

## APPENDIX 19

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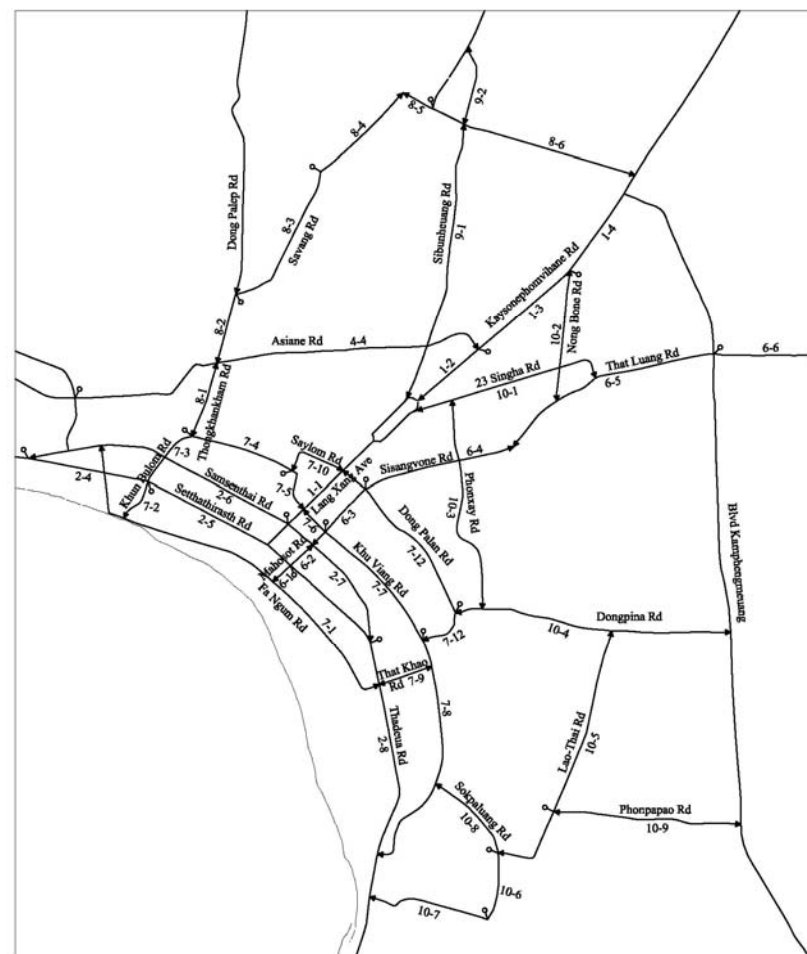
### TRAFFIC MANAGEMENT PLAN

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Target Road Sections Where pavement Markings will be installed in Vientiane City



Target Road Sections where Pavement Markings will be Installed within the City Center



Pavement Marking Design of Center line and Lane Markings on Target Road Section and those Estimated Costs

Road Section	Road Class	Length (km)	Cross Section	Surface Type	Condition	Remarks	Types of Line Marking						Length of Line Marking (m)						Area of Marking only(m2)						Cost of marking		
							Yellow		White		Yellow		White		Yellow		White		Yellow		White		Yellow	White	Total		
							S	B	S	B	Solid	Broken	Solid	Broken	Solid	Broken	Solid	Broken	Solid	Broken							
1-1 Lane Xang Ave.	National	1.5		Concrete	Good	13 South	4	6	0.0	0.0	6.0	9.0	0	0	600	225	-	16,500	16,500								
1-2 Kaysonphomvihane Rd. (a)	National	0.6		Asphalt	Good	13 South	2	2	1.2	0.0	1.2	1.2	120	0	120	30	2,400	3,000	5,400								
1-3 Kaysonphomvihane Rd. (b)	National	0.8		Asphalt	Good	13 South	2	4	1.6	0.0	1.6	3.2	160	0	160	80	3,200	4,800	8,000								
1-4 Kaysonphomvihane Rd. (c)	National	5.2		Asphalt	Good	13 South	4	4	0.0	0.0	20.8	20.8	0	0	2080	520	-	52,000	52,000								
1-5 Kaysonphomvihane Rd. (d)	National	3.1		Asphalt	Good	13 South	2	4	6.2	0.0	6.2	12.4	620	0	620	310	12,400	18,600	31,000								
1-6 South 13 Rd.	National	11.8		DBST	Good	13 South	2	2	0.0	23.6	23.6	23.6	0	1011	2360	590	20,229	59,000	79,229								
1-7 N10 Rd.	National	0.5		DBST	Fair	Code 10	2	2	0.0	1.0	1.0	1.0	0	43	100	25	857	2,500	3,357								
2-1 North 13 Rd. (b)	National	0.5		DBST	Fair	13 North	2	2	0.0	1.0	1.0	1.0	0	43	100	25	857	2,500	3,357								
2-2 North 13 Rd. (a)	National	6.4		DBST	Fair	13 North	2	2	0.0	12.8	12.8	12.8	0	549	1280	320	10,971	32,000	42,971								
2-3 Luang Phabang Rd. (a)	National	3.8		Asphalt	Good	Route No 1	4	4	0.0	0.0	15.2	15.2	0	0	1520	380	-	38,000	38,000								
2-4 Luang Phabang Rd. (b)	National	1.0		Asphalt	Good	Route 1, One way	2	3	0.0	0.0	2.0	3.0	0	0	200	75	-	5,500	5,500								
2-5 Sathathirath Rd	National	2.0		Asphalt	Good	Route 1, One way	2	3	0.0	0.0	4.0	6.0	0	0	400	150	-	11,000	11,000								
2-6 Samsenthai Rd. (a)	Urban	2.1		Asphalt	Good	Route 1, One way	2	3	0.0	0.0	4.2	6.3	0	0	420	158	-	11,550	11,550								
2-7 Samsenthai Rd. (b)	Urban	1.0		Asphalt	Good	Route 1, One way	2	2	0.0	0.0	2.0	2.0	0	0	200	50	-	5,000	5,000								
2-8 Thadeua Rd. (a)	National	5.4		Asphalt	Good	Route 1	2	2	0.0	0.0	10.8	10.8	0	0	1080	270	-	27,000	27,000								
2-9 Thadeua Rd. (b)	National	12.4		Asphalt	Good	Route 1	2	2	0.0	0.0	24.8	24.8	0	0	2480	620	-	62,000	62,000								
2-10 Thadeua Rd. (c)	National	0.9		Asphalt	Good	Route 1	2	2	0.0	1.8	1.8	1.8	0	77	180	45	1,543	4,500	6,043								
2-11 Thadeua Rd. (d)	Provincial	0.5		DBST	very bad	code 124			0.0	0.0	0.0	0.0	0	0	0	0	-	-	-								
3-1 N11 Rd. (a)	National	3.5		DBST	Fair	Code 11	2	2	0.0	7.0	7.0	7.0	0	300	700	0	6,000	14,000	20,000								
3-2 N11 Rd. (b)	National	0.0		Gravel	Fair	Code 11			0.0	0.0	0.0	0.0	0	0	0	0	-	-	-								
3-3 Ban Nong Teng - Ban Mai	Provincial	0.5		DBST	Fair	Code 106	1	2	0.0	0.5	1.0	1.0	0	21	100	0	429	2,000	2,429								
3-4 Jct. 13N (B.Thongpong) - B.Nonkeo - N11 Rd.	Urban	4.1		DBST	Bad		1		0.0	4.1	0.0	0.0	0	176	0	0	3,514	-	3,514								

Road Section	Road Class	Length (km)	Cross Section	Surface Type	Condition	Remarks	Types of Line Marking						Length of Line Marking (m)						Area of Marking only(m2)						Cost of marking		
							Yellow			White			Yellow		White		Yellow		White		Yellow		White		Yellow	White	Total
							S	B	S	B	S	B	Solid	Broken	Solid	Broken	Solid	Broken	Solid	Broken	Solid	Broken					
4-1	Provincial	11.7		DBST	Fair	code 107	2	2	2	2	2	2	0.0	23.4	23.4	0	1003	2340	585	20,057	58,500	78,557					
4-2	Urban	7.4		DBST	Good		2	2	2	2	2	0.0	14.8	14.8	0	634	1480	370	12,686	37,000	49,686						
4-3	Urban	3.2		DBST	Good		2	2	2	2	2	0.0	6.4	6.4	0	274	640	160	5,486	16,000	21,486						
4-4	Urban	3.0		DBST	Good		2	2	2	2	2	0.0	6.0	6.0	0	257	600	150	5,143	15,000	20,143						
5-1	Urban	1.4		Asphalt	Good		2	2	2	2	2	0.0	2.8	2.8	0	120	280	70	2,400	7,000	9,400						
5-2	Urban	3.5		Asphalt	Good		2	2	2	2	2	0.0	7.0	7.0	0	300	700	175	6,000	17,500	23,500						
5-3	Urban	6.0		Asphalt	Good		2	2	2	2	2	0.0	12.0	12.0	0	514	1200	300	10,286	30,000	40,286						
6-1	Urban	0.1		Asphalt	Good		2	2	4	4	4	0.2	0.0	0.2	0.4	20	0	20	10	400	600	1,000					
6-2	Urban	0.2		Asphalt	Good	Oneway		2	1	1	1	0.0	0.0	0.4	0.2	0	0	40	5	-	900	900					
6-3	Urban	0.5		Asphalt	Good		4	4	4	4	4	0.0	2.0	2.0	0	0	0	200	50	-	5,000	5,000					
6-4	Urban	1.0		Asphalt	Good		2	2	2	2	2	0.0	2.0	2.0	0	86	200	50	1,714	5,000	6,714						
6-5	Urban	1.7		Asphalt	Good		2	2	2	2	2	0.0	3.4	3.4	0	146	340	85	2,914	8,500	11,414						
6-6	Urban	0.9		Asphalt	Good		2	2	2	2	2	0.0	1.8	1.8	0	77	180	45	1,543	4,500	6,043						
7-1	Urban	3.0		Asphalt	Good		1	2	1	1	1	0.0	3.0	3.0	0	129	600	75	2,571	13,500	16,071						
7-2	Urban	0.3		Asphalt	Good		2	2	2	2	2	0.0	0.6	0.6	0	26	60	15	514	1,500	2,014						
7-3	Urban	0.5		Asphalt	Good		2	2	2	2	2	0.0	1.0	1.0	0	43	100	25	857	2,500	3,357						
7-4	Urban	0.8		Asphalt	Good		2	2	2	2	2	0.0	1.6	1.6	0	69	160	40	1,371	4,000	5,371						
7-5	Urban	0.3		Asphalt	Good		2	2	2	2	2	0.0	0.6	0.6	0	26	60	15	514	1,500	2,014						
7-6	Urban	0.2		Asphalt	Good		2	2	2	2	2	0.0	0.4	0.4	0	17	40	10	343	1,000	1,343						
7-7	Urban	1.1		Asphalt	Good		2	2	2	2	2	0.0	2.2	2.2	0	94	220	55	1,886	5,500	7,386						
7-8	Urban	1.8		Asphalt	Good		2	2	2	2	2	0.0	3.6	3.6	0	154	360	90	3,086	9,000	12,086						
7-9	Urban	0.4		Asphalt	Good		2	2	2	2	2	0.0	0.8	0.8	0	34	80	0	686	1,600	2,286						
7-10	Urban	0.5		Asphalt	Good		2	2	2	2	2	0.0	1.0	1.0	0	43	100	25	857	2,500	3,357						

Road Section	Road Class	Length (km)	Cross Section	Surface Type	Condition	Remarks	Types of Line Marking						Length of Line Marking (m)						Area of Marking only(m2)				Cost of marking		
							Yellow			White			Yellow		White		Yellow		White		Broken	White	Total		
							S	B	S	B	S	B	Solid	Broken	Solid	Broken	Solid	Broken	Solid	Broken					
7-11	Urban	1.4		Asphalt	Good		2	2	2	2	2	2	0	0	0	120	280	70	2,400	7,000	9,400				
7-12	Urban	0.3		DBST	Good		2	2	2	2	2	0	0	0	26	60	0	514	1,200	1,714					
8-1	Urban	0.6		DBST	Good		2	2	2	2	2	1.2	0.0	1.2	0	120	30	2,400	3,000	5,400					
8-2	Urban	0.5		DBST	Good		2	2	2	2	2	1.0	0.0	1.0	100	100	25	2,000	2,500	4,500					
8-3	Urban	1.0		DBST	Bad		1					0.0	1.0	0.0	0	43	0	857	-	857					
8-4	Urban	0.9		DBST	Fair		1					0.0	0.9	0.0	0	39	0	771	-	771					
8-5	Urban	0.2		DBST	Bad		1	2	2	2	2	0.0	0.2	0.4	0	9	40	171	1,000	1,171					
8-6	Urban	1.6		DBST	Bad		1	2	2	2	2	0.0	1.6	3.2	0.0	69	320	0	1,371	6,400	7,771				
8-7	Urban	4.7		DBST	Fair		1	2	2	2	2	0.0	4.7	9.4	0.0	201	940	0	4,029	18,800	22,829				
8-8	Urban	2.3		DBST	Good		2	2	2	2	2	0.0	4.6	4.6	4.6	0	197	460	115	3,943	11,500	15,443			
9-1	Urban	2.0		DBST	Good		2	2	2	2	2	4.0	0.0	4.0	0	400	0	100	8,000	10,000	18,000				
9-2	Urban	0.6		DBST	Good		2	2	2	2	2	0.0	1.2	1.2	0	51	120	30	1,029	3,000	4,029				
9-3	Urban	2.2		DBST	Fair		1	2	2	2	2	0.0	2.2	4.4	0.0	94	440	0	1,886	8,800	10,686				
9-4	Urban	1.5		DBST	Fair		1	2	2	2	2	0.0	1.5	3.0	0.0	64	300	0	1,266	6,000	7,266				
9-5	Urban	3.1		DBST	Fair		1	2	2	2	2	0.0	3.1	6.2	0.0	133	620	0	2,657	12,400	15,057				
10-1	Urban	1.4		Asphalt	Good		2	2	2	2	2	0.0	2.8	2.8	2.8	0	120	280	70	2,400	7,000	9,400			
10-2	Urban	1.0		Asphalt	Good		2	2	2	2	2	0.0	2.0	2.0	2.0	0	86	200	50	1,714	5,000	6,714			
10-3	Urban	1.6		Asphalt	Good		2	2	2	2	2	0.0	3.2	3.2	3.2	0	137	320	80	2,743	8,000	10,743			
10-4	Urban	2.1		Asphalt	Good		2	2	2	2	2	0.0	4.2	4.2	4.2	0	180	420	105	3,600	10,500	14,100			
10-5	Urban	1.9		Concrete	Good		2	2	2	2	2	3.8	0.0	3.8	3.8	380	0	95	7,600	9,500	17,100				
10-6	Urban	0.5		Concrete	Good		2	2	2	2	2	1.0	0.0	1.0	1.0	100	0	25	2,000	2,500	4,500				
10-7	Urban	0.9		Concrete	Good		2	2	2	2	2	0.0	1.8	1.8	1.8	0	77	180	45	1,543	4,500	6,043			
10-8	Urban	0.6		DBST	Good		2	2	2	2	2	0.0	1.2	1.2	1.2	0	51	120	30	1,029	3,000	4,029			

Road Section	Road Class	Length (km)	Cross Section	Surface Type	Condition	Remarks	Types of Line Marking						Length of Line Marking (m)						Area of Marking only(m2)						Cost of marking		
							Yellow			White			Yellow		White		Yellow		White		Yellow		White		Yellow	White	Total
							S	B	S	B	S	B	Solid	Broken	Solid	Broken	Solid	Broken	Solid	Broken	Solid	Broken					
10-9 Phompapao Rd.	Urban	1.3		DBST	Fair		2	2	2	2	0	0	0	0	0	0	0	0	0	0	111	0	65	2,229	1,300	3,529	
11-1 Jct.13S Km 6 - B.Xiangda - B.Dongphosi <sup>(a)</sup>	Provincial	4.4		DBST	Fair	Code 109	1				0.0	4.4	0.0	0.0	0	189	0	0	0	0	189	0	0	3,771	-	3,771	
11-2 Jct.13S Km 6 - B.Xiangda - B.Dongphosi <sup>(b)</sup>	Provincial	5.6		DBST	Good	Code 109	1				0.0	5.6	0.0	0.0	0	240	0	0	0	0	240	0	0	4,800	-	4,800	
11-3 Jct.13S Km 6 - B.Xiangda - B.Dongphosi <sup>(c)</sup>	Provincial	0.0		Gravel 8.6km	very bad	Code 109					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	
11-4 B.Nonkho - B.Nakhouay	Urban	3.2		DBST	Fair		1	2			0.0	3.2	0.0	6.4	0	137	0	160	0	160	137	0	160	2,743	3,200	5,943	
11-5 B.Xiangda - B.Donbanxang - Thadeua Rd. (Nahai) <sup>(a)</sup>	District	3.6		DBST	Good	Code 152	1				0.0	3.6	0.0	0.0	0	154	0	0	0	0	154	0	0	3,086	-	3,086	
11-6 B.Xiangda - B.Donbanxang - Thadeua Rd. (Nahai) <sup>(b)</sup>	District	0.0		Gravel 3.4km	very bad	Code 152					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	
11-7 Blvd. Kamphengmeuang - 3 Jct. Code 152	Urban	1.5		DBST	Fair		1				0.0	1.5	0.0	0.0	0	64	0	0	0	0	64	0	0	1,286	-	1,286	
12-1 Jct. SaNamMar - Jct. B.Mai <sup>(a)</sup>	District	2.2		DBST	Fair	Code 155	1				0.0	2.2	0.0	0.0	0	94	0	0	0	0	94	0	0	1,886	-	1,886	
12-2 Jct. SaNamMar - Jct. B.Mai <sup>(b)</sup>	District	0.0		Gravel 6.2km	Bad	Code 155					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	
12-3 13S Km21 - B.KhokSaAdd - B.Nakhouay	District	0.0		Gravel 15.5km	Bad	Code 108					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	
12-4 B.Dongkang - B.XokGnai	District	0.0		Gravel 4.1km	Bad	Code 148					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	
13-1 B.SaLakham - B.SaVang	District	0.0		Gravel 4.8km	very bad	Code 187					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	
13-2 Jct. Ji Nie Mo - B.Thakhek - B.Nahai <sup>(a)</sup>	District	0.0		DBST 18.1km	Bad	Code 123					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	
13-3 Jct. Ji Nie Mo - B.Thakhek - B.Nahai <sup>(b)</sup>	District	0.0		Gravel 4.4km	very bad	Code 123					0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	

Total Length= 171.8 Km

20.2 208.9 309.0 295.3 2,020 8,953 30,900 7,383 38,283 \$219,457 \$765,650 \$985,107

