

Innovative Landscape Urban Planning for Bangkok Sustainable Transportation development, three study models of Bangkok.

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Introduction

Bangkok, as one of Asian's mega cities, has been undergoing her rapid growth in urbanization and motorization. Even the expansion of urban transportation indicates a growing economy, the traffic congestion and aggravated air pollution have been seen as major problems for urban environment and living quality. The average traffic speeds measured were 10.36-12.5 km/h in 2009, around Central Business District (CBD) area, significantly decreased from 14.32 km/h in 2006². This indicates that the situation has only worsened. More streets and wider roads have been built to reduce these problems. However, there are consequences. It raises other problems, such as air and noise pollutions, economic lost and even worse, social stress. The net social costs (congestion costs and environmental costs) of traffic congestion in Bangkok were rated among APEC Cities as the most serious³. Although many attempts have been made to solve traffic and pollution problems, none of them approaches Bangkok as she was originally designed. The old city is not exactly for cars. Most roads are very narrow, and the city center areas are limited. Current policies of increasing infrastructures and roads make people travel longer and loss opportunities to sustain community interaction. Thus inappropriate and imbalance transportation planning have brought the city into conflict in urban development and urban ecology. This paper aims to demonstrate the idea of transportation planning and urban landscape improvement as fully integrated networks to propose innovative solutions of three different cases in a context of urban limitation.

In achieving the goals for sustainable cities related to transportation, three changes are required⁴. First is to change into separated zoning for mixed-use, to reduce the need and distance that people have to travel. Second is to change the traveling mode to be more environmental friendly and healthier, such as walking or cycling. Third is to change cars and transportation system to be more Energy efficient with less pollution. In case of Bangkok, the third change has been handled by application of technologies such as electric or hydrogen fuel cell. Although it will reduce environmental impact of motorized transportation, it might affect on existing social-traveling pattern. Not many studies have been practiced towards the first and second changes, which indicate that the relationship between transportation system, land-use planning and people-behavior is the key.

Discussion

3 Scenarios

This paper is an attempt to demonstrate the possibility to develop those 2 integration ideas in real cases, three urban scenarios which three different traffic problems commonly found in Bangkok were set as a scope of study. The first scenario was the Inner City in CBD situation. Although adequate public transportation network is provided, it still faces serious pollution and urban stress problems. The second scenario, a mixed-used residential Super-block area, was a consequence of rapid growth of urban settlement caused by arterial roads. The lacking of good hierarchical connection of inner road system and expansion of local roads not only destroys neighborhood sense

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² Traffic and Transportation Department, Bangkok Metropolitan Administrator (2009), **Traffic Statistics**, annual report

³ APEC Industrial Science and Technology Working Group (2000), **Sustainable Transport for APEC Megacities: Issues and Solutions, Vol.II Full Report**, National Science and Technology Department Agency, Bangkok, Thailand February 2000

⁴ Thorne R. and Filmer-Sankey W. (2003), **Sustainable Urban Design: an environmental Approach**, edited by Randall T. and Fordham M., London

of communities, but also generates Urban Blight. The last scenario was Transportation Interchange Sub-center where interchange commuting modes from mass transit to private vehicles and pedestrian caused rapid growth of private development and occupied most of the public open space. Virtually this is a common problem resulted from incompatible development with no study of commuter needs, and does not take into account of community aspects in most Bangkok transportation sub centers.

Site Selection Method

Study area of each problem was selected amongst possible Bangkok sites by using key index set from significant factors such as BMA⁵ and National Policy,⁶ physical and social suitability, economic and investment potential to support project-implementation possibility.

Table 1 Site Selection Matrix

Key index	Scenario 1 Inner City CBD			Scenario 2 Mix-used Super-block		Scenario3 Transportation Sub-center		
	Site1 Saladaeng	Site2 Rangnarm	Site3 Sathorn 10	Site1 Bueng Kum	Site2 Ladpraw- Chokchai4	Site1 Sukhumvit 71	Site2 Aimsombat market	Site3 Patanakan intersection
A	3	2	2	1	2	2	3	1
B	3	2	2	0	3	0	3	2
C	2	2	0	3	3	2	2	0
D	3	3	0	1	3	2	3	2
E	3	1	2	2	2	3	2	1
F	2	1	1	2	3	2	3	0
G	3	3	1	1	3	1	2	2
Total	19	14	8	10	19	12	18	8

Site Selection Key Indicators

- A. Project possibility (time, study budget), Data base Adequacy,
- B. National/BMA development plan policies such as public transit plan, urban zoning plan, road management enforcement,
- C. Social and Economic suitability in terms of economic sustainable possibility,
- D. Physical suitability such as scope of work (size, boundary, accessibility), Land use suitability, Land availability,
- E. Potential of Change in Environmental-impact after implementation,
- F. People participation / user interests/Local awareness and cultural value, and
- G. Possibility of project implementation (constraints vs. possibilities)

Scenario 1

In this study, instead of planning a new land use of city center, we looked for the existing CBDs that already had a potential for mixed-use development with adequate public-transportation network (preferable emission-free system), which was a typical urban pattern in many CBDs in Bangkok. Saladaeng area was the most suitable site for this study because it is in famous business Silom district, which is well known not only among locals but also foreigners, as one of the highest density and diversity of uses, busiest traveling conjunction, and one of the most polluted areas. The area of study was not too large with the surrounded road network which provided opportunity for optional

⁵ Bangkok Metropolitan Administrator, **Bangkok Development Policy 6,7 (12 years plan 2009--2020)**

⁶ Office of the National Economic and Social Development Board (2006), **National Economic and Social Development Policy9 year 2002-2006.**

mobility management. Any changes proposed, it would clearly reveal the impact on both social/mobility pattern and environmental quality.

Scenario 2

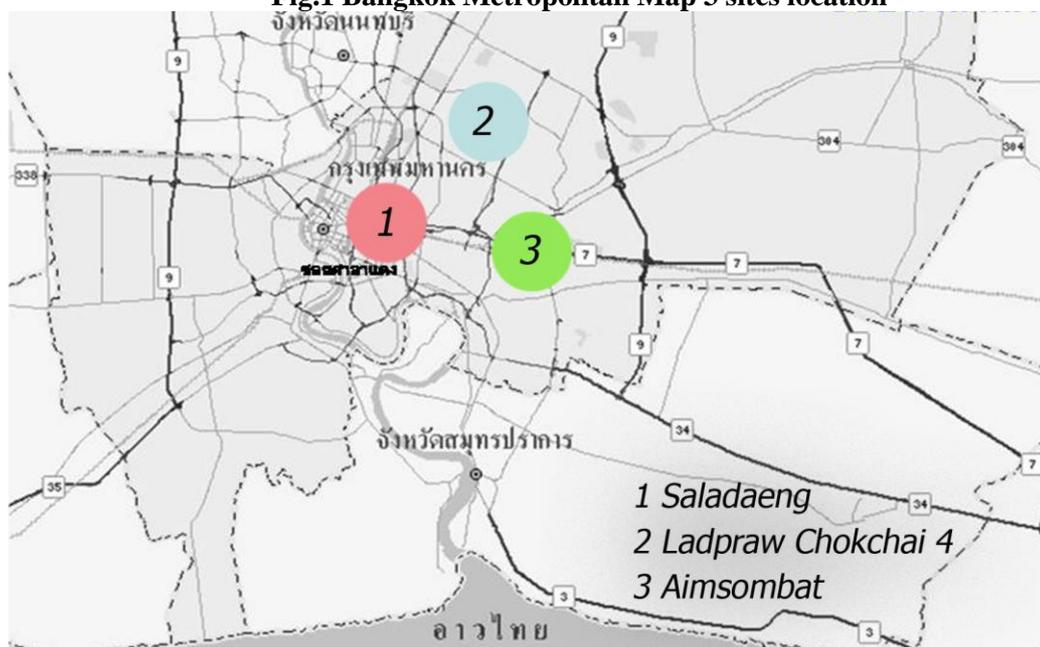
Ladpraw-Chokchai4 was the mixed-used residential area with 121,000 habitats⁷. Three new major arterial roads and the old minor arterial road bounded this area, allowed residents to easier connect to the city. This area becomes 21.5 Sq.km. Super-block, which is popular for housing and apartment developments for middle income group. They rely mostly on private vehicles to commute to the city. Besides the suitability of policy, community economic, and site components; appropriateness in identifying target groups and problem they were facing; were also clearly addressed. This is to propose the options of traveling model that suit their behavior and needs.

Scenarios 3

Aimsombat community at suburban Bangkok was a selected case of Transportation Interchange Sub-center. This area will be a station of future Bangkok Sky Train System (BTS 2012 yellow line plan⁸), which will connected to existing mass public transportation connection of buses, local vans and boat-buses. Therefore, it had development potential to be mixed-used community center that responded to both multi-mode transportation and healthy communities.

The local interests in environmental and cultural value were viewed to potentially strengthen the future development. Since existing market were already the local transportation and commercial node, and there was a piece of vacant land by the canal; this land availability and community activities grant an opportunity for project implementation.

Fig.1 Bangkok Metropolitan Map 3 sites location



Method of study

Each scenario had been conducted differently through site survey, questionnaires and interviews, along with collection and analysis of related environmental data, as required. In Inner City, Saladaeng, we focused on measurement of pollutions, along with street width, and marking traveling

⁷ Ladpraw District Population, Bangkok Metropolitan Administration 2006

⁸ Bangkok Metropolitan Administrator, **Bangkok Development Policy 6,7 (12 years plan 2009--2020)**, indicates that Aimsombat area will be transportation interchange sub-center and new community center.

behavior pattern. Super-block, Ladpraw-Chokchai4 is considered large area; therefore, we used questionnