

The Study on Integrated Development Strategy for  
Danang City and its Neighboring Area in  
the Socialist Republic of Vietnam  
(DaCRISS)

Progress in  
Formulation of Long-term Urban  
Transport Network

19 June 2009

JICA Study Team

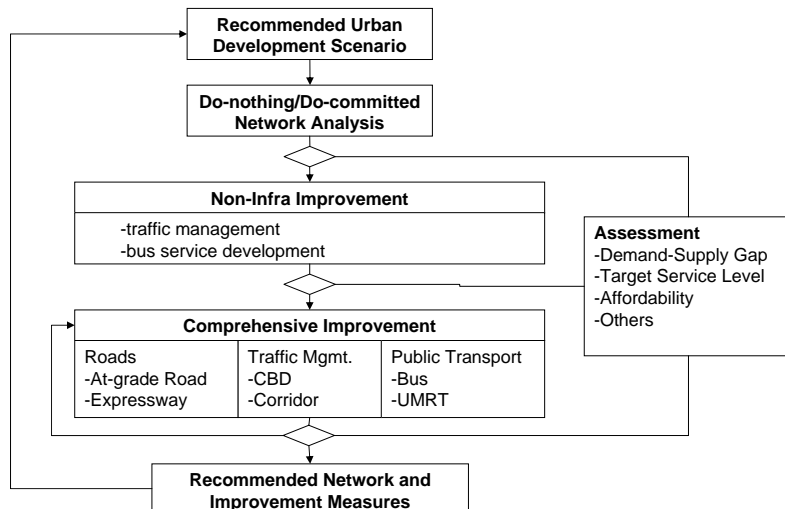
TOPICS

Formulation of Long-term Urban Transport Network

- Planning Methodology
- Analysis of Do-nothing/Do-committed Cases
- Transport Corridor Development
- Alternative Network Plans
- Next Steps

Planning Methodology

Framework for Network Analysis and Planning

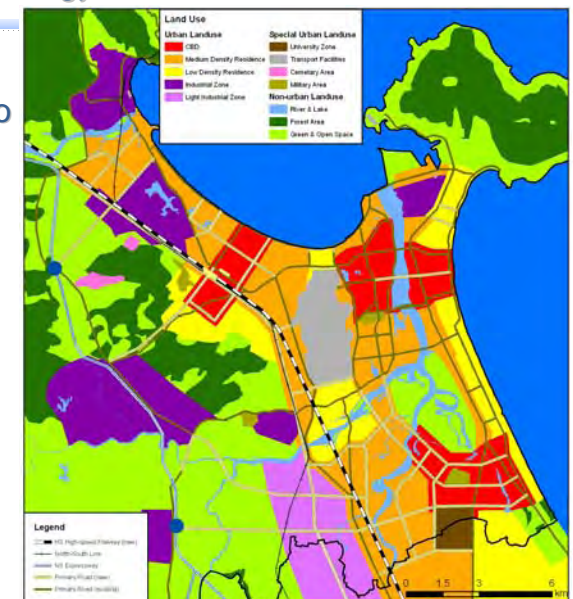


Planning Methodology

Proposed Urban Development Scenario (provisional)

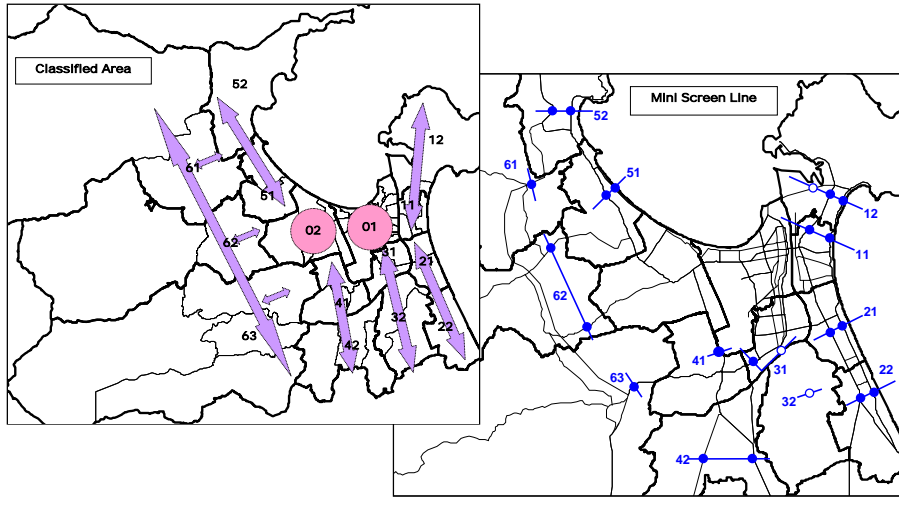
- Population: 2.1 million
- 3 urban centers
- TOD (Transit Oriented Development) on north-south axis