10,973

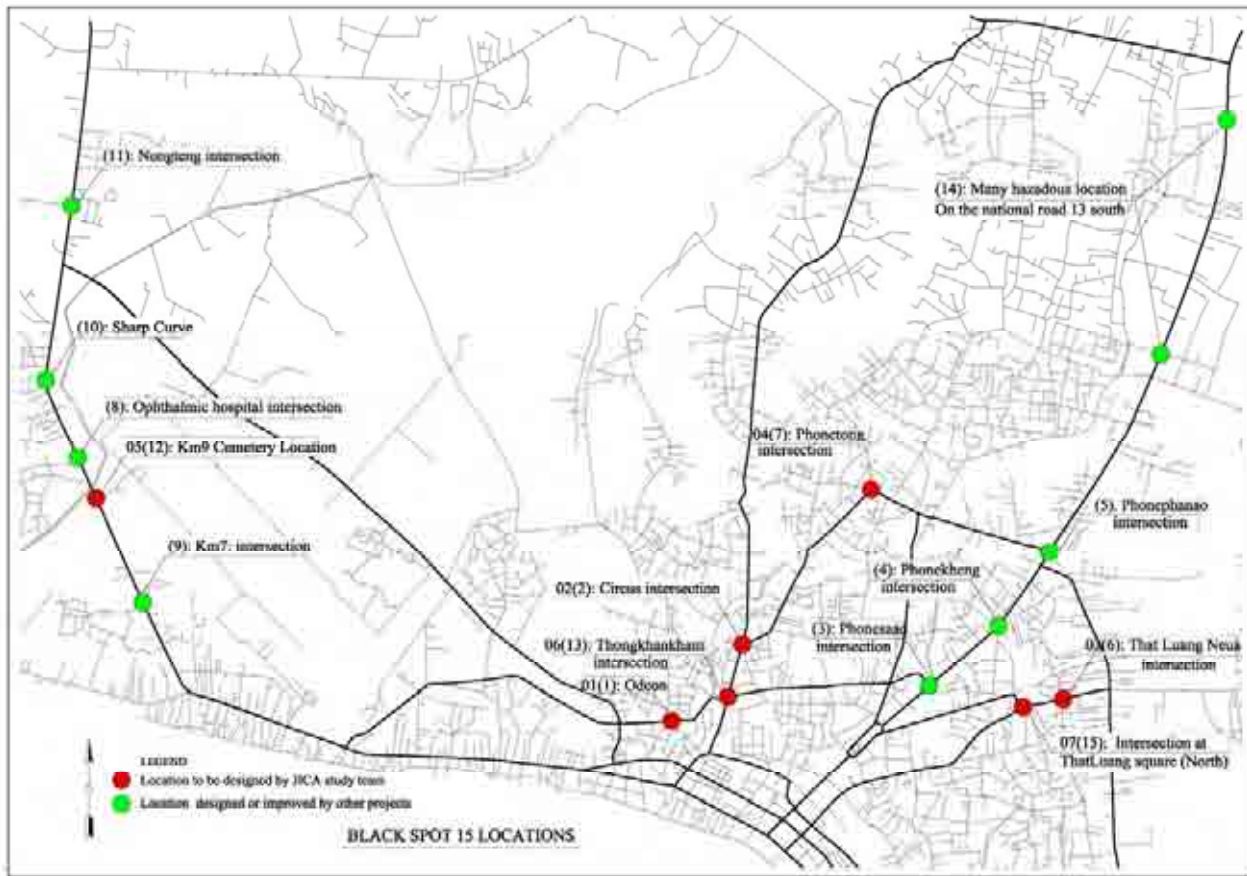
Unit cost of yellow marking = \$ 20 m2  
Unit cost of white marking = \$ 20 m2

Average Cost / km = \$5,734

Yellow solid line  
Yellow broken line  
White solid line  
White broken line

500 meter section on terminal of road where pavement marking will be installed.  
Pavement marking can not be installed on this section because of poor pavement surface

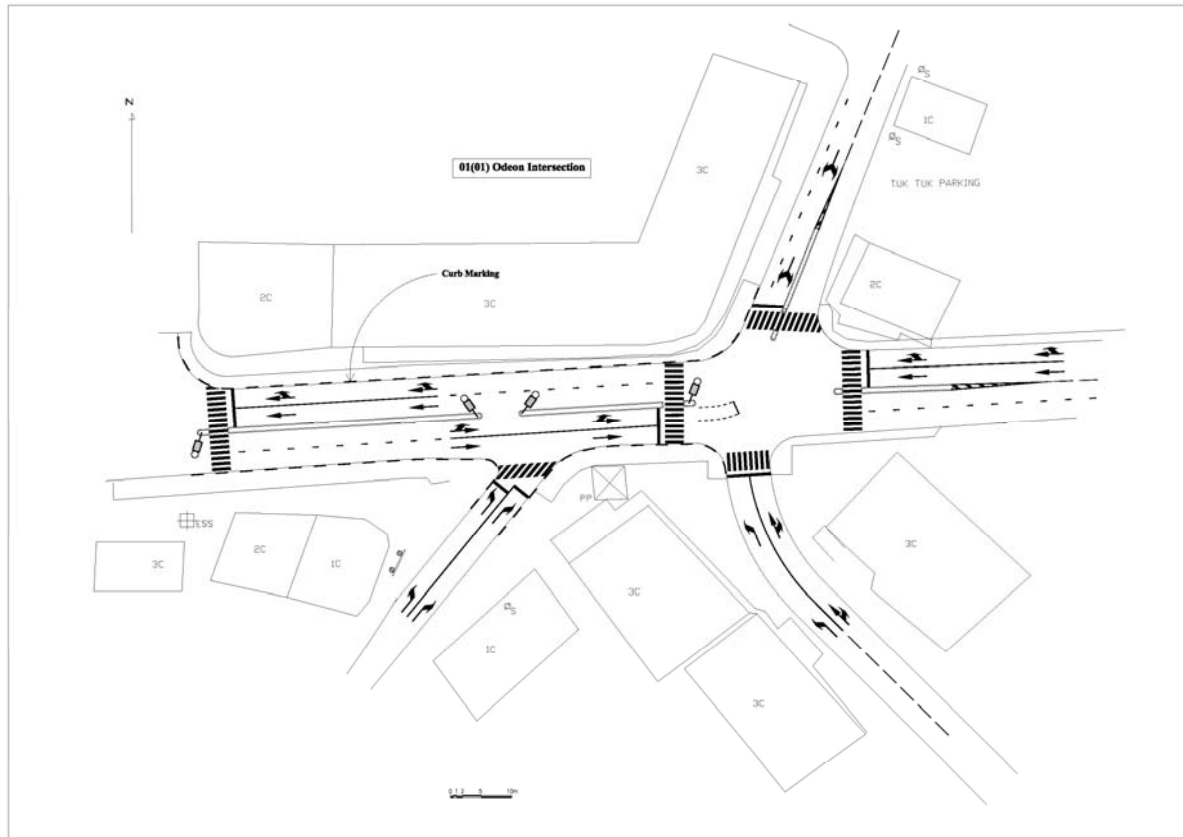
**Improvement Design of Intersections**



Locations of Designed Intersections

	Target Location	Accidents Record maintained by traffic police	Special Features
1	ODEON Intersection (T2)	168 A's/yr	-
2	Circus Intersection	3-4 A's/wk	Collusion of left turning vehicle with through traffic vehicle
3	That Luang Neua Intersection	2-3 A's/wk	Collusion of left turning vehicle with through traffic vehicle
4	Phontong Intersection	2 A's/wk	-
5	KM9 cemetery location	3 F's/yr	Head-on collusion of vehicles in opposite directions, Sideswipe collusion of vehicles in same direction
6	Thonghankham Intersection	28 A's/7 M's	Ignoring traffic signal
7	Intersections at That Luang square (& east Intersection)		Collusion of left turning vehicle with through traffic vehicle

**No1 ODEN Intersection**



**1. ODEN Intersection**

- a 5 legged intersection with traffic signal control

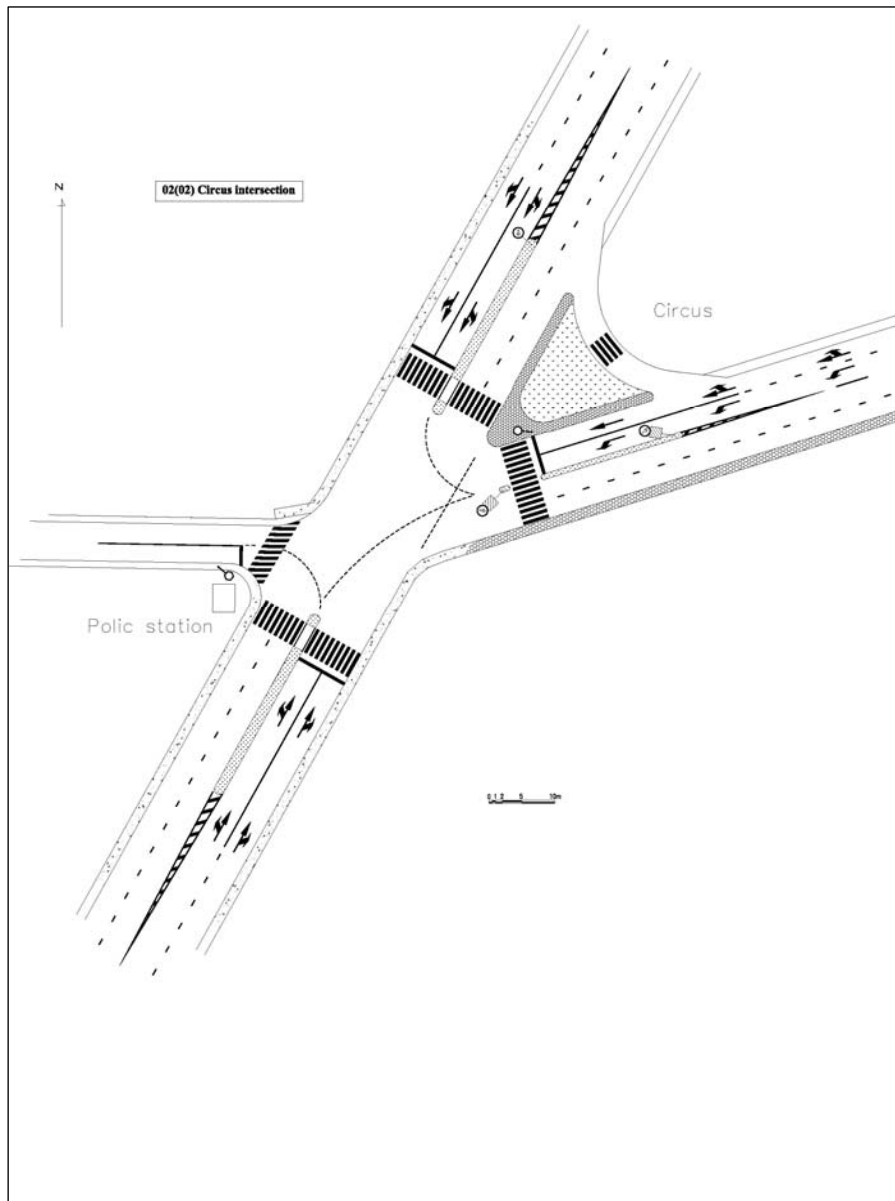
Present conditions and Problems	Countermeasures
<ul style="list-style-type: none"> <li>● Rough road surfaces</li> <li>● Disorderly traffic flow</li> <li>● Huge traffic conflict area</li> <li>● Indiscernible pavement markings</li> <li>● Illegal parking at intersection</li> </ul>	<ul style="list-style-type: none"> <li>● Surface pavement improvement</li> <li>● Install road median</li> <li>● Install new pavement markings</li> <li>● Install parking prohibition markings (red broken line marking on curb stone)</li> </ul>

Alternative:  
If traffic congestion at this intersection occurs in the near future, a possible countermeasure would be to prohibit left turning movement from the minor road at the western location of this intersection.





## No2 Circus Intersection



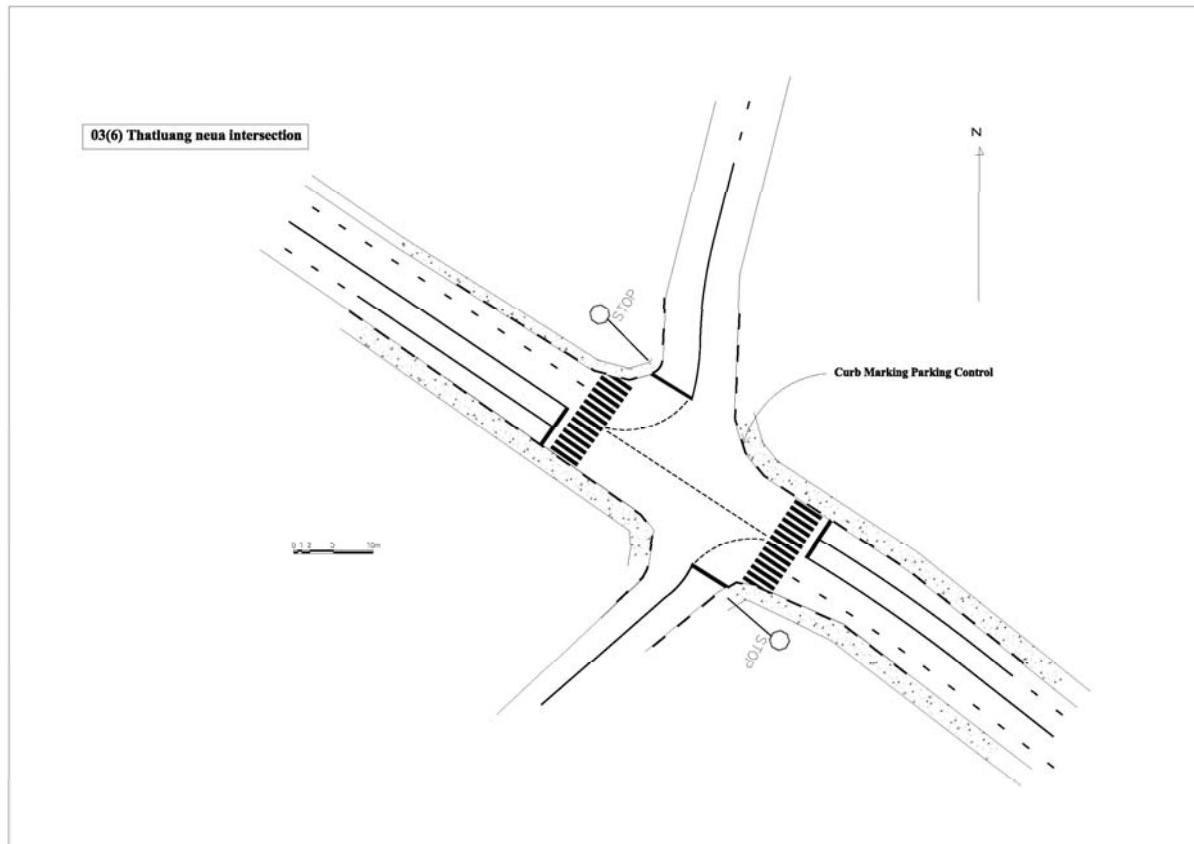
### 2. Circus Intersection

- an irregular cross intersection

Present Conditions and Problems	Countermeasures
<ul style="list-style-type: none"> <li>● Congestion occurs during peak hours especially on the east side of Savang Rd</li> <li>● Many disorderly driving behavior within the intersection</li> <li>● Poor pavement markings</li> <li>● Absent of pedestrian crossing facilities</li> </ul>	<ul style="list-style-type: none"> <li>● Install an exclusive right turn lane at the north-eastern corner of the intersection to facilitate traffic coming from the east of Savang Rd but turning to the north of Dong Palep Rd</li> <li>● Install center divider on the minor road east of Savang Rd.</li> <li>● Install traffic turning guide lines within the intersection for traffic coming from the east along Savang Rd</li> <li>● Install appropriate pavement markings on all minor roads</li> <li>● Install pedestrian crossing facilities.</li> </ul>
<p>Note: Signalization of this intersection is necessary and it is currently being considered by VUDAA</p>	



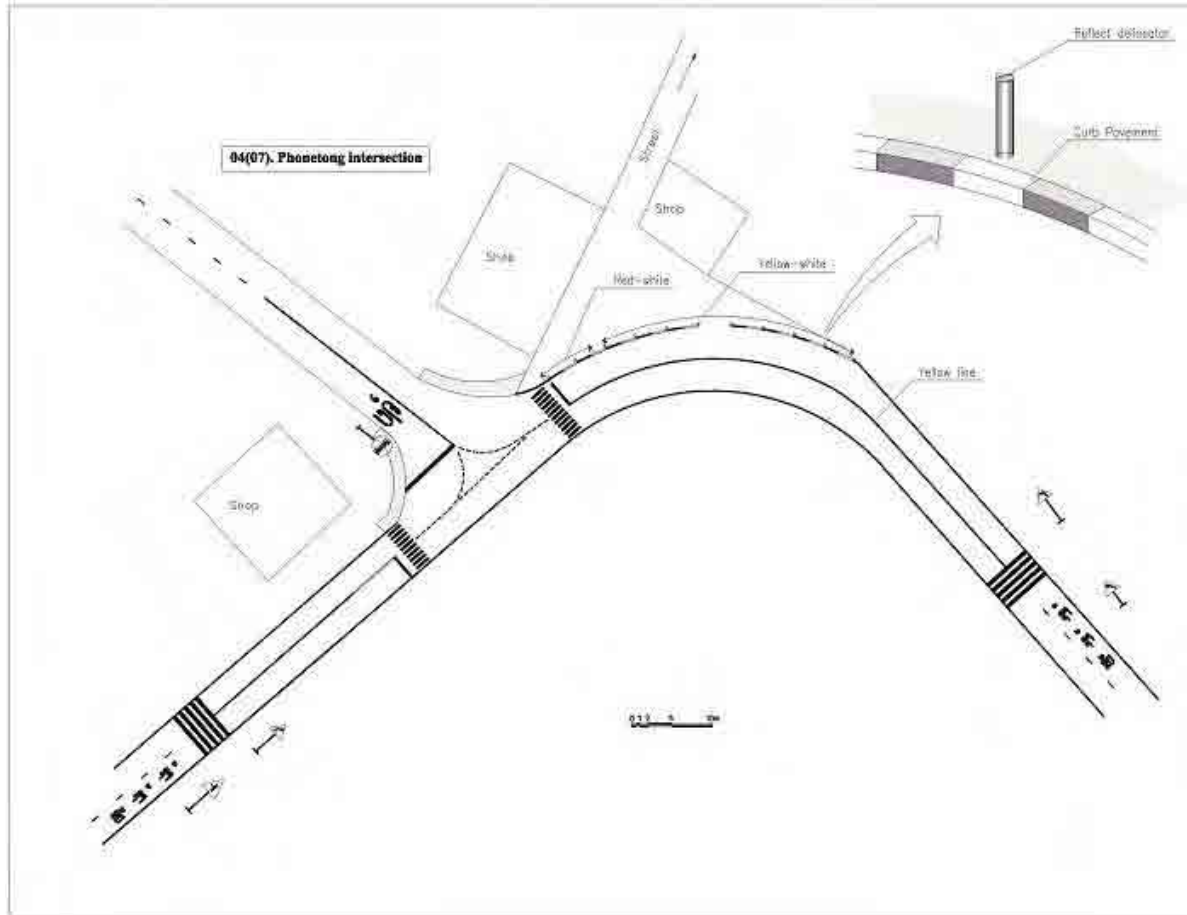
### No3 That Luang Neua Intersection



3. That Luang Neua Intersection - a regular cross intersection	
Present conditions and Problems	Countermeasures
<ul style="list-style-type: none"> <li>● Drivers traveling on the major roads have difficulty in recognizing the intersection</li> <li>● Many parked vehicles near the intersection, further obscuring the intersection</li> <li>● No center line or lane markings</li> <li>● No pedestrian crossing facility</li> </ul>	<ul style="list-style-type: none"> <li>● Emphasize the presence of this intersection by installing pedestrian crossing facilities as well as stop lines</li> <li>● Parking prohibition marking on curb stones (red and white painting)</li> <li>● Install appropriate pavement markings</li> <li>● Install stop signs at the entry legs along minor roads.</li> <li>● Install pedestrian crossing markings</li> </ul>
<p>Note: Road surface pavement along the minor roads is necessary.</p>	



