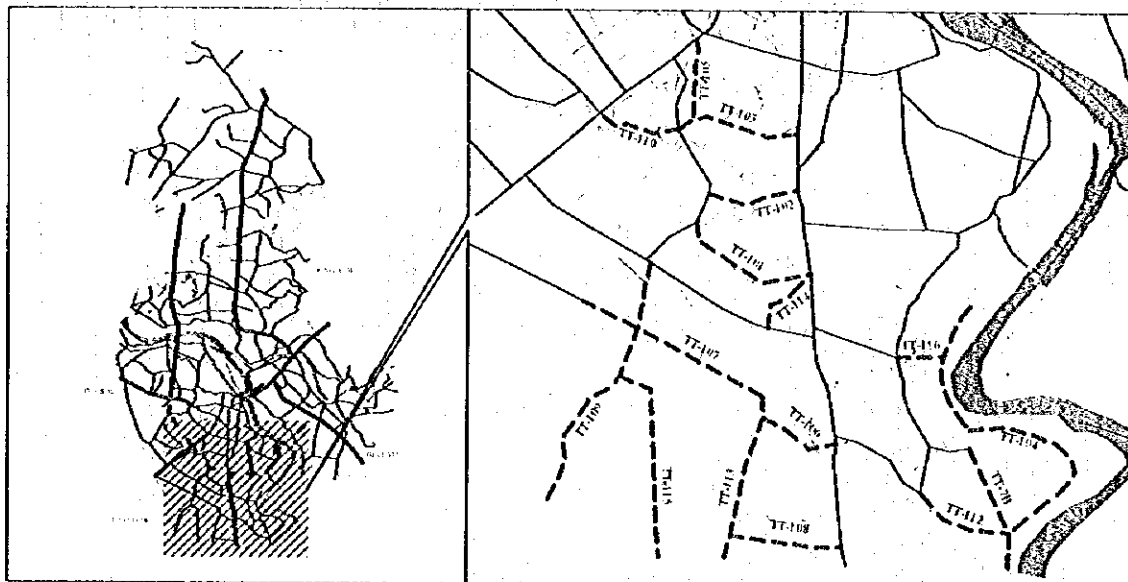
<b>Project Name</b>		<b>Road Improvement Project in Gia Lam District</b>			
<b>Existing Condition</b>		The district has high potential for future socioeconomic development with few paved roads in fair/good condition or with an adequate width over 6.0m. A total of about 83 km requires to be paved with a minimum width of 6.0 m. In addition, a rural road network linking all villages and suitable for motor vehicles will support the development plans in rural areas and improve the people's living standards.			
<b>Objective</b>		<ul style="list-style-type: none"> <li>- To support socioeconomic development in eastern areas of Hanoi</li> <li>- To improve the living standards of local people</li> <li>- To provide all-weather and reliable rural road network linking all villages</li> <li>- To provide improved transport services for rural and future urban development.</li> </ul>			
<b>Roads</b>		As in the attached sheet			
<b>Implementation Program</b>		<b>Short-term</b>	<b>Medium-term</b>	<b>Long-term</b>	<b>Total</b>
<b>Length (meter)</b>		19,470	22,150	41,100	82,720
<b>Work Item :</b>					
Road widening 2-L	(m)	19,470	22,150	41,100	82,720
Bridge widening 2-L	(m)	20	26	3	49
<b>Cost (billion VND)</b>					
Right-of-Way		0.5	0.4	0.8	1.7
Construction		85.4	95.4	178.7	359.5
Engineering		10.2	11.4	21.4	43.0
Total		96.1	107.2	200.9	404.2
<b>Implementation</b>	<b>From To</b>	1996 2000	2001 2005	2006 2015	
<b>Remarks:</b>					



**PROJECT PROFILE**

Project No 805

Project Name	Road Improvement Project in Thanh Tri District			
Existing Condition	The district has high potential for future socioeconomic development with few paved roads in fair/good condition or with an adequate width over 6.0m. A total of about 44 km requires to be paved with a minimum width of 6.0 m. In addition, a rural road network linking all villages and suitable for motor vehicles will support the development plans in rural areas and improve the people's living standards.			
Objective	<ul style="list-style-type: none"> <li>- To support socioeconomic development in southern areas of Hanoi</li> <li>- To improve the living standards of local people</li> <li>- To provide all-weather and reliable rural road network linking all villages</li> <li>- To provide improved transport services for rural and future urban development.</li> </ul>			
Roads Implementation Program	As in the attached sheet.			
Length (meter)	Short-term 13,800	Medium-term 16,600	Long-term 13,500	Total 43,900
Work Item :				
Road widening 2-L (m)	13,800	16,600	13,500	43,900
Bridge widening 2-L (m)	20	35		55
Cost (billion VND)				
Right-of-Way	0.4	0.4	0.3	1.1
Construction	60.8	74.1	58.1	193.0
Engineering	7.3	8.9	7.0	23.2
Total	68.5	83.4	65.4	217.3
Implementation From	1996	2001	2006	
To	2000	2005	2015	
Remarks:				





**PROJECT PROFILE**

Project No. B06

Project Name	Bridge Rehabilitation Project in Hanoi Rural Districts			
Existing Condition	Most of the bridges in Hanoi rural areas are in fair condition, however, some other bridges which are in bad condition should be rehabilitated to provide basic transport facilities for local people. This project aims to rehabilitate the sub-standard or deteriorated bridges in the five rural districts of Hanoi city.			
Objective	<ul style="list-style-type: none"> <li>- To support socioeconomic development in rural areas of Hanoi</li> <li>- To improve the living standards of local people by providing basic crossing facilities</li> <li>- To provide all-weather and reliable rural road network linking all villages</li> <li>- To provide improved transport services for rural and future urban development.</li> </ul>			
Bridges	As in the attached sheet.			
Implementation Program	Short-term	Medium-term	Long-term	Total
Length (meter)	93	-	-	93
Work Item:				
Bridge Rehabilitation	93			93
Cost (billion VND)				
Right-of-Way	-			
Construction	6.48			6.48
Engineering	0.78			0.78
Total	7.26			7.26
Implementation	From	2001	2005	
	To	2005	2015	
Remarks:				

	No	Name	Type	Length
	1	Da Hoi	Concrete	8
	2	Cho Chau + Do Tan	Concrete	10
	3	Minh Tri + Xuan Hoa	Concrete	10
	4	Tan Dan + Xuan Hoa	Concrete	12
	5	Thong Nhat	Steel girder	4
	6	My Noi	Concrete	6
	7	Xu Ky	Concrete	6
	8	Co Loa	Concrete	20
	9	Viet Hung + Phu Thi	Concrete	3
10	Doi	Brick arch	6	

**PROJECT PROFILE**

Project No. C01

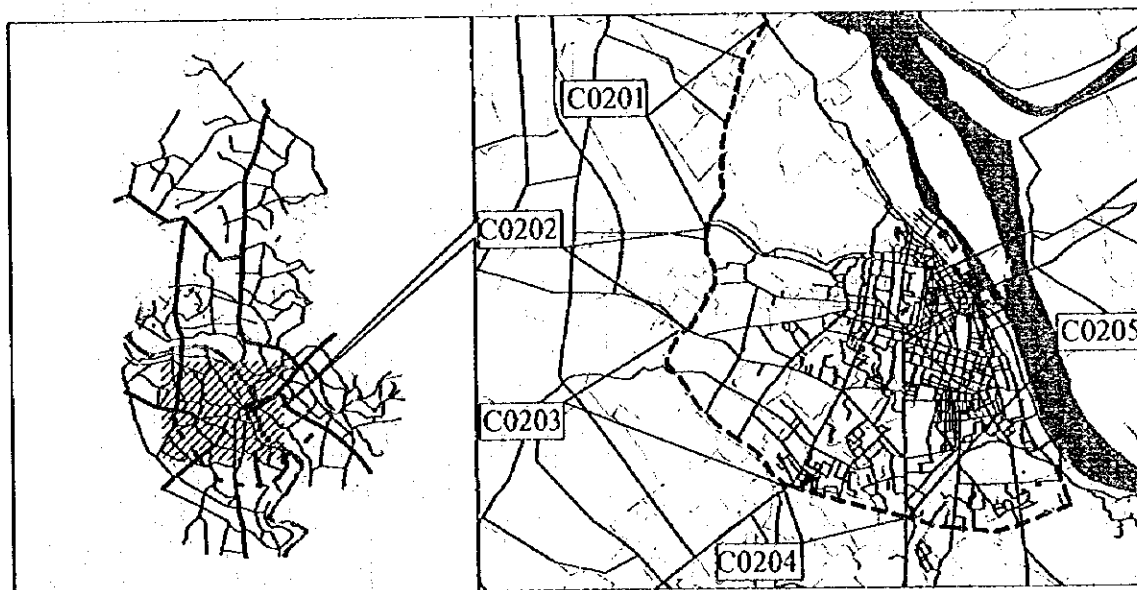
Project Name		Ring Road 1 Improvement Project			
Existing Condition		The road has a total length of about 11 kilometers, in which some sections are narrow and others are not impassable for car traffic. As the road is surrounding the central areas of Hanoi, it is an important link in the urban street network.			
Objective		<ul style="list-style-type: none"> <li>- To provide an additional axle for east - west high transport demand</li> <li>- To realize the function of the road as a ring road</li> </ul>			
Segment		C0101	C0102	C0103	Total
Location	From To	Cau Giay Ton Duc Thang	Ton Duc Thang Kim Lien	Hue Minh Khai	
Length	(meter)	3,300	1,200	2,000	6,500
Traffic Volume	Year	2015	2015	2015	
	Bicycle	51,400	53,100	11,400	
	Motorcycle	92,800	84,400	18,000	
	Bus	1,200	700	100	
	P.Car	6,000	6,800	900	
	Truck	9,200	10,400	4,200	
Work Item					
Widening of Street (60m)		3,300	1,200	2,000	6,500
Cost (billion VND)					
Direct Cost		56.4	17.6	29.6	103.6
Eng. & Supervision		6.8	2.1	3.6	12.5
Compensation		619.5	95.2	137.2	851.9
Total		682.7	114.9	170.3	967.9
Priority Rank		C-2	C-2	C-2	
Implementation	From	2009	2009	2009	
	To	2011	2011	2011	
Economic Return	B/C				0.6
Remarks:					



**PROJECT PROFILE**

Project No. C02

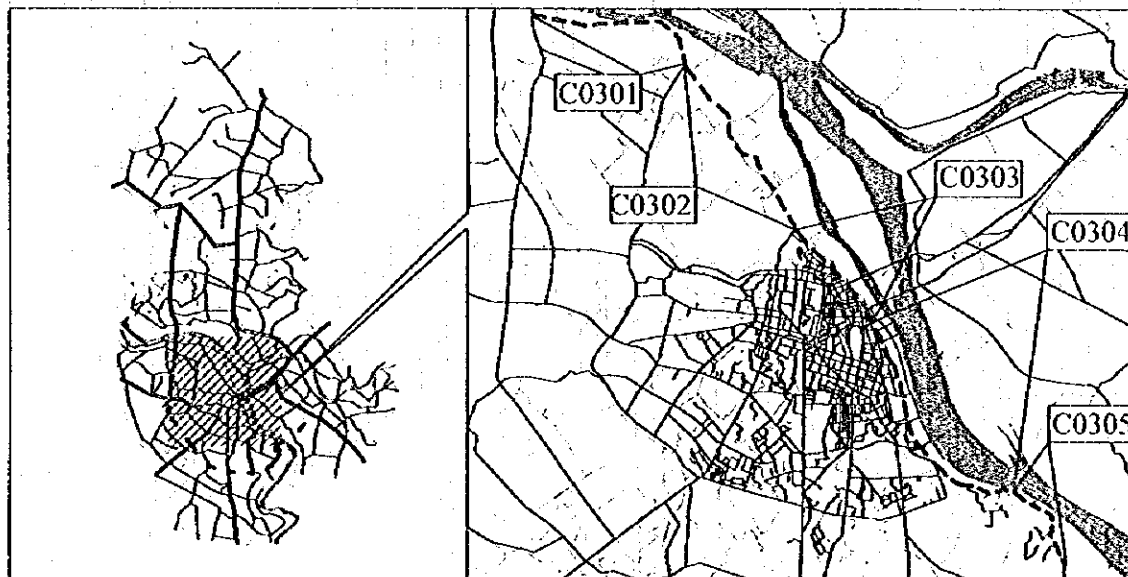
Project Name		Ring Road 2 Improvement Project					
Existing Condition		As the main existing ring road in the network handling high traffic volumes, the capacity of this ring road should be increased through a doubling scheme to construct a new carriageway for its western sections and to carry out widening and right-of-way adjustments to the existing eastern sections of the road.					
Objective		<ul style="list-style-type: none"> <li>- To realize the function of the road as a ring road in handling heavy traffic outside the central areas.</li> <li>- To support development plans in the western and sub-urban areas of the city.</li> </ul>					
Segment		C0201	C0202	C0203	C0204	C0205	Total
Location	From To	Nhat Tan Buoi	Buoi NH 32	NH32 NH 6	NH 6 NH 1	NH 1 Red River Dike	
Length	(meter)	4,200	2,200	4,200	2,400	4,000	17,000
Traffic Volume	Year	2015	2015	2015	2015	2015	
	Bicycle	6,600	1,200	28,900	79,100	34,600	
	Motorcycle	25,000	3,900	67,200	130,300	56,300	
	Bus	0	100	300	400	200	
	P.Car	200	100	1,000	1,600	700	
	Truck	200	100	2,300	5,400	7,200	
Work Item :							
Carriageway Const (4+1 L)		4200	2,200	4,200			10,600
Street Widening (4+2 L)					2,400	4,000	6,400
Cost (billion VND)							
Direct Cost		47.1	40.6	38.4	25.9	48.9	548.2
Eng. & Supervision		5.7	4.9	4.6	3.1	5.7	147.2
Compensation		157.4	238.4	445.3	477.6	796	17.6
Total		210.2	284.2	488.3	506.6	850.8	713.0
Priority Rank		B-2	B-2	B-2	B-2	B-2	
Implementation	From To	2003 2006	2003 2006	2003 2006	2003 2006	2003 2006	
Economic Return	B/C						0.6
Remarks:							



**PROJECT PROFILE**

Project No. C03

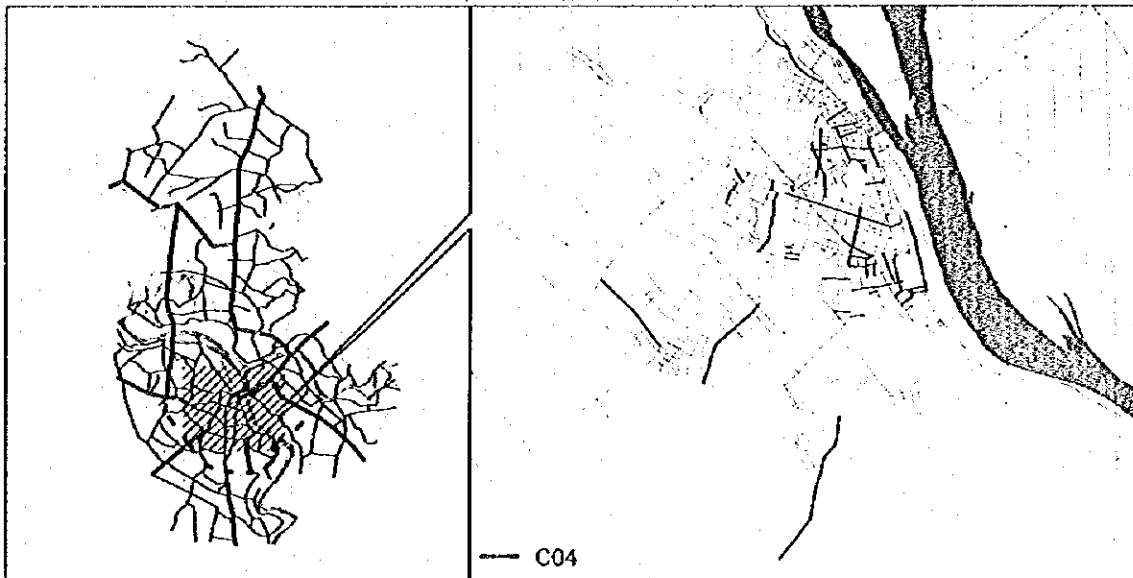
Project Name		Red River Dike Road Rehabilitation Project					
Existing Condition		This is the main road for truck movements between north and south of urban Hanoi. The road requires rehabilitation and upgrading works to provide a divided arterial primary road with enough width to the heavy truck movement outside of Hanoi central areas and to provide safety for non-motorized traffic.					
Objective		<ul style="list-style-type: none"> <li>- To handle through heavy-traffic of truck movement</li> <li>- To provide a primary arterial road in the street network outside of the central areas of Hanoi for south - north traffic.</li> </ul>					
Segment		C0301	C0302	C0303	C0304	C0305	Total
Location	From To	Noi Bai Eway R Nhat Tan	Nhat Tan Thanh Nien	Thanh Nien Ch Duong Br.	Ch Duong Br. RR 2	RR 2 RR 3	
Length	(meter)	5,600	4,300	2,400	3,800	3,200	19,300
Traffic Volume	Year	2015	2015	2015	2015	2015	
	Bicycle	700	5,900	21,200	11,300	9,600	
	Motorcycle	5,500	39,300	58,100	24,300	18,400	
	Bus	100	400	700	600	100	
	P.Car	100	600	1,400	1,300	200	
	Truck	400	1,100	1,500	11,300	2,700	
Work Item :							
Widening of Street 4+2 L		5,600	4,300	2,400	3,800	3,200	19,300
Cost (billion VND)							
Direct Cost		106.8	79.3	24.9	40.8	66.8	318.6
Eng. & Supervision		12.8	9.5	3	4.9	8	38.2
Compensation		61.5	472	147.3	551.6	37.7	1270.1
Total		181.2	560.8	175.1	597.3	112.5	1626.9
Priority Rank		A-3	A-3	A-3	A-3	A-3	
Implementation	From To	1999 2002	1999 2002	1999 2002	1999 2002	1999 2002	
Economic Retur	B/C						0.4
Remarks:							