Note: Land use and socio-economic framework for Scenario 3 are being finalized in coordination with Danang PC)



## Planning Methodology

### Classified Zoning and Mini Screen Lines for Analysis



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## Planning Methodology

### Indicators obtained from traffic assignment

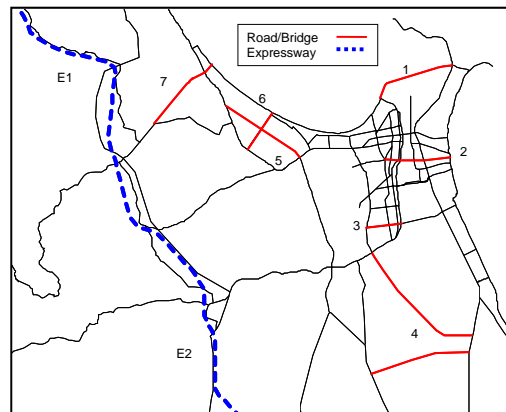
- ❖ Total Traffic Demand (PCU)
  - ❖ Traffic Load
    - PCU-km
    - PCU-hours
- ❖ Travel Features
  - Average Travel Speed (kph)
  - Average V/C (Volume/Capacity) Ratio
- ❖ Transport Cost (US\$)
  - VOC (Vehicle Operation Cost)
  - TTC (Travel Time Cost)
  - Total Cost

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## Analysis of Do-nothing/Do-committed Cases

### Do-committed Network

Existing + On-going and Committed Projects  
(including completed projects after Sep.2008)



No.	Project Name
1	Thuan Phuoc Bridge
2	a. Dragon Bridge b. Ext. of Nguyen Van Linh c. New Road to Son Tra Dien Ngoc
3	Road from Tuyen Son Bridge to N. Tri Phuong
4	a. Nguyen Huu Tho Road (CMTT-Hoa Quy) including Hoa Xuan Bridge b. Southern Road (NH1A-Tran Dai Nghia)
5	Parallel road of NH1A in Lien Chieu
6	Road from Administrative Centre of Lien Chieu Dist. to N. Tat Thanh
7	Road from N. Tat Thanh to Provincial Road 602
E1	Quang Tri - Danang Expressway
E2	Danang - Quang Ngai Expressway

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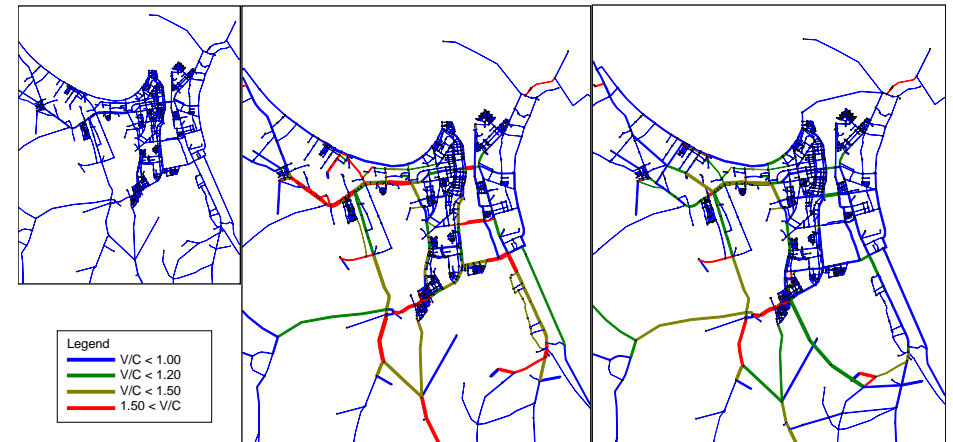
## Analysis of Do-nothing/Do-committed Cases

### Assigned Traffic

Existing (2008)

Do-nothing (2025) <sup>1)</sup>

Do-committed (2025) <sup>1),2)</sup>



1) Assumed modal share (%) of motorcycle, car and bus: 50/20/30, Average occupancy: motorcycle 1.3, car 2.0 and bus 36  
2) Expressway is not included