## No4 Phantong Intersection



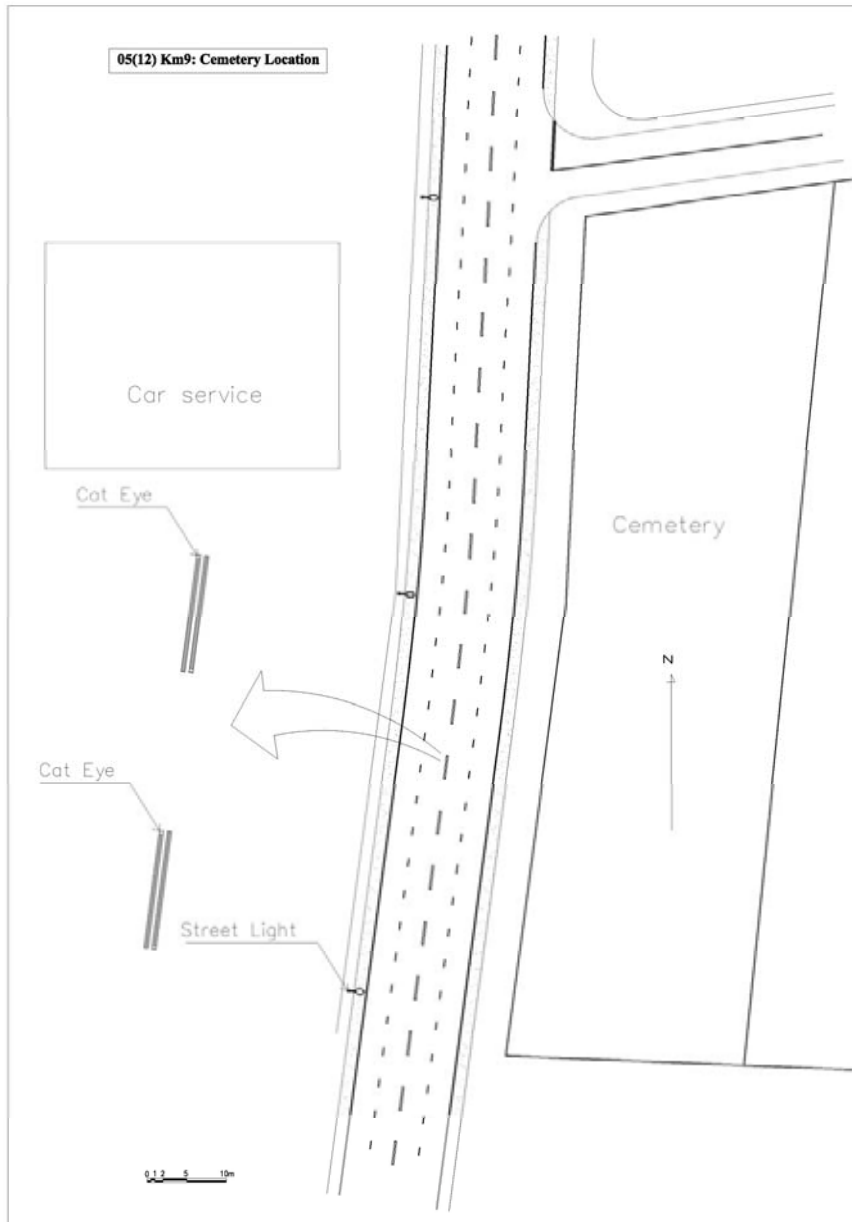
### 4. Phantong Intersection

- Intersection formed by an minor road adjoining at the near 90° curved section of Phantong road

Present conditions and Problems	Countermeasures
<ul style="list-style-type: none"> <li>● The curved section of Phantong road and the intersection are difficult to discern,</li> <li>● There is no clear demarcation on the edge of the curved road section. There is no safe channelization facility for traffic entering the intersection.</li> <li>● Traffic speed along this road section is general high.</li> <li>● Unclear center line marking along this road section</li> <li>● Drivers on the major road have difficulty in recognizing the presence of the intersection</li> <li>● Very bad driving behavior at this intersection, many vehicles even travel on the opposing roadway.</li> <li>● No pedestrian crossing facility</li> </ul>	<ul style="list-style-type: none"> <li>● Install warning sign to warn drivers of curved road section ahead.</li> <li>● Install warning sign to warn drivers the presence of intersection ahead</li> <li>● Install curbside stones along the curved road section and install parking prohibition painting (yellow and white) on these curbstones.</li> <li>● Install guardrail or low poles (including delineators) to guide the traffic in maneuver the curved section,</li> <li>● Install markings to slow down traffic:               <ol style="list-style-type: none"> <li>1) Install Rumble Strip Lines</li> <li>2) Install word marking "Slow Down"</li> </ol> </li> <li>● Install solid yellow center line marking</li> <li>● Install Cats Eye device along the center line</li> <li>● Enhance visibility and recognition of intersection by installing stop lines and pedestrian crossing markings</li> <li>● Install appropriate pavement markings on all minor road</li> <li>● Install pedestrian crossing markings</li> </ul>



## No5 KM9 Cemetery Location



### 5. KM9 Cemetery Location

- a straight road section facing a cemetery

#### Present conditions and Problems

- Unclear road edges
- Center line marking exists but it is not clearly visible
- No lane marking
- No street lighting rendering the area dark at night.

#### Countermeasures

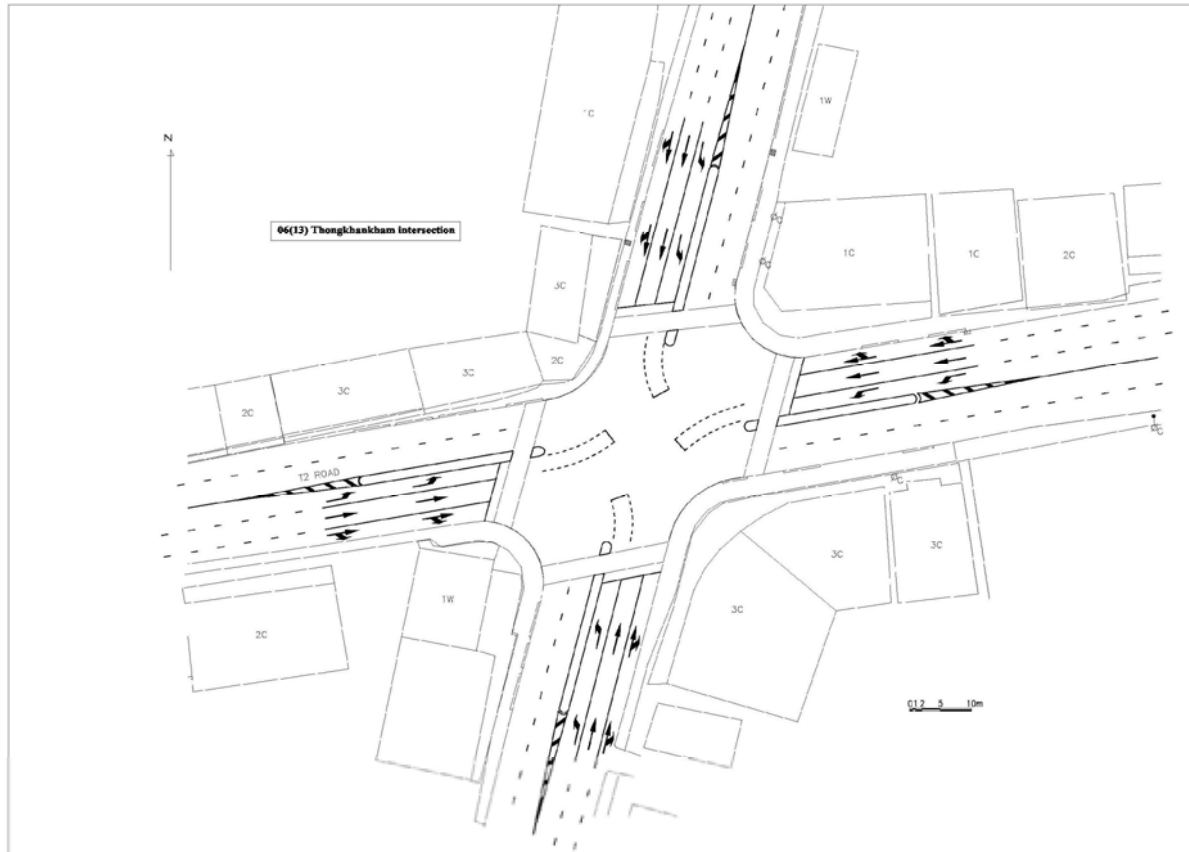
- Install yellow double broken centerline marking
- Install cats eye device at the terminus of broken line marking
- Install lane markings
- Improve road shoulder and install the road edge line marking
- Erect street lightings.

#### Alternative:

If traffic accident reduction is still insignificant after the above improvement measures, then consider the implementation of prohibiting overtaking along this road section.



## No6 Thongkhankham Intersection



### 6. Thongkhankham Intersection

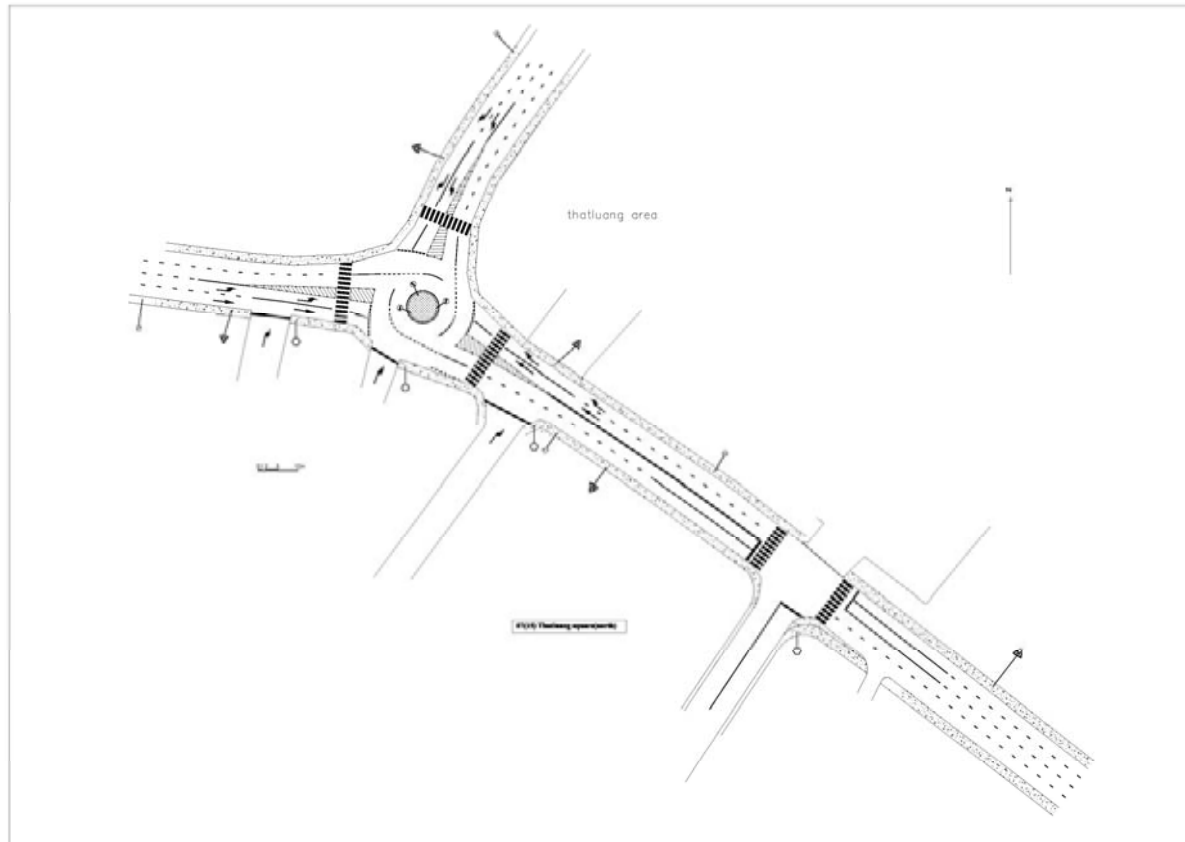
- a cross intersection of two major roads with signal control

Present conditions and Problems	Countermeasures
<ul style="list-style-type: none"> <li>● Road surface pavement is relatively good, but several potholes still exist</li> <li>● Traffic congestion occurs during peak hours</li> <li>● All movements as well as left turn traffic are very disorderly</li> <li>● Poor pavement markings as they are not clearly visible</li> <li>● Signal lanterns are installed on arm-poles, rendering them too small to the drivers and thus difficult to see</li> </ul>	<ul style="list-style-type: none"> <li>● Repair the surface pavement</li> <li>● Install guide line markings within the intersection for left turn vehicles at all entry legs to the intersection</li> <li>● Improve the maintenance of pavement markings</li> </ul>
<p>Note: Consider replacing the signal lanterns on the arm poles with bigger sizes, such as 30cm diameter lanterns.</p>	





**No7 Intersections at That Luang square (& east Intersection)**



**7 Intersections at That Luang square (& east Intersection)**

- A roundabout intersection together with a junction at 100m from the roundabout

Present conditions and Problems	Countermeasures
<p><u>Roundabout</u></p> <ul style="list-style-type: none"> <li>● Disorderly traffic movements within the roundabout</li> <li>● Traffic with no rights of way but entering the intersection without giving way to those with right-of-way.</li> <li>● Many vehicles are observed to travel on top of safety islands (demarcated only by marking)</li> <li>● Pavement markings are not clearly visible</li> <li>● Difficulty in crossing the road by pedestrians</li> </ul> <p><u>In between the Intersections</u></p> <ul style="list-style-type: none"> <li>● Many vehicles are observed to change lane or travel on the opposing roadway</li> <li>● Parked vehicles near the intersection.</li> </ul> <p><u>At the Intersection</u></p> <ul style="list-style-type: none"> <li>● Difficult to recognize the presence of this intersection</li> <li>● Difficulty in crossing the street by pedestrians.</li> </ul>	<ul style="list-style-type: none"> <li>● Install proper pavement markings within the roundabout to guide the movement of traffic streams</li> <li>● Correct the location of safety islands (markings)</li> <li>● Install appropriate pavement markings on each minor roads entering the roundabout</li> <li>● Install pedestrian crossing facilities</li> <li>● Install double solid yellow center line to prohibit overtaking of vehicles</li> <li>● Install Cats Eye Device on the solid line</li> <li>● Install lane markings</li> <li>● Prohibit parking along this section of the road by erecting parking prohibition signs or painting of curbstone with yellow and white to that effect.</li> <li>● Install stop lines and pedestrian crossing facility</li> <li>● Install stop line, center line and stop sign on the minor road</li> </ul>



**Cost Estimate for each Location**

No.1. ODEN Intersection

Item	Unit	Qty	Rate\$	Amount\$
<b>Road Surface</b>				
Curb Stone	m	0	10	0
Center divider	m		38	0
Area improvement	m2	548	33	17,859
<b>Sign</b>				
double sign	No		281	0
single sign	No		220	0
<b>Marking</b>				
Pedestrian Cross	m2	83.40	20	1,687
Stop line	m2	12.90	20	261
Center line (Solid)	m2	15.00	20	303
Center line (broken)	m2	6.86	20	139
Cross hatching	m2	21.00	20	425
Lane Line(Solid)	m2	0.00	20	0
Lane Line(Broken)	m2	0.00	20	0
Arrow( 1Arrow)	m2	72.68	22	1,564
Arrow( 2Arrow)	m2	100.61	22	2,165
guide line	m2	0.00	20	0
Give way	m2	0.00	20	0
Rumble Strip	m2	0.00	20	0
Letter marking	m2	0.00	22	0
Painting on curb stor	m	163.50	4	654
<b>Others</b>				
Cat eye device	set		15	0
Street light	set		3,500	0
Except Pavement Improvement				7,199
Total				25,057

No.2 Circus Intersection

Item	Unit	Qty	Rate\$	Amount\$
<b>Road Surface</b>				
Curb Stone	m	4	10	41
Center divider	m	7	38	264
Area improvement	m2	716	33	23,317
<b>Sign</b>				
double sign	No		0	0
single sign	No	2	281	561
	No	1	220	220
<b>Marking</b>				
Pedestrian Cross	m2	64.80	20	1,311
Stop line	m2	9.00	20	182
Center line (Solid)	m2	3.00	20	61
Center line (broken)	m2	6.86	20	139
Cross hatching	m2	105.00	20	2,124
Lane Line	m2	9.00	20	182
Lane Line	m2	3.00	20	61
Arrow( 1Arrow)	m2	18.17	22	391
Arrow( 2Arrow)	m2	90.55	22	1,949
guide line	m2	0.00	20	0
Give way	m2	0.00	20	0
Rumble Strip	m2	20.25	20	410
Letter marking	m2		22	0
Painting on curb stor	m	0.00	4	0
<b>Others</b>				
Cat eye device	set		15	0
Street light	set		3,500	0
Except Pavement Improvement				7,895
Total				31,212

No.3 That Luang Neua Intersection

Item	Unit	Qty	Rate\$	Amount\$
<b>Road Surface</b>				
Curb Stone	m		10	0
Center divider	m		38	0
Area improvement	m2	973	33	31,693
<b>Sign</b>				
double sign	No		0	0
single sign	No	2	220	440
<b>Marking</b>				
Pedestrian Cross	m2	26.88	20	544
Stop line	m2	6.48	20	131
Center line (Solid)	m2	64.00	20	1,295
Center line (broken)	m2	0.00	20	0
Cross hatching	m2	0.00	20	0
Lane Line(Solid)	m2	4.80	20	97
Lane Line(Broken)	m2	1.60	20	32
Arrow( 1Arrow)	m2	2.42	22	52
Arrow( 2Arrow)	m2	0.00	22	0
guide line	m2	1.08	20	22
Give way	m2	0.00	20	0
Rumble Strip	m2	0.00	20	0
Letter marking	m2	0.00	22	0
Painting on curb stor	m	154.40	4	618
<b>Others</b>				
Cat eye device	set		15	0
Street light	set		3,500	0
Except Pavement Improvement				3,231
Total				34,924

No.4 Phantong Intersection

Item	Unit	Qty	Rate\$	Amount\$
<b>Road Surface</b>				
Curb Stone	m	10	10	102
Center divider	m		38	0
Area improvement	m2	365	33	11,899
<b>Sign</b>				
double sign	No		0	0
single sign	No	5	220	1,101
<b>Marking</b>				
Pedestrian Cross	m2	14.40	20	291
Stop line	m2	4.56	20	92
Center line (Solid)	m2	12.60	20	255
Center line (broken)	m2	2.57	20	52
Cross hatching	m2	0.00	20	0
Lane Line	m2	0.00	20	0
Lane Line	m2	0.00	20	0
Arrow( 1Arrow)	m2	0.00	22	0
Arrow( 2Arrow)	m2	0.00	22	0
guide line	m2	1.28	20	26
Give way	m2	0.00	20	0
Rumble Strip	m2	7.20	20	146
Letter marking	m2	19.38	22	417
Painting on curb stor	m	40.00	4	160
<b>Others</b>				
Cat eye device	set	0	15	0
Street light	set	3	3,500	10,499
Shout pole	set	11	30	330
Delineator	set	22	25	550
Except Pavement Improvement				14,022
Total				25,920