**PROJECT PROFILE**

Project No. C04

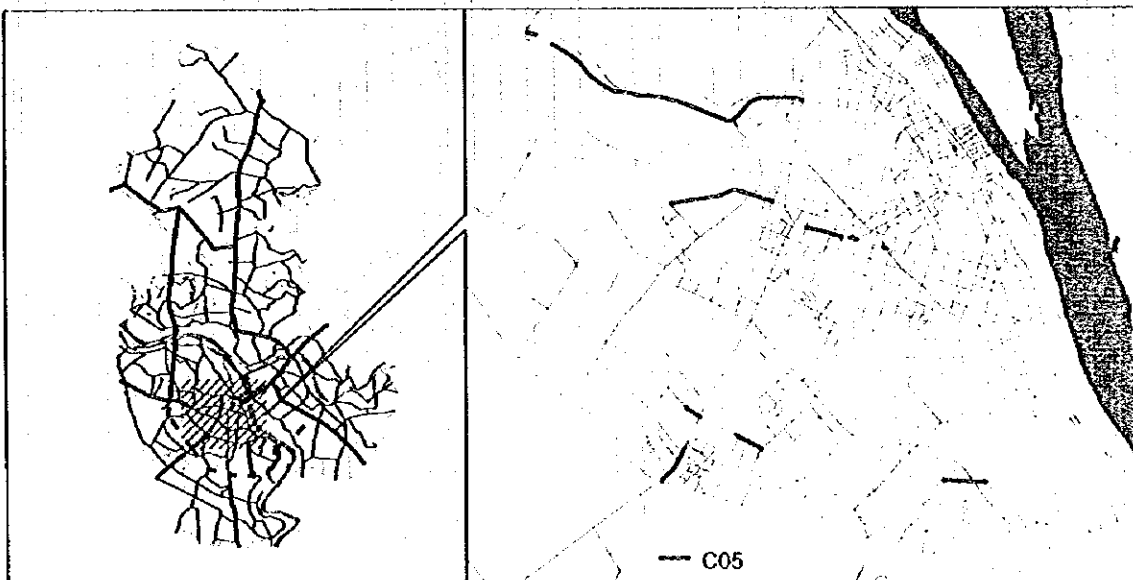
Project Name		Urban Street Improvement Project				
Existing Condition		Some of the streets in urban Hanoi are in bad or fair condition and do not meet the minimum requirements of urban streets which decrease their capacity. The surface of these streets should be improved to improve the traffic flow and reduce the vehicle operating costs.				
Objective		<ul style="list-style-type: none"> <li>- To provide a well maintained urban street network</li> <li>- To improve the flow of traffic on streets</li> <li>- To reduce the losses in vehicle operating costs</li> </ul>				
District		Hoan Kiem	Dong Da	Hai Ba Trung	Ba Dinh	Total
Length (meter)		13,075	2,939	10,280	3,055	29,349
Streets		As shown in the attached Sheet				
Work Item:						
Street Surface Improvement		13,075	2,939	10,280	3,055	29,349
Cost (billion VND)						
Right-of-Way		-	-	-	-	-
Construction		48.1	10.4	36.0	10.8	105.3
Engineering		5.772	1.248	4.32	1.296	12.636
Total		53.872	11.648	40.32	12.096	146.16
Implementation	From	1997	1997	1997	1997	
	To	2000	2000	2000	2000	
Remarks:						



**PROJECT PROFILE**

Project No. C05

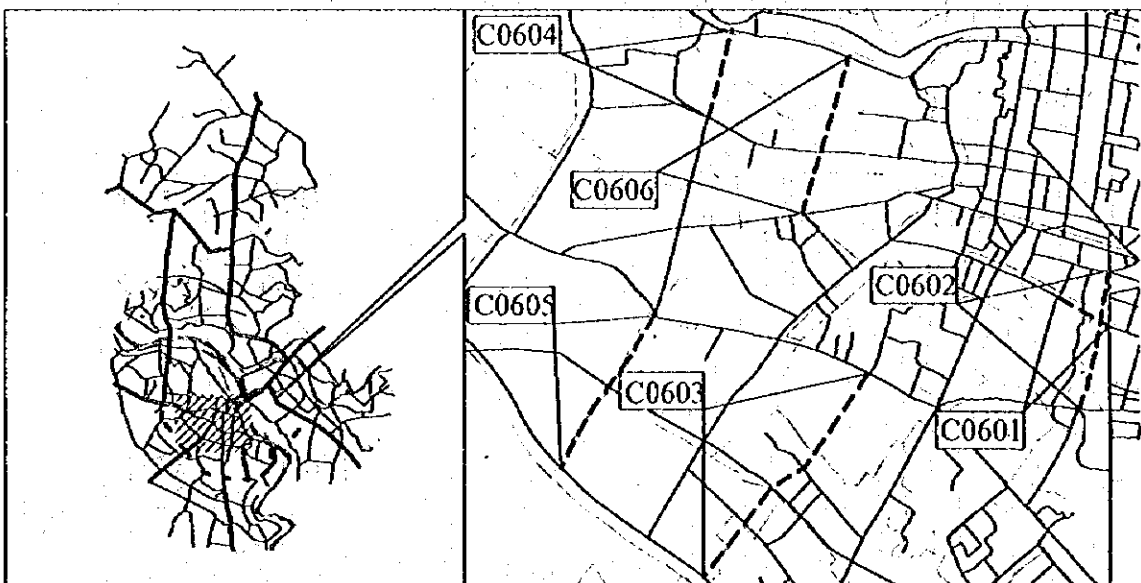
Project Name		Urban Street Width Adjustment Project				
Existing Condition		The wide variation of widths in one street is significantly decreasing the street's actual capacity. These variations are due to street encroachment or delay in widening schemes because of relocation problems. Adjusting the street width by removing these bottlenecks will improve the efficiency and capacity of the streets and the network as a whole.				
Objective		<ul style="list-style-type: none"> <li>- To provide a street network without interrupted links</li> <li>- To increase the efficiency and capacity of urban streets</li> <li>- To provide more alternative links in the street network</li> </ul>				
Streets		As shown in the attached Sheet				
Work Item :						
Street Surface Improvement						
Cost (billion VND)						
Right-of-Way						
Construction						
Engineering						
Total						
Priority Rank		A-3	A-3	A-3	A-3	
Implementation	From	1998	1998	1998	1998	
	To	2007	2007	2007	2007	
Remarks:						



**PROJECT PROFILE**

Project No. C06

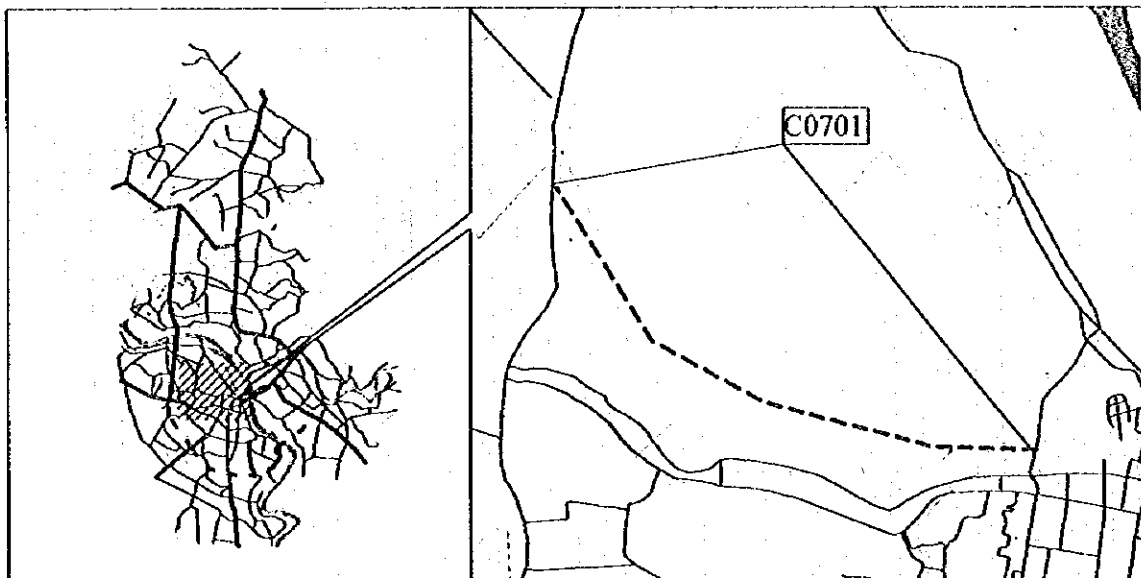
Project Name		Urban Street New Construction Project							
Existing Condition		The urban street network in Hanoi has very low density in some districts and does not cover many areas. The resettlement problem to construct new roads is a big issue. Here, only the urgently required schemes are proposed to connect some of the main streets in low density areas.							
Objective		<ul style="list-style-type: none"> <li>- To provide a street network without interrupted links</li> <li>- To increase the efficiency and capacity of urban streets</li> <li>- To provide more alternative links in the street network</li> </ul>							
Segment		C0601	C0602	C0603	C0604	C0605	C0606	C0607	Total
Street Name		Sta.Tunnel Sta.Tunnel	LinhQuang ChoKham	YenLDrain Yen LDrai	LieuG. Ext North	LieuG Ext South	NuiT Ext Nui TExt.	Nui T. Ext.	
Length	(meter)	1,500	1,025	2,815	590	1,825	1,060	2,680	8,815
Traffic Volume	Year	2015	2015	2015	2015	2015	2015	2015	
	Bicycle	27,300	6,100	11,100	6,000	31,500	6,400	2,900	
	Motorcycle	29,600	6,500	12,000	21,700	54,800	10,900	10,600	
	Bus	300	100	100	400	400	100	700	
	P.Car Truck	0 0	100 200	1,300 100	0 1,800	2,600 4,700	400 1,000	800 1,900	
Work Item :									
Street Const 2-L			1,025	2,812					3,837
Street Const 4-L					587	1,825	1,062	2,680	6,154
Tunnel Construction		1,500							1,500
Cost (billion VND)									
Direct Cost		457.9	10.6	29.2	9.7	30.1	17.5	44.1	555.0
Eng. & Supervision		54.9	1.3	3.5	1.2	3.6	2.1	5.3	66.6
Compensation		143.6	214.2	405.0	195.4	604.4	351.0	51.6	1913.6
Total		656.5	226.1	437.8	206.3	638.0	370.6	100.9	2535.3
Priority Rank		C-2	C-3	C-3	C-3	A-3	B-3	A-2	
Implementation	From	2012	2009	2013	2010	2000	2003	1997	
	To	2014	2009	2014	2010	2002	2004	1997	
Economic Return	B/C	1.2	0	8.2	12	8.9	20.9	42.1	
Remarks:									



**PROJECT PROFILE**

Project No. C07

Project Name		West Lake Parkway Construction Project			
Existing Condition		The present east / west arterial roads are limited in number and capacity in the street network. For the future expansion of the city to the west, more roads are required to handle the generated traffic in this direction. As there is no available space for such a new road, the West Lake Parkway will provide the necessary road in addition to opening the southern coast of the lake for better landscape.			
Objective		<ul style="list-style-type: none"> <li>- To provide an additional east/west arterial road</li> <li>- To support development projects west of Hanoi</li> <li>- To provide an open landscape parkway south of the West Lake</li> </ul>			
Segment		C0701			Total
Location	From	Ho Tay East / West			
	To	Ho Tay East / West			
Length	(meter)	3,900			3,900
Traffic Volume	Year	2015			
	Bicycle	24,100			
	Motorcycle	85,600			
	Bus	0			
	P.Car	1,200			
	Truck	0			
Work Item :					
Primary Street Const (4+2L)		3,900			3,900
Cost (billion VND)					
Direct Cost		86.2			86.2
Eng. & Supervision		10.3			10.3
Compensation		185.1			185.1
Total		281.6			281.6
Priority Rank		C-2			
Implementation	From	2015			
	To	2015			
Economic Return	B/C	59.3			
Remarks:					

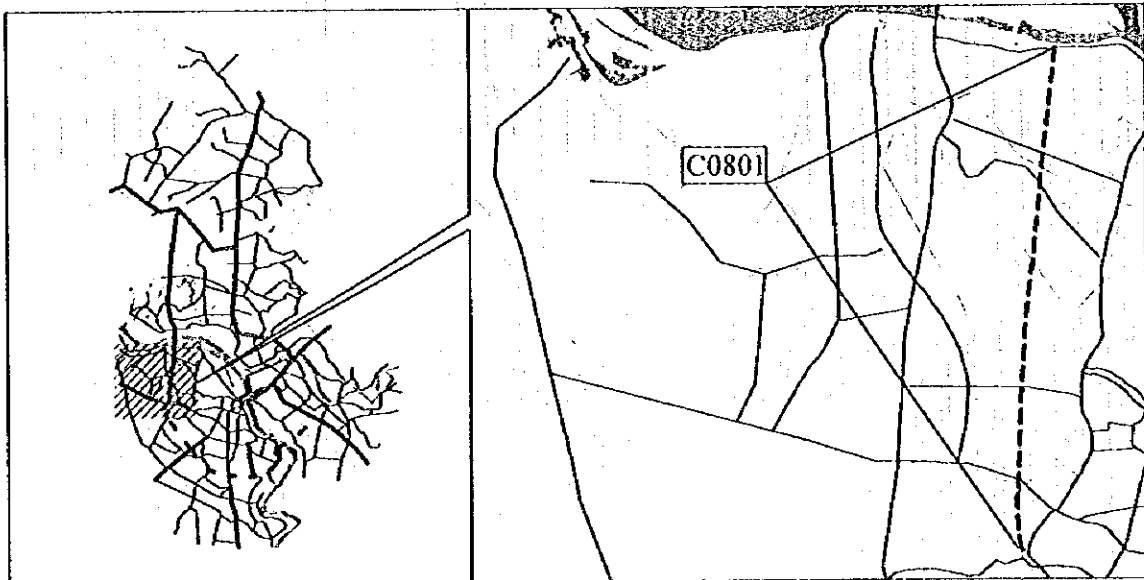




**PROJECT PROFILE**

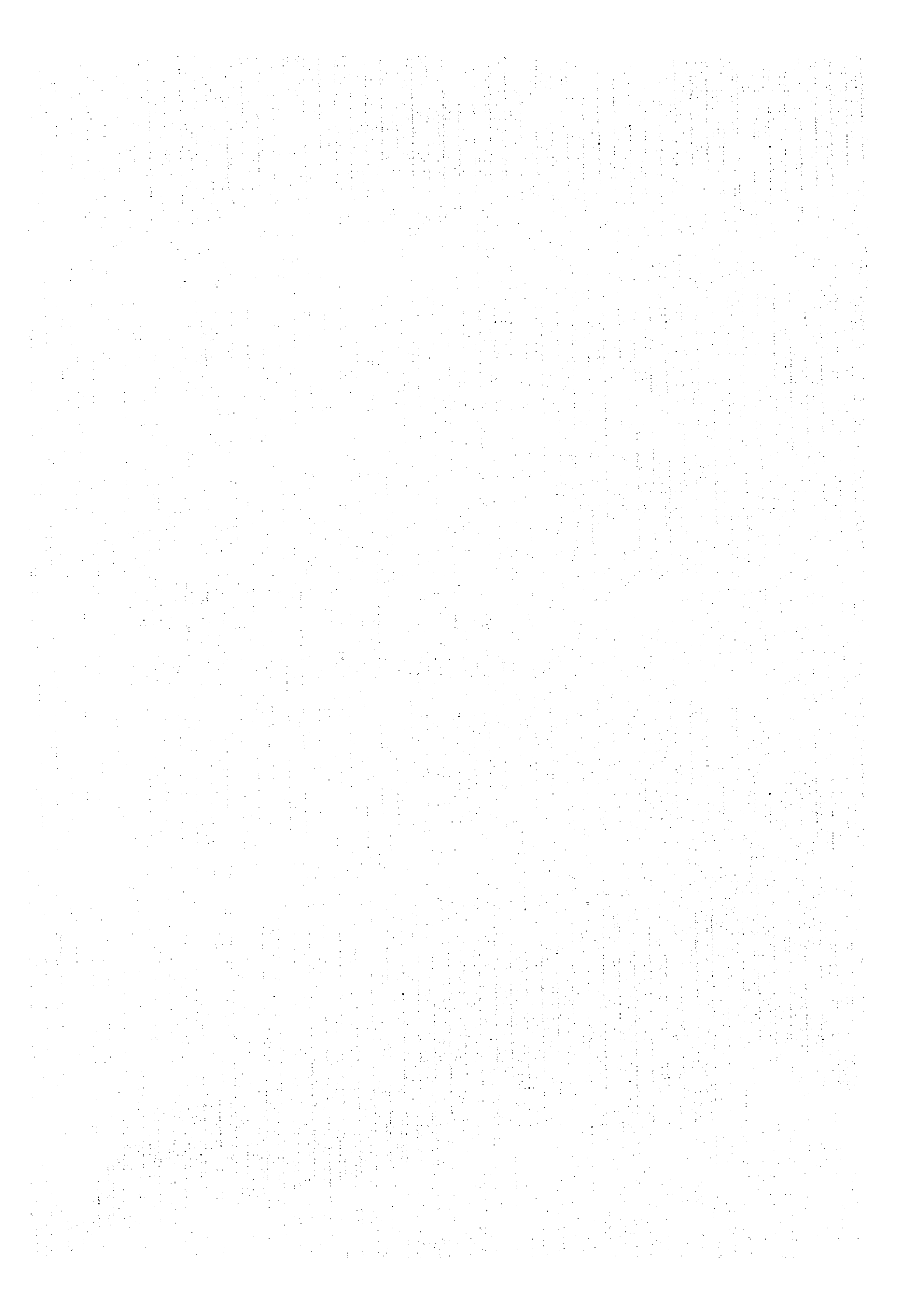
Project No. C08

Project Name		Hanoi Interchange Construction Project				
Existing Condition		The level of control for intersections with heavy traffic volumes on RR-2 at Chuong Duong Bridge west-side should increase to provide higher capacity and safety. However, enough road width should be provided before implementing the interchanges				
Objective		<ul style="list-style-type: none"> <li>- To increase intersection and road capacity</li> <li>- To improve the traffic flow on the main roads</li> <li>- To provide safety for road users</li> </ul>				
Segment		C0801	C0802	C0803	C0804	Total
Location	From To	RR 2 NH32 I/C	RR 2 NH 6 I/C	RR 2 NH 1A I/C	ChuongD BridgeI/C	
Length	(meter)	600	500	1,000	500	2,600
Work Item :						
Street Const 4+2 L		600	500	1,000	500	2,600
Bridge Const 4+2 L		70				70
Cost (billion VND)						
Direct Cost		159.8	117.8	280.5	66.9	625
Eng. & Supervision		19.2	14.1	33.7	8	75
Compensation		0	0	0	0	0
Total		179	131.9	314.1	74.9	699.9
Priority Rank		C-3	C-3	C-3	C-3	
Implementation	From To	2007 2010	2007 2010	2007 2010	2007 2010	
Remarks:						





**APPENDIX D  
PROJECT PROFILE  
PUBLIC TRANSPORT PROJECTS**

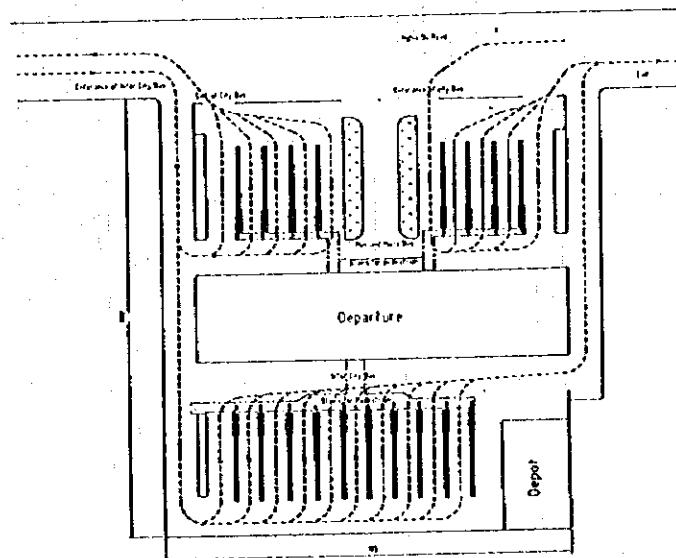
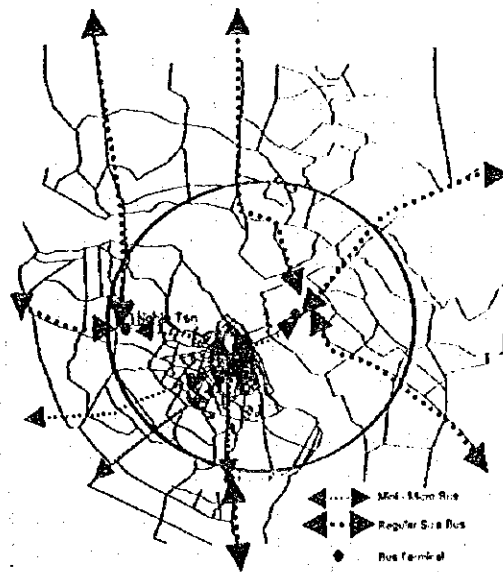