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## Analysis of Do-nothing/Do-committed Cases

### Assessment by Area

Corridor/Area		Existing (2008) 1)			Do-nothing (2025) 2)		Do-committed (2025) 3)		
		Capacity (000 PCU-km)	Traffic Vol. (000 PCU-km)	V/C Ratio	Traffic Vol. (000 PCU-km)	V/C Ratio	Capacity (000 PCU-km)	Traffic Vol. (000 PCU-km)	V/C Ratio
CBD	01 Hai Chau	2,079	670	0.3	1,810	<b>0.8</b>	2,514	1,749	<b>0.7</b>
	02 Thanh Khe	750	297	0.4	1,147	<b>1.1</b>	1,377	1,135	<b>0.8</b>
1. Son Tra	11 Inner	722	162	0.2	527	0.7	954	525	0.6
	12 Outer	379	63	0.2	170	0.4	673	237	0.4
2. NHS Coastal	21 Inner	756	149	0.2	940	<b>1.2</b>	793	629	<b>0.8</b>
	22 Outer	615	111	0.2	723	<b>0.9</b>	865	583	<b>0.7</b>
3. NHS Central	31 Inner	676	213	0.3	969	<b>0.9</b>	1,147	891	<b>0.8</b>
	32 Outer	52	7	0.1	180	<b>1.1</b>	1,045	812	<b>0.8</b>
4. NH1 South	41 Inner	681	210	0.3	948	<b>1.4</b>	684	915	<b>1.3</b>
	42 Outer	622	206	0.3	836	<b>0.9</b>	964	701	<b>0.7</b>
5. Lien Chieu	51 Inner	868	170	0.2	572	0.6	1,126	477	0.4
	52 Outer	1,383	150	0.1	405	0.3	1,383	384	0.3
6. Rural	61 HV North	1,558	19	0.0	600	0.3	1,645	535	0.3
	62 HV Central	1,314	61	0.1	540	0.4	1,382	523	0.4
	63 HV South	1,628	106	0.1	805	0.5	1,628	843	0.5
City Total		14,082	2,594	0.2	11,172	0.7	18,179	10,939	0.6

- 1) Excluding roads with no traffic volume assigned  
 2) Assumed modal share (%) of motorcycle, car and bus: 50/20/30, Average occupancy: motorcycle 1.3, car 2.0 and bus 36  
 3) Expressway is not included

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## Analysis of Do-nothing/Do-committed Cases

### Assessment by Section

Screen Line/Section			No. of lanes	Capacity (000 PCU)	Existing (2008)		Do-nothing (2025) 1)		Do-committed (2025) 1)2)	
					Traffic vol. (000 PCU)	V/C Ratio	Traffic vol. (000 PCU)	V/C Ratio	Traffic vol. (000 PCU)	V/C Ratio
1. Son Tra	11 Inner (S)	Ngo Quyen	4	56.3	17.1	0.3	32.0	0.6	22.5	0.4
		SonTra-DienNgoc	4	56.3	1.7	0.0	14.3	0.3	16.1	0.3
	12 Outer (N)	Ngo Quyen	4	56.3	12.7	0.2	18.1	0.3	19.6	0.4
		SonTra-DienNgoc	4	56.3	1.7	0.0	8.2	0.1	8.9	0.2
		Thuan Phuoc Br.	4	56.3	-	-	-	-	20.5	0.4
2. NHS Coastal	21 Inner (N)	Le Van Hien	4	56.3	16.3	0.3	116.1	<b>2.1</b>	63.3	<b>1.1</b>
		Yersin	4	56.3	10.1	0.2	57.8	<b>1.0</b>	51.9	<b>0.9</b>
2. NHS Coastal	22 Outer (S)	Le Van Hien	4	56.3	12.1	0.2	74.4	<b>1.3</b>	44.5	<b>0.8</b>
		Yersin	4	56.3	10.1	0.2	57.8	<b>1.0</b>	51.9	<b>0.9</b>
3. NHS Central	31 Inner (N)	CMTT (NH14B)	4	56.3	24.1	0.4	72.1	<b>1.3</b>	55.2	<b>1.0</b>
		N. Huu Tho(PIIP)	6	85.0	-	-	-	-	91.2	<b>1.1</b>
	32 Outer (S)	N. Huu Tho(PIIP)	6	85.0	-	-	-	-	91.2	<b>1.1</b>
4. NH1 South	41 Inner (N)	Truong Chinh (NH1)	4	56.3	18.8	0.3	80.6	<b>1.4</b>	72.9	<b>1.3</b>
	42 Outer (S)	NH1A PR605	4	56.3	16.8	0.3	80.6	<b>1.4</b>	61.6	<b>1.1</b>
			4	61.4	7.4	0.1	75.7	<b>1.2</b>	75.6	<b>1.1</b>
5. Lien Chieu	51 Inner (E)	N. Tat Thanh	4	56.3	0.4	0.0	22.2	0.4	13.1	0.2
		N.LuongBang(NH1)	4	56.3	19.1	0.3	38.8	0.7	28.7	0.5
5. Lien Chieu	52 Outer (W)	N. Van Cu	4	55.6	0.0	0.0	1.2	0.0	1.2	0.0
		NH1 (Haivan Tunnel)	4	56.3	13.6	0.2	31.8	0.6	31.8	0.6
6. Rural	61 HV North	NH1A Bypass	4	43.2	0.2	0.0	11.4	0.3	16.7	0.4
	62 HV Central	PR602	4	55.6	0.4	0.1	36.9	0.7	37.4	0.7
		Hoang Van Thai	2	19.6	0.0	0.0	8.7	0.4	3.7	0.2
	63 HV South	NH14B	4	56.3	13.3	0.2	62.9	<b>1.1</b>	71.8	<b>1.3</b>