No.5 KM9 Cemetery Location

Item	Unit	Qty	Rate\$	Amount\$
<b>Road Surface</b>				
Curb Stone	m	0	10	0
Center divider	m		0	0
Area improvement	m2	3600	33	117,320
<b>Sign</b>				
double sign	No	0	281	0
single sign	No	0	220	0
<b>Marking</b>				
Pedestrian Cross	m2	0.00	20	0
Stop line	m2	0.00	20	0
Center line (Solid)	m2	0.00	20	0
Center line (broken)	m2	25.71	20	520
Cross hatching	m2	0.00	20	0
Lane Line(Solid)	m2	60.00	20	1,214
Lane Line(Broken)	m2	15.00	20	303
Arrow( 1Arrow)	m2	0.00	22	0
Arrow( 2Arrow)	m2	0.00	22	0
guide line	m2	0.00	20	0
Give way	m2	0.00	20	0
Rumble Strip	m2	0.00	20	0
Letter marking	m2	0.00	22	0
Painting on curb stor	m	0.00	4	0
<b>Others</b>				
Cat eye device	set	58	15	870
Street light	set	7	3,500	24,498
Except Pavement Improvement				27,406
Total				144,726

No.6 Thongkhankham Intersection

Item	Unit	Qty	Rate\$	Amount\$
<b>Road Surface</b>				
Curb Stone	m		10	0
Center divider	m	7	0	0
Area improvement	m2	5412	33	176,364
<b>Sign</b>				
double sign	No		0	0
single sign	No		281	0
	No		220	0
<b>Marking</b>				
Pedestrian Cross	m2	96.00	20	1,942
Stop line	m2	15.90	20	322
Center line (Solid)	m2	0.00	20	0
Center line (broken)	m2	0.00	20	0
Cross hatching	m2	28.00	20	566
Lane Line(Solid)	m2	24.00	20	486
Lane Line(Broken)	m2	4.00	20	81
Arrow( 1Arrow)	m2	0.00	22	0
Arrow( 2Arrow)	m2	0.00	22	0
guide line	m2	4.50	20	91
Give way	m2	0.00	20	0
Rumble Strip	m2	0.00	20	0
Letter marking	m2	0.00	22	0
Painting on curb stor	m	0.00	4	0
<b>Others</b>				
Cat eye device	set		15	0
Street light	set		3,500	0
Except Pavement Improvement				3,488
Total				179,851

No.7 Intersections around That Lung Square

Item	Unit	Qty	Rate\$	Amount\$
<b>Road Surface</b>				
Curb Stone	m	0	10	0
Center divider	m		0	0
Area improvement	m2	4899	33	159,666
<b>Sign</b>				
double sign	No	0	281	0
single sign	No	7	220	1,541
<b>Marking</b>				
Pedestrian Cross	m2	65.70	20	1,329
Stop line	m2	14.40	20	291
Center line (Solid)	m2	22.13	20	448
Center line (broken)	m2	0.87	20	18
Cross hatching	m2	54.15	20	1,095
Lane Line(Solid)	m2	15.75	20	319
Lane Line(Broken)	m2	7.95	20	161
Arrow( 1Arrow)	m2	18.17	22	391
Arrow( 2Arrow)	m2	0.00	22	0
guide line	m2	2.10	20	42
Give way	m2	4.50	20	91
Rumble Strip	m2	0.00	20	0
Letter marking	m2	0.00	22	0
Painting on curb stor	m	0.00	4	0
<b>Others</b>				
Cat eye device	set	192	15	2,880
Street light	set	0	3,500	0
Except Pavement Improvement				8,606
Total				168,272

## **APPENDIX 22**

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### **TRAFFIC MANAGEMENT PLAN**

22-1	The Details of Environmental Impacts of Master Plan	A22-1
22-2	General Contents and Format of the EIA Report under the Study of Master Plan on Comprehensive Urban Transport in Vientiane	A22-9
22-3-1	Programme of the First Stakeholder Meeting for The Study of Master Plan on Comprehensive Urban Transport in Vientiane	A22-11
22-3-2	List of Participants	A22-12
22-3-3	Minutes of Meeting of Stakeholder Meetings	A22-17
22-4	List of Local Officials with whom Urban transport and environmental issues were Discussed during the IEE Study	A22-23
22-5	List of Number of Households By Village and District	A22-24
22-6	Minutes of Discussion	A22-28



**The Details of Environmental Impacts of Master Plan**

**Environmental Impacts of Intersection Improvement works**

Code	Name of Intersection	scope of work	Impact on Social Environment		Impact on Natural Environment		Pollution	
			Level of Impact	Description	Level of Impact	Description	Level of Impact	Description
X1	Odeon (Road T2 and 3 streets)	Improvement	B	Traffic congestion during construction will occur. Smooth flow of traffic is expected upon completion		No significant impact on natural environment	B	Air and noise pollution will increase owing to increased traffic
X2	Circus intersection (Road P2 and Phontong road)	Improvement	B	Ditto		Ditto	B	Ditto
X5	Phonphanao intersection (National Road 13 south and road to Mitaphap hospital)	Improvement	A	Land acquisition and resettlement will involve		Ditto	B	Ditto
X6	That Luang Neua intersection (Thatluang road and Phonthan road)	Improvement	B	Temporary structure of houses and shops are subject to remove		Ditto	B	Ditto
X7	Phontong intersection (Phontong road and Mitaphap hospital road)	Improvement	B	Temporary structure of houses and shops are subject to remove		Ditto	B	Ditto
X13	Thonghankham intersection (intersection of Road T2 and Road P2)	Improvement	B	Traffic congestion during construction will occur. Smooth flow of traffic is expected upon completion		Ditto	B	Ditto
X15	Intersections at That Luang square (north) (Two junctions and one roundabout)	Improvement	B	Ditto	B	Small roundabout with greenery will be lost	B	Ditto

(Impacts) A: Serious impact is expected; B: Some impact is expected; C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.); No Mark: No impact is expected. IEE/EIA is not necessary.

**Environmental Impacts of Road Improvement (including widening) Works**

Road No.	Road Code	Road Section	Road Length (km)	Proposed Road Width (m)	scope of work	Impact on Social Environment		Impact on Natural Environment		Pollution	
						Level of Impact	Description	Level of Impact	Description	Level of Impact	Description
<b>Principal Arterial</b>											
1	Code 13N	Jct. Sikhay - 13N Km16	10.6	19.0	w, o, s	B	Traffic congestion during improvement of the road is expected	No significant adverse impact on natural environment	B	Air and noise pollution will increased owing to increased traffic	
2	Code 13N	Luang Phabang Rd.	1.6	27.5	o, L	B	Ditto	Ditto	B	Ditto	
3	Code A12	Thadeua Rd.	3.5	27.5	w, s	A	Several portions of the road require land acquisition and resettlement by road widening activities	Ditto	B	Ditto	
	Code A12	Thadeua Rd.	12.9	19.0	o, L	B	Traffic congestion during improvement of the road is expected	Ditto	B	Ditto	
5	Code 108	B.Nakhouay - B.Dong Kang	2.7	14.5	w, c	A	Several portions of the road require land acquisition and resettlement by road widening activities	Ditto	B	Ditto	
6	Code 148	B.Dong Kang - B.Xok Noy	4.1	14.5	w, c	A	Ditto	Ditto	B	Ditto	
9	Code 172	B.Dongxiangdi - 13N Km16	6.4	14.5	w, c	A	Land acquisition and resettlement are required at the end point of the road section	Ditto	B	Ditto	
10	Code 13S	Kaysonphomvihane Rd.	10.0	27.5	o, L	B	Traffic congestion during improvement of the road is expected	Ditto	B	Ditto	
11	Code 13S	Jct. Don Noun - 13S Km21	9.0	27.5	w, o, s	B	Ditto	Ditto	B	Ditto	
<b>Arterial</b>											
12	Code 11	N11 Rd. (Jct. Sikhay - B.Nongda)	4.2	19.0	w, o, s	A	Several portions of the road require land acquisition and resettlement by road widening activities	Ditto	B	Ditto	
	Code 11	N11 Rd. (B.Nongda - )	0.8	19.0	w, c, s	A	Ditto	Ditto	B	Ditto	
13		Nong Duag Rd. (13S - Inner ring)	3.8	19.0	w, o, s	B	Ditto	Ditto	B	Ditto	

14		B.Pakthang - B.Phontong	4.2	27.5	n, s	A	Ditto				Ditto	B	Ditto
15	T4N	Phonphanou Rd.	1.8	27.5	w, o, s	A	Ditto				Ditto	B	Ditto
16	T4N	Bld. Kamphengmeuang	4.9	19.0	w, s	B	Portions of the road require land acquisition as the road widening activities				Ditto	B	Ditto
	T4N	Bld. Kamphengmeuang	6.0	19.0	w, s	B	Ditto				Ditto	B	Ditto
17	P2N	Savang Rd.	0.5	19.0	o, L	B	Traffic congestion during improvement of the road is expected				Ditto	B	Ditto
18	P2N	Dong Palep Rd.	2.3	19.0	w, o, s	A	Several portions of the road require land acquisition and resettlement by road widening activities				Ditto	B	Ditto
	P2N	Dong Palep Rd.	4.7	19.0	w, o, s	A	Ditto				Ditto	B	Ditto
19		Dong Palep Rd. - new outer ring Rd.	2.1	9.5	w, o	A	Ditto	B		Some grown tree will be cut down as the road widening works	Ditto	B	Ditto
21	Code 109	B.Xiangda - B.Khoumhin	1.8	19.0	w, c, s	A	Ditto	C		Specific natural impact is subject to further study	Ditto	B	Ditto
23	Code 108	B.Dong Kand - 13S Km21	11.2	9.5	w, c	B	Traffic congestion during improvement of the road is expected			No significant adverse impact on natural environment	Ditto	B	Ditto
24	Code 106	13N Km11 - B.Viangkham	5.0	19.0	w, o, s	A	Land acquisition are required as the widening activities conducted and some houses and shops at the beginning are subject to remove				Ditto	B	Ditto
Collector													
26		B.Nonkhilek - N11 Rd.	2.0	14.5	w, o	A	Land acquisition are required as the widening activities conducted				Ditto	B	Ditto
		13N Km8 - B.Phosomboun	1.8	14.5	w, o	A	Ditto				Ditto	B	Ditto
27		13N Km8 - B.Phosomboun	2.4	14.5	w, c	A	Ditto				Ditto	B	Ditto
28		Nong Duag Rd. (Inner ring - T2)	3.2	16.5	o, L	B	Traffic congestion during improvement of the road is expected				Ditto	B	Ditto
29	Code 107	Dongdok Rd.(T7N)	11.7	16.5	o, s	B	Ditto				Ditto	B	Ditto
32	Code 172	B.Dongxiangdi - B.Nongphagna (T7N)	1.6	9.5	w, c	B	Land acquisition is required as the widening activities conducted at end point of the road				Ditto	B	Ditto
34	T5N	Sivilai Rd. (P3N - N13S)	1.5	16.5	w, o, s	A	Portions of road are subject				Ditto	B	Ditto

35	B.Dongdok - new outer ring Rd.	1.9	9.5	w, c	B	to land acquisition and resettlement as the widening of the road conducted Traffic congestion during improvement of the road is expected	Ditto	B	Ditto
36	Sivilai Rd. (B.Phonsavang - Inner ring)	3.0	16.5	w, o, s	A	Portions of road are subject to land acquisition and resettlement as the widening of the road conducted	Ditto	B	Ditto
37	Pul Thong Rd.	2.2	16.5	w, o, s	A	Ditto	Ditto	B	Ditto
38	New Hong Kai Keo Rd.	1.7	16.5	o, L	B	Traffic congestion during improvement of the road is expected	Ditto	B	Ditto
39	13S Km6 - B.Xiangda	10.0	14.5	w, o	A	Portions of road are subject to land acquisition and resettlement as the widening of the road conducted	Ditto	B	Ditto
40	B.Singda - Thadeua Rd.	3.6	9.5	w, o	B	Traffic congestion during improvement of the road is expected	Ditto	B	Ditto
	B.Singda - Thadeua Rd.	3.4	9.5	c	A	Land acquisition and resettlement are required at ending section of the road due to widening activities	Ditto	B	Ditto
41	That Luang Rd.	0.9	19.0	o, s	B	Traffic congestion during improvement of the road is expected	Ditto	B	Ditto
42	B.Dongkhamxang(cd1152) - Inner ring Rd.	1.5	9.5	w, o	A	Ditto	Ditto	B	Ditto
43	Jct.SaNamMar(cd109) - Jct.B.Mai(cd108)	2.2	9.5	w, o	A	Ditto	Ditto	B	Ditto
	Jct.SaNamMar(cd109) - Jct.B.Mai(cd108)	6.2	9.5	c	A	Ditto	Ditto	B	Ditto
44	B.Nomkho(cd109) - B.Nakhouay(outer ring)	3.2	9.5	o	A	Ditto	Ditto	B	Ditto
47	13S Km18 - B.Konk Gnai	5.2	9.5	w, c	A	Traffic congestion during improvement of the road is expected	Ditto	B	Ditto
49	Jct.Ji Nie Mo(A12) - B.Thakhek	22.5	9.5	w, o	B	Ditto	Ditto	B	Ditto

(Work type) c: pavement construction, o: overlay, w: widening, s: sidewalk & drainage, r: repair, L: land acquisition (Impacts) A: Serious impact is expected; B: Some impact is expected; C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.); No Mark: No impact is expected. IEE/EIA is not necessary.

**Environmental Impacts of Road Construction Works**

Road No.	Code	Road Section	Road Length (km)	Proposed Road Width (m)	scope of work	Impact on Social Environment		Impact on Natural Environment		Pollution	
						Level of Impact	Description	Level of Impact	Description	Level of Impact	Description
<b>Principal Arterial</b>											
4		Friendship Bridge - B.Nakhouay	7.9	14.5	n	A	Local residential and agricultural lands will be affected by the project	C	Specific natural impacts are subject to further study	B	Air pollution and noise should increase due to increased traffic
7		B.Xok Noy - 13S Km10	5.1	14.5	n	A	Portions of road are subject to land acquisition and resettlement		No significant adverse impact on natural environment	B	Ditto
8		13S Km10 B.Dongxiangdi	6.6	14.5	n	A	Ditto		Ditto	B	Ditto
<b>Arterial</b>											
14		B.Pakthang B.Phontong	4.2	27.5	n, s	A	Local agricultural area, irrigation and housing units would be affected by construction of the road		Ditto	B	Ditto
20	P8	B.Sokpaluang B.Xiangda	4.7	19.0	n, s	A	Local agricultural area, irrigation and housing units would be affected by construction of the road	C	Parts of the road pass That Luang wetland that require further study on natural impact	B	Ditto
22		B.Khoumhin - new outer ring Rd.	2.0	19.0	n, s		No significant social impact is expected	C	Specific natural impacts are subject to further study due to the road pass the forest conservation area	B	Ditto
<b>Collector</b>											
25		B.Nonkhilek - Provincial Rd. 106	3.6	14.5	n	A	Portions of road are subject to land acquisition and resettlement	B	Natural grown trees may be affected by the road construction	B	Ditto
30		B.Phonkeo B.Dongkalao(T7N.)	3.6	9.5	n	A	Local agricultural, residential land and housing units would be affected by construction of the road	B	Natural grown trees may be affected by the road construction	B	Ditto

31	B. Dongkalao(T7N) Inner ring Rd.	-	4.6	14.5	n	A	Ditto	No significant adverse impact on natural environment	B	Ditto
33	B.Nongphagna(T7N) B.Phonsavang(P3N)	-	5.1	14.5	n	A	Land acquisition will be affected and Photong radio broadcasting station should be affected by the project	Ditto	B	Ditto
45	B.Vangxay(cd109) B.Khamngoy	-	3.4	9.5	n	A	Portions of road are subject to land acquisition and resettlement	Ditto	B	Ditto
46	B.Khamngoy - 13S Km9		6.0	9.5	n	A	Local residential and agricultural lands will be affected by the project	Ditto	B	Ditto
48	B.Khok Noy - Hong Beng		5.4	9.5	n	A	Ditto	Specific natural impacts are subject to further study	B	Ditto
50	Code 187 B.SaLaKham(A12) B.SaVang(gd123)	-	4.8	9.5	n	A	Portions of road are subject to land acquisition and resettlement	No significant adverse impact on natural environment	B	Ditto

(Work type) n: new construction, s: sidewalk & drainage,  
(Impacts) A: Serious impact is expected; B: Some impact is expected; C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.);  
No Mark: No impact is expected. IEE/EIA is not necessary.

**Environmental Impacts of Bridge Replacement Works**

Code	Name of Bridge (KM Between Road Section)	Length (m)	proposed bridge Width (m)	scope of work	Impact on Social Environment		Impact on Natural Environment		Pollution	
					Level of Impact	Description	Level of Impact	Description	Level of Impact	Description
B1	KM 0.92 (Km6 Nong Niang-B. Xiangda)	45.0	14.5	Construction	B	A few temporary shops are subject to remove. Smooth flow of traffic is expected upon completion	B	Waste and debris generated from bridge improvement activities may affect the river flow and fish habitat		No significant air pollution is expected
B2	Jct. Sa Nam Mar-Jct. B. Mai	30.0	10.5	Construction	B	Although congestion would increase during construction, smooth flow of traffic is expected upon completion	B	Ditto		Ditto
B3	Jat. Sa Nam Mar-Jact. B.Mai	20.0	10.5	Construction	B	Ditto	B	Ditto		Ditto
B4	B. Nakhouay-B. Dong Kang	50.5	17.0	Construction	B	Ditto	B	Ditto		Ditto
B5	B. Khamngoy-13s Km9	45.0	10.5	Construction	B	Ditto	B	Ditto		Ditto
N11 Rd.	KM3.5 (Rd.13s-Jct.B. Khok Sa Ae)									

(Impacts) A: Serious impact is expected; B: Some impact is expected; C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.); No Mark: No impact is expected. IIE/EIA is not necessary.

Environmental Impacts of Bus Terminal Construction

No	Name of bus terminal/station	scope of work	Impact on Social Environment		Impact on Natural Environment		Pollution	
			Level of Impact	Description	Level of Impact	Description	Level of Impact	Description
1	Dongxingdi bus station	New construction	B	Traffic congestion and accident would occur during operational period around the bus terminal due to increased traffic		There is no significant natural environment affected by the project	B	Air pollution should occur due during operational period
2	Naxaithong bus station	New construction	B	Ditto		Ditto	B	Ditto
3	Don Noun bus station	New construction	B	Ditto		Ditto	B	Ditto
4	Nonthong bus station	New construction	B	Ditto		Ditto	B	Ditto
5	University bus station	New construction	+	Part of University's land will be acquired and utilized for construction of new bus station.		Ditto	B	Ditto
6	Xoknoy bus station	New construction	+	Accessibility of local people to public transport should be improved		Ditto	B	Ditto
7	Viengkham bus station	New construction	B	Land acquisition would involve where the government land is not available for construction of the bus station		Ditto	B	Ditto
8	New bus terminal inter change	New construction	A	Traffic congestion and accident would occur during operational period around the bus terminal due to increased traffic		Ditto	A	Air pollution and noise disturbance is expected to affect people living around bus terminal
9	Thanaleng bus station	New construction	+	Accessibility of local people to public transport should be improved		Ditto	B	Air pollution and noise will increase due to increased traffic
10	Thaseua bus station	New construction	+	Ditto		Ditto	B	Ditto

(Impacts) A: Serious impact is expected; B: Some impact is expected; C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.); No Mark: No impact is expected. IE/EIA is not necessary.