## PROJECT PROFILE

Project Name		Bus Fleet Reinforcement		
Existing Condition		76 buses		
Objectives		To increase bus units		
Increase Number		Micro-bus	Mini-bus	Regular size
	1997 - 2005	1,242	270	2,792
	2005 - 2015	1,990	433	3,596
Costs (BVND)		2,562		
Implementation		1997 - 2015		

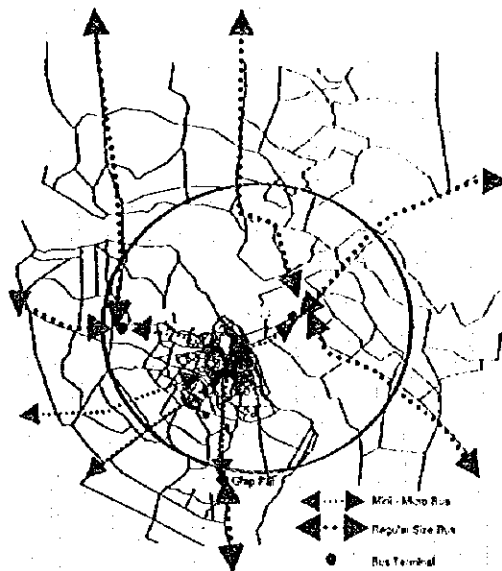
## PROJECT PROFILE

Project Name	Nghia Tan Bus Terminal	
Existing Condition	Open Space (4 ha)	
Objectives	To construct a bus terminal	
Buses Passing the Terminal (buses/day)	2005	1,318
	Note: intra-Hanoi only 2015	1,740
Costs (BVND)	42.8	
Implementation	2002 - 2004	

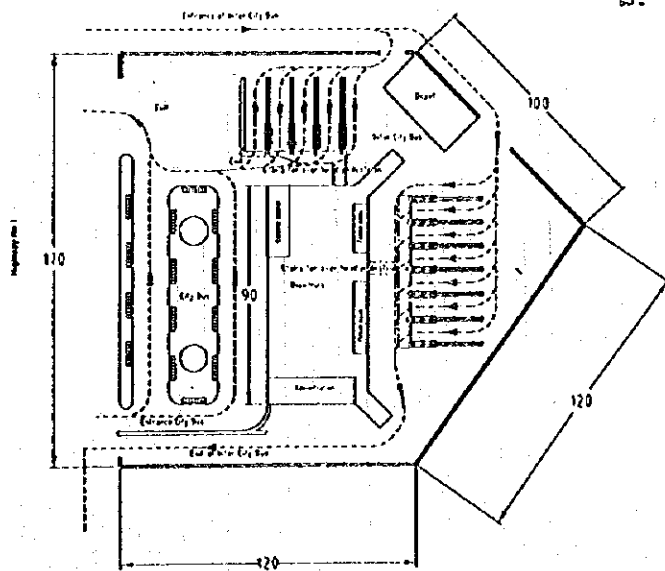


# PROJECT PROFILE

Project Name	Giap Bat Bus Terminal	
Existing Condition	Bus Terminal (HPC, 3 ha)	
Objectives	To construct a bus terminal	
Buses Passing the Terminal (buses/day)	2005	42
	Note: intra-Hanoi only	
	2015	172
Costs (BVND)	6.3	
Implementation	2013	

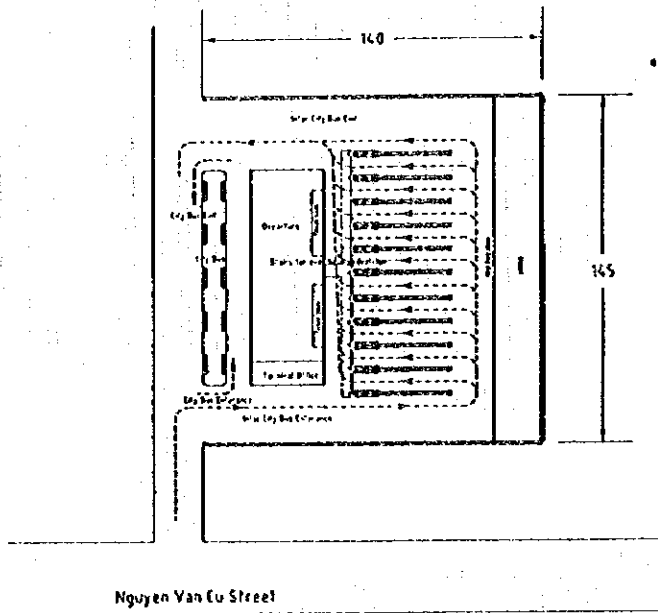
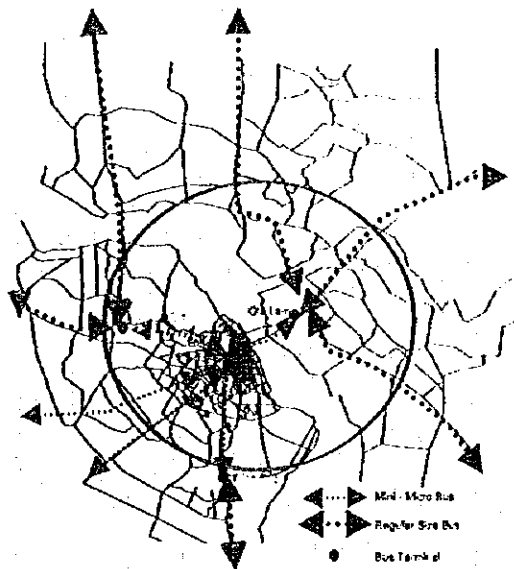


City  
Mid-Size Bus  
Regular Size Bus  
Bus Terminal



# PROJECT PROFILE

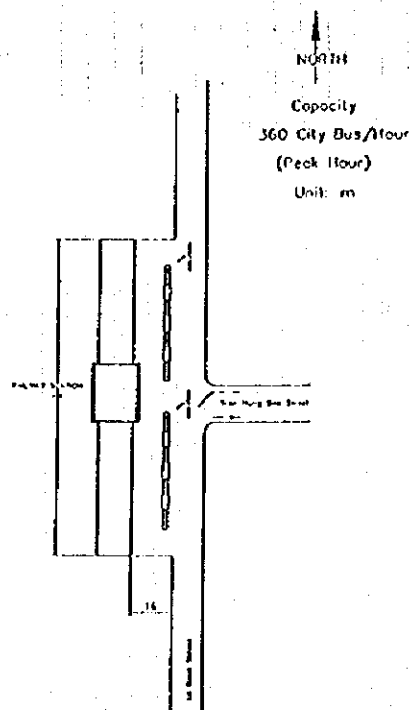
Project Name	Gia Lam Bus Terminal	
Existing Condition	Bus Terminal (HPC, 2 ha)	
Objectives	To construct a bus terminal	
Buses Passing the Terminal (buses/day)	2005	2,542
	Note: intra-Hanoi only 2015	3,010
Costs (BVND)	2.1	
Implementation	1998	





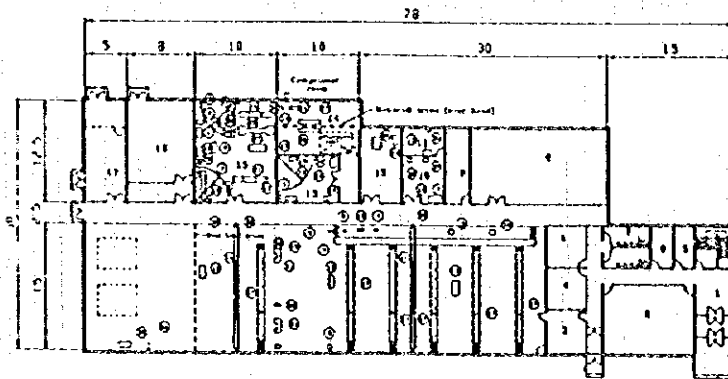
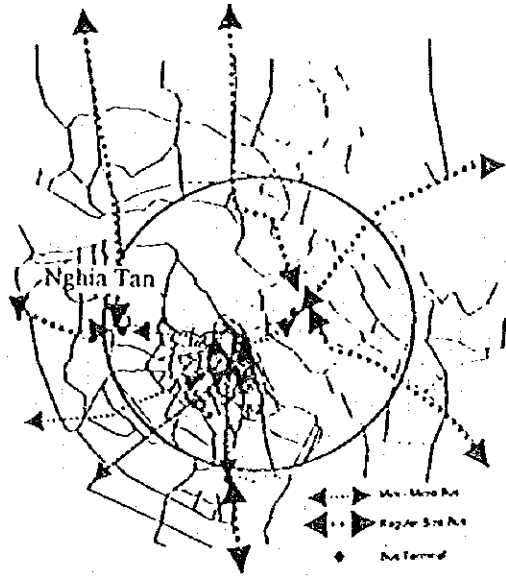
# PROJECT PROFILE

Project Name	Hanoi Station Large Scale Bus Stop
Capacity	320 buses/hour
Costs	2.3 BVND
Location	Forecourt of Hanoi Station
Implementation	1998



# PROJECT PROFILE

Project Name	Bus Maintenance Center
Existing Condition	Open Space (4 ha)
Objectives	To construct a bus maintenance shop
Costs (BVND)	22.0
Implementation	2014 - 2015



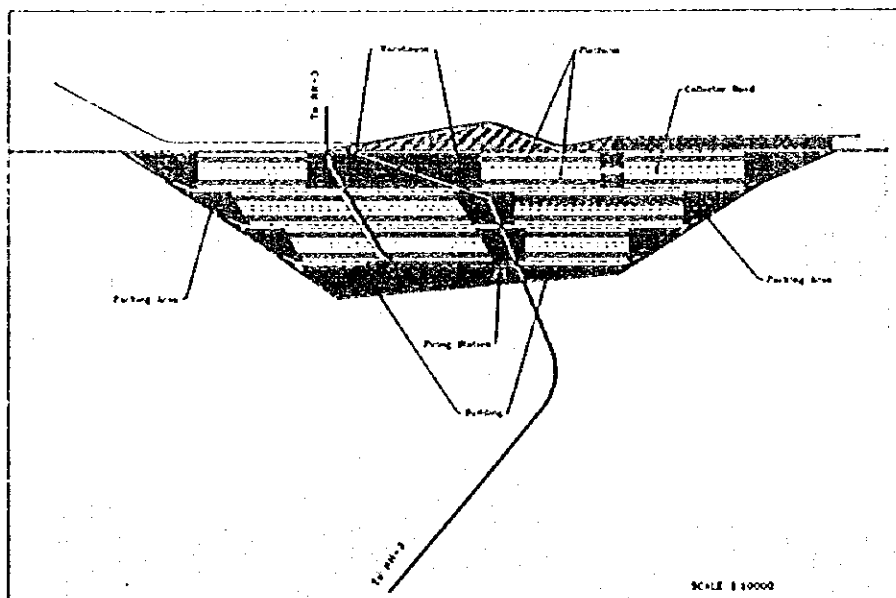
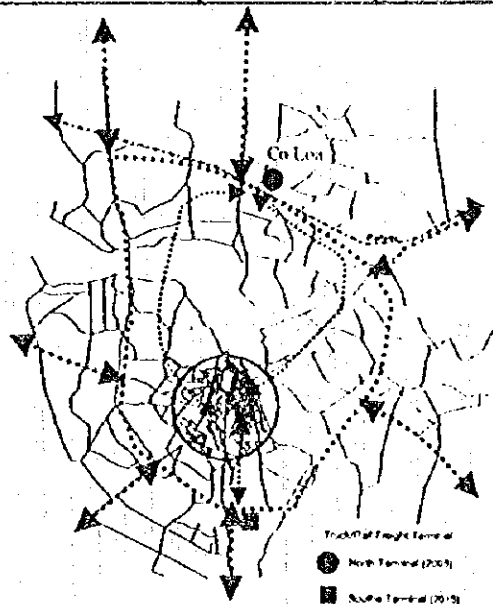
No	Area	No	Area	No	Area
1	Director's Office	9	Wash	19	Engine Repair Room
2	Administration Room	10	Spare Parts Storage	20	Engine Test Room
3	Director's Office	11	Tool Storage	21	Workshop Shop
4	Director's Office	12	Storage Room	22	Workshop Shop
5	Director's Office	13	Battery Room	23	Paint and Storage Room
6	Director's Office	14	Spaying Pump Room		
7	Director's Office				
8	Director's Office				

## Equipments

No	Description
1	Excavator Grader
2	Busch Drill
3	Busch Grader
4	Busch Loader
5	Auto Welder
6	Auto Welder
7	Auto Welder
8	Auto Welder
9	Auto Welder
10	Auto Welder
11	Auto Welder
12	Auto Welder
13	Auto Welder
14	Auto Welder
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33	Auto Welder
34	Auto Welder

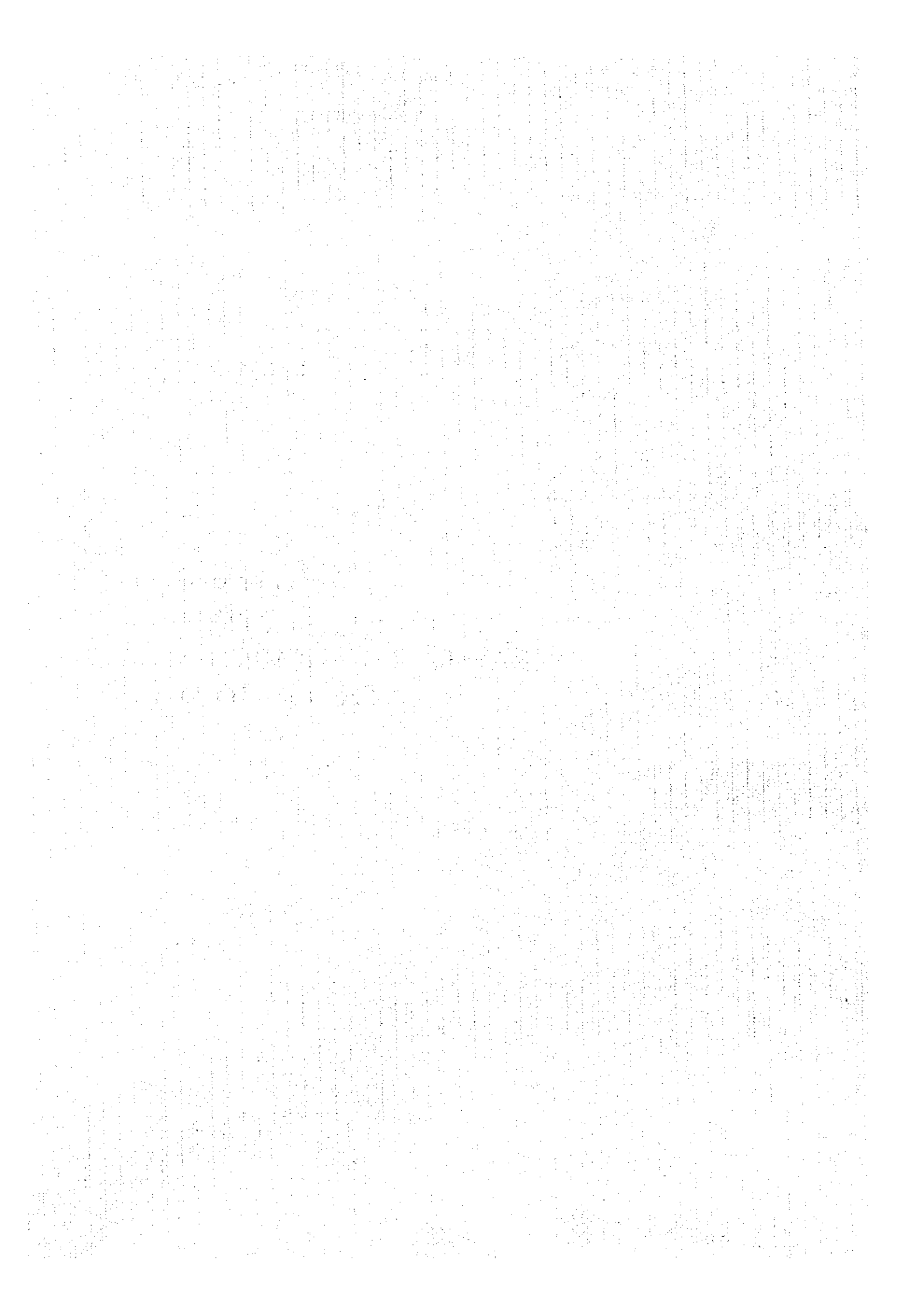
# PROJECT PROFILE

Project Name	Co Loa Railway/Truck Terminal		
Existing Condition	Switch Yard (VNR, 31 ha)		
Objectives	To construct a railway/truck terminal		
Cargo Volumes (tons/day)		2005	2015
	Truck	979	4,340
	Rail	3,408	13,448
Costs (BVND)	1st phase	131.4	
	2nd phase	266.3	
Implementation	1st phase	2002 - 2003	
	2nd phase	2012 - 2014	