- 1) Assumed modal share (%) of motorcycle, car and bus: 50/20/30, Average occupancy: motorcycle 1.3, car 2.0 and bus 36  
 2) Expressway is not included

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## Transport Corridor Development

### Development Requirement and Alternative Solutions

Corridor/Area		Existing Road		Required No. of Lanes 1), 2)	Possibility of Road Dev't 3)		Alternative Solutions 4)						
		No. of Roads	Total No. Lanes		Wide ning	New Road	Traffic Mgmt.		Road Development			UMRT	
							Traffic Mgmt.	TDM	Widen ing	New Road (at-grade)	New Road (elevat ed)		
CBD	01 Hai Chau	-	-	-	C	C	A	A	B	B	A	A	A
	02 Thanh Khe	-	-	-	C	C	A	A	B	B	A	A	A
1. Son Tra	11 Inner	2	8	-	B	B	A	B	A	B	B	A	A
	12 Outer	2	8	-	B	B	A	B	A	A	B	C	B
2. NHS Coastal	21 Inner	2	8	<b>6</b>	B	B	A	B	A	B	B	A	A
	22 Outer	2	8	<b>2</b>	B	B	B	B	B	A	A	C	A
3. NHS Central	31 Inner	1	4	<b>2</b>	B	B	A	B	A	B	B	A	A
	32 Outer	0	0	-	B	B	B	B	B	A	C	A	A
4. NH1 South	41 Inner	1	4	<b>3</b>	B	B	A	C	A	A	A	C	B
	42 Outer	2	8	<b>4</b>	B	B	B	C	B	A	A	C	C
5. Lien Chieu	51 Inner	2	8	-	B	B	A	B	A	B	B	B	B
	52 Outer	2	8	-	B	B	B	C	B	A	A	C	C
6. Rural	61 HV North	1	4	-	B	B	B	C	B	A	A	C	C
	62 HV Central	2	6	-	B	B	B	C	B	A	A	C	C
	63 HV South	1	4	<b>1</b>	B	B	B	C	B	A	A	C	C

- 1) Estimated based on the Do-nothing situation, assuming a standard capacity of 10,000 PCU/lane/day  
 2) Assumed modal share (%) of motorcycle, car and bus: 50/20/30, Average occupancy: motorcycle 1.3, car 2.0 and bus 36  
 3) Possibility of road development: A-possible, B-possible with some difficulty, C-difficult  
 4) Assessment of alternative solutions: A-recommended, B-for consideration, C-not recommended

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## Alternative Network Plans

### Different Modal Share Scenarios

Modal Policy	Description	Mode	Share (%)	Average Occupancy
Base Scenario	Bus Service Improvement Control of Car Use At-grade Road Network	Motorcycle	50	1.3
		Car	15	2.0
		Bus	35	36
Alternative Scenario	1. Present Modal Share	Motorcycle	94	1.3
		Car	2	2.0
	Bus	4	15	
	2. Trend Modal Share	Motorcycle	70	1.3
Car		20	2.0	
Bus	10	15		
3. Strong Bus Service Improvement	Motorcycle	35	1.3	
	Car	15	2.0	
	Bus	50	50	
4. Increase in Car Use	Motorcycle	60	1.3	
	Car	30	2.0	
	Bus	10	15	