Where positive impact is expected +: Some positive impact is expected.



General Contents and Format of the EIA Report under the Study of Master Plan on Comprehensive Urban Transport in Vientiane

Chapter 1: Executive Summary

Chapter 2: Introduction

- Name and address of project owner and DPRA
- Name, address and affiliation of the author of the report
- Purposes of the project
- Institutional framework including relevant laws, regulation and international treaties that pertain to the project

Chapter 3: Description of the environment in the project Area (baseline data)

Provide sufficient information and clear picture of the existing environmental resources in the areas affected by the project, including the following:

- Physical environment:
  - Atmosphere
  - Topography and soil
  - Surface and ground water
  - Geology/seismology
- Biological/ecological environment:
  - Fisheries
  - Aquatic biology
  - Fauna and flora,
  - Endangered species
  - Protected areas
- Economic:
  - Industries
  - Infrastructure facilities (water supply, sewerage, flooding control)
  - Transport (roads, harbors, airports and navigation)
  - Land use
  - Agricultural development, mineral and tourism development
  - Power resources and transmission.
- Social and cultural environment:
  - Population and communities (numbers, locations, composition, employment)
  - Health facilities
  - Socio-economic situations (community structure, family structure, social well being)
  - Physical or cultural heritage
  - Current use of lands and resource for traditional purposes by indigenous people
  - Structures or sites that are of historical, and architectural significance.

Chapter 4: Identification and evaluation of reasonable alternatives for achieving the project purpose(s)

Chapter 5: Direct and indirect significant environmental impacts including cumulative impacts for each of the alternatives

- Impacts during project construction period (including preparation)
- Impacts during project operation period
- Impacts during project closure period
- Compliance with laws, regulations, international treaties and land use or watershed management plan in the project area

#### Chapter 6: Summary on PI activities during preparation of EIA report

This section will describe the process undertaken to involve the public in project design and recommended measures for continuing public participation; summarize major comments received from local residents, community leaders, NGOs, and others; list of milestones in public involvement such as dates, attendance, and topics of public meeting

#### Chapter 7: Identification of the chosen alternative and reasons for choosing the alternative

#### Chapter 8: Detailed description of the chosen alternative

- Work plan including time intervals for project
- Construction and operation of project
- Project costing
- Economic benefits versus environmental damage
- Social, natural resources, health risks and security of population

#### Chapter 9: Environmental management plan to prevent and reduce environmental impacts

- Protective or reductive measures for physical, biological, economic and social impacts
- Compensation measures (if any)
- Environmental monitoring programme
- Training workshops for implementation of EMP
- Institutional arrangement, timing and budgets for implementation of EMP

#### Chapter 10: Conclusions and recommendations

This section will be concluded with the likely positive benefits of mitigation measure and its monitoring action to address the unavoidable negative affects caused by projects. The reduction of adverse impacts on air quality, noise disturbance and impacts on other social environment such as road accident and congestion will be also discussed.

#### Chapter 11: References

#### Chapter 12: Annexes ( all baseline data and relevant information should put in the EIA report )

Programme of the First Stakeholder Meeting for The Study of Master Plan on Comprehensive Urban Transport in Vientiane

Held on 15 August 2007 at Don Chan Palace Hotel

PROGRAMME:

Time and Date: 15<sup>th</sup> August, 2007

Venue: Donechan Palace Hotel

Agenda

8:30-9:00	Registration
9:00- 9:10	Opening Remarks by Vientiane Vice Mayor, Steering Committee Chairman
9:10- 10:10	Presentation by JICA Study Team <ul style="list-style-type: none"><li>- Outline of the Study</li><li>- Urban Development</li><li>- Transport Network</li><li>- Public Transport, etc.</li></ul>
10:10-10:15	JICA Representative
10:15-10:30	Tea Break
10:30-11:00	Presentation by MCTPC and Urban Research Institute <ul style="list-style-type: none"><li>- Outline of Environmentally Sustainable Transport (EST) Study (by MCTPC)</li><li>- National EST Strategy and Action Plan (by URI)</li></ul>
11:00-12:00	Discussion
12:00-13:30	Lunch Break
13:30-14:30	Continued Discussion
14:30-15:00	Wrap-up
15:00-15:15	Closing Remarks.

**List of Participants**

No	Name	Position	Organization	Phone No	Email
1	Mr. Phutthasen ACKHAVONG	Deputy Director of Urban Research Institute	Urban Research Institute	021-412285	
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List of Participants: 3<sup>rd</sup> Steering Committee Meeting

Held on January 15, 2008 at Vice Governor Office, Vientiane Capital

No.	Name	Designation	Organization	Remark
1	Mr. Bounchan SINTHAVONG	Vice Mayor	Vientiane Capital	SC- Chairperson
2	Mr. Bouaphet SAYASANE	DDG	DOT , MPWT	SC-Member
3	Mr. Khampheng SAYSOULY	Deputy Director	VTE , DPWT	SC-Member
4	Mr. Ketkeo SYHALATH	Vice President	VUDDA	SC-Member
5	Dr. Sompong PHOISENA	Deputy Director	Railway Authority	SC-Member
6	Mr. Someneuk CHANDARA	Director	Traffic Police Department	SC-Member
7	Mr. Thanome THAMTHONG	Vice Governor	Saysettha District	Observer
8	Mr. Kanthaly PANIVONG	Vice Governor	Hatsaifong District	Observer
9	Mr. Khamphashert Phiphac	Vice Governor	Nasaithong District	Observer
10	Mr. Vongdeuan BOUNNGASENG	Vice Governor	Parkngum District	Observer
11	Mr. Phomvisone KEOMEUANGTHONG	Vice Governor	Chanthabouly District	Observer
12	Mr. Xonglao YOUGNUOU	Vice President	Xaythany District	Observer
13	Mr. Tatsuyuki Sakurai	Team Leader		Study Team
14	Dr. Shiugo GOSE	Urban Transport Plan		Study Team
15	Mr. Ryuichi UENO	Traffic Survey		Study Team
16	Mr. Nabeshima	Traffic Management Plan		Study Team
17	Mr. Hatakeyama	Environment Engineer		Study Team
18	Mr. Toshinori TODA	Public Transport Plan		Study Team
19	Mr. Murakami	Road Development Plan		Study Team
20	Dr. Bounta ONNAVONG	Project Coordinator	DOT , MPWT	
21	Mr. Litthideth KATTIYAVONG	CAD Operator		
22	Mr. Kozu MURAOKA	Expert	JICA , MPWT	
23	Mr. Khamphai SOUVATDY	Assistant Project Coordinator	VTE , DDWT	
24	Mr. Chanthasak POTAPHANITH	Environmental Specialist	LTEC	

SC- Steering Committee

MPWT-Ministry of Public Work and Transport

DOT- Department of Transport



Minutes of Meeting of Stakeholder Meetings

Minutes of Meeting of 1<sup>st</sup> Stakeholder Meeting  
Held on 15 August 2007 at Don Chan Palace Hotel

Record of Discussion

[Introduction]

1. H.E. Bounchan SINTHAVONG, the Chairperson of the Steering Committee and the Vice Mayor of Vientiane called the opening of the Meeting.
2. Mr. K. Sekine, Asst. Resident Representative, JICA Lao Office gave address.
3. The JICA Study Team (Mr. Sakurai, Dr. Gose and Mr. Toda) explained the purpose of the Stakeholder Meeting, objectives of the Study and outline of the contents of the Progress Report.
4. The Chairperson summarized the contents of the Progress Report in Lao language/
5. Mr. Bounsoum SOMSIHAKHOM, the Deputy Director General of Transport, MCTPC clarified that Vientiane has two choices to choose from, "private car-oriented society" or "public transport-oriented society",
6. Then, the Chairperson invited discussion/comments from the floor,

[Discussion]

1. Mr. Daovone PHANTHAYONG, Director, Lao National Chamber of Industry and Commerce (LNCIC)
  - : This project is good and very useful for Vientiane people
  - : Wish to have color copy of the handout plus CD.
  - : Number of accident cases per day, being trialed in court etc should be incorporated
  - : Sonteo is more efficient than bus. Thus, bus may not be able to compete with Sonteo. To supplement the constraints of public funds, private investment needs to be considered.
  - : Important problem is how to encourage people to use public transport. Car is symbol of wealth. We need social and political measures to change the mind of people.
  - : As long-term measure for traffic safety, traffic education should be incorporated in school education program.
  - : Premises of temples may be used for parking spaces, like Thailand.
  - : Roads are blocked when VIP such as foreign guest travels. This kind of information should be disseminated through radio and other media beforehand so that drivers can divert to other roads.
  - : Traffic signals should not be installed at round about

2. Mr. Khamphoun TEMERATH, Director, Vientiane State Bus Company
- : Existing facilities, for example bus stop and road signs, are not suitable for good bus services. Better bus bay needs to be provided,
  - : People do not want a bus stop located in front of their houses.
  - : The Study does not survey the traffic during peak hours. The Study needs more in-depth consideration. (This comment may have been based on some misunderstanding.)
  - : What is the public transport plan suitable to Vientiane? Something like Bangkok or Hanoi? Roads in Vientiane are narrow and there are many Sonteos. At the moment there is no bus services on feeder roads in Vientiane
  - : The bus service only covers only the paved trunk roads
  - : Public transport should be given priority. (Public first, then private.)
  - : Bankruptcy of Lao Dee should not be overlooked. Government subsidy is needed for public services.
  - : Introduction of public private partnership (PPP) should be considered.
  - : Electric buses need to be introduced to reduce air pollution.
  - : Express bus should be operated.
  - : Infrastructure should be improved to be suitable for bus services.
  - : More buses are needed to attract people.
  - : Exclusive bus lane should be introduced for smooth operation of buses and reduction of waiting time of the passengers. Other measures/regulations may be needed to reduce travel time of buses.
3. Mr. Thongphan PHOMMASITH, Vice President, Vientiane Long-Distance Bus Association  
(Northern Bus Station)
- : Environmental conditions of bus stations, garages and repair shops need to be improved. (Waste water containing dirt, oil and grease is discharged to river and marsh, or seep into the ground.)
  - : Introduction of PPP should be considered.
  - : As for the social status problem, it is recently found quite many foreigners riding bicycles to work
  - : Roads structure should be improved to be suitable for bus services.
  - : Bus stop with indication of waiting time for bus passenger is desired.
  - : Tukluk-jumbos should be moved to provide services at suburb areas
  - : More companies are desired to join bus operation for better services.
  - : Sonteos should be regulated at the Donnoun Station
  - : Use of public transport should be educated in school. What is taught at school remains long time in the mind of children. They will be grown-ups in the future.
  - : Buses should stop at bus stations in the suburbs before arriving at the Central Bus Station for the convenience of the passengers.

- ‡ Long-distance bus can provide services in the suburbs beyond the boundary of the city.
  - ‡ Three factors are important for bus station; terminal facility, service and location (distance to the city center; so that people do not need to take paratransit).
  - ‡ People have to pay large amount of charge for Tuktuk, Sonteo or Jumbo, if the bus station is located far from the city center.
  - ‡ People should contribute to improve the road environment just like the city official. They can clean clogged road drainage.
4. Mr. Bouaphet XAYASANE, Deputy Director General, Dept. of Transport, MCTPC
- ‡ Volume of the collected accident data has recently increased. These data needs more in-depth analysis. The results of the analysis should be reflected in traffic safety plan.
  - ‡ The present situation is that 65 % of traffic is motorcycles and the share of public transport is very small.
  - ‡ Factories use their own buses for commutation of the employees. Thus, these employees do not use public transport.
  - ‡ Vientiane will become like Hanoi or Ho Chi Minh City (congested with motorcycles if nothing is done,
  - ‡ Introduction of PPP should be considered.
  - ‡ Lanes separation for various types of vehicles should be considered
  - ‡ Use of electric bus and/or bus with LNG etc should be considered,
  - ‡ Railroad stations, airport and other important traffic facilities should be liked. The Study Team is requested to recommend suitable system for Vientiane.
  - ‡ Lack of integration among various transport services (ruk-tuk, sonteo, bus....)
5. Mr. Ounheuang SIRIAMPHONE, Senior Officer, Dept. of Road, MCTPC
- ‡ 2020 Lao PDR plans to graduate from Least Developed Countries so we have to think about how to incorporate this study with this target
  - ‡ Public transport system suitable for Vientiane should be carefully selected, [t should adopt modern high technology and should be implemented step by step,
  - ‡ By the target year of the Study (2025), two system, private motorcycles and public transport, should go in parallel, not separately.
  - ‡ In the Lao society people have two duties: government and family so private vehicles play very important roles for family business
  - ‡ Every family will own its own vehicle and number of motorcycles will inevitably increase even if good public transport is provided.
  - ‡ Motorcycles should be used in the suburbs. Motorcycles should be used between home and bus stop and parked at bus stop. For this, parking spaces for motorcycles should be provided near bus stops. (Park and Ride)
  - ‡ Conditions of infrastructure should be improved for better services of public transport.
  - ‡ Campaign to reduce usage of private vehicles should be implemented.
  - ‡ We should consider why people in Thailand do not use public transport in spite of traffic congestion on the streets.

Minute of Meeting of 3<sup>rd</sup> Steering Committee Meeting  
Held on 1 January 2008 at Vice Governor Office, Vientiane Capital

## Record of Discussion

The third Steering Committee meeting was held on 15 January 2008 at Vice Governor's Office in Vientiane Capital. The main objective of the meeting is to allow the Study Team to present the result of the study as prepared in the Interim Report. The presentation was presented by Team Leader. The list of the attendants is shown in Attachment 1.

Welcoming and opening remarks were made by Mr. Bounchan SINTHAVONG, Vice Governor of Vientiane Capital (Chairman).

Mr. Sakurai the Consultant's Team Leader of the Study made a presentation of the topics covered in the Interim Report and remaining tasks will be undertaken in next stage.

After presentation finished, the Chairman called for open discussion to allow attendees have comments and suggestion on interim report which focused on 3 main issues:

- (i) Right-of-way;
- (ii) Road network improvement (including widening and construction of the roads and other ring roads);
- (iii) Up to 2010, Tuk-Tuk and Jambo service will be reduced from the main streets and congested roads which was the issue that the Vientiane governor members had considered. Anyway, it does not mean we will eliminate Tuk-Tuk and Jambo services as written in newspaper.

During discussion, many comments and suggestions from steering committee were pointed out. The following are the detail of discussion:

### Discussion

1. Mr. Ketkeo SAYHALATH, Vice President of VUDAA
  - Commented on section 2.2 of socio-economic condition part of interim report which required study team to consider about the percentage of migration in Vientiane Capital
  - It is difficult to stop using of Tuk-Tuk, Jambo and motorcycles
  - Regarding ROW, now there is national road law and land law but it conflict to each another. For example, the road law defines the ROW for each class of the

road with particular dimension from the center line to either side of the road. While the land titling office issued the boundary of the land over the right of way to the land owners.

- Improvement of outer and inner ring roads is necessary, especially the inner ring road connecting Dong Dok-Saynam Ngeun-Chommani-Hongseng.
2. Mr. Bouaphet XAYASANE, DDG of DOR, MPT (Ministry of Public Works and Transport)

Mr Bouaphet expressed his appreciation to the result of traffic demand forecast prepared by study team and point out few important issues:

- In order to improve public transport service in Vientiane Capital, is it necessary to promote the private operator?
- Prohibition of students using motorcycles is not appropriate at this time
- Increasing of tax for import motorcycles year by year until people are not able to pay is another measure to solve the problem of increasing number of motorcycles.
- Elimination of Tuk-Tuk and Jambo use is not appropriate solution, since the volume of accidents cause by Tuk-Tuk and Jambo are relatively low compared to other vehicles. On the other hand, Tuk-Tuk and Jambo can provide door to door service and are still popular transport option for the tourists.
- The proposed minimum improvement of the road network scenario may not enough to accommodate the increasing of future traffic.

3. Mr. Xong lao XONGNOU, Vice Governor of Xaythany District

- Traffic issue should be in cooperated into town planning, for example, expansion of consumption area of traffic in outskirt should be provided in order to accommodate traffic inflow and outflow of the Vientiane capital.
- The areas of Tuk-Tuk and Jambo service should be clearly defined, for example, Tuk Tuk and Jambo may serve in the area where the bus services not cover.
- Suggested to select the complete road network scenario in order to accommodate the growing of traffic demand in the future. However, the improvement of the road should be prioritized for each period of time (short term, medium and long term periods) depends on budget available.

Responded by Study Team

Mr. Tatsuyuki Sakurai, Team Leader responded to some questions raised by

attendees as summarized below:

- Improvement of public transport service operation will be consulted and studied more on next stage.
- Elimination of Tuk-Tuk and Jambo service in urban area of Vientiane Capital needs to be considered, especially on social issue such as losing of jobs for the drivers. And how does the government can provide a job for them.
- Regarding data on socio-economic condition presented in the interim report, about 2 percent is the population growth rate of Vientiane Capital per year.

#### Wrap-up

Mr. Bounchan SINTHAVONG (The chairperson) summarized the discussion of the meeting and highlighted five main points as following:

1. Officially adopted the interim report of master plan for comprehensive urban transport in Vientiane Capital;
2. All valuable comments raised by participants should be incorporate into the report;
3. Requested the study team to study more on:
  - + How the plan for urban transport improvement proposed in the master plan could be implemented more that 60 per cent in the real practice.
  - + The way for solving the problems related to urban transport system in Vientiane Capital and which activity should we start from.
4. Requested all participants to bring the relevant documents (including interim report) back to read more and give more comments latter.
5. It is expected that, the next meeting will be held in next three months.

Mr. Tatsuyuki Sakurai, Team leader of the study expressed his appreciation to the meeting and thanks to all respective attendees for their participation and raising the questions and comments. Finally, Mr. Sakurai also asks for additional cooperation from all participants.