**APPENDIX E  
PROJECT PROFILE  
TRAFFIC MANAGEMENT AND  
SAETY PROJECTS**



**MANAGEMENT AND SAFETY PROJECTS**

Project Profile

Projects J01

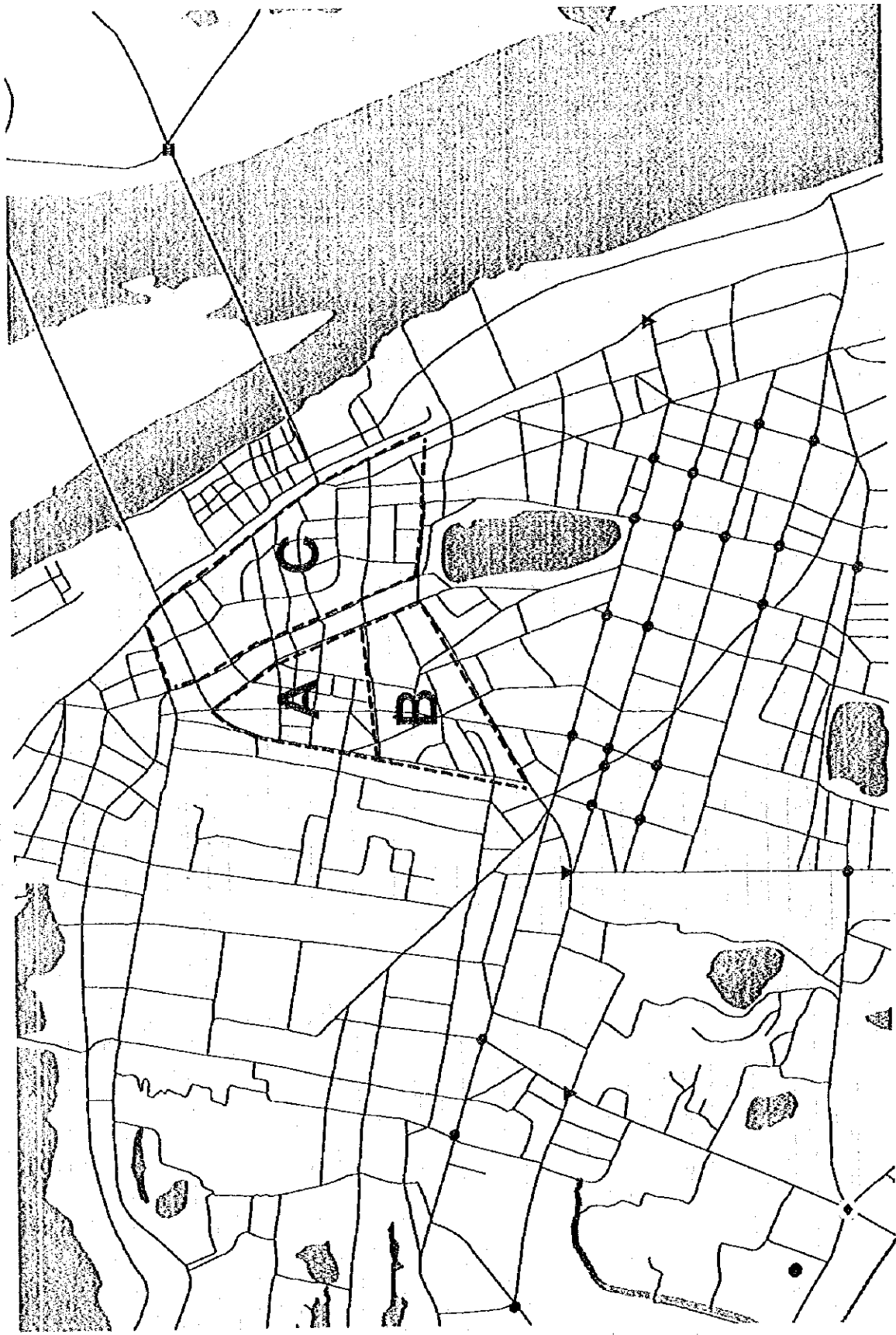
Name	<b>TRAFFIC RESTRAINT PROGRAM</b>		
Objectives	<p>-In order to obtain smoother and safer traffic flow an intensive restraint scheme should be introduced, particularly to restrict traffic entering the Old City area. As the result, a less congested and less polluted environment would be realized.</p>		
Procedure	<p>-Traffic Entering the Old City Area should be controlled, considering the recommendations made by previous studies. Priority should be given to pedestrians and bicycles.</p> <p>-The implementation should be planned so as not to disturb the current beautification scheme in the Old City Area. Zone A will be completed in a short period (phase I). Zone B in the medium term and zone C in the final stage.</p>		
Cost	Short	Medium	Long
	<p>-Campaign cost Newspaper \$70x50 times =\$3,500</p> <p>TV spots \$1,000x20 times =\$20,000</p> <p>Signs and markings (No entry sign No vehicle entry Pedestrians, bicycle only) @ \$130x20 unitx3 =\$7,800</p>	<p align="center">\$3,500</p> <p align="center">\$20,000</p> <p align="center">\$7,800</p>	<p align="center">\$3,500</p> <p align="center">\$20,000</p> <p align="center">\$7,800</p>

## Project Profile

## Projects J01

Cost	Short	Medium	Long
Marking \$12/m <sup>2</sup> x2760m <sup>2</sup> =\$33,000		\$33,000	\$33,000
Guard fence @ \$300x20=\$6000x		\$6,000	\$6,000
Rehabilitation for parking space @ \$100,000		\$100,000	\$100,000
-Improvement of one way streets (Hang Dao, Hang Luoc) 2kmx\$100/m =\$200,000			
Sub total	\$370,300 (4.0 b VND)	\$170,300 (1.9 b VND)	\$170,300 (1.9 b VND)
Total			\$710,900 (7.8 b VND)





Zoning of the Old City for traffic restraint

**MANAGEMENT AND SAFETY PROJECTS**

Project Profile

Projects J02

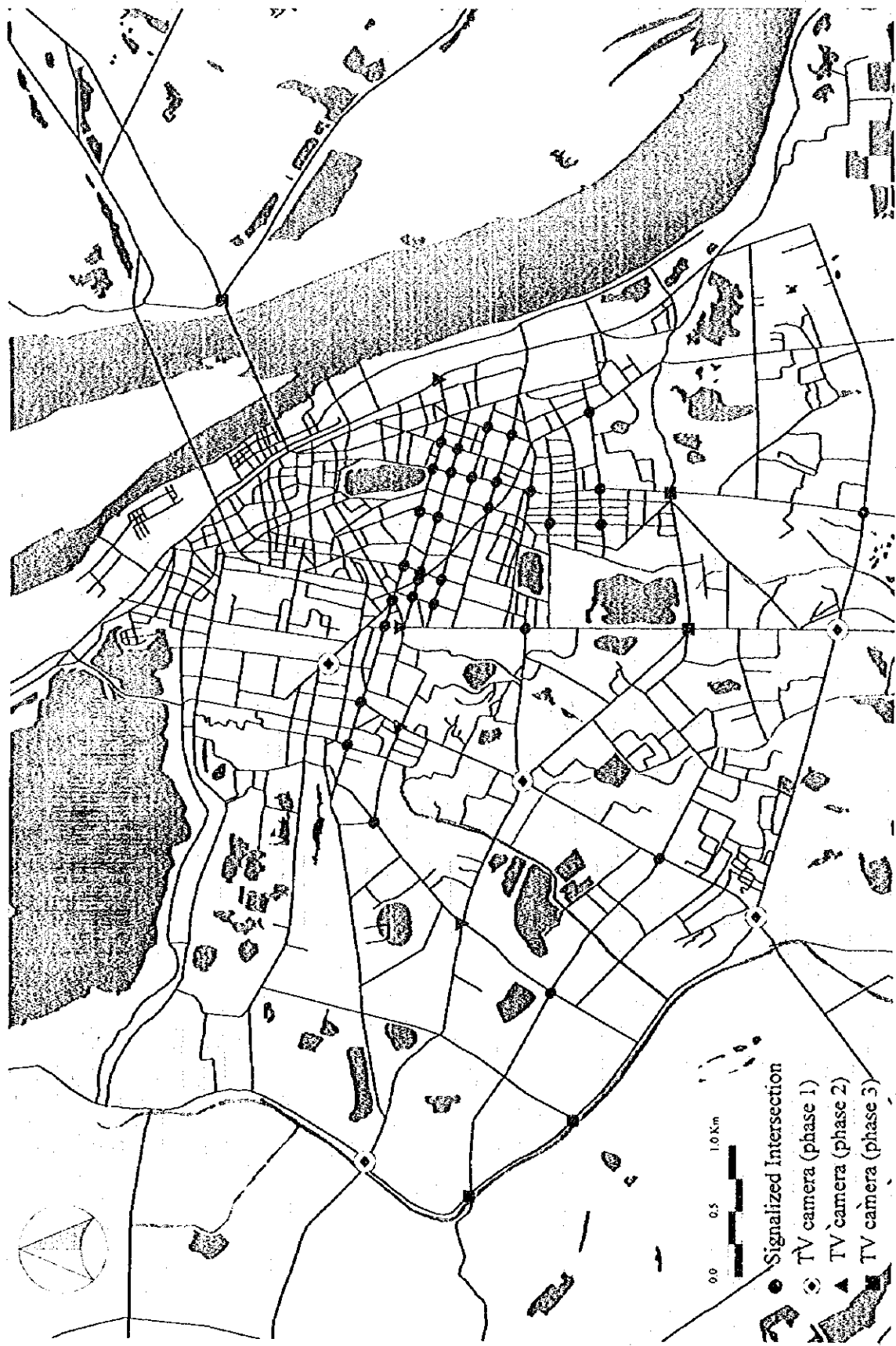
Name	<b>TRAFFIC CONTROL CENTER PROGRAM</b>		
Objectives	<p>-Considering the growing traffic demand the function mechanisms should be linked in the Traffic Cotrol Center</p> <p>-The program should be integrated with the progress made by French project. Staff training (OJT) is also indispensable.</p>		
Procedure	<p>-To install TV cameras for observation purposes.</p> <p>-To accumulate traffic data on main routes.</p> <p>-To train the staff at the Center.</p>		
Cost	<b>Short (Phase I)</b>	<b>Medium (Phase II)</b>	<b>Long (Phase III)</b>
	<p>-TV camera installation: (Those spots are indicated on the attached map) @ \$40,000x5 unit =\$200,000</p> <p>-Data processing: @ \$10,000x5 years =\$50,000</p>	<p>\$200,000</p> <p>\$50,000</p>	<p>\$200,000</p> <p>\$50,000</p>

**MANAGEMENT AND SAFETY PROJECTS**

**Project Profile**

**Projects J02**

<b>Cost</b>	<b>Short</b>	<b>Medium</b>	<b>Long</b>
-Maintenance fee: @ \$10,000x5 years =\$50,000		\$50,000	\$50,000
-Output cost: @ \$10,000x5 years =\$50,000		\$50,000	\$50,000
-Man power: \$3,000/y x 10 person x 5years=\$150,000		\$150,000	\$150,000
<b>(Subtotal)</b>	\$500,000	\$500,000	\$500,000
20%	\$100,000	\$100,000	\$100,000
<b>(Total)</b>	\$600,000 (6.6 b VND)	\$600,000 (6.6 b VND)	\$600,000 (6.6 b VND)
<b>(Grand total)</b>			\$1,800,000 (19.8 b VND)



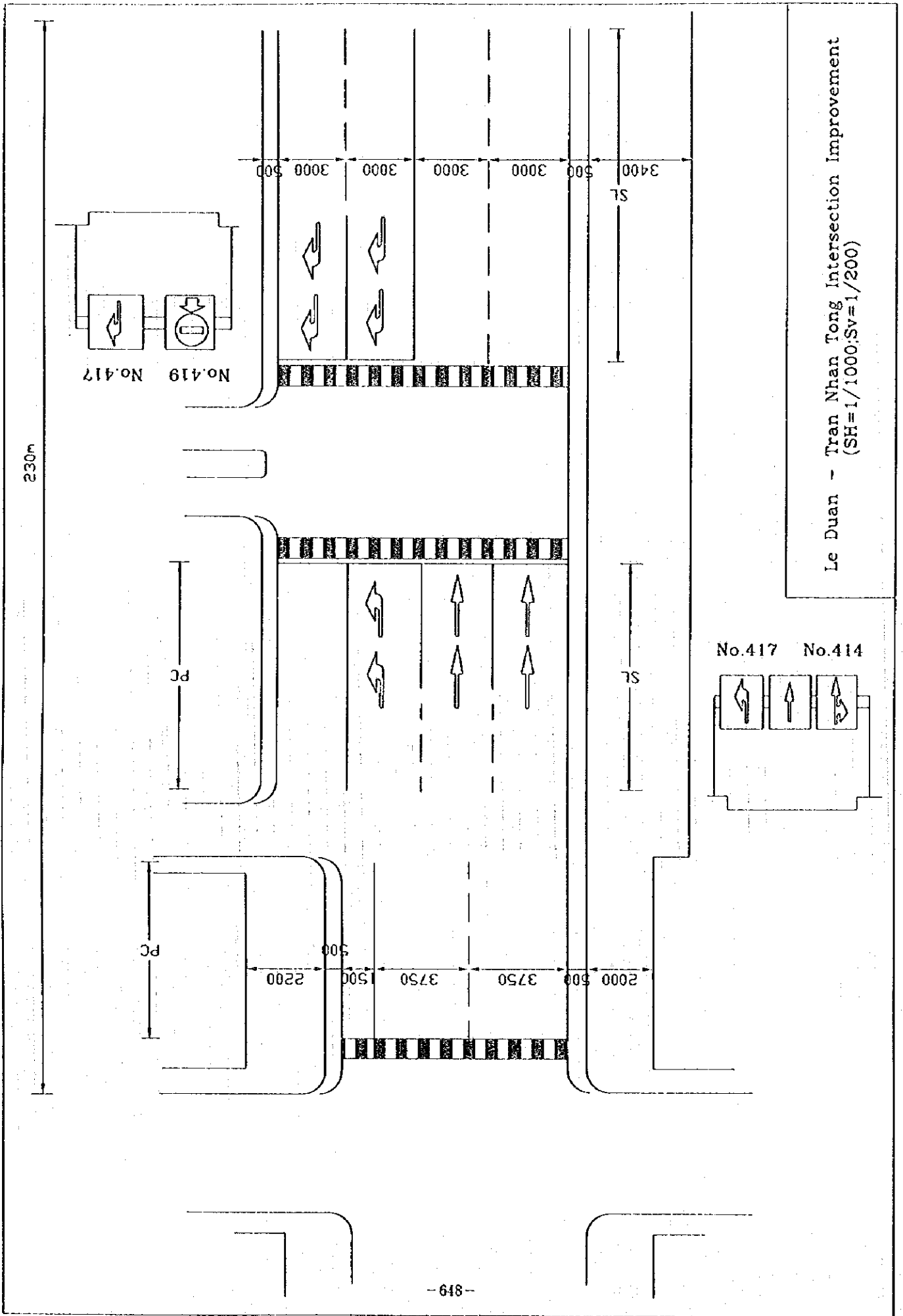
Existing Signalized Intersections in Hanoi

## MANAGEMENT AND SAFETY PROJECTS

Project Profile

Projects J03

Name	<b>TRAFFIC CAPACITY ENHANCEMENT PROGRAM</b>		
Objectives	<p>-The current traffic situation in the City of Hanoi will not accommodate rapidly increasing traffic demand unless appropriate improvements are undertaken including traffic safety facilities and signal installation.</p> <p>- Installation of medians will smooth the traffic flow and reduce the chance of head-on collisions</p>		
Procedure	<p>-The following three routes are designated as the model areas in the phase I:</p> <p>① Pho Hue 1.9 km Pho Ba Trieu 2.0 km (one way)</p> <p>② Le Duan 1.2 km (one way)</p> <p>③ Pho Doi Can 3.05 km (partially both ways).</p> <p>-Traffic signs, road markings, median installation and intersection improvement in phase II (medium term) covering half of the Old CBD area (total length of road -15 km), and on phase III (long term) the rest of old CBD area (9 km) would be implemented.</p>		
Cost	Short (Phase I)	Medium (Phase II)	Long (Phase III)
	<p>① Bicycle lane Intersection improvement \$177,000</p> <p>② Intersection improvement \$204,000</p> <p>③ Road marking for bicycle lanes \$233,000</p>	<p>Half of old CBD (see attached map)</p> <p>Road length 15 km as \$100/m \$1,500,000</p>	<p>Rest of old CBD</p> <p>Road length 9 km \$900,000</p>
Sub total	\$614,000 (6.7 b VND)	\$1,500,000 (16.5 b VND)	\$900,000 (9.9 b VND)
Total			\$3,014,000 (33,1 b VND)



Le Duan - Tran Nhan Tong Intersection Improvement  
 (SH=1/1000; Sv=1/200)

## MANAGEMENT AND SAFETY PROJECTS

Project Profile

Projects J04

Name	TRAFFIC LAW AND REGULATIONS REVISION SYSTEM		
Objectives	<p>-Current road traffic laws and regulations do not function well with traffic operation and police enforcement. Road users are not well informed through appropriate sources.</p> <p>-Review and revise the current law and regulation systems.</p>		
Procedure	<p>-To organize an ad hoc committee with related government agencies and experts.</p> <p>-To find an appropriate method to deliver information to the road users and the general public.</p>		
Cost	Short	Medium	Long
	<p>-Production cost of materials: \$20,000</p> <p>-Distribution cost of materials: @ \$5x10,000x5 years =\$250,000</p>	\$250,000	\$250,000
(Sub total)	\$270,000	\$250,000	\$250,000
20%	\$54,000	\$50,000	\$50,000
(Total)	\$324,000 (3.6 b VND)	\$300,000 (3.3 b VND)	\$300,000 (3.3 b VND)
(Grand total)			\$924,000 (10.2 b VND)

MANAGEMENT AND SAFETY PROJECTS

Project Profile

Projects J05

Name	EDUCATION PROGRAM FOR CHILDREN		
Objectives	<ul style="list-style-type: none"> <li>-No formal programs on safety education for young children are currently available</li> <li>-Put emphasis on safety education for pre-school children, particularly for kindergarten pupils and the cooperation of housewives and school teachers is necessary</li> </ul>		
Target	<ul style="list-style-type: none"> <li>-Kindergarten and primary school children.</li> <li>-School teachers.</li> <li>-Housewives</li> </ul>		
Procedure	<ul style="list-style-type: none"> <li>-Organize ad hoc committee.</li> <li>-Conduct campaign activities for children through mass-media.</li> <li>-Distribute pamphlets and materials on safety education.</li> <li>-Establish "Bicycle Riding Class" and other activities for children to be conducted at "Traffic Park"</li> </ul>		
Cost	Short	Medium	Long
	<ul style="list-style-type: none"> <li>-Pamphlet production cost: \$20,000</li> <li>-Pamphlet cost: @ \$1x20,000unit x5years=\$100,000</li> <li>-Model schools nominatoin: @ \$1,000x10 schools x5 years=\$50,000</li> </ul>	<p style="margin-top: 200px;">\$100,000</p> <p style="margin-top: 100px;">\$50,000</p>	<p style="margin-top: 200px;">\$100,000</p> <p style="margin-top: 100px;">\$50,000</p>