### Efficiency of Road Space Utilization by Transport Mode

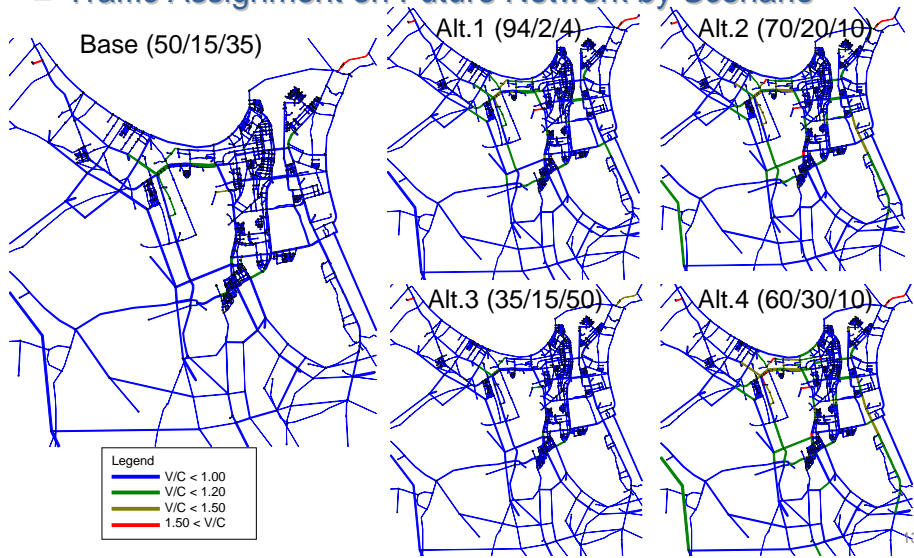
Mode	Car	Motorcycle	Bus
Average Occupancy	2.0	1.3	15 - 36
PCU	1.0	0.4	2.0
No. of Passengers per PCU	2	3	8 - 18

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## Alternative Network Plans

### Traffic Assignment on Future Network by Scenario



## Alternative Network Plans

### Performance of Future Network by Area (Daily Ave.)

Corridor/Area		Average V/C by Area				
		Base 50/15/35	Alt.1 94/2/4	Alt.2 70/20/10	Alt.3 35/15/50	Alt.4 60/30/10
CBD	01 Hai Chau	0.6	0.6	0.7	0.5	0.7
	02 Thanh Khe	0.6	0.6	0.7	0.5	0.7
1. Son Tra	11 Inner	0.5	0.6	0.6	0.4	0.7
	12 Outer	0.3	0.4	0.5	0.3	0.5
2. NHS Coastal	21 Inner	0.7	<b>0.8</b>	<b>0.8</b>	0.6	<b>0.9</b>
	22 Outer	0.4	0.5	0.6	0.3	0.5
3. NHS Central	31 Inner	0.6	0.7	0.7	0.6	0.7
	32 Outer	0.3	0.4	0.5	0.3	0.5
4. NH1 South	41 Inner	0.7	0.7	<b>0.8</b>	0.6	<b>0.9</b>
	42 Outer	0.5	0.6	0.7	0.4	0.7
5. Lien Chieu	51 Inner	0.2	0.3	0.3	0.2	0.3
	52 Outer	0.2	0.2	0.2	0.2	0.2
6. Rural	61 HV North	0.1	0.1	0.2	0.1	0.2
	62 HV Central	0.2	0.2	0.3	0.2	0.3
	63 HV South	0.3	0.3	0.4	0.3	0.4
City Total		0.4	0.4	0.5	0.4	0.5

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## Alternative Network Plans