**List of Local Officials with whom Urban transport and environmental issues were Discussed during the IEE Study**

No	Date	Name	Position	Organization
1	30/11/2007	Mr. Phoxay	Chief of Environmental Unit	Chanthabuly District
2	27/11/2007	Mr. Khamphit	Chief of Agriculture-Forestry Unit	Chanthabuly District
3	27/11/2007	Mr. Pangkham	Deputy of CTPC Office	Chanthabuly District
4	27/11/2007	Mr. Nhutthana	Staff	Chanthabuly District
5	27/11/2007	Mr. Khamting	Staff	Chanthabuly District
6	28/11/2007	Mr. Chittavong	VUDAA Staff	Vientiane Capital
7	26/11/2007	Mr. Bountheung	CTPC Staff	Chanthabuly District
8	28/12/2007	Mr. Khamsavat	Agriculture-Forestry Staff	Chanthabuly District
9	28/12/2007	Mr. Nheaeu	CTPC Staff	Sisattanak District
10	28/11/2007	Mr. Khamphouthong	CTPC Staff	Sisattanak District
11	28/11/2007	Mr. Sana	Agriculture-Forestry Staff	Sisattanak District
12	28/11/2007	Mr. Souvanhthong	CTPC Staff	Sisattanak District
13	28/11/2007	Mr. Chitpaseut	Chief of Environmental Unit	Sisattanak District
14	27/11/2007	Mr. Thavisak	Irrigation Staff	Sikhottabong District
15	27/11/2007	Mr. Khammany	Agriculture-Forestry Staff	Sikhottabong District
16	27/11/2007	Mr. Bounthy	CTPC Staff	Sikhottabong District
17	27/11/2007	Mr. Lonchanh	CTPC Staff	Xaysetha District
18	27/11/2007	Mr. Viengkeo	VUDAA Staff	Xaysetha District
19	27/11/2007	Mr. Inpone	CTPC Staff	Xaysetha District
20	27/11/2007	Mr. Thavone	CTPC Staff	Xaysetha District
21	27/11/2007	Mr. Phienxay	Agriculture-Forestry Staff	Xaysetha District
22	26/11/2007	Mr. Phouthong	CTPC Staff	Hadxaifong District
23	29/11/2007	Mr. Banlom	Chief of Agriculture-Forestry Unit	Xaythany District
24	23/11/2007	Mr. Ousanong	Chief of CTPC Unit	Xaythany District
25	29/11/2007	Mr. Phetsomphone	CTPC Staff	Xaythany District
26	29/11/2007	Mr. Khamphouan	CTPC Staff	Xaythany District
27	4/12/2007	Miss. Khamfong	Staff	VSTO
28	10/12/2007	Mr. Khanhthong	Deputy of Office manager	Hadxaifon District
29	7/12/2007	Mr. Arthone	Chief of Road traffic Unit	Hadxaifong District
30	7/12/2007	Mr. Angkham	Deputy of Lao youth unit	Hadxaifong District
31	11/12/2007	Mr. Arlounxay	Chief of Environmental unit	Xaysetha District
32	10/12/2007	Mr. Thongthip	Deputy District Governor	Sikhottabong District
33	11/12/2007	Mr. Khamkhay	Staff	Sikhottabong District
34	10/12/2007	Mr. Saly	Chief of Environmental unit	Sikhottabong District

**List of Number of Households By Village and District.**

No.	Name of District and Village	No. of Hh Interviewed	Date of Interview
I	Sikhothabong District		
1	Nongniew	38	22/10/2007
2	Nongdouang Tai	18	22/10/2007
3	Sithan Neua	11	22/10/2007
4	Khountathong	9	22/10/2007
5	Khountatha	12	22/10/2007
6	Oumoung	18	22/10/2007
7	Nakham	17	23/10/2007
8	Vattaynoytha	12	23/10/2007
9	Vattaynoythong	18	23/10/2007
10	Nongphanay	14	23/10/2007
11	Vattaynhaythong	9	23/10/2007
12	Vattaynhaytha	10	23/10/2007
13	Akarth	23	23/10/2007
14	Meuangvatha	10	23/10/2007
15	Meuangvathong	19	23/10/2007
16	Sikhaythong Tai	10	24/10/2007
17	Sikhaytha	14	24/10/2007
18	Nahare	21	24/10/2007
19	Phosi	9	24/10/2007
20	Thongphong	50	24/10/2007
21	Sibounheuangthong	14	24/10/2007
22	Sibouheuang tha	13	25/10/2007
23	Sisomseun	8	25/10/2007
24	Kaoliew	15	25/10/2007
25	Dankham	28	25/10/2007
26	Nonkilaek	33	25/10/2007
27	Nonkeo	37	25/10/2007
28	Tat thong	21	25/10/2007
29	Dongnasok Tai	31	29/10/2007
30	Dongnasok neua	27	29/10/2007
31	Nongbouathong neua	34	29/10/2007
32	Nongping	21	29/10/2007
33	Phakthang	30	31/10/2007
34	Dongnathong	11	31/10/2007
35	Nongteng Tai	16	31/10/2007
36	Sumket	17	31/10/2007
37	Dongkalao	7	31/10/2007
38	Nongteng Neua	26	1/11/2007
39	Nongdouang Neua	18	1/11/2007
40	Nongsanokham	15	1/11/2007
41	Nongbeuk Tai	15	1/11/2007
42	Nongbeuk Neua	16	1/11/2007
	<i>Sub-total</i>	<i>795</i>	
II	Saysettha District		
1	Phonxay	24	25/10/2007



2	Naxay	24	25/10/2007
3	Nongbone	25	25/10/2007
4	Thatlouang Tai	34	25/10/2007
5	Hongkare	29	25/10/2007
6	Phonthan tai	20	29/10/2007
7	Phonthan Neua	25	29/10/2007
8	Phonphanao	39	29/10/2007
9	Phonsaat	19	30/10/2007
10	Phonkheng	32	30/10/2007
11	Viengchalern	35	30/10/2007
12	Houakhoua	21	30/10/2007
13	Nonkhor Neau	25	30/10/2007
14	Nonkhor Tai	20	30/10/2007
15	Khamsavath	35	30/10/2007
16	Nonvay	25	31/10/2007
17	Meuangnoy	23	31/10/2007
18	Xiengda	24	31/10/2007
19	Fay	15	1/11/2007
20	Chommany Tai	29	1/11/2007
21	Nongnieng	22	1/11/2007
22	Chommany Neua	30	2/11/2007
23	Thatlouangkang	26	2/11/2007
	<i>Sub-total</i>	<i>601</i>	
III	Sisatthanak District		
1	Kaognod	12	22/10/2007
2	Simeuang	18	22/10/2007
3	Thatkhao	15	22/10/2007
4	Beungkhagnong Tai	15	22/10/2007
5	Vatnak	26	22/10/2007
6	Thaphalanxay	27	22/10/2007
7	Phanmanh	9	22/10/2007
8	Phoxay	7	22/10/2007
9	Vatsob	7	22/10/2007
10	Haysok	19	23/10/2007
11	Chomcheng	11	23/10/2007
12	Chompeth Neua	23	23/10/2007
13	Koknine	6	23/10/2007
14	Chompeth Tai	35	23/10/2007
15	Nongchane	6	25/10/2007
16	Phonpapaothong	41	29/10/2007
17	Donekoy	35	29/10/2007
18	Dongpalanthong	15	1/11/2007
19	Dongpalantha	15	1/11/2007
20	Phonsavan Neua	22	1/11/2007
21	Phonsinouan	22	1/11/2007
22	Thongphanthong	31	1/11/2007
23	Phaxay	12	1/11/2007
24	Phonpapaotha	25	2/11/2007
25	Sokpalouang	21	2/11/2007
26	Thongkang	30	2/11/2007
27	Donepamai	15	2/11/2007
28	Saphanthongkang	15	2/11/2007

29	Beungkhagnong Neua	11	2/11/2007
30	Phapo	11	2/11/2007
31	Saphanthong Tai	23	2/11/2007
	<i>Sub-total</i>	<i>580</i>	
IV	Chanthabouli District		
1	Harthsadee Tai	11	22/10/2007
2	Thongkhankham tai	14	22/10/2007
3	Anou	15	22/10/2007
4	Thongkhankham Neua	19	22/10/2007
5	Savang	23	22/10/2007
6	Dongparlap	28	22/10/2007
7	Donedeng	29	22/10/2007
8	Sisakate	11	22/10/2007
	Khoualouang Tai	18	22/10/2007
9	Nongtha neua	48	23/10/2007
10	Houayhong	50	23/10/2007
11	Phonsavang	39	24/10/2007
12	Phonthongchommany	44	25/10/2007
14	Sibounheuang	25	30/10/2007
15	Seadamduan	21	30/10/2007
16	Sisavard Tai	17	30/10/2007
17	Sisavard Neua	10	30/10/2007
18	Dongmieng	21	31/10/2007
19	Thongtoun	18	31/10/2007
20	Khoualouang Neua	17	31/10/2007
21	Varthchan	10	1/11/2007
22	Sihom	15	1/11/2007
23	Meaxay	10	1/11/2007
24	Xiengnheun	14	1/1/2007
25	Phontongsavarth	45	2/11/2007
26	Hongkaykeo	13	2/11/2007
	<i>Sub-total</i>	<i>585</i>	
V	Hathsayfong District		
1	Somvang Neua	25	23/10/2007
2	Somvang tai	16	23/10/2007
3	Somsanook	34	24/10/2007
4	Salakhame Tai	17	24/10/2007
5	Salakham Neua	15	24/10/2007
6	Nahai	32	24/10/2007
7	Nahay	16	24/10/2007
8	Nongheo	28	24/10/2007
9	Dongphosi	27	24/10/2007
10	Nonghay	39	29/10/2007
11	Dongkhamsang	24	31/10/2007
	<i>Sub-total</i>	<i>273</i>	
VI	Xaythany District		
1	Tanmisay	40	23/10/2007
2	Sainamguen	22	24/10/2007
3	Sivilay	41	25/10/2007
4	Dongdok	42	25/10/2007
5	Khamhoung	53	29/10/2007

6	Pharkhao	45	30/10/2007
7	Donenoun	29	30/10/2007
8	Sangkhon	31	31/10/2007
9	Saphangmeuk	22	31/10/2007
10	Saysavang	25	31/10/2007
11	Nongphagnar	50	1/11/2007
	<i>Sub-total</i>	<i>400</i>	
Total =		3,234	

Minutes of Discussion

**Minutes of Discussion  
on the Inception Report for the Study of Master Plan on Comprehensive Urban Transport  
in Vientiane Capital in Lao PDR  
between the Steering Committee and the Study Team**

Japan International Cooperation Agency (hereinafter referred to as "JICA") organized a Study Team for the Study of Master Plan on Comprehensive Urban Transport in Vientiane Capital (hereinafter referred to as "the Study") to be carried out based on the Minutes of Meeting signed by the Second Preparatory Study Team and the Ministry of Communication, Transport, Post and Construction (hereinafter referred to as "MCTPC") on 18 December 2006.

For the purpose of discussion on the Inception Report of the Study, a meeting was held between the Steering Committee and the Study Team on 2 May 2007. The attendants are listed in Attachment 1.

After a series of discussion, the following points were agreed upon :

- 1) The Study Team formally submitted the Inception Report to the Steering Committee and made presentation of the report with particular focus on the study approach, contents and work procedure.
- 2) The Lao side agreed in principle to the methodology of the Study shown in the Inception Report.
- 3) The Lao side proposed to quit the first workshop scheduled to be held in May 2007 and instead to hold another workshop in February or March 2008 to discuss the contents of the urban transport master plan and its implementation plan. The Study Team has no objection to this proposal and promised to convey this matter to JICA.
- 4) The Lao side promised to assign the counterpart personnel from various departments to work with the Study Team.
- 5) Both Lao and Japanese sides recognized that the traffic survey should be carried out as early as possible because rainy season has started and the summer vacation of the school starts in June and ends in August affecting drastically the traffic volume during this period.
- 6) The Lao side wanted the Study Team to carry out the pre-feasibility study for as many projects as possible. The Study Team replied that two top priority projects will probably be selected for the pre-feasibility study.

Vientiane, May 2, 2007



Mr. Bouaphet Sayasane  
DDG, Dpt. of Transport,  
MCTPC

Mr. Kunihiko Sawano  
Team Leader  
Study Team

LIST OF ATTENDANTS

Ministry of Communication, Transport, Post and Construction (MCTPC)

- |                             |  |
|-----------------------------|--|
| 1. Mr. Bouaphet Sayasane    | DDG, Dpt. of Transport   |
| 2. Mr. Pothong Ngonphachanh | DDG, Dpt. of Roads   |
| 3. Mr. Thenkham Thongtonh   | DDG, Dpt. of Housing and Urban Planning  |
| 4. Dr. Bounta Onnavong      | Senior R & D and International Liaison Officer, National Transport Committee, Dept. of Transport |
| 5. Mr. Vilayphanh Sayavong  | Deputy Director of Road Transport Development Division, Dpt. of Transport                        |
| 6. Mr. Katsuro Kondo        | Planning Advisor to the Cabinet Office in Infrastructure Development (JICA Expert)               |

Vientiane Capital

- |                          |                                  |
|--------------------------|----------------------------------|
| 1. Mr. Ounneua Silavong  | Chief of Transport Office, DCTPC |
| 2. Mr. Khamphai Souvatdy | DCTPC                            |

Vientiane Urban Development and Administration Authority (VUDAA)

- |                      |                |
|----------------------|----------------|
| 1. Mr. Ketkeo Sihath | Vice President |
|----------------------|----------------|

Urban Research Institute (URI)

- |                              |          |
|------------------------------|----------|
| 1. Mr. Keophilavanh Aphayath | Director |
|------------------------------|----------|

Ministry of Interior/Public Security

- |                           |   |
|---------------------------|---|
| 1. Mr. Someneuk Chanchara | Director, Traffic Police Division, Department of Traffic Police |
|---------------------------|---|

Study Team

- |                        |   |
|------------------------|---|
| 1. Mr. Kunihiko Sawano | Team Leader / Implementing Organization and System            |
| 2. Dr. Shingo Gose     | Deputy Team Leader / Transport Plan / Transport Facility Plan |
| 3. Mr. Ryuichi Ueno    | Traffic Survey / Transport Demand Forecast                    |
| 4. Mr. Yasuo Nabeshima | Traffic Management Plan                                       |



MINUTES OF DISCUSSION  
on  
The Progress Report for  
The Study of Master Plan on Comprehensive Urban Transport  
in Vientiane Capital in Lao PDR  
between the Steering Committee and the Study Team


Japan International Cooperation Agency (hereinafter referred to as 'JICA') organized a Study Team for the Study of Master Plan on Comprehensive Urban Transport in Vientiane Capital (hereinafter referred to as 'the Study') to be carried out based on the Minutes of Meeting signed by the Ministry of Communication, Transport, Post and Construction (hereinafter referred to as 'MCTPC') and the Second Preparatory Study Team of JICA on 18 December 2006.


The second Steering Committee meeting was held on 10 August 2007, and the Progress Report was presented by the Study Team. The list of the attendants is attached as Attachment 1.

After a series of discussion on the Progress Report, the followings were agreed upon between the Steering Committee and the Study Team:

- (1) The Study Team officially submitted the Progress Report to the Steering Committee and made presentation with particular focus on the result of traffic surveys, the views on the current conditions of public transport, road network, traffic management and safety, and socioeconomic framework including future urban development and land use.
- (2) The Lao side agreed in principle to the contents of the Progress Report.
- (3) The Lao side agreed in principle that the Study focuses on the area surrounded by the cordon line adopted in the Traffic Surveys of the Study and the areas directly adjacent to the cordon line where high possibility of future urban development is foreseen (hereinafter referred to as 'the Planning Area') as proposed by the Study Team.
- (4) The both sides agreed that the boundary of the Planning Area be subject to adjustment based on the further discussion between the both sides.

In Vientiane  
10 August 2007

  
\_\_\_\_\_  
Mr. Bounchan Sinthavong  
Chairperson  
Steering Committee  
(Vice Mayor of Vientiane)

  
\_\_\_\_\_  
Mr. Tatsuyuki Sakurai  
Team Leader  
Study Team

# MINUTES OF DISCUSSION

on

## The Interim Report for The Study of Master Plan on Comprehensive Urban Transport in Vientiane Capital in Lao PDR between the Steering Committee and the Study Team


Japan International Cooperation Agency (hereinafter referred to as 'JICA') organized a Study Team for the Study of Master Plan on Comprehensive Urban Transport in Vientiane Capital (hereinafter referred to as 'the Study') to be carried out based on the Minutes of Meeting signed by the Ministry of Communication, Transport, Post and Construction (hereinafter referred to as 'MCTPC') and the Second Preparatory Study Team of JICA on 18 December 2006.


The third Steering Committee meeting was held on 15 January 2008, and the Interim Report was presented by the Study Team. The list of the attendants is attached as Attachment 1.

After a series of discussion on the Interim Report, the following were agreed upon between the Steering Committee and the Study Team:

- (1) The Study Team officially submitted the Interim Report to the Steering Committee and made presentation with particular focus on the future urban development and future vision of Vientiane, future traffic demand forecast and basic policy for urban transport master plan.
- (2) The Lao side agreed in principle to the contents of the Interim Report.
- (3) The Lao side requested that the following comments be incorporated in the Study in the future:
  - (i) Complete prohibition of motorcycle may be difficult in the culture of Laos. Due consideration is necessary on this issue.
  - (ii) Operation of Vientiane State Bus Company (VSBC) is a big problem. It is desired that the Study propose any policy/strategy of operation of VSBC.
  - (iii) It is desired that the Study propose the future management of para-transit such as tuk-tuk and jumbo.

In Vientiane  
17 January 2008

  
Mr. Bounchan Sinthavong  
Chairperson  
Steering Committee  
(Vice Mayor of Vientiane)

  
Mr. Tatsuyuki Sakurai  
Team Leader  
Study Team

MINUTES OF DISCUSSION  
on  
The Draft Final Report for  
The Study of Master Plan on Comprehensive Urban Transport  
in Vientiane Capital in Lao PDR  
between the Steering Committee and the Study Team

Japan International Cooperation Agency (hereinafter referred to as 'JICA') organized a Study Team to carry out the Study of Master Plan on Comprehensive Urban Transport in Vientiane Capital (hereinafter referred to as 'the Study').

The fifth Steering Committee meeting was held on 10 July 2008, and the Draft Final Report was presented by the Study Team. The list of the attendants is attached as Attachment 1.

After a series of discussion on the Draft Final Report, the following were agreed upon between the Steering Committee and the Study Team:

- (1) The Study Team officially submitted the Draft Final Report to the Steering Committee and made presentation with particular focus on urban transport master plan, pre-feasibility studies on Construction of the Missing Link Section of the Inner Ring Road and Shuttle Bus Service between the Central Bus Station and Dongdok.
- (2) The Lao side agreed in principle to the contents of the Draft Final Report.
- (3) The Lao side agreed that the Master Plan be authorized as the official transport master plan of Vientiane upon official submission of Final Report.
- (4) The Lao side requested that the following comments be incorporated in the Final Report:
  - (i) It is requested that view on new type of vehicles such as electric bus and description on the type and timing implementation of rail transit to be considered in the future be added, as much as possible.
  - (ii) It is requested to adjust years of Short- Medium- and Long-Term period to coincide with the year of development plans of Laos/Vientiane such as 2010 – 2020, as much as possible.