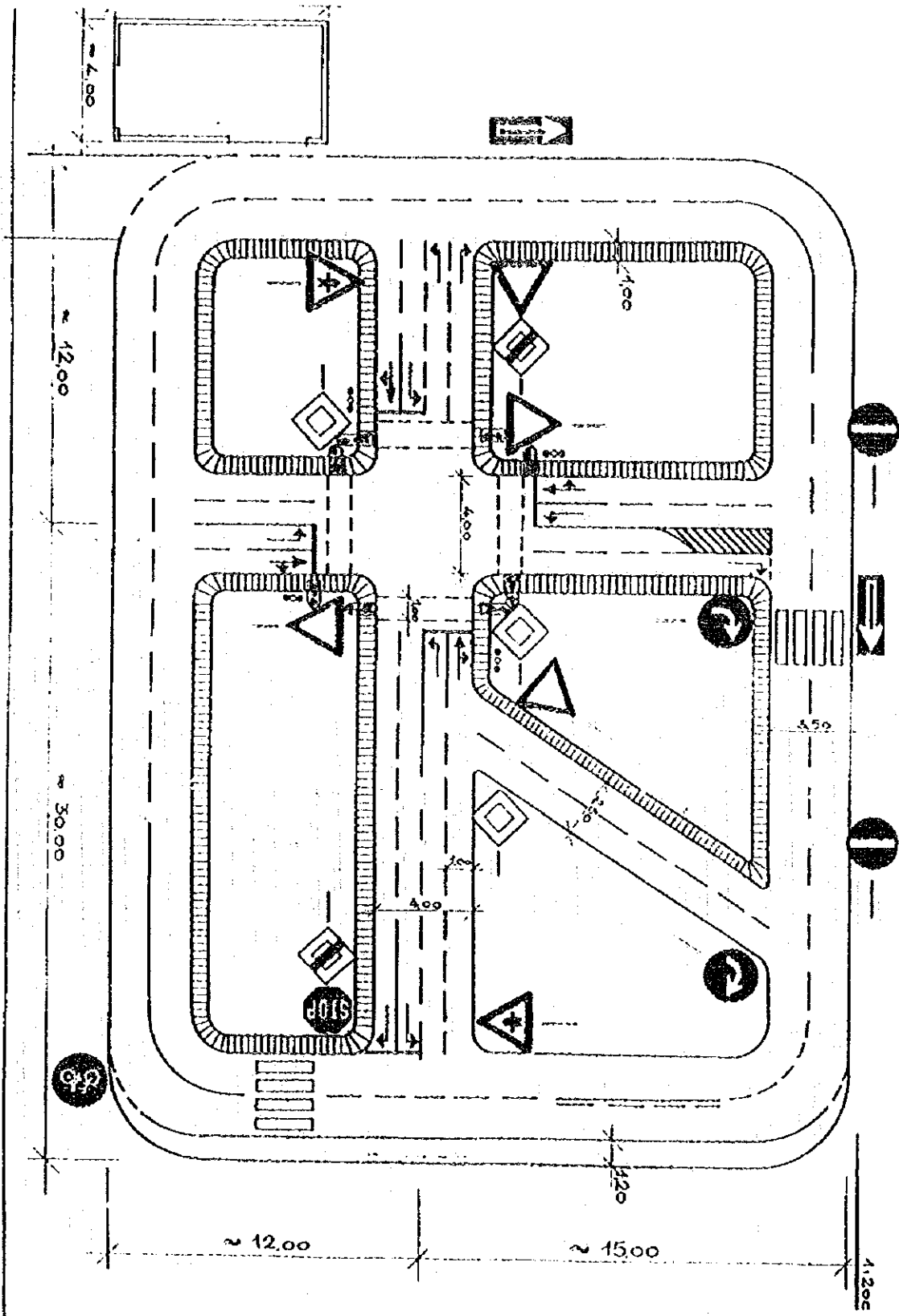


**MANAGEMENT AND SAFETY PROJECTS**

Project Profile

Projects J05

Cost	Short	Medium	Long
-Construction cost for "Traffic Park" excluding land acquisition cost \$2,150,000			
-Maintenance cost: \$100,000x5 years =\$500,000		\$500,000	\$500,000
-Instructor training cost @ \$100x20 person x5 years=\$10,000		\$10,000	\$10,000
-Educational equipments @ \$10,000x5 years =\$50,000		\$50,000	\$50,000
(Subtotal)	\$2,880,000	\$710,000	\$710,000
20%	\$576,000	\$142,000	\$142,000
(Total)	\$3,456,000 (38.0 b VND)	\$852,000 (9.4 b VND)	\$852,000 (9.4 b VND)
(Grand total)			\$5,160,000 (56.8 b VND)



AM EXAMPLE OF BICYCLE ROAD FOR CHILDREN IN GERMANY

SOCIALIST REPUBLIC OF VIET NAM

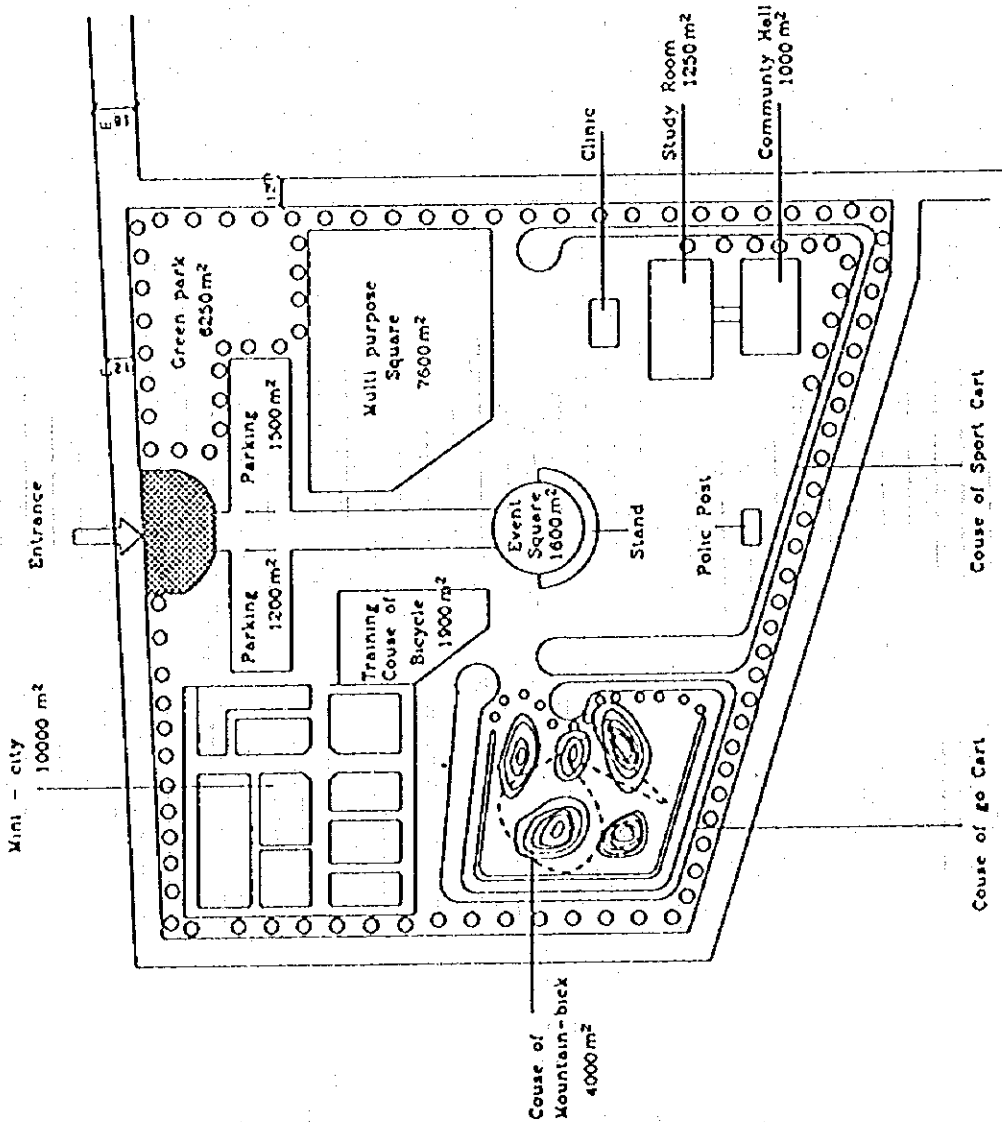
THE FEASIBILITY OF NEW CBD FOR HANOI CITY

TITLE OF DRAWING

DWG No

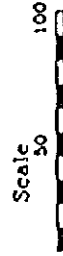
Plan of Road Safety Park

AS SHOWN



Total Area  
A = 8.79 ha

Item	Area (m <sup>2</sup> )
Green park	6250
Mini-city	10000
Parking	2700
Training Course	1900
Multi Purpose Sq.	7600
Course of Mount-bick	4000
Community Hall	1000
Study Room	1250
Event Square	1600
Other	41350
Road	10250
Total	87900



**MANAGEMENT AND SAFETY PROJECTS**

Project Profile

Projects J06

Name	SAFETY CAMPAIGN PROGRAM		
Objectives	<ul style="list-style-type: none"> <li>-To conduct various traffic safety campaigns in order to improve road users behavior and attitudes</li> <li>-To facilitate motorcycle use instead of four wheel vehicles</li> </ul>		
Target	- All road users including drivers, motorcyclists, pedestrians and cyclists		
	Short	Medium	Long
	<ul style="list-style-type: none"> <li>- Motorcyclists</li> <li>- Cyclists</li> <li>- School children</li> </ul>	<ul style="list-style-type: none"> <li>- Motorcyclists</li> <li>- Pedestrian</li> <li>- School children</li> </ul>	<ul style="list-style-type: none"> <li>- Motorcyclists</li> <li>- Drivers</li> <li>- School children</li> </ul>
Procedure	<ul style="list-style-type: none"> <li>- Distribute booklets on "Walking safety" and "Bicycle Safety" To primary and secondary schools.</li> <li>- Distribute pamphlets on "Safe riding" at police stations for new riders on license issuing.</li> <li>- Promote public campaign through mass media including TV and radio spots on traffic safety.</li> </ul>		
Cost	Short	Medium	Long
	<ul style="list-style-type: none"> <li>-Pamphlets distribution: @ \$1x20,000x5years =\$100,000</li> <li>-Local Newspaper Ad (Full page): @ \$70x30 times/y x 5 years=10,500\$</li> </ul>	<p align="center">\$100,000</p> <p align="center">\$10,500</p>	<p align="center">\$100,000</p> <p align="center">\$10,500</p>

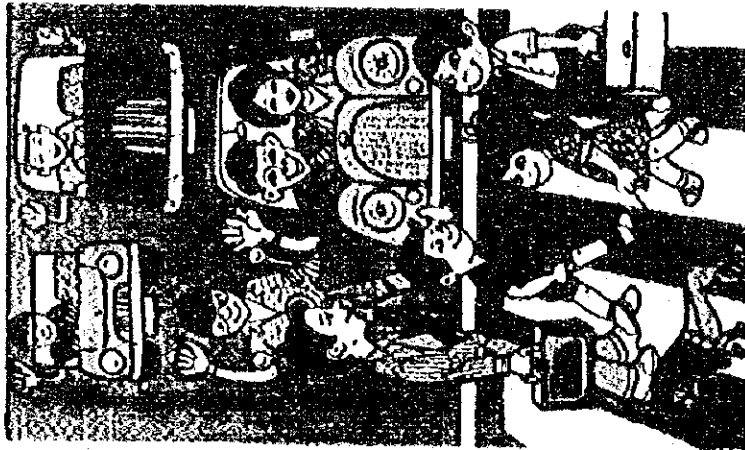
MANAGEMENT AND SAFETY PROJECTS

Project Profile

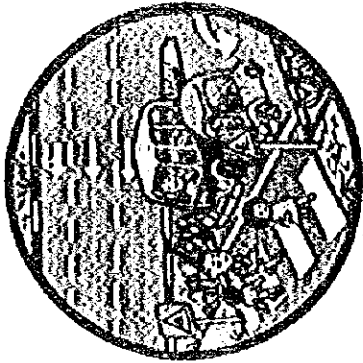
Projects J06

Cost	Short	Medium	Long
	-TV spot: @ \$1,000x5 time/day x20 daysx5 years =\$500,000	\$500,000	\$500,000
	-Radio spot: @ \$18x5 times/day x30 daysx5 years = \$13,500	\$13,500	\$13,500
	-Production cost: Man power: \$200/mx10 person x60m(12x5 years) =\$120,000	\$120,000	\$120,000
(Subtotal)	\$744,000	\$744,000	\$744,000
20%	\$148,800	\$148,800	\$148,800
(Total)	\$892,800 (9.8 b VND)	\$892,800 (9.8 b VND)	\$892,800 (9.8 b VND)
(Grand total)			2,678,400\$ (29.4 b VND)
Reference	-Need cooperation with related agencies including NTSC (National Traffic Safety Committee). Better to organise special ad hoc committee to promote safety campaign.		

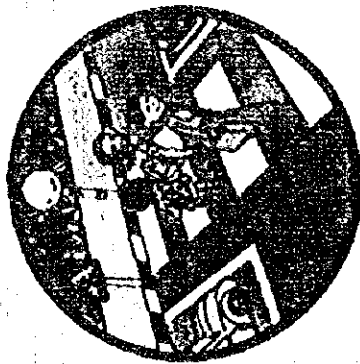
THE PEDESTRIAN'S RESPONSIBILITIES  
 SECURE A NOTORIOUS RECORD TO PEDESTRIANS  
 AT PEDESTRIAN CROSSINGS



**CROSSING WITHIN PARALLEL YELLOW LINES**  
 Pedestrians cross parallel to the flow of traffic. Vehicles crossing shall stop to give way.



**ZEBRA CROSSING AT SLIP ROAD**  
 Pedestrians shall stop to give way to pedestrians at zebra crossing at a slip road.



**ZEBRA CROSSING**  
 Traffic shall stop to give way to pedestrians at a zebra crossing.



**CROSSING WITH THE GREEN MAN**  
 Pedestrians cross when the green man is lit up. Vehicles shall stop to give way.

AN EXAMPLE OF PAMPHLET FOR PEDESTRIAN IN SINGAPORE

**MANAGEMENT AND SAFETY PROJECTS**

Project Profile

Projects J07

Name	<b>MOTORCYCLE TRAINING PROGRAM</b>		
Objectives	<p>-Since no uniform training scheme exists, motor-cyclists behavior is unsafe and unpredictable.</p> <p>-Conduct formal training for mootorcycle riders.</p>		
Target	<p>-Administrate formal training for new riders including class-room lectures.</p> <p>-Conduct reeducation programs for accident repeaters and violators.</p> <p>-Conduct riding training for high school students.</p>		
Procedure	<p>-Execute training program for instructors by sending to either Japan (Honda Motor Co.) or Singapore (Singapore Safety Driving Center).</p> <p>-Construct Riding Testing Circuit in phase I. Conduct training for new riders and for high school students who want to get licences.</p>		
Cost	<b>Short (Phase I)</b>	<b>Medium (Phase II)</b>	<b>Long (Phase III)</b>
	<p>-Instructors training cost: (abroad) @ \$12,000x10x5 years =\$600,000</p> <p>-Instruction cost: @ \$30x2,000(trainees) x5 years=\$300,000</p> <p>-Purchase bike: @ \$2,000x30 unit =\$60,000</p>	<p align="center">\$600,000</p> <p align="center">\$300,000</p> <p align="center">@ \$2,000x50 unit =\$100,000</p>	<p align="center">\$600,000</p> <p align="center">\$300,000</p> <p align="center">@ \$2,000x30 unit =\$60,000</p>

MANAGEMENT AND SAFETY PROJECTS

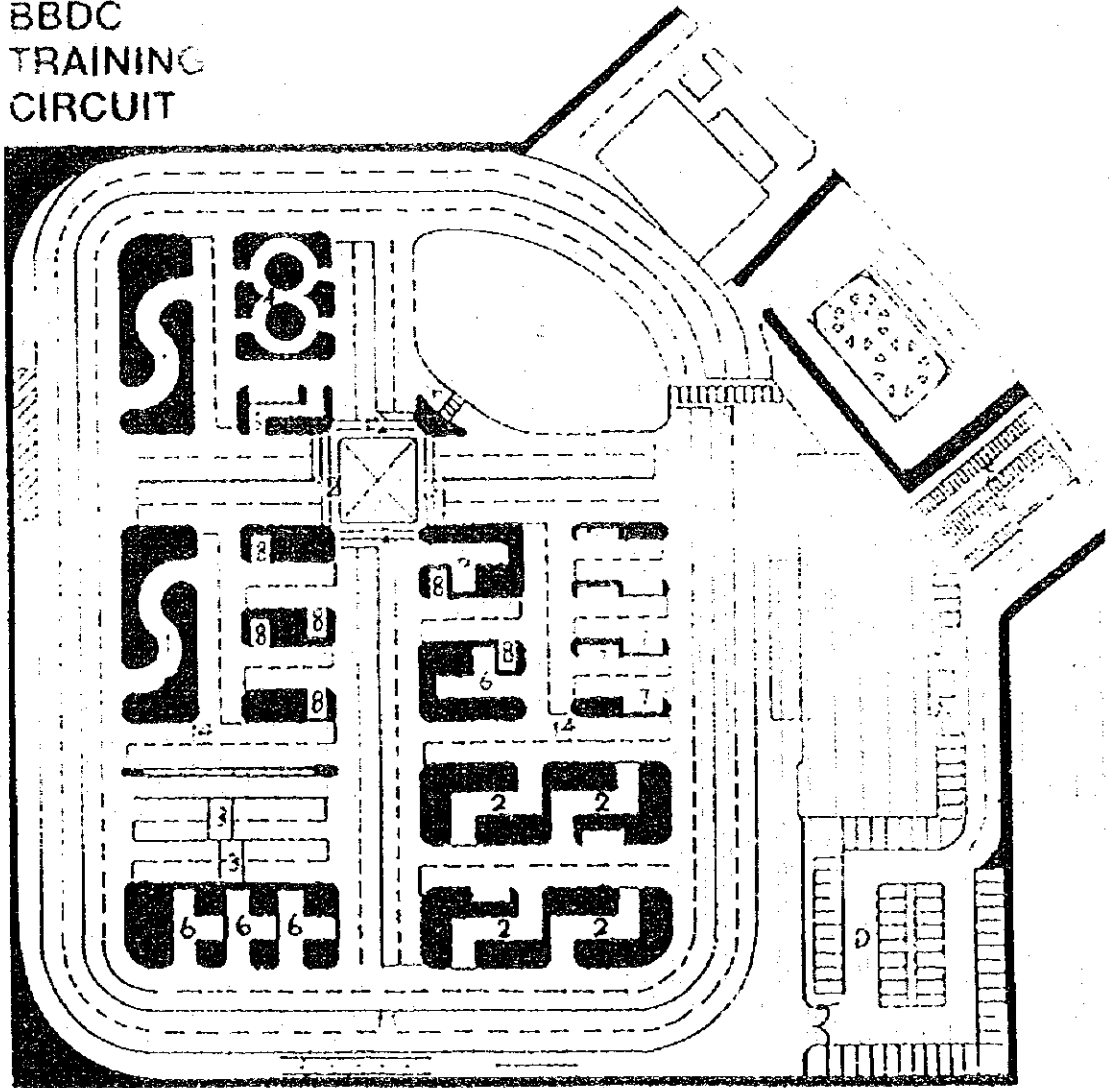
Project Profile

Projects J07

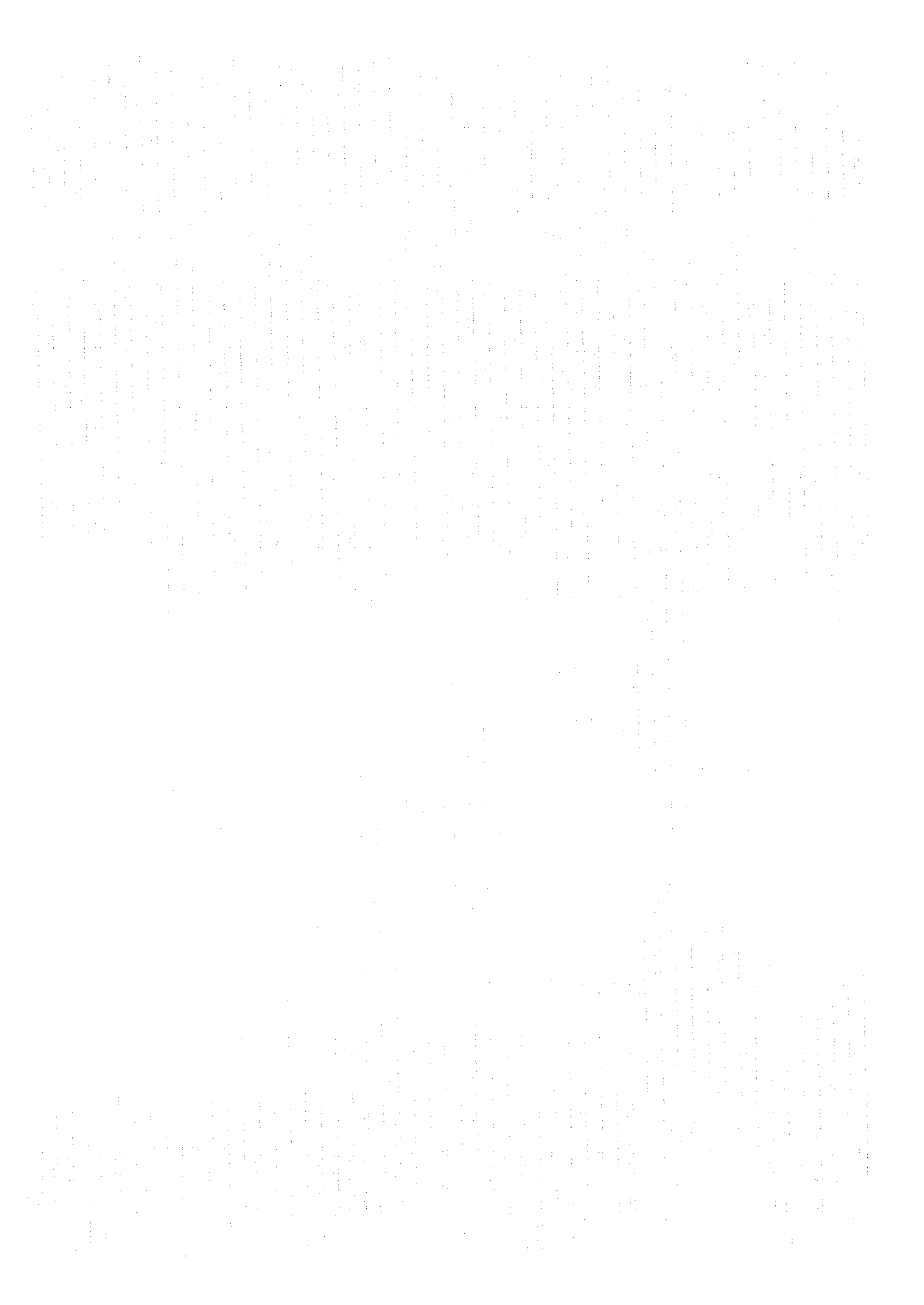
Cost	Short (Phase I)	Medium (Phase II)	Long (Phase III)
-Text book: @ \$5x20,000x5 years =\$500,000		\$500,000	\$500,000
-Man power: \$3,000/y x 30 person x5 years=\$450,000		\$450,000	\$450,000
-Construction cost for circuit (4 ha) excluding land acquisition cost Building \$200,000 Paving \$410,000 =\$610,000			
-Maintenance fee \$35,000/y x 5years =\$175,000		\$175,000	\$175,000
(Subtotal)	\$2,695,000	\$2,125,000	\$2,085,000
20%	\$539,000	\$425,000	\$417,000
(Total)	\$3,234,000 (35.6 b VND)	\$2,550,000 (28.0 b VND)	\$2,502,000 (27.5 b VND)
(Grand total)			\$8,286,000 (91.1 b VND)