### Performance of Future Network (Daily Average)

Corridor/Area/Section			Daily Average V/C by Section				
			Base 50/15/35	Alt.1 94/2/4	Alt.2 70/20/10	Alt.3 35/15/50	Alt.4 60/30/10
1. Son Tra	11 Inner (S)	Ngo Quyen SonTra-DienNgoc	0.4 0.2	0.5 0.3	0.6 0.4	0.4 0.2	0.6 0.4
	12 Outer (N)	Ngo Quyen SonTra-DienNgoc Thuan Phuoc Br.	0.3 0.2 0.3	0.4 0.2 0.4	0.5 0.2 0.5	0.2 0.1 0.2	0.5 0.2 0.5
2. NHS Coastal	21 Inner (N)	Le Van Hien Yersin	0.9 0.6	1.0 0.8	1.4 0.8	0.9 0.5	1.4 0.9
	22 Outer (S)	Le Van Hien Yersin	0.7 0.6	0.8 0.8	1.1 0.8	0.6 0.5	1.1 0.9
3. NHS Central	31 Inner (N)	CMTT (NH14B) N. Huu Tho(PIIP) New Road	1.0 0.6 0.8	1.1 0.7 0.8	1.2 0.7 0.9	1.0 0.6 0.7	1.2 0.8 0.9
	32 Outer (S)	N. Huu Tho(PIIP) New Road	0.5 0.2	0.6 0.3	0.7 0.3	0.5 0.2	0.7 0.5
4. NH1 South	41 Inner (N)	Truong Chinh (NH1) New Road	0.9 0.9	1.0 0.9	1.1 1.0	0.9 0.8	1.1 1.0
	42 Outer (S)	NH1A PR605 New Road	0.5 0.0 0.2	0.6 0.0 0.3	0.6 0.0 0.4	0.5 0.0 0.2	0.7 0.0 0.6
5. Lien Chieu	51 Inner (E)	N. Tat Thanh N.LuongBang(NH1)	0.2 0.3	0.2 0.3	0.2 0.4	0.2 0.3	0.3 0.4
	52 Outer (W)	N. Van Cu NH1 (Haivan Tunnel)	0.0 0.3	0.0 0.4	0.0 0.4	0.0 0.3	0.0 0.4
6. Rural	61 HV North	NH1A Bypass New Road	0.3 0.2	0.3 0.3	0.3 0.2	0.3 0.2	0.4 0.3
	62 HV Central	PR602 Hoang Van Thai New Road	0.1 0.2 0.4	0.1 0.2 0.5	0.2 0.3 0.6	0.1 0.2 0.3	0.2 0.4 0.7
	63 HV South	NH14B New Road	0.6 0.5	0.6 0.6	0.7 0.7	0.5 0.4	0.7 0.8

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## Alternative Network Plans

### Performance of Future Network (Peak Hour)

Corridor/Area/Section			Peak Hour (15%) V/C by Section				
			Base 50/15/35	Alt.1 94/2/4	Alt.2 70/20/10	Alt.3 35/15/50	Alt.4 60/30/10
1. Son Tra	11 Inner (S)	Ngo Quyen SonTra-DienNgoc	1.3 0.7	1.5 1.0	1.8 1.2	1.1 0.5	1.9 1.3
	12 Outer (N)	Ngo Quyen SonTra-DienNgoc Thuan Phuoc Br.	0.8 0.5 0.8	1.1 0.5 1.1	1.4 0.6 1.4	0.7 0.4 0.5	1.5 0.7 1.5
2. NHS Coastal	21 Inner (N)	Le Van Hien Yersin	2.9 1.8	3.1 2.3	4.1 2.5	2.6 1.5	4.3 2.6
	22 Outer (S)	Le Van Hien Yersin	2.0 1.8	2.3 2.3	3.2 2.5	1.8 1.5	3.4 2.6
3. NHS Central	31 Inner (N)	CMTT (NH14B) N. Huu Tho(PIIP) New Road	3.1 2.0 2.3	3.4 2.0 2.5	3.5 2.3 2.8	3.0 1.9 2.1	3.6 2.5 2.8
	32 Outer (S)	N. Huu Tho(PIIP) New Road	1.6 0.7	1.8 0.9	2.1 1.0	1.5 0.6	2.0 1.4
4. NH1 South	41 Inner (N)	Truong Chinh (NH1) New Road	2.8 2.7	3.0 2.7	3.2 3.0	2.6 2.5	3.4 3.0
	42 Outer (S)	NH1A PR605 New Road	1.6 0.0 0.7	1.7 0.0 0.8	1.9 0.0 1.1	1.5 0.0 0.6	2.0 0.0 1.9
5. Lien Chieu	51 Inner (E)	N. Tat Thanh N.LuongBang(NH1)	0.5 0.9	0.5 1.0	0.7 1.1	0.5 0.8	0.8 1.1
	52 Outer (W)	N. Van Cu NH1 (Haivan Tunnel)	0.0 1.0	0.0 1.1	0.0 1.1	0.0 1.0	0.0 1.1
6. Rural	61 HV North	NH1A Bypass New Road	0.7 0.6	0.8 0.7	0.8 0.8	0.7 0.6	0.9 0.9
	62 HV Central	PR602 Hoang Van Thai New Road	0.2 0.0 0.6 1.1	0.3 0.0 0.7 1.5	0.5 0.0 1.1 1.9	0.0 0.0 0.5 0.9	0.5 0.0 1.2 2.0
	63 HV South	NH14B New Road	1.7 1.5	1.8 1.9	2.2 2.2	1.6 1.3	2.1 2.5