*[Signature]*  
Mr. Bounchan Sinthavong  
Chairperson  
Steering Committee  
(Vice Mayor of Vientiane)

In Vientiane  
10 July 2008

*[Signature]*  
Mr. Tatsuyuki Sakurai  
Team Leader  
Study Team



## **APPENDIX 26**

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### **SHUTTLE BUS SERVICE BETWEEN CENTRAL BUS STATION AND DONGDOK**

26-1	Result of passenger on board survey	A26-1
26-2	Passenger Maneuver at the Peak Hour (East Route)	A26-7
26-3	Bus Travel Time	A26-8
26-4	LOS of BUS service	A26-10
26-5	Traffic flow at Intersections	A26-11

**Result of passenger on board survey**

Table 26-1-1 Result of passenger on board survey on Bus (East route,27/5/2008)

Route:Dongdok - Phonkheng - Khuadin Bus Station(East Route)

Date:27/5/2008

No	Departure Time		Arriving Time	Passenger									Reference			
	CBS	Univ.		Bound for Univ.(Forward)			Bound for CBS(Backward)			All passengers			Passenger from CBS			
				Total	Student	Other	Total	Student	Other	Total	Student	Other	Total	Student	Other	
1	6:00															
2	6:15															
3	6:30	7:14	7:50	37	13	24	37	5	32	74	18	56	31	10	21	
4	6:45															
5	7:10	7:55	8:31	53	32	21	22	3	19	75	35	40	34	18	16	
6	7:15															
7	7:30															
8	7:45															
9	8:00															
10	8:13	8:46	9:18	48	13	35	20	4	16	68	17	51	35	11	24	
11	8:30															
12	8:45															
13	9:00	9:31	10:10	45	8	37	25	3	22	70	11	59	37	3	34	
14	9:15															
15	9:30															
16	9:40	10:14	10:44	37	14	23	11	3	8	48	17	31	30	10	20	
17	10:00															
18	10:15															
19	10:30	11:16	11:46	60	12	48	22	13	9	82	25	57	41	1	40	
20	10:45															
21	11:00	11:44	12:15	65	20	45	25	19	6	90	39	51	47	5	42	
22	11:15															
23	11:30															
24	11:45															
25	12:00	12:46	13:15	72	33	39	19	5	14	91	38	53	52	17	35	
26	12:15															
27	12:37	13:05	13:27	63	23	40	16	7	9	79	30	49	53	17	36	
28	12:45															
29	13:00															
30	13:15															
31	13:30	14:02	14:45	48	8	40	27	13	14	75	21	54	43	7	36	
32	13:45															
33	14:00	14:32	14:53	72	24	48	21	7	14	93	31	62	44	11	33	
34	14:15															
35	14:30															
36	14:45															
37	15:08	15:49	16:23	46	24	22	26	15	11	72	39	33	21	8	13	
38	15:15															
39	15:36	16:10	16:45	53	17	36	44	30	14	97	47	50	31	4	27	
40	15:45															
41	16:00															
42	16:15															
43	16:35	17:23	17:50	33	9	24	20	15	5	53	24	29	27	5	22	
44	16:45															
45	17:00															
46	17:20	18:01	18:24	53	9	44	9	2	7	62	11	51	45	5	40	
47	17:30															
48	17:45															
49	18:00															
Average(6-8)				45	23	23	30	4	26	75	27	48	33	14	19	
Average				46	15	31	20	8	12	66	24	43	34	8	26	
Max(12:0)				72	33	39	19	5	14	91	38	53	52	17	35	
Min(17:20)				53	9	44	9	2	7	62	11	51	45	5	40	
Total				785	259	526	344	144	200	1,129	403	726	571	132	439	

Table 26-1-2 Result of passenger on board survey on Bus (East route,28/5/2008)

Route:Dongdok - Phonkheng - Khuadin Bus Station(Eastern Route)

Date:28/5/2008

No	Departure Time		Arriving Time	Passenger									Reference					
	CBS	Univ.		Bound for Univ.(Forward)			Bound for CBS(Backward)			All passengers			Passenger from CBS					
				Total	Student	Other	Total	Student	Other	Total	Student	Other	Total	Student	Other			
1	6:00																	
2	6:15																	
3	6:30	6:59	7:40	18		18	27	7	20	45	7	38	13		13			
4	6:45																	
5	7:02	7:37	8:15	38	22	16	19	9	10	57	31	26	20	11	9			
6	7:15																	
7	7:35	8:10	8:45	33	14	19	13	2	11	46	16	30	31	12	19			
8	7:45																	
9	8:00	8:41	9:15	37	9	28	25	1	24	62	10	52	23	4	19			
10	8:15																	
11	8:39	9:14	9:36	52	17	35	18	1	17	70	18	52	30	9	21			
12	8:45																	
13	9:10	9:40	10:12	32	6	26	11	1	10	43	7	36	24	5	19			
14	9:15																	
15	9:30	10:08	10:40	20	7	13	18	5	13	38	12	26	12	4	8			
16	9:45																	
17	10:05	10:40	11:11	35	2	33	22	7	15	57	9	48	29	1	28			
18	10:15																	
19	10:35	11:06	11:41	23	8	15	19	6	13	42	14	28	17	3	14			
20	10:45																	
21	11:00	11:45	12:20	75	18	57	50	30	20	125	48	77	46	10	36			
22	11:15																	
23	11:30																	
24	11:47	12:18	12:43	64	29	35	10	9	1	74	38	36	49	18	31			
25	12:00																	
26	12:15																	
27	12:30	13:07	13:30	70	31	39	17	5	12	87	36	51	45	20	25			
28	12:45																	
29	13:00																	
30	13:15	13:46	14:16	44	11	33	25	6	19	69	17	52	31	7	24			
31	13:30																	
32	13:45																	
33	14:00	14:37	15:12	42	7	35	31	13	18	73	20	53	36	4	32			
34	14:15																	
35	14:30																	
36	14:54	15:22	15:55	42	5	37	28	13	15	70	18	52	31	2	29			
37	15:00																	
38	15:15																	
39	15:30	16:10	16:40	54	18	36	24	16	8	78	34	44	41	13	28			
40	15:45																	
41	16:00																	
42	16:20	17:00	17:35	80	39	41	31	18	13	111	57	54	45	10	35			
43	16:30																	
44	16:45																	
45	17:00																	
46	17:15	18:04	18:25	62	12	50	3	1	2	65	13	52	57	12	45			
47	17:30																	
48	17:45																	
49	18:00																	
Average(6-8)				30	12	18	20	6	14	49	18	31	21	8	14			
Average				39	12	27	19	7	11	58	19	38	28	7	21			
Max(16:20)				80	39	41	31	18	13	111	57	54	45	10	35			
Min(17:15)				62	12	50	3	1	2	65	13	52	57	12	45			
Total				821	255	566	391	150	241	1,212	405	807	580	145	435			

Table 26-1-3 Result of passenger on board survey on Bus (East route,29/5/2008)

Route:Dongdok - Phonkheng - Khuadin Bus Station(Eastern Route)

Date:29/5/2008

No	Departure Time		Arriving Time	Passenger									Reference					
	CBS	Univ.		Bound for Univ.(Forward)			Bound for CBS(Backward)			All passengers			Passenger from CBS					
				Total	Student	Other	Total	Student	Other	Total	Student	Other	Total	Student	Other			
1	6:00																	
2	6:15																	
3	6:30	7:00	7:30	14	1	13	11	3	8	25	4	21	10			10		
4	6:45																	
5	7:00	7:36	8:17	29	18	11	33	2	31	62	20	42	19	10		9		
6	7:15																	
7	7:32	8:07	8:43	51	25	26	25	6	19	76	31	45	40	21		19		
8	7:45																	
9	8:00	8:36	9:15	44	12	32	22	3	19	66	15	51	31	7		24		
10	8:15																	
11	8:35	9:14	9:45	28	9	19	18	2	16	46	11	35	20	5		15		
12	8:45																	
13	9:08	9:36	10:10	33	6	27	25	6	19	58	12	46	28	4		24		
14	9:15																	
15	9:30	10:05	10:40	41	9	32	25	9	16	66	18	48	33	9		24		
16	9:45																	
17	10:05	10:45	11:14	36	3	33	10	2	8	46	5	41	20	1		19		
18	10:15																	
19	10:35	11:14	11:47	55	7	48	19	7	12	74	14	60	41	3		38		
20	10:45																	
21	11:10	11:42	12:13	38	11	27	32	14	18	70	25	45	34	9		25		
22	11:15																	
23	11:30	12:15	12:46	55	17	38	22	8	14	77	25	52	33	7		26		
24	11:45																	
25	12:00	12:40	13:01	75	27	48	8	4	4	83	31	52	46	12		34		
26	12:15																	
27	12:30	13:09	13:40	58	22	36	20	1	19	78	23	55	44	16		28		
28	12:45																	
29	13:00	13:40	14:10	33	5	28	15	5	10	48	10	38	23			23		
30	13:15																	
31	13:35	14:09	14:43	32	7	25	18	8	10	50	15	35	32	7		25		
32	13:45																	
33	14:05	14:40	15:10	45	11	34	16	4	12	61	15	46	37	9		28		
34	14:15																	
35	14:30	15:08	15:40	30	14	16	14	7	7	44	21	23	19	7		12		
36	14:45																	
37	15:07	15:37	16:13	32	6	26	23	12	11	55	18	37	29	4		25		
38	15:15																	
39	15:33	16:07	17:00	25	6	19	33	15	18	58	21	37	19	4		15		
40	15:45																	
41	16:00	16:45	17:25	59	13	46	22	14	8	81	27	54	39	2		37		
42	16:15																	
43	16:40	17:24	17:55	37	10	27	18	10	8	55	20	35	21	6		15		
44	16:45																	
45	17:00																	
46	17:15	17:56	18:30	34	14	20	7	1	6	41	15	26	24	10		14		
47	17:30																	
48	17:45																	
49	18:00																	
Average(6-8)				31	15	17	23	4	19	54	18	36	23	10			13	
Average				35	10	25	17	6	12	53	16	37	26	6				20
Max(12:0)				75	27	48	8	4	4	83	31	52	46	12				34
Min(17:15)				34	14	20	7	1	6	41	15	26	24	10				14
Total				884	253	631	436	143	293	1,320	396	924	642	153				489

Table 26-1-4 Result of passenger on board survey on Bus (East route,3/6/2008)

Route:Dongdok - Phonetong - Khuadin Bus Station(Central Route)

Date:3/6/2008

No	Departure Time		Arriving Time	Passenger									Reference		
	CBS	Univ.		Bound for Univ.(Forward)			Bound for CBS(Backward)			All passengers			Passenger from CBS		
				Total	Student	Other	Total	Student	Other	Total	Student	Other	Total	Student	Other
1	6:00														
2	6:15	6:55	7:38	22	1	21	23	8	15	45	9	36	16		16
3	6:30														
4	6:45	7:25	8:12	19	3	16	14	3	11	33	6	27	9		9
5	7:00														
6	7:12	8:00	8:43	22	4	18	27	1	26	49	5	44	15		15
7	7:30														
8	7:50	8:40	9:21	25	3	22	20	1	19	45	4	41	21	1	20
9	8:00														
10	8:15														
11	8:33	9:15	9:54	29	1	28	11		11	40	1	39	25	1	24
12	8:45														
13	9:00	9:45	10:25	32	1	31	27	7	20	59	8	51	27		27
14	9:15														
15	9:30	10:20	11:06	38	1	37	19	4	15	57	5	52	31	1	30
16	9:45														
17	10:00														
18	10:15	10:56	11:28	30	1	29	12		12	42	1	41	26		26
19	10:30														
20	10:40	11:30	12:13	31	4	27	16	7	9	47	11	36	26	1	25
21	11:00														
22	11:15														
23	11:25	12:11	12:50	51	5	46	18	2	16	69	7	62	38		38
24	11:45														
25	12:00	12:41	13:21	48	13	35	18	10	8	66	23	43	39	7	32
26	12:15														
27	12:30	13:30	14:10	42	6	36	19		19	61	6	55	33	1	32
28	12:45														
29	13:00														
30	13:15	13:58	14:45	32		32	16	3	13	48	3	45	26		26
31	13:30														
32	13:45	14:25	15:05	31	3	28	27	3	24	58	6	52	22		22
33	14:00														
34	14:15														
35	14:37	15:25	16:07	47	6	41	35	14	21	82	20	62	23		23
36	14:45														
37	15:10	15:58	16:46	46	17	29	28	8	20	74	25	49	33	9	24
38	15:15														
39	15:30	16:19	17:10	41	10	31	24	9	15	65	19	46	35	10	25
40	15:45														
41	16:00														
42	16:15														
43	16:30	17:17	18:00	46	5	41	21	11	10	67	16	51	33	3	30
44	16:45														
45	17:00	17:52	18:30	43		43	6	1	5	49	1	48	30		30
46	17:15														
47	17:30														
48	17:45														
49	18:00														
Average(6-8)				22	3	19	21	3	18	43	6	37	15	0	15
Average				29	4	26	17	4	13	46	8	38	22	1	21
Max(11:25)				51	5	46	18	2	16	69	7	62	38	-	38
Min(17:0)				43	-	43	6	1	5	49	1	48	30	-	30
Total				675	84	591	381	92	289	1,056	176	880	508	34	474

Table 26-1-5 Result of passenger on board survey on Bus (East route,4/6/2008)

Route:Dongdok - Phonetong - Khuadin Bus Station(Central Route)

Date:4/6/2008

No	Departure Time		Arriving Time	Passenger									Reference		
	CBS	Univ.		Bound for Univ.(Forward)			Bound for CBS(Backward)			All passengers			Passenger from CBS		
			CBS	Total	Student	Other	Total	Student	Other	Total	Student	Other	Total	Student	Other
1		6:00													
2	6:15	6:53	7:43	8	1	7	38	10	28	46	11	35	7		7
3	6:30														
4	6:50	7:30	8:17	18	5	13	21	3	18	39	8	31	6	1	5
5	7:00														
6	7:12														
7	7:30														
8	7:50	8:44	9:22	38	5	33	18		18	56	5	51	29		29
9	8:00														
10	8:15														
11	8:30														
12	8:50	9:41	10:20	35	1	34	21		21	56	1	55	28		28
13	9:00														
14	9:15														
15	9:30	10:23	11:04	40	1	39	23	8	15	63	9	54	35		35
16	9:45														
17	10:00														
18	10:15														
19	10:30	11:12	11:53	38		38	35	5	30	73	5	68	29		29
20	10:45														
21	11:00														
22	11:15	12:08	12:47	41	6	35	25	8	17	66	14	52	34	3	31
23	11:30														
24	11:45														
25	12:00	12:43	13:20	49	11	38	29	3	26	78	14	64	34	4	30
26	12:15														
27	12:22	13:05	13:45	37	4	33	25	2	23	62	6	56	30	2	28
28	12:45														
29	13:00														
30	13:10	14:03	14:45	35	5	30	22	4	18	57	9	48	28	3	25
31	13:30														
32	13:50	14:37	15:19	30		30	21	6	15	51	6	45	23		23
33	14:00														
34	14:15														
35	14:37	15:26	16:08	45	2	43	31	7	24	76	9	67	31	1	30
36	14:45														
37	15:00														
38	15:15	16:03	16:55	47	4	43	28	10	18	75	14	61	21	4	17
39	15:30														
40	15:45	16:45	17:25	53	9	44	22	6	16	75	15	60	35	3	32
41	16:00														
42	16:15														
43	16:33	17:23	18:03	49	15	34	6	1	5	55	16	39	36	10	26
44	16:45														
45	17:00														
46	17:25	18:13	18:41	28	3	25	5	3	2	33	6	27	17		17
47	17:30														
48	17:45														
49	18:00														
Average(6-8)				21	4	18	26	4	21	47	8	39	14	0	14
Average				31	4	27	19	4	15	51	8	43	22	2	21
Max(15:45)				53	9	44	22	6	16	75	15	60	35	3	32
Min(17:25)				28	3	25	5	3	2	33	6	27	17	-	17
Total				591	72	519	370	76	294	961	148	813	423	31	392

Table 26-1-6 Result of passenger on board survey on Bus (East route,5/6/2008)

Route:Dongdok - Phonetong - Khuadin Bus Station(Central Route)

Date:5/6/2008

No	Departure Time		Arriving Time	Passenger									Reference		
	CBS	Univ.		Bound for Univ.(Forward)			Bound for CBS(Backward)			All passengers			Passenger from CBS		
			CBS	Total	Student	Other	Total	Student	Other	Total	Student	Other	Total	Student	Other
1		6:00													
2	6:15	6:53	7:39	16		16	38	12	26	54	12	42	12		12
3	6:30														
4	6:40	7:27	8:16	11		11	29	8	21	40	8	32	8		8
5	7:00														
6	7:10	8:03	8:41	22	1	21	26	2	24	48	3	45	16		16
7	7:30														
8	7:45	8:35	9:18	35	8	27	32		32	67	8	59	16		16
9	8:00														
10	8:25	9:11	9:54	20	1	19	23	1	22	43	2	41	14	1	13
11	8:33														
12	8:45														
13	9:10	9:56	10:32	39	1	38	23	6	17	62	7	55	25	1	24
14	9:15														
15	9:30														
16	9:45	10:24	11:10	34	2	32	33	4	29	67	6	61	27	1	26
17	10:00														
18	10:15	11:04	11:52	31	1	30	40	3	37	71	4	67	28		28
19	10:35	11:11	12:05	31	3	28	20	3	17	51	6	45	28	3	25
20	10:45														
21	11:00														
22	11:15														
23	11:30	12:18	12:53	43	8	35	15	6	9	58	14	44	29	1	28
24	11:45														
25	12:05	12:53	13:30	37	5	32	6	1	5	43	6	37	25		25
26	12:15														
27	12:35	13:17	13:57	28	1	27	20	3	17	48	4	44	21		21
28	12:45														
29	13:00														
30	13:15														
31	13:20	14:03	14:40	27	3	24	18	4	14	45	7	38	20	1	19
32	13:55	14:37	15:25	26	2	24	23	5	18	49	7	42	24	2	22
33	14:00														
34	14:15														
35	14:25	15:06	15:45	35	3	32	14	6	8	49	9	40	22	2	20
36	14:45														
37	15:00														
38	15:05	15:49	16:33	31	2	29	31	10	21	62	12	50	22	1	21
39	15:30														
40	15:55	16:45	17:32	42	15	27	29	10	19	71	25	46	27	10	17
41	16:00														
42	16:15														
43	16:30	17:19	17:57	46	9	37	21	5	16	67	14	53	35	6	29
44	16:45														
45	17:00	-	(17:45)	26	6	20				26	6	20	20	6	14
46	17:15		Arriving at Univ.												
47	17:30														
48	17:45														
49	18:00														
Average(6-8)				21	2	19	31	6	26	52	8	45	13	-	13
Average				25	3	22	19	4	15	44	7	37	18	2	17
Max(16:30)				46	9	37	21	5	16	67	14	53	35	6	29
Min(17:0)				26	6	20	-	-	-	26	6	20	20	6	14
Total				580	71	509	441	89	352	1,021	160	861	419	35	384

**Passenger Maneuver at the Peak Hour (East Route)**

Table 26-2-1 Passenger Maneuver at the Peak Hour (East Route, 29/5/2008 7:32-8:07)

No	Bus Stop	Distance (km)	Cumulative distance (km)	Time	Passenger									Type of BUS STOP
					On Board			On			Off			
					Total	Student	Other	Total	Student	Other	Total	Student	Other	
0	CBS	0	0	7:32	40	21	19	40	21	19				
1	(E) 0247446(L) 1987886	0.1	0.1	7:34	41	21	20	1	0	1	0	0	0	
2	(E) 0247579(L) 1987947	0.1	0.2	7:35	42	21	21	1	0	1	0	0	0	
3	(E) 0247599(L) 1988049	0.1	0.3	7:36	43	21	22	1	0	1	0	0	0	Shelter
4	(E) 0247872(L) 1988550	0.6	0.9	7:37	45	21	24	2	0	2	0	0	0	
5	(E) 0248126(L) 1988826	0.4	1.3	7:38	46	22	24	1	1	0	0	0	0	Sign
6	(E) 0248825(L) 1989418	0.9	2.2	7:42	47	23	24	1	1	0	0	0	0	
7	(E) 0248933(L) 1989508	0.1	2.3	7:43	48	24	24	1	1	0	0	0	0	
8	(E) 0249031(L) 1989592	0.1	2.5	7:44	47	24	23	0	0	0	1	0	1	
9	(E) 0250072(L) 1991007	1.8	4.2	7:45	48	24	24	1	0	1	0	0	0	
10	(E) 0250614(L) 1991968	1.1	5.3	7:46	46	24	22	0	0	0	2	0	2	
11	(E) 0251037(L) 1993062	1.2	6.5	7:48	45	24	21	0	0	0	1	0	1	
12	(E) 0251407(L) 1994939	1.9	8.4	7:51	43	24	19	0	0	0	2	0	2	
13	(E) 0251348(L) 1995191	0.3	8.7	7:54	42	24	18	0	0	0	1	0	1	
14	(E) 0250396(L) 1995375	1.0	9.6	7:55	43	25	18	2	1	1	1	0	1	
15	(E) 0249975(L) 1995461	0.4	10.1	7:57	40	25	15	0	0	0	3	0	3	
16	(E) 0249808(L) 1995501	0.2	10.2	7:59	39	25	14	0	0	0	1	0	1	
17	(E) 0249397(L) 1995576	0.4	10.7	7:59	34	22	12	0	0	0	5	3	2	
18	(E) 0249383(L) 1996012	0.4	11.1	8:01	33	21	12	0	0	0	1	1	0	
19	(E) 0249459(L) 1996159	0.2	11.3	8:02	19	10	9	0	0	0	14	11	3	
20	(E) 0249721(L) 1996460	0.4	11.7	8:04	10	6	4	0	0	0	9	4	5	Sign
21	(E) 0249827(L) 1996431	0.1	11.8	8:07	0	0	0	0	0	0	10	6	4	