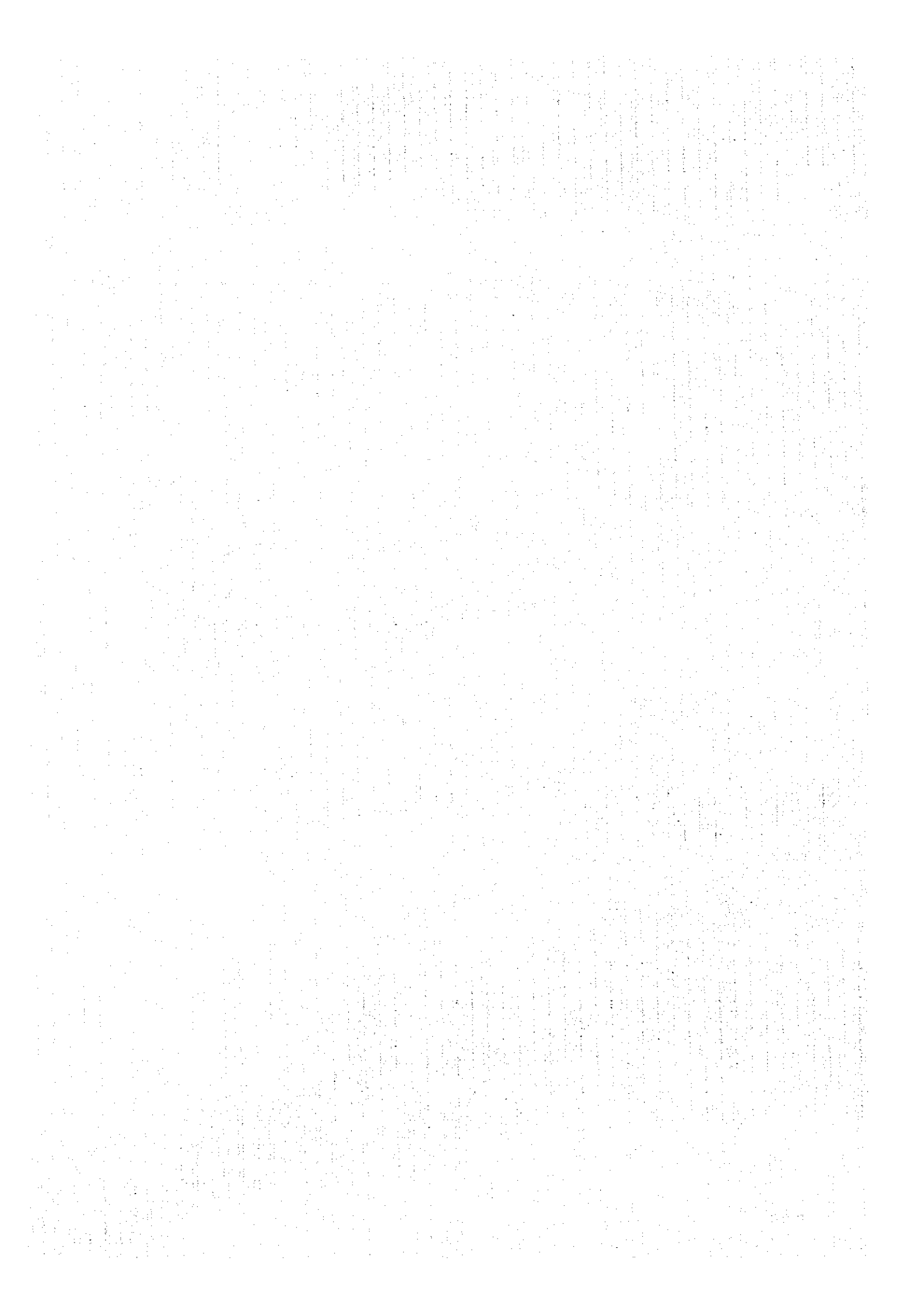
BBDC  
TRAINING  
CIRCUIT



AN EXAMPLE OF MOTORCYCLE TRAINING COURSE IN SINGAPORE



**APPENDIX F  
DESIGN STANDARDS  
OF VIETNAM**



Design Standards of New CBD Streets ( 1 )

ITEMS	UNIT	VIETNAM STANDARD Major Street Order NO.2	AASHTO Urban Principal Arterial Road	JAPANESE STANDARD Urban Road 4 - 1
Type of Highway				
Design Speed	km / hr	80	80	60
Number of Lane	m	4 - 6	4 - 8	4 - 6
Width of Lane	m	3.75	3.00 - 3.60	3.25
Parking Lane	m	3.00	3.00 - 3.60	2.5
Center Shoulder	m	0.5	1.80 - 2.40	0.50
Outer Shoulder	m	2.00	0.60	0.25
Median	m	4.00	3.60 - 5.40	1.00
Marginal Strip	m	0.50		0.25
Medial Strip	m	3.00		0.50
Sidewalk	m	4.50 + 0.50	2.40	3.00
Landscaping	m	1.00 - 6.00		1.50
Bus Stop	m	( 3.50 + 1.50 ) x 30.0		[ ( 3.0 - 3.5 ) + 2.25 ] x 60.0
Road Alignment	m	100	115	75
Minimum Stopping Sight Distance	m		482	350
Minimum Passing Sight Distance	m	250	280	150 ( 120 )
Minimum Horizontal Curve	m			50
Minimum Transition Curve Length	m			
Maximum Horizontal Curvature	m	2,000		500
Requiring Transition Curve	m			
Maximum Horizontal Curvature	m	3,000	2,500	2,000
Requiring Superelevation	m			
Maximum Horizontal Curvature	m	750	750	250
Requiring Widening	%	6.00	6.00	5.00
Maximum Vertical Gradient	%	0.50 ( 0.30 )	0.50 ( 0.30 )	0.50 ( 0.30 )
Minimum Vertical Gradient	m	6000	3,200	1,400 ( 1,000 )
Minimum	m	1,500	2,500	1,000
Vertical Curve	m			50
Sag	m			2.00
Minimum Vertical Curve Length	%	1.50 - 2.50	1.50 - 2.00	2.00
Standard Crossfall	%	6.00 ( 4.00 )	6.00	6.00 or 0
Superelevation ( Max )	%		1 / 200	1 / 125
Superelevation Run - Off ( Max )				1 / 350
Superelevation Run - Off ( min )				4.50 / 6.00
Road / Railway	m	1.75	4.2	2.00 ( 1.50 )
Vertical Clearance	m			
Bicycle Lane	m			

Design Standards of New CBD Streets ( 2 )

ITEMS	UNIT	VIETNAM STANDARD	AASHTO	JAPANESE STANDARD	RECOMMENDATION
Type of Highway		Zonal Road	Urban Minor Arterial Road	Urban Road 4 - 2	
Design Speed	km / hr	80	60 - 100	40 - 60	60
Number of Lane	each	4 - 6	4 - 8	more than 2	4
Width of Lane	m	3.75	3.00 - 3.60	3	3.75
Parking Lane	m	3.00	3.00 - 3.60	2.50	3.00
Center Shoulder	m	0.50	1.80	0.50	0.50 (0.25)
Outer Shoulder	m	2.00		0.50	0.50 (0.25)
Median	m	4.00	3.60 - 5.40	1.00	3.00 (2.50 - 0.50)
Center Strip	m	0.50		0.25	0.50 (0.25)
Marginal Strip	m	3.00		0.50	2.00
Medial Strip	m	4.50 + 0.50	2.40	3.00	6.00 (4.00)
Sidewalk	m	1.00		1.50	1.00
Landscaping	m	3.00		3.50	3.00
Bus Stop	m				
Road Alignment	m	100	115	55	75
Minimum Stopping Sight Distance	m		482	250	350
Minimum Passing Sight Distance	m		280	100 (80)	150
Minimum Horizontal Curve	m	250			
Minimum Transition Curve Length	m	80	44	40	50
Maximum Horizontal Curvature	m				
Requiring Transition Curve	m	2,000		350	500
Maximum Horizontal Curvature	m				
Requiring Superelevation	m	3,000	2,500	1,300	2,000
Maximum Horizontal Curvature	m				
Requiring Widening	m	750	750	100	250
Maximum Vertical Gradient	%	6.00	6.00	6.00	6.00
Minimum Vertical Gradient	%	0.50 (0.30)	0.50 (0.30)	0.50 (0.30)	0.50 (0.30)
Minimum Crest	m	4,000	3,200	800	1,400 (1,000)
Vertical Curve Sag	m	1,000	2,500	700	1,000
Minimum Vertical Curve Length	m			40	50
Standard Crossfall	%	1.50 - 2.50	1.50 - 3.00	2.00	2.00
Superelevation ( Max )	%	6.00 ( 4.00 )	4.00 or 0	6.00 or 0	4.00 or 0
Superelevation Run - Off ( Max )			1 / 200	1 / 125	1 / 125
Superelevation Run - Off ( min )				1 / 350	1 / 350
Vertical Clearance	m	4.50 / 6.00	4.10 /	4.50 / 6.00	4.70 / 6.00
Bicycle Lane	m	1.75	4.20	2.00 ( 1.50 )	5.00 ( 2.50 )

Design Standards of New CBD Streets (3)

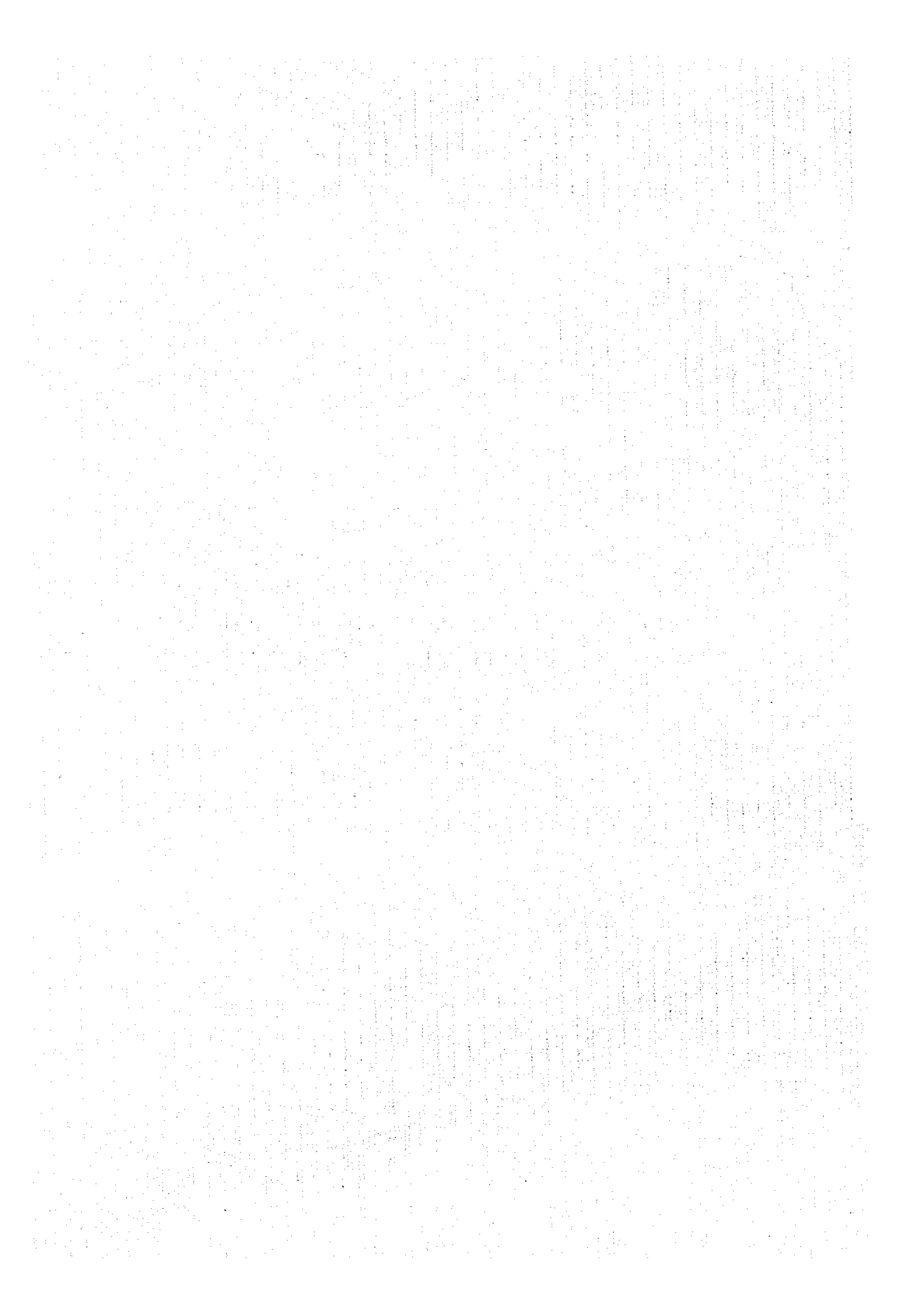
ITEMS	UNIT	VIETNAM STANDARD	AASHTO	JAPANESE STANDARD	RECOMMENDATION
Type of Highway		Local Road ( Living Quarter)	Urban Collector Road	Urban Road 4 - 3	
Design Speed	km / hr	60	Minimum 50	30 - 50	40
Number of Lane	each	2 - 4	2	more than 2	4
Width of Lane	m	3.00	3.00 - 3.60	3.00	3.00
Parking Lane	m	3.00	2.40 - 3.00	2.50	2.50
Center Shoulder	m			0.50	0.50 (0.25) or 0
Outer Shoulder	m			0.50	0.50 (0.25) or 0
Median	m		3.00 - 4.80	1.00	2.00 (1.50) or 0.50
Center Strip	m			0.25	0.50 (0.25) or 0
Marginal Strip	m			0.50	1.00 or 0
Medial Strip	m			1.50	5.00 (2.00)
Sidewalk	m	1.50 + 0.50	1.20 - 2.40	1.50	1.00
Landscaping	m	1.00		1.50	3.00
Bus Stop	m	3.00		3.50	3.00
Road Alignment	m	75	75	40	40
Minimum Stopping Sight Distance	m		407	200	200
Minimum Passing Sight Distance	m		125 / 501	60 (50)	60 (50)
Minimum Horizontal Curve	m	125			
Minimum Transition Curve Length	m	40	33	35	35
Maximum Horizontal Curvature	m	700		250	250
Requiring Transition Curve	m				
Maximum Horizontal Curvature	m	700	1,300	800	800
Requiring Superelevation	m				
Maximum Horizontal Curvature	m	100	750	100	100
Requiring Widening	m	8.00	9.00	7.00	6.00
Maximum Vertical Gradient	%	0.50 (0.30)	0.50 (0.30)	0.50 (0.30)	0.50 (0.30)
Minimum Vertical Gradient	%	2.000	1.400	450	450
Minimum Crest	m	500	1,500	450	450
Minimum Sag	m			35	35
Minimum Vertical Curve Length	m			2.00	2.00
Standard Crossfall	%	1.50 - 2.50	1.50 - 2.00	2.00	4.00 or 0
Superelevation ( Max )	%	6.00 or 4.00	4.00 or 0	6.00 or 0	1 / 100
Superelevation Run - Off ( Max )			1 / 167	1 / 100	1 / 350
Superelevation Run - Off ( min )				1 / 350	1 / 350
Vertical Clearance Road / Railway	m	4.50 / 6.00	4.30 /	4.50 / 6.00	4.70 / 6.00
Bicycle Lane	m	1.75	4.20	2.00 (1.50)	2.50 - 4.50

Design Standards of New CBD Streets ( 4 )

ITEMS	UNIT	VIETNAM STANDARD	AASHTO	JAPANESE STANDARD	RECOMMENDATION
Type of Highway				Urban Road 4 - 4	
Design Speed	km / hr	40 ( 30 )	Local Urban Street 50 * 30	20 * 40	30
Number of Lane	each	2 ( 1 )	2		2
Width of Lane	m	3.5	3.0 * 3.6		3.00
Parking Lane	m	3.00	2.20	2.50	3.00
Center Shoulder	m				
Outer Shoulder	m				2.50 * 0.50
Median	m				
Center Strip	m				
Marginal Strip	m				
Medial Strip	m				
Sidewalk	m	1.50 + 0.50	1.20 * 2.40	1.00	3.00 ( 2.50 )
Landscaping	m	1.00			1.00
Bus Stop	m	3.00			3.00
Road Alignment					
Minimum Stopping Sight Distance	m	50	45	30	30
Minimum Passing Sight Distance	m	285	285	150	150
Minimum Horizontal Curve	m	125	45 ( 50 )	30	30
Minimum Transition Curve Length	m			25	25
Maximum Horizontal Curvature					
Requiring Transition Curve	m	200		130	130
Maximum Horizontal Curvature					
Requiring Superlevation	m	200	700	500	500
Maximum Horizontal Curvature					
Requiring Widening	m	750	500	100	100
Maximum Vertical Gradient	%	8.00	8.00 ( 5.00 )	8.00	4.00
Minimum Vertical Gradient	%	0.50 ( 0.30 )	0.20	0.50 ( 0.30 )	0.30 ( 0 )
Minimum	m		500	250	250
Vertical Curve	m		800	250	250
Minimum Vertical Curve Length	m	15	25	25	25
Standard Crossfall	%	1.50 * 2.50	0.50 * 1.00	2.00	1.50 * 2.00
Superlevation ( Max )	%	6.00 ( 4.00 )	4.00 or 0		0
Superlevation Run - Off ( Max )			1 / 143		
Superlevation Run - Off ( min )					
Vertical Clearance Road / Railway	m	4.50 / 6.00	4.30 /	4.50 / 6.00	4.75 / 6.00
Bicycle Lane	m	1.75	4.20	2.00 ( 1.50 )	2.00 ( 0 )