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## Alternative Network Plans

### Impact of Future Transport Network (tentative)

		2008	2025			2025/2008		
			Do-nothing	Do-committed	Future Net (prov.)	Do-nothing	Do-committed	Future Net (prov.)
Traffic Demand (mil. PCU)		424	1241	1241	1,241	2.9	2.9	2.9
Traffic Load	PCU0km (mil.)	2,594	11172	10939	6,036	4.3	4.2	2.3
	PCU-hrs. (mil.)	59	473	368	154	8.0	6.2	2.6
Travel Features	Ave. Travel Speed (kph)	44	24	30	39	0.5	0.7	0.9
	Ave. V/C Ratio	0.2	0.7	0.6	0.4	3.5	3.0	2.0
Transport Cost (mil. US\$)	Vehicle Operation Cost	284	1,921	1,662	799	6.8	5.9	2.8
	Travel Time Cost	360	6,307	4,867	2,096	17.5	13.5	5.8
	Total Cost	644	8,228	6,529	2,895	12.8	10.1	4.5

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## Next Steps

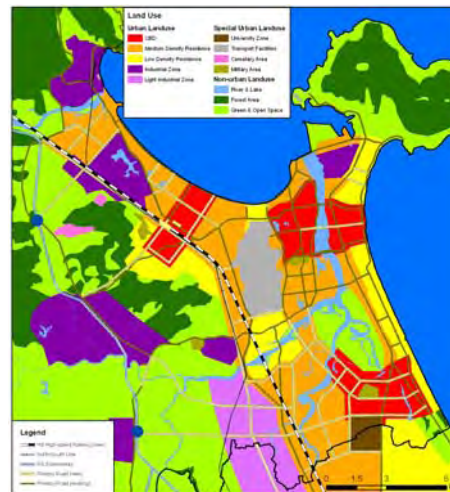
- ❖ Re-examination of network analysis using the revised socio-economic framework based on the proposed urban development scenario (so-called Scenario 3)
- ❖ Examination of road capacity and setting of supplied service level in the future network
- ❖ Examination of Transit Corridor Development including UMRT System (urban rails and busways, etc.)
- ❖ Finalization of future urban transport network for the year 2025
- ❖ Preparation of project list and individual project profiles (including cost estimates)

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## Next Steps

### Profile of Future Network

- ❖ At-grade Road Network
    - Primary road
    - Secondary Road
  - ❖ UMRT (urban rail and busway)
  - ❖ Urban Elevated Expressway ?
- Supported by:
- ❖ Effective Urban Bus Services
  - ❖ Efficient Traffic Management
    - Traffic control at intersection (signalization, geometric improvement)
    - Traffic regulation and enforcement



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## Assessment of Living Conditions In Danang City - Urban Karte -

26 June 2009

JICA Study Team

### ▣ Topics

- Objective and Concept of the Urban Karte
- Evaluation Framework
- Assessment Methods
- Utilization of the Urban Karte

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### ▣ Objective and Concept of the Urban Karte

- DaCRISS aims to propose a Master Plan for the future development of Danang City
- For a more comprehensive understanding of the development orientation, it is necessary to look at both the issues and attractive factors of Danang City
- An overview of the city's structure and living condition (socio-economic and livability factors) is needed

*“karte” is a medical record of a patient – it reveals the status of the patient’s body, which provides needed information for the doctor’s diagnosis*

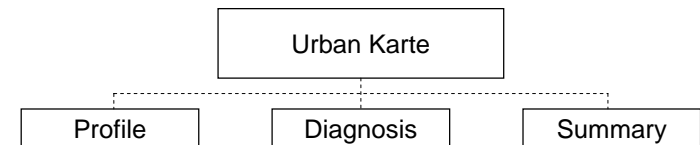
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### ▣ Evaluation Framework