\*)Distance is calculated between two bus stops by specified Latitude and Longitude



**Bus travel Time**

Table 26-3-1 Bus travel time of East route

Route:Dongdok - Phonkheng - Khuadin Bus Station(East Route)  
Distance: 12.1km(from CBS to UOL)

Date	No	Departure time		Head way (minute)		Arrival time at CBS	Travel time(Minute)			Average travel speed(Km/h)		
		CBS	UOL	CBS	UOL		to UOL	to CBS	Total	to UOL	to CBS	Total
Date:27/5/2008	1	6:30	7:14	-	-	7:50	44	36	80	17	20	18
	2	7:10	7:55	40	41	8:31	45	36	81	16	20	18
	3	8:13	8:46	63	51	9:18	33	32	65	22	23	22
	4	9:00	9:31	47	45	10:10	31	39	70	23	19	21
	5	9:40	10:14	40	43	10:44	34	30	64	21	24	23
	6	10:30	11:16	50	62	11:46	46	30	76	16	24	19
	7	11:00	11:44	30	28	12:15	44	31	75	16	23	19
	8	12:00	12:46	60	62	13:15	46	29	75	16	25	19
	9	12:37	13:05	37	19	13:27	28	22	50	26	33	29
	10	13:30	14:02	53	57	14:45	32	43	75	23	17	19
	11	14:00	14:32	30	30	14:53	32	21	53	23	35	27
	12	15:08	15:49	68	77	16:23	41	34	75	18	21	19
	13	15:36	16:10	28	21	16:45	34	35	69	21	21	21
	14	16:35	17:23	59	73	17:50	48	27	75	15	27	19
	15	17:20	18:01	45	38	18:24	41	23	64	18	32	23
Date:28/5/2008	1	6:30	6:59	-	-	7:40	29	41	70	25	18	21
	2	7:02	7:37	32	38	8:15	35	38	73	21	19	20
	3	7:35	8:10	33	33	8:45	35	35	70	21	21	21
	4	8:00	8:41	25	31	9:15	41	34	75	18	21	19
	5	8:39	9:14	39	33	9:36	35	22	57	21	33	25
	6	9:10	9:40	31	26	10:12	30	32	62	24	23	23
	7	9:30	10:08	20	28	10:40	38	32	70	19	23	21
	8	10:05	10:40	35	32	11:11	35	31	66	21	23	22
	9	10:35	11:06	30	26	11:41	31	35	66	23	21	22
	10	11:00	11:45	25	39	12:20	45	35	80	16	21	18
	11	11:47	12:18	47	33	12:43	31	25	56	23	29	26
	12	12:30	13:07	43	49	13:30	37	23	60	20	32	24
	13	13:15	13:46	45	39	14:16	31	30	61	23	24	24
	14	14:00	14:37	45	51	15:12	37	35	72	20	21	20
	15	14:54	15:22	54	45	15:55	28	33	61	26	22	24
	16	15:30	16:10	36	48	16:40	40	30	70	18	24	21
	17	16:20	17:00	50	50	17:35	40	35	75	18	21	19
	18	17:15	18:04	55	64	18:25	49	21	70	15	35	21
Date:298/5/2008	1	6:30	7:00	-	-	7:30	30	30	60	24	24	24
	2	7:00	7:36	30	36	8:17	36	41	77	20	18	19
	3	7:32	8:07	32	31	8:43	35	36	71	21	20	20
	4	8:00	8:36	28	29	9:15	36	39	75	20	19	19
	5	8:35	9:14	35	38	9:45	39	31	70	19	23	21
	6	9:08	9:36	33	22	10:10	28	34	62	26	21	23
	7	9:30	10:05	22	29	10:40	35	35	70	21	21	21
	8	10:05	10:45	35	40	11:14	40	29	69	18	25	21
	9	10:35	11:14	30	29	11:47	39	33	72	19	22	20
	10	11:10	11:42	35	28	12:13	32	31	63	23	23	23
	11	11:30	12:15	20	33	12:46	45	31	76	16	23	19
	12	12:00	12:40	30	25	13:01	40	21	61	18	35	24
	13	12:30	13:09	30	29	13:40	39	31	70	19	23	21
	14	13:00	13:40	30	31	14:10	40	30	70	18	24	21
	15	13:35	14:09	35	29	14:43	34	34	68	21	21	21
	16	14:05	14:40	30	31	15:10	35	30	65	21	24	22
	17	14:30	15:08	25	28	15:40	38	32	70	19	23	21
	18	15:07	15:37	37	29	16:13	30	36	66	24	20	22
	19	15:33	16:07	26	30	17:00	34	53	87	21	14	17
	20	16:00	16:45	27	38	17:25	45	40	85	16	18	17
	21	16:40	17:24	40	39	17:55	44	31	75	17	23	19
	22	17:15	17:56	35	32	18:30	41	34	75	18	21	19
Average		6:30-7:30		33	36		36	37	73	20	20	20
		10:30-12:30		36	36		39	29	68	19	25	21
		15:30-17:00		38	43		41	36	77	18	20	19
		All day		37	38		37	32	69	20	22	21

■ Peak hour at CBS) Morning class: 6:30-7:30 Evening class:10:30-12:30 Night Class:15:30-17:00

\* Average of "Average travel speed" is harmonic mean.

Table 26-3-2 Bus travel time of Central route

Route:Dongdok - Phonetong - Khuadin Bus Station(Central Route)  
Distance: 11.2km(from CBS to UOL)

Date	No	Departure time		Head way (minute)		Arrival time at CBS	Travel time(Minute)			Average travel speed(Km/h)		
		CBS	UOL	CBS	UOL		to UOL	to CBS	Total	to UOL	to CBS	Total
Date:3/6/2008	1	6:15	6:55	-	-	7:38	40	43	83	17	16	16
	2	6:45	7:25	30	30	8:12	40	47	87	17	14	15
	3	7:12	8:00	27	35	8:43	48	43	91	14	16	15
	4	7:50	8:40	38	40	9:21	50	41	91	13	16	15
	5	8:33	9:15	43	35	9:54	42	39	81	16	17	17
	6	9:00	9:45	27	30	10:25	45	40	85	15	17	16
	7	9:30	10:20	30	35	11:06	50	46	96	13	15	14
	8	10:15	10:56	45	36	11:28	41	32	73	16	21	18
	9	10:40	11:30	25	34	12:13	50	43	93	13	16	14
	10	11:25	12:11	45	41	12:50	46	39	85	15	17	16
	11	12:00	12:41	35	30	13:21	41	40	81	16	17	17
	12	12:30	13:30	30	49	14:10	60	40	100	11	17	13
	13	13:15	13:58	45	28	14:45	43	47	90	16	14	15
	14	13:45	14:25	30	27	15:05	40	40	80	17	17	17
	15	14:37	15:25	52	60	16:07	48	42	90	14	16	15
	16	15:10	15:58	33	33	16:46	48	48	96	14	14	14
	17	15:30	16:19	20	21	17:10	49	51	100	14	13	13
	18	16:30	17:17	60	58	18:00	47	43	90	14	16	15
	19	17:00	17:52	30	35	18:30	52	38	90	13	18	15
Date:4/6/2008	1	6:15	6:53	-	-	7:43	38	50	88	18	13	15
	2	6:50	7:30	35	37	8:17	40	47	87	17	14	15
	3	7:50	8:44	60	74	9:22	54	38	92	12	18	15
	4	8:50	9:41	60	57	10:20	51	39	90	13	17	15
	5	9:30	10:23	40	42	11:04	53	41	94	13	16	14
	6	10:30	11:12	60	49	11:53	42	41	83	16	16	16
	7	11:15	12:08	45	56	12:47	53	39	92	13	17	15
	8	12:00	12:43	45	35	13:20	43	37	80	16	18	17
	9	12:22	13:05	22	22	13:45	43	40	83	16	17	16
	10	13:10	14:03	48	58	14:45	53	42	95	13	16	14
	11	13:50	14:37	40	34	15:19	47	42	89	14	16	15
	12	14:37	15:26	47	49	16:08	49	42	91	14	16	15
	13	15:15	16:03	38	37	16:55	48	52	100	14	13	13
	14	15:45	16:45	30	42	17:25	60	40	100	11	17	13
	15	16:33	17:23	48	38	18:03	50	40	90	13	17	15
	16	17:25	18:13	52	50	18:41	48	28	76	14	24	18
Date:5/6/2008	1	6:15	6:53	-	-	7:39	38	46	84	18	15	16
	2	6:40	7:27	25	34	8:16	47	49	96	14	14	14
	3	7:10	8:03	30	36	8:41	53	38	91	13	18	15
	4	7:45	8:35	35	32	9:18	50	43	93	13	16	14
	5	8:25	9:11	40	36	9:54	46	43	89	15	16	15
	6	9:10	9:56	45	45	10:32	46	36	82	15	19	16
	7	9:45	10:24	35	28	11:10	39	46	85	17	15	16
	8	10:15	11:04	30	40	11:52	49	48	97	14	14	14
	9	10:35	11:11	20	7	12:05	36	54	90	19	12	15
	10	11:30	12:18	55	67	12:53	48	35	83	14	19	16
	11	12:05	12:53	35	35	13:30	48	37	85	14	18	16
	12	12:35	13:17	30	24	13:57	42	40	82	16	17	16
	13	13:20	14:03	45	46	14:40	43	37	80	16	18	17
	14	13:55	14:37	35	34	15:25	42	48	90	16	14	15
	15	14:25	15:06	30	29	15:45	41	39	80	16	17	17
	16	15:05	15:49	40	43	16:33	44	44	88	15	15	15
	17	15:55	16:45	50	56	17:32	50	47	97	13	14	14
	18	16:30	17:19	35	34	17:57	49	38	87	14	18	15
	19	17:00	17:45) Arriva	30	-	-	45	-	-	15	-	-
Average	6:30-7:30		35	40		47	44	91	14	16	15	
	10:30-12:30		37	37		46	40	86	15	17	15	
	15:30-17:00		38	40		50	44	94	13	15	14	
	All day		38	39		46	42	89	14	16	15	

■ Peak hour at CBS Morning class: 6:30-7:30 Evening class:10:30-12:30 Night Class:15:30-17:00

\* Average of "Average travel speed" is harmonic mean.

**LOS of BUS service**

Highway Capacity Manual 2000 (HCM2000) defines Level of service of Bus. Criteria are given Tables 26-4-1 to 4.

**Table 26-4-1 Service Frequency LOS for Urban Scheduled Transit Service**

LOS	Headway(min)	Veh/h	Comments
A	< 10	>6	Passengers don't need schedules
B	= 10-14	5-6	Frequent services; passengers consult schedules
C	> 14-20	3-4	Maximum desirable time to wait if bus/train missed
D	> 20-30	2	Service unattractive to choice riders
E	> 30-60	1	Service available during hour
F	> 60	< 1	Service unattractive to all riders

Source: HCM2000

**Table 26-4-2 Hours of Service LOS**

LOS	Hours per Day	Comments
A	> 18-24	Night or owl service provided
B	> 16-18	Late evening service provided
C	> 13-16	Early evening service provided
D	> 11-13	Daytime service provided
E	> 3-11	Peak-hour service/limited midday service
F	0-3	Very limited or no service

Notes:

Fixed route: number of hours per day when service is provided at least once an hour.

Paratransit: number of hours per day when service is offered.

Source: HCM2000

**Table 26-4-3 Passenger Load LOS**

LOS	Bus		Comments
	m <sup>2</sup> /p	p/seat	
A	> 1.20	0.00-0.50	No passenger need sit next to another
B	0.80-1.20	0.51-0.75	Passengers can choose where to sit
C	0.60-0.79	0.76-1.00	All passengers can sit
D	0.50-0.59	1.01-1.25	Comfortable loading for standees
E	0.40-0.49	1.26-1.50	Maximum schedule load
F	< 0.40	> 1.50	Crush loads

Note:

"p/seat" is approximate values for comparison. LOS that is based on area per passenger.

Source: HCM2000

**Table 26-4-4 Reliability LOS for On-Time performance**

LOS	Hours per Day	Comments
A	97.5-100.0	1 late bus per month
B	95.0-97.4	2 late buses per month
C	90.0-94.9	1 late bus per week
D	85.0-89.9	
E	80.0-84.9	1 late bus per direction per week
F	< 80.0	

Notes:

Applies to routes with frequencies of fewer than 6 buses/h scheduled.

a. User perspective, based on 5 round trips/week of their travel on a particular transit route with no transfers.

On-time = 0-5 min late departing published time point (fixed route)

arrival within 10 min of scheduled pickup time (deviated fixed route)

arrival within 20 min of scheduled pickup time (paratransit)

Source: HCM2000

**Traffic flow at Intersections**

Table 26-5-2 Hourly traffic flow volume of Intersection T4(22/5/2008)

Location T4/2

		Direction		Vehicle number		Direction		Vehicle number		Total Vehicle from leg 1		Total Vehicle of Intersection	
		From	To	in Veh's	in PCU's	From	To	in Veh's	in PCU's	in Veh's	in PCU's	in Veh's	in PCU's
1	6:00-7:00	1	2	190	140	1	3	72	37	262	177	705	432
2	7:00-8:00	1	2	589	302	1	3	548	203	1,137	505	3,200	1,502
3	8:00-9:00	1	2	552	325	1	3	728	284	1,280	609	3,140	1,588
4	9:00-10:00	1	2	472	332	1	3	325	139	797	471	1,730	1,022
5	10:00-11:00	1	2	470	319	1	3	250	120	720	439	1,709	979
6	11:00-12:00	1	2	644	383	1	3	255	111	899	494	2,163	1,169
7	12:00-13:00	1	2	411	287	1	3	754	278	1,165	565	2,579	1,271
8	13:00-14:00	1	2	390	257	1	3	371	133	761	390	1,766	956
9	14:00-15:00	1	2	444	302	1	3	208	96	652	398	1,675	982
10	15:00-16:00	1	2	581	392	1	3	304	123	885	515	2,178	1,175
11	16:00-17:00	1	2	927	511	1	3	844	327	1,771	838	4,102	1,868
12	17:00-18:00	1	2	788	467	1	3	778	298	1,566	765	3,280	1,588
13	18:00-19:00	1	2	470	297	1	3	323	132	793	429	2,188	1,076
14	19:00-20:00	1	2	608	322	1	3	150	58	758	380	2,354	1,067
15	20:00-21:00	1	2	729	354	1	3	118	51	847	405	2,616	1,109
16	21:00-22:00	1	2	201	132	1	3	60	26	261	158	756	409
16-hr Traffic				8,466	5,122			6,088	2,416	14,554	7,538	36,141	18,193
Peak(16:00-17:00)				927	511			844	327	1,771	838	4,102	1,868
Average				529	320			381	151	910	471	2,259	1,137

		Direction		Vehicle number		Direction		Vehicle number		Total Vehicle from leg 2		Total Vehicle of Intersection	
		From	To	in Veh's	in PCU's	From	To	in Veh's	in PCU's	in Veh's	in PCU's	in Veh's	in PCU's
1	6:00-7:00	2	1	308	189	2	3	38	18	346	207	705	432
2	7:00-8:00	2	1	1,188	614	2	3	343	133	1,531	747	3,200	1,502
3	8:00-9:00	2	1	1,129	645	2	3	297	116	1,426	761	3,140	1,588
4	9:00-10:00	2	1	502	358	2	3	132	52	634	410	1,730	1,022
5	10:00-11:00	2	1	408	299	2	3	98	41	506	340	1,709	979
6	11:00-12:00	2	1	536	368	2	3	72	32	608	400	2,163	1,169
7	12:00-13:00	2	1	600	381	2	3	305	121	905	502	2,579	1,271
8	13:00-14:00	2	1	485	328	2	3	166	59	651	387	1,766	956
9	14:00-15:00	2	1	453	335	2	3	80	34	533	369	1,675	982
10	15:00-16:00	2	1	523	352	2	3	123	50	646	402	2,178	1,175
11	16:00-17:00	2	1	789	438	2	3	315	125	1,104	563	4,102	1,868
12	17:00-18:00	2	1	640	383	2	3	339	137	979	520	3,280	1,588
13	18:00-19:00	2	1	559	322	2	3	128	52	687	374	2,188	1,076
14	19:00-20:00	2	1	553	294	2	3	100	40	653	334	2,354	1,067
15	20:00-21:00	2	1	406	213	2	3	91	38	497	251	2,616	1,109
16	21:00-22:00	2	1	285	160	2	3	54	24	339	184	756	409
16-hr Traffic				9,364	5,679			2,681	1,072	12,045	6,751	36,141	18,193
Peak(16:00-17:00)				789	438			315	125	1,104	563	4,102	1,868
Average				585	355			168	67	753	422	2,259	1,137

		Direction		Vehicle number		Direction		Vehicle number		Total Vehicle from leg 3		Total Vehicle of Intersection	
		From	To	in Veh's	in PCU's	From	To	in Veh's	in PCU's	in Veh's	in PCU's	in Veh's	in PCU's
1	6:00-7:00	3	1	83	43	3	2	14	5	97	48	705	432
2	7:00-8:00	3	1	441	205	3	2	91	45	532	250	3,200	1,502
3	8:00-9:00	3	1	325	170	3	2	109	48	434	218	3,140	1,588
4	9:00-10:00	3	1	202	97	3	2	97	44	299	141	1,730	1,022
5	10:00-11:00	3	1	380	160	3	2	103	40	483	200	1,709	979
6	11:00-12:00	3	1	463	190	3	2	193	85	656	275	2,163	1,169
7	12:00-13:00	3	1	348	142	3	2	161	62	509	204	2,579	1,271
8	13:00-14:00	3	1	250	134	3	2	104	45	354	179	1,766	956
9	14:00-15:00	3	1	334	151	3	2	156	64	490	215	1,675	982
10	15:00-16:00	3	1	485	194	3	2	162	64	647	258	2,178	1,175
11	16:00-17:00	3	1	877	341	3	2	350	126	1,227	467	4,102	1,868
12	17:00-18:00	3	1	537	220	3	2	198	83	735	303	3,280	1,588
13	18:00-19:00	3	1	496	189	3	2	212	84	708	273	2,188	1,076
14	19:00-20:00	3	1	698	261	3	2	245	92	943	353	2,354	1,067
15	20:00-21:00	3	1	833	297	3	2	439	156	1,272	453	2,616	1,109
16	21:00-22:00	3	1	94	43	3	2	62	24	156	67	756	409
16-hr Traffic				6,846	2,837			2,696	1,067	9,542	3,904	36,141	18,193
Peak(16:00-17:00)				877	341			350	126	1,227	467	4,102	1,868
Average				428	177			169	67	596	244	2,259	1,137

Direction1:Thirteen South Junction

Direction2:Tanmixay

Direction3:Faculty Forestry