**APPENDIX G  
BREAK DOWN OF  
ROAD CONSTRUCTION COSTS**



# 1. Quantity of Road

Arterial Road No.1

Work Items	Unit	Arterial Road			Arterial Road		
		Quantity	Length(m)	Stage	Quantity	Length(m)	Stage
Clearing & Grubbing	SQM/M	70.50	1,600	0	61.50	2,246.34	1,243.82
Embankment	CM/M	69.00	1,600	0	60.00	2,246.34	1,243.82
Subgrade Preparation	SQM/M	76.50	1,600	0	68.50	2,246.34	1,243.82
Subbase Course	CM/M	16.50	1,600	0	13.66	2,246.34	1,243.82
Base Course	CM/M	15.03	1,600	0	10.35	2,246.34	1,243.82
Prm Coat	TONNE/M	0.056	1,600	0	0.046	2,246.34	1,243.82
Tack Coat	TONNE/M	0.019	1,600	0	0.015	2,246.34	1,243.82
Asphalt Concrete	TONNE/M	11.70	1,600	0	9.52	2,246.34	1,243.82
Center Median	CM/M	2.00	1,600	0	1.50	2,246.34	1,243.82
Separate Strip	CM/M	3.00	1,600	0	3.00	2,246.34	1,243.82
Curb & Gutter	LM/M	10.00	1,600	0	10.00	2,246.34	1,243.82
Sidewalk	SQM/M	14.00	1,600	0	14.00	2,246.34	1,243.82
Drainage	LM/M	2.00	1,600	0	2.00	2,246.34	1,243.82
Catch Basin	EACH	192			192		
Road Safety Devices	LM/M	1.00	1,600	0	1.00	2,246.34	1,243.82
Plantation	SQM/M	4.00	1,600	0	5.00	2,246.34	1,243.82
Boundary Block	LM/M	2.00	1,600	0	2.00	2,246.34	1,243.82

Arterial Road No.2

Work Items	Unit	Arterial Road			Arterial Road		
		Quantity	Length(m)	Stage	Quantity	Length(m)	Stage
Clearing & Grubbing	SQM/M	0	0	0	0	0	0
Embankment	CM/M	0	0	0	0	0	0
Subgrade Preparation	SQM/M	0	0	0	0	0	0
Subbase Course	CM/M	0	0	0	0	0	0
Base Course	CM/M	0	0	0	0	0	0
Prm Coat	TONNE/M	0	0	0	0	0	0
Tack Coat	TONNE/M	0	0	0	0	0	0
Asphalt Concrete	TONNE/M	0	0	0	0	0	0
Center Median	CM/M	0	0	0	0	0	0
Separate Strip	CM/M	0	0	0	0	0	0
Curb & Gutter	LM/M	0	0	0	0	0	0
Sidewalk	SQM/M	0	0	0	0	0	0
Drainage	LM/M	0	0	0	0	0	0
Catch Basin	EACH	0	0	0	0	0	0
Road Safety Devices	LM/M	0	0	0	0	0	0
Plantation	SQM/M	0	0	0	0	0	0
Boundary Block	LM/M	0	0	0	0	0	0

Collector Road No.1

Work Items	Unit	Collector Road			Collector Road		
		Quantity	Length(m)	Stage	Quantity	Length(m)	Stage
Clearing & Grubbing	SQM/M	48.00	9,658.45	3,196.79	43.00	6,370.85	2,265.24
Embankment	CM/M	48.50	9,658.45	3,196.79	41.50	6,370.85	2,265.24
Subgrade Preparation	SQM/M	45.00	9,658.45	3,196.79	37.00	6,370.85	2,265.24
Subbase Course	CM/M	10.44	9,658.45	3,196.79	9.54	6,370.85	2,265.24
Base Course	CM/M	8.60	9,658.45	3,196.79	4.05	6,370.85	2,265.24
Prm Coat	TONNE/M	0.085	9,658.45	3,196.79	0.033	6,370.85	2,265.24
Tack Coat	TONNE/M	0.012	9,658.45	3,196.79	0.011	6,370.85	2,265.24
Asphalt Concrete	TONNE/M	5.62	9,658.45	3,196.79	5.28	6,370.85	2,265.24
Center Median	CM/M	1.00	9,658.45	3,196.79	0.50	6,370.85	2,265.24
Separate Strip	CM/M	1.00	9,658.45	3,196.79	1.00	6,370.85	2,265.24
Curb & Gutter	LM/M	6.00	9,658.45	3,196.79	6.00	6,370.85	2,265.24
Sidewalk	SQM/M	12.00	9,658.45	3,196.79	10.00	6,370.85	2,265.24
Drainage	LM/M	2.00	9,658.45	3,196.79	2.00	6,370.85	2,265.24
Catch Basin	EACH	360			256		
Road Safety Devices	LM/M	0.50	9,658.45	3,196.79	0.50	6,370.85	2,265.24
Plantation	SQM/M	3.00	9,658.45	3,196.79	3.00	6,370.85	2,265.24
Boundary Block	LM/M	2.00	9,658.45	3,196.79	2.00	6,370.85	2,265.24

Collector Road No.3

Work Items	Unit	Collector Road			Collector Road		
		Quantity	Length(m)	Stage	Quantity	Length(m)	Stage
Clearing & Grubbing	SQM/M	35.00	12,329.92	3,767.32	35.00	12,329.92	3,767.32
Embankment	CM/M	33.50	12,329.92	3,767.32	33.00	12,329.92	3,767.32
Subgrade Preparation	SQM/M	7.14	12,329.92	3,767.32	7.14	12,329.92	3,767.32
Subbase Course	CM/M	5.85	12,329.92	3,767.32	5.85	12,329.92	3,767.32
Base Course	CM/M	0.03	12,329.92	3,767.32	0.03	12,329.92	3,767.32
Prm Coat	TONNE/M	0.01	12,329.92	3,767.32	0.01	12,329.92	3,767.32
Tack Coat	TONNE/M	3.64	12,329.92	3,767.32	3.64	12,329.92	3,767.32
Asphalt Concrete	TONNE/M	0	12,329.92	3,767.32	0	12,329.92	3,767.32
Center Median	CM/M	0	12,329.92	3,767.32	0	12,329.92	3,767.32
Separate Strip	CM/M	2.00	12,329.92	3,767.32	2.00	12,329.92	3,767.32
Curb & Gutter	LM/M	10.00	12,329.92	3,767.32	10.00	12,329.92	3,767.32
Sidewalk	SQM/M	2.00	12,329.92	3,767.32	2.00	12,329.92	3,767.32
Drainage	LM/M	2.00	12,329.92	3,767.32	2.00	12,329.92	3,767.32
Catch Basin	EACH	484			484		
Road Safety Devices	LM/M	0.50	12,329.92	3,767.32	0.50	12,329.92	3,767.32
Plantation	SQM/M	2.00	12,329.92	3,767.32	2.00	12,329.92	3,767.32
Boundary Block	LM/M	2.00	12,329.92	3,767.32	2.00	12,329.92	3,767.32

Feeder Road No.1

Feeder Road No.2

Work Items	Unit	Feeder Road No.1		Feeder Road No.2		Prim. Stage	Second Stage	Third Stage	Fourth Stage	Fifth Stage	Feeder Road No.1		Feeder Road No.2		Prim. Stage	Second Stage	Third Stage	
		Quantity	Length(m)	Quantity	Length(m)						Quantity	Length(m)	Quantity	Length(m)				
Clearing & Grubbing	SQM/M		10.816		10.816	1.480	5.828	3.510			16.00	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Embankment	CM/M		10.816		10.816	1.480	5.828	3.510			14.50	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Subgrade Preparation	SQM/M		10.816		10.816	1.480	5.828	3.510			13.00	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Subbase Course	CM/M		10.816		10.816	1.480	5.828	3.510			1.96	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Base Course	CM/M		10.816		10.816	1.480	5.828	3.510			1.29	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Prim Coat	CM/M		10.816		10.816	1.480	5.828	3.510			0.008	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Tack Coat	CM/M		10.816		10.816	1.480	5.828	3.510			0.003	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Asphalt Concrete	CM/M		10.816		10.816	1.480	5.828	3.510			1.01	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Center Median	CM/M		10.816		10.816	1.480	5.828	3.510			0	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Separate Strip	CM/M		10.816		10.816	1.480	5.828	3.510			0	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Curb & Gutter	LM/M		10.816		10.816	1.480	5.828	3.510			2.00	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Sidewalk	LM/M		10.816		10.816	1.480	5.828	3.510			5.00	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Drainage	SQM/M		10.816		10.816	1.480	5.828	3.510			2.00	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Catch Basin	EACH										320							
Road Safety Devices	LM/M		10.816		10.816	1.480	5.828	3.510			0.25	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Plantation	SQM/M		10.816		10.816	1.480	5.828	3.510			2.00	11.975	4.35	6.970	4.35	6.970	4.35	6.970
Boundary Block	LM/M		10.816		10.816	1.480	5.828	3.510			2.00	11.975	4.35	6.970	4.35	6.970	4.35	6.970

Work Items	Unit	WALKWAY W = 30m		
		Quantity	Length (m)	First Sta. Second Sta. Third Sta.
Clearing & Grubbing	SQM/M	31.00	406.11	0 406.11
Embankment	CM/M	32.50	406.11	0 406.11
Subgrade Preparation	SQM/M	31.00	406.11	0 406.11
Subbase Course	CM/M	0	406.11	0 406.11
Base Course	CM/M	0	406.11	0 406.11
Prim Coat	TONZ/M	0	406.11	0 406.11
Tack Coat	TONZ/M	0	406.11	0 406.11
Asphalt Concrete	TONZ/M	0	406.11	0 406.11
Center Median	CM/M	0	406.11	0 406.11
Separate Strip	CM/M	0	406.11	0 406.11
Curb & Gutter	LM/M	0	406.11	0 406.11
Sidewalk	SQM/M	30.00	406.11	0 406.11
Drainage	LM/M	2.00	406.11	0 406.11
Catch Basin	EACH	14		
Road Safety Devices	LM/M	0.25	406.11	0 406.11
Plantation	SQM/M	4.00	406.11	0 406.11
Boundary Block	LM/M	2.00	406.11	0 406.11

Work Items	Unit	COMB. COLLECTOR AND WALKWAY W = 60m			WALKWAY W = 60.0m		
		Quantity	Length (m)	First Sta. Second Sta. Third Sta.	Quantity	Length (m)	First Sta. Second Sta. Third Sta.
Clearing & Grubbing	SQM/M	64.00	577	577 0	81.00	463.92	463.92 0
Embankment	CM/M	62.50	577	577 0	62.50	463.92	463.92 0
Subgrade Preparation	SQM/M	61.00	577	577 0	61.00	463.92	463.92 0
Subbase Course	CM/M	9.54	577	577 0	0	463.92	463.92 0
Base Course	CM/M	4.05	577	577 0	0	463.92	463.92 0
Prim Coat	TONZ/M	0.033	577	577 0	0	463.92	463.92 0
Tack Coat	TONZ/M	0.011	577	577 0	0	463.92	463.92 0
Asphalt Concrete	TONZ/M	5.28	577	577 0	0	463.92	463.92 0
Center Median	CM/M	0.50	577	577 0	0	463.92	463.92 0
Separate Strip	CM/M	1.00	577	577 0	0	463.92	463.92 0
Curb & Gutter	LM/M	8.00	577	577 0	0	463.92	463.92 0
Sidewalk	SQM/M	31.00	577	577 0	31.00	463.92	463.92 0
Drainage	LM/M	2.00	577	577 0	2.00	463.92	463.92 0
Catch Basin	EACH	46			34		
Road Safety Devices	LM/M	0.50	577	577 0	0.25	463.92	463.92 0
Plantation	SQM/M	2.00	577	577 0	4.00	463.92	463.92 0
Boundary Block	LM/M	2.00	577	577 0	2.00	463.92	463.92 0

Work Item	Unit	Unit Quantity	First Package		Second Package		Third Package		Total Quantity
			Length(m)	Quantity	Length(m)	Quantity	Length(m)	Quantity	
<b>Quantity of RCBC</b>									
Excavation	CUM/M	107.20	288.00	30,873.60	589.50	63,194.40	438.00	46,953.60	141,021.60
Foundation Fill	CUM/M	2.12	288.00	610.56	589.50	1,249.74	438.00	928.56	2,788.86
Backfill	CUM/M	20.00	288.00	5,760.00	589.50	11,790.00	438.00	8,760.00	26,310.00
Lean Concrete	CUM/M	1.22	288.00	351.36	589.50	719.19	438.00	534.36	1,604.91
Concrete	CUM/M	9.00	288.00	2,592.00	589.50	5,305.50	438.00	3,942.00	11,839.50
Reinforcing Bar	KG/M	540.00	288.00	155,520.00	589.50	318,330.00	438.00	236,520.00	710,370.00
<b>Quantity of Green Belt</b>									
Excavation	C/M/M	68.00	3,660.00	248,880.00	1,780.00	121,040.00	3,380.00	229,840.00	599,760.00
Backfill	C/M/M	7.50	3,660.00	27,450.00	1,780.00	13,350.00	3,380.00	25,350.00	66,150.00
Stone Masonry	C/M/M	18.00	3,660.00	65,880.00	1,780.00	32,040.00	3,380.00	60,840.00	158,760.00
Plantation	SQM/M	4.00	3,660.00	14,640.00	1,780.00	7,120.00	3,380.00	13,520.00	35,280.00
Sodding	SQM/M	30.00	3,660.00	109,800.00	1,780.00	53,400.00	3,380.00	101,400.00	264,600.00
<b>Quantity of Utility Tunnel</b>									
Reinforcement	KG/M	1,715.00	7,880.00	13,514,200	2,270.00	3,893,050	4,320.00	7,408,800	24,816,050
Concrete	CUM/M	9.90	7,880.00	77,973	2,270.00	22,462	4,320.00	42,746	143,181
Lean Concrete	CUM/M	0.97	7,880.00	7,644	2,270.00	2,202	4,320.00	4,190	14,036
Foundation Fill	CUM/M	1.94	7,880.00	15,287	2,270.00	4,404	4,320.00	8,381	28,072
Excavation	CUM/M	97.80	7,880.00	770,664	2,270.00	222,006	4,320.00	422,496	1,415,166
Backfill	CUM/M	69.20	7,880.00	545,296	2,270.00	157,084	4,320.00	298,944	1,001,324

## Ha Noi urban Road Cost Estimate

### I. Unit Cost

<u>WORK ITEMS</u>	<u>UNIT</u>	<u>COST ( VND )</u>
Clearing and Grubbing	SQM	2,650
Roadway Excavation	CM	34,580
Embankment	CM	63,640
Subgrade Preparation	CM	12,660
Sub -base Course	CM	120,000
Base Course	CM	189,000
Prime Coat	TONE	5,339,000
Tack Coat	TONE	5,339,000
Asphalt Concrete	TONE	504,000
Concrete Class A	CM	1,192,760
Center Median	CM	42,810
Separate Strip	CM	42,810
Concrete Curb Type A	LM	277,000
Concrete Curb Type B	LM	217,000
Curb & Gutter	LM	241,000
Sidewalk	SQM	
Asphalt Concrete Surface	SQM	144,800
Inter Locking Block	SQM	188,800
Drainage	LM	593,970
Catch Basin	EACH	2,335,220
Road Safety Devices		
Arterial Road	LM	1,357,000
Collector Road	LM	678,500
Feeder Road	LM	339,250
Plantation	SQM	87,800
Warning Sign	EACH	1,055,100
Regulatory Sign	EACH	1,429,540
Informatory Sign	EACH	90,216,000
Thermoplastic Pavement		
Marking	SQM	63,750
Reflectorized Pavement		

Studs		EACH	321,400
Top Soil		CM	42,820
Sodding		SQM	56,040
Bridge, Viaduct, and Depress		SQM	16,000,000
Boundary Block		LM	59,000
Metal Beam Guardrail with Concrete Post		LM	1,296,900
Reinforcing Steel		KG	11,800
Stone Masonry		CM	623,300
Lean Concrete		CM	879,400
RC Pipe	750mm	LM	811,100
	1,000mm	LM	1,228,300
	2,000mm	LM	5,484,600



2. CONSTRUCTION COST OF NEW CBD ROADS

Work Items	Unit	Unit Cost (VND)	Arterial Road No. 1			Arterial Road No. 2			Collector Road No. 1		
			Quantity	Length (m)	Construction Cost	Quantity	Length (m)	Construction Cost	Quantity	Length (m)	Construction Cost
Clearing & Grubbing	SQM / M	2,650	70.50	1,890	353	61.50	2,300	375	48.00	8,960	1,140
Embankment	CM / M	63,640	69.00	1,890	8,299	60.00	2,300	8,782	46.50	8,960	26,515
Subgrade Preparation	SQM / M	12,660	76.50	1,890	1,830	58.50	2,300	1,703	45.00	8,960	5,105
Subbase Course	CM / M	120,000	16.59	1,890	3,763	19.88	2,300	3,831	10.44	8,960	11,225
Base Course	CM / M	189,000	15.03	1,890	5,369	10.35	2,300	4,499	8.60	8,960	14,564
Prin Coat	TONE / M	5,339,000	0.056	1,890	665	0.046	2,300	565	0.035	8,960	1,674
Tack Coat	TONE / M	5,339,000	0.019	1,890	192	0.015	2,300	184	0.012	8,960	574
Asphalt Concrete	TONE / M	604,000	11.70	1,890	11,146	9.52	2,300	11,036	5.52	8,960	24,927
Center Median	CM / M	42,810	2.00	1,890	162	1.50	2,300	148	1.00	8,960	384
Separate Strip	CM / M	42,810	3.00	1,890	243	3.00	2,300	295	1.00	8,960	384
Curb & Gutter	LM / M	241,000	10.00	1,890	4,555	10.00	2,300	5,543	8.00	8,960	17,275
Sidewalk	SQM / M	144,800	14.00	1,890	3,831	14.00	2,300	4,663	12.00	8,960	15,559
Drainage	LM / M	593,970	2.00	1,890	2,245	2.00	2,300	2,732	2.00	8,960	10,614
Catch Basin	EACH	2,335,220	152		355	186		434	360		841
Road Safety Devices	LM / M	1,357,000	1.00	1,890	2,565	1.00	2,300	3,121	0.50	8,960	6,079
Plantation	SQM / M	87,800	4.00	1,890	664	5.00	2,300	3,121	3.00	8,960	2,360
Boundary Block	LM / M	59,000	2.00	1,890	223	2.00	2,300	1,010	2.00	8,960	1,057
Construction Cost	CM / M				46,359			52,042			140,316
Unit Cost	MVND / M				24.53			22.63			15.66

Note : Construction Cost indicated million Vietnam don (MVND)  
Unit Cost referred existing O&MCF Loan Project price.

Collector Road No. 2			Collector Road No. 3			Feeder Road No. 1			Feeder Road No. 2		
Quantity	Length (m)	Construction Cost	Quantity	Length (m)	Construction Cost	Quantity	Length (m)	Construction Cost	Quantity	Length (m)	Construction Cost
43.00	6,370	726	35.00	12,080	1,120	22.00	10,816	631	16.00	11,975	508
41.50	6,370	16,824	33.50	12,080	25,754	20.50	10,816	14,111	14.50	11,975	11,050
37.00	6,370	2,984	33.00	12,080	5,047	19.00	10,816	2,602	13.00	11,975	1,971
9.54	6,370	7,292	7.14	12,080	10,350	3.45	10,816	4,478	1.96	11,975	2,817
4.05	6,370	4,876	5.65	12,080	12,900	1.89	10,816	3,864	1.29	11,975	2,920
0.033	6,370	1,122	0.03	12,080	1,925	0.015	10,816	866	0.009	11,975	575
0.011	6,370	374	0.01	12,080	645	0.005	10,816	289	0.003	11,975	192
5.28	6,370	16,951	3.84	12,080	23,379	1.32	10,816	10,466	1.01	11,975	6,096
0.50	6,370	136	0		0	0		0	0		0
1.00	6,370	273	0		0	0		0	0		0
8.00	6,370	12,281	2.00	12,080	5,823	2.00	10,816	5,213	2.00	11,975	5,772
10.00	6,370	9,224	10.00	12,080	17,492	6.00	10,816	9,397	5.00	11,975	8,670
2.00	6,370	7,567	2.00	12,080	14,350	2.00	10,816	12,849	2.00	11,975	14,226
256		598	484		1,130	290		667	320		747
0.50	6,370	4,322	0.50	12,080	8,196	0.25	10,816	1,835	0.25	11,975	2,031
3.00	6,370	1,678	2.00	12,080	2,121	2.00	10,816	1,899	2.00	11,975	2,103
2.00	6,370	752	2.00	12,080	1,425	2.00	10,816	1,276	2.00	11,975	1,413
		87,980			131,668			70,442			60,242
		13,81			10,90			6,51			5,04

3. CONSTRUCTION COST FOR WALKWAY

Work Items	Unit	Unit Cost (VND)	COMB. COLLECTOR AND WALKWAY			WALKWAY W = 60.0 M			WALKWAY W = 30.0 M			Remarks
			Quantity	Length (m)	Construction Cost	Quantity	Length (m)	Construction Cost	Quantity	Length (m)	Construction Cost	
Cleaning & Grubbing	SQM / M	2,660	64.00	550	93	61.00	410	66	31.00	330	27	
Embankment	CM / M	63,640	62.50	550	2,188	62.50	410	1,631	32.50	330	683	
Subgrade Preparation	SQM / M	12,660	61.00	550	425	61.00	410	317	31.00	330	130	
Subbase Course	CM / M	120,000	9.54	550	630	0	410	0	0	330	0	
Base Course	CM / M	189,000	4.05	550	421	0	410	0	0	330	0	
Prism Coat	TONE / M	5,339,000	0.633	550	97	0	410	0	0	330	0	
Tack Coat	TONE / M	5,339,000	0.011	550	32	0	410	0	0	330	0	
Asphalt Concrete	TONE / M	504,000	5.28	550	1,464	0	410	0	0	330	0	
Center Median	CM / M	42,810	0.50	550	12	0	410	0	0	330	0	
Separate Strip	CM / M	42,810	1.00	550	24	0	410	0	0	330	0	
Curb & Gutter	LM / M	241,000	8.00	550	1,060	0	410	0	0	330	0	
Sidewalk	SQM / M	188,800	31.00	550	3,219	31.00	410	2,400	30.00	330	1,869	
Drainage	LM / M	693,970	2.00	550	653	2.00	410	487	2.00	330	392	
Catch Basin	EACH	2,335,230	46	550	107	34	550	79	14	550	33	
Road Safety Devices	LM / M	1,367,000	0.50	550	373	0.25	410	139	0.25	330	112	
Plantation	SQM / M	87,800	2.00	550	97	4.00	410	144	4.00	330	116	
Boundary Block	LM / M	59,000	2.00	550	65	2.00	410	48	2.00	330	39	
Construction Cost	CM / M				10,969			5,311			3,400	
Unit Cost	MYND / M				19.93			12.95			10.30	

4. ROAD CONSTRUCTION COST OF NEW CBD AREA

	ARTERIAL ROAD NO.1	ARTERIAL ROAD NO.2	COLLECTOR ROAD NO.1	COLLECTOR ROAD NO.2	COLLECTOR ROAD NO.3	FEEDER ROAD NO.1	FEEDER ROAD NO.2	WALKWAY W/C.R.NO.2	WALKWAY W=0.0M	WALKWAY W=0.0M	TOTAL (MVND)	REMARKS
TOTAL ROAD LENGTH (M)	1,880	2,300	8,960	6,370	12,090	10,810	11,970	550	410	410	370	65,051
NEW CBD EAST AREA (FIRST STAGE)	1,480	1,330	4,000	2,130	4,170	1,480	435	650	410	410	0	16,408
NEW CBD EAST AREA (SECOND STAGE)	0	970	1,130	2,800	4,290	5,820	6,970	0	0	0	0	22,032
NEW CBD WEST AREA (THIRD STAGE)	0	0	3,270	1,440	3,630	3,610	4,670	0	0	0	3,801	16,750
(ROAD WIDTH (M))	65.50	87.00	44.00	30.00	31.00	18.00	12.00	60.00	60.00	60.00	30.00	
CONSTRUCTION COST (MVND)	46,360	62,042	140,316	87,980	131,668	70,442	60,343	10,269	5,311	5,311	3,400	608,820
NEW CBD EAST AREA (FIRST STAGE)	46,360	30,094	70,471	29,419	45,482	9,030	2,192	10,269	5,311	5,311	0	249,896
NEW CBD EAST AREA (SECOND STAGE)	0	21,944	18,636	38,073	40,651	37,943	35,122	0	0	0	0	104,073
NEW CBD WEST AREA (THIRD STAGE)	0	0	61,200	19,888	39,928	22,850	23,079	0	0	0	3,400	160,961
UNIT COST (MVND / M)	24,629	27,027	15,020	13,811	10,900	6,513	5,039	19,926	12,964	12,964	10,303	10,934

5. Construction Cost of Flyover

ITEMS	UNIT	QUANTITY	UNIT COST	CONSTRUCTION COST(MVND)	REMARKS
<b>1. NORTH SIDE VIADUCT L=402.0m</b>					
<b>Super Structure</b>					
Concrete	CM	2,318.0	1,192,800.0	2,764.91	
Reinforcing Bar	KG	124,000.0	11,800.0	1,463.20	
Girder	EACH	96.0	194,000,000.0	18,624.00	
Girder	TONE	250.0	56,571,430.0	14,142.86	
Railing	M	804.0	706,300.0	567.87	
Railing	TONE	32.0	0.0	0.00	
Sub-total				37,562.83	
<b>Sub-Structure</b>					
Excavation	CM	11,647.0	174,000.0	2,026.58	
Back Fill	CM	8,329.0	77,000.0	641.33	
Lean Concrete	CM	141.0	879,400.0	124.00	
Foundation Fill	CM	423.0	55,500.0	23.48	
Concrete	CM	5,301.0	1,192,800.0	6,323.03	
Reinforcement Bar	KG	318,000.0	11,800.0	3,752.40	
Pile 400 x 400	EACH	1,640.0	662,000.0	1,085.68	
Pile 400 x 400	M	19,680.0	451,400.0	8,883.55	
Pile 400 x 400	EACH	5.0	148,000,000.0	740.00	
Sub-total				23,600.05	
Total Cost				61,162.88	
<b>2. SOUTH SIDE VIADUCT L=440.2m</b>					
<b>Super Structure</b>					
Concrete	CM	2,535.0	1,192,800.0	3,023.75	
Reinforcing Bar	KG	135,000.0	11,800.0	1,593.00	
Girder	EACH	104.0	194,000,000.0	20,176.00	
Girder	TONE	250.0	56,571,430.0	14,142.86	
Railing	M	880.0	706,300.0	621.54	
Railing	TONE	35.0	0.0	0.00	
Sub-total				39,557.15	
<b>Sub-Structure</b>					
Excavation	CM	12,329.0	174,000.0	2,145.25	
Back Fill	CM	8,807.0	77,000.0	678.14	
Lean Concrete	CM	149.0	879,400.0	131.03	
Foundation Fill	CM	448.0	55,500.0	24.86	
Concrete	CM	5,684.0	1,192,800.0	6,779.88	
Reinforcement Bar	KG	341,000.0	11,800.0	4,023.80	
Pile 400 x 400	EACH	1,740.0	662,000.0	1,151.88	
Pile 400 x 400	M	20,880.0	451,400.0	9,425.23	
Pile 400 x 400	EACH	5.0	148,000,000.0	740.00	
Sub-total				25,100.07	
Total Cost				64,657.22	
<b>3. PEESTRIAN BRIDGE</b>					
				23,880.00	
<b>4. GRAND TOTAL</b>					
				149,700.10	

6. Construction Cost of RCBC (NEW CBD)

Items	Unit	Unit Cost (VND)	1st. Stage		2nd. Stage		3rd. Stage		Grand Total	
			Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost
Excavation	CM	57,750.0	30,874	1,783	63,194	3,649	45,954	2,712	141,022	8,144
Back Fill	CM	77,050.0	5,760	444	11,790	908	8,760	675	26,310	2,027
Foundation Fill	CM	55,500.0	611	34	1,250	69	929	52	2,789	155
Lean Concrete	CM	879,400.0	351	309	719	632	534	470	1,605	1,411
Concrete	CM	1,192,800.0	2,592	3,092	5,306	6,328	3,942	4,702	11,840	14,122
Reinforcing Bar	KG	11,800.0	155,520	1,835	318,330	3,756	286,520	2,791	710,370	8,382
Total				7,497	15,344			11,401		34,242

7. Construction Cost of Green Belt

Items	Unit	Unit Cost (VND)	1st. Stage		2nd. Stage		3rd. Stage		Grand Total	
			Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost
Drainage Excavation	CM	50,750.0	248,880	12,631	121,040	6,143	229,840	11,664	599,760	30,438
Back Fill	CM	77,050.0	27,450	2,115	13,350	1,029	25,350	1,953	66,150	5,097
Stone Masonry	CM	632,300.0	65,880	41,656	32,040	20,259	60,840	38,469	158,760	100,384
Plantation	SCM	87,800.0	14,840	1,285	7,120	625	13,520	1,187	35,280	3,098
Soliding	SCM	56,040.0	109,800	6,153	53,400	2,993	101,400	5,682	264,600	14,828
Total				63,840		31,048		58,956		133,844

8. Construction Cost of Utility Tunnel

Items	Unit	Unit Cost (VND)	1st. Stage		2nd. Stage		3rd. Stage		Grand Total	
			Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost
Reinforcement	KG	11,800.0	13,514,200	159,468	3,893,050	45,938	7,408,800	87,424	24,816,050	282,829
Concrete	CM	1,192,800.0	77,973	93,006	22,462	26,793	42,746	50,987	143,181	170,786
Lean Concrete	CM	897,400.0	7,944	6,860	2,202	1,976	4,190	3,760	14,036	12,596
Foundation Fill	CM	55,500.0	15,287	848	4,272	237	8,381	465	27,940	1,551
Excavation	CM	174,000.0	770,864	134,096	222,006	38,629	422,496	73,514	1,415,166	246,239
Back Fill	CM	77,000.0	545,295	41,988	157,084	12,095	288,944	23,019	1,001,324	77,102
Total				436,265		125,668		239,170		801,103

9. Construction Cost of Water Pipe

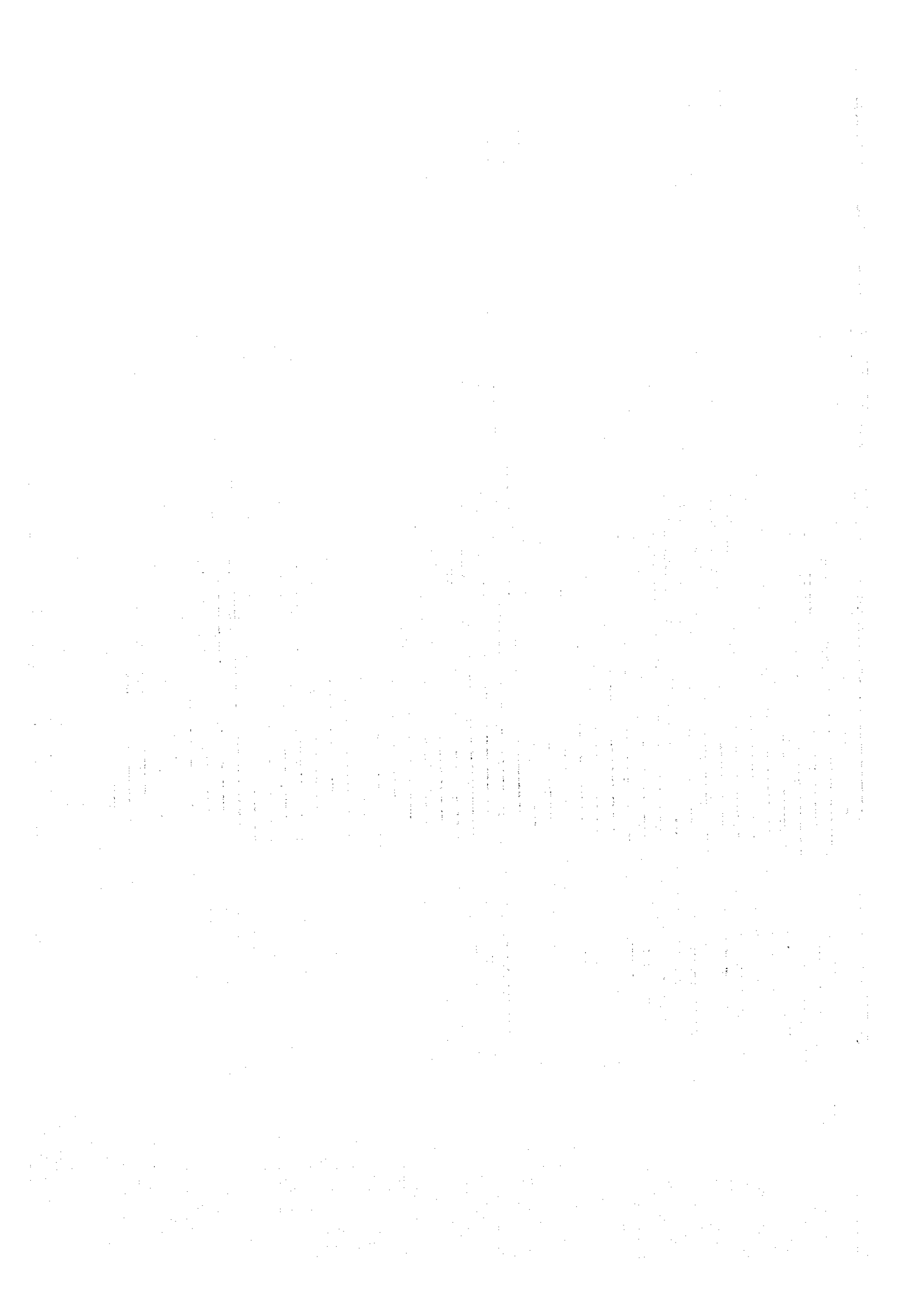
Diameter of pipe	Utility/Embedded	Total Length(m)	1st. Stage		2nd. Stage		3rd. Stage		Total Cost	Remarks
			Length(m)	Cost(BVND)	Length(m)	Cost(BVND)	Length(m)	Cost(BVND)		
pipe φ 350	Utility	5,020	2,820	5.44	2,200	4.24	0	0.00	15.49	
	Embedded	2,930	1,000	1.98	850	1.88	1,080	2.14		
pipe φ 450	Utility	6,480	3,330	7.12	0	0.00	3,150	6.73	17.44	
	Embedded	1,630	880	1.94	750	1.85	0	0.00		
pipe φ 600	Utility	0	0	0.00	0	0.00	0	0.00	6.16	
	Embedded	1,600	800	3.08	800	3.08	0	0.00		
pipe φ 700	Utility	1,170	0	0.00	0	0.00	1,170	4.39	4.39	
	Embedded	0	0	0.00	0	0.00	0	0.00		
pipe φ 800	Utility	1,370	1,370	5.13	0	0.00	0	0.00	7.05	
	Embedded	500	0	0.00	500	1.93	0	0.00		
pipe φ 1000	Utility	360	360	2.92	0	0.00	0	0.00	2.92	
	Embedded	0	0	0.00	0	0.00	0	0.00		
Sub Total	Utility	14,400	7,880	20.61	2,200	4.24	4,320	11.13	53.46	
	Embedded	6,660	2,680	7.00	2,900	8.34	1,080	2.14		
Total Cost		21,060	10,560	27.60	5,100	12.58	5,400	13.27	53.46	

10. Construction Cost of Sewerage Pipe

Diameter of pipe	Utility/Embedded	Total Length(m)	1st. Stage		2nd. Stage		3rd. Stage		Total Cost	Remarks
			Length(m)	Cost(BVND)	Length(m)	Cost(BVND)	Length(m)	Cost(BVND)		
pipe φ 300	Utility	1,440	1,440	2.78	0	0.00	0	0.00	2.78	
	Embedded	0	0	0.00	0	0.00	0	0.00		
pipe φ 350	Utility	690	690	1.33	0	0.00	0	0.00	7.14	
	Embedded	2,930	1,000	1.98	850	1.88	1,080	2.14		
pipe φ 450	Utility	7,530	2,080	4.45	2,300	4.92	3,150	6.73	21.45	
	Embedded	2,430	1,680	3.70	750	1.65	0	0.00		
pipe φ 500	Utility	2,820	1,650	6.22	0	0.00	1,170	4.41	10.63	
	Embedded	0	0	0.00	0	0.00	0	0.00		
pipe φ 600	Utility	800	0	0.00	0	0.00	0	0.00	3.08	
	Embedded	0	0	0.00	800	3.08	0	0.00		
pipe φ 700	Utility	1,620	1,620	6.08	0	0.00	0	0.00	6.08	
	Embedded	0	0	0.00	0	0.00	0	0.00		
pipe φ 800	Utility	500	0	0.00	0	0.00	0	0.00	1.93	
	Embedded	300	300	2.43	500	1.93	0	0.00		
pipe φ 1000	Utility	0	0	0.00	0	0.00	0	0.00	2.43	
	Embedded	0	0	0.00	0	0.00	0	0.00		
pipe φ 1200	Utility	0	0	0.00	0	0.00	0	0.00	2.48	
	Embedded	300	300	2.48	0	0.00	0	0.00		
Sub Total	Utility	5,450	0	23.29	2,300	4.92	3,150	11.14	57.99	
	Embedded	4,260	300	8.15	2,900	8.34	1,080	2.14		
Total Cost		9,730	300	31.45	5,200	13.26	4,230	13.28	57.99	













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