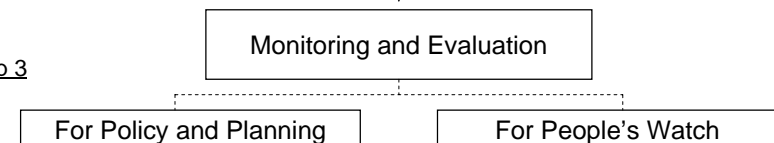
Step 1



Step 2



Step 3



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## Living Conditions Evaluation Factors

1. **Convenience:** basic conveniences necessary for people to participate in daily activities and have access to information
2. **Safety / Security:** safety from risks or emergencies / accidents and to the protection of life and property from disasters and crimes
3. **Health / Wellbeing:** access to basic and health services in order to increase their resistance to diseases, sicknesses and have an improved wellbeing
4. **Amenity:** basic social and cultural freedoms as well as a comfortable environment
5. **Capability:** people's assets and abilities to increase their capacities

*Note: In 1961, the World Health Organization (WHO) categorized the notion of living conditions into the following 4 factors; 1) convenience, 2) safety / security, 3) health / wellbeing, 4) amenity. 5) capability was added to demonstrate the multidimensional concepts of livability.*

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## Assessment Methods

- For each of the 5 living condition evaluation factor, a set of indicators were selected either because it presents some comparative significance and / or it is very specific and relevant to Danang City.
- As a criteria, these indicators must be easily measurable and verifiable at the commune and district levels.
- For each set of indicators, objective indicators and subjective indicators (mainly the people's assessment based on the results from the Household Interview Survey done in August to October 2008).

### Objective Indicators (current living conditions)

For example, for "Convenience"...

- Households with Electricity Connectivity (%)
- Road Area Ratio (%)
- "To Work" Travel Time (min.)
- "To Work" Trips by Public Transportation
- Motor Vehicles per 1,000 Pop
- TV Sets per 1,000 Pop
- Telephone per 1,000 Pop
- etc.

### Subjective Indicators (people's assessment)

- Power Supply
- Traffic Situation
- Travel Time to Work
- Public Transport Convenience
- Convenience of Transport
- Telecommunications
- Telecommunications
- etc.

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## Assessment Methods (scoring)

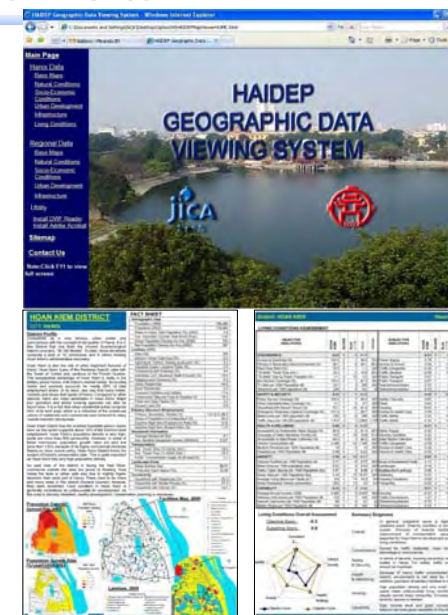
Objective Indicators	Range of Indicators and Scores Assigned				
	-2	-1	0	1	2
<b>CONVENIENCE</b>					
HH with Electricity Connectivity (%)	0 - 70	70 - 80	80 - 95	95 - 100	100
Road Area Ratio (%)	0 - 3	3 - 5	5 - 10	10 - 15	15 -
"To Work" Travel Time (min.)	60 -	45 - 60	30 - 45	20 - 30	0 - 20
"To Work" Trips by Public Transportation (%)	0 - 5	5 - 20	20 - 35	35 - 50	50 -
Motor Vehicles per 1,000 Pop	0 - 10	10 - 50	50 - 200	200 - 400	400 -
TV Sets per 1,000 Pop	0 - 50	50 - 100	100 - 200	200 - 300	300 -
Telephone per 1,000 Pop	0 - 50	50 - 100	100 - 200	200 - 400	400 -

Subjective Indicators (all)	Range of Indicators and Scores Assigned				
	-2	-1	0	1	2
Range of Calculated Average Value of Subjective Indicators	< - 1.0	-1.0 =< x <= -0.05	-0.05 < x < 0.05	0.05 =< x <= 1.0	1.0 <

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## Utilization of the Urban Karte

- To design a database system for future urban planning including GIS-based data system
- To contribute to standardizing the urban planning process and methodology
- To use as a database for the people's watch (monitoring of living conditions and environment)
- ... and many more ideas are welcome!



***End***

*... thank you for your attention.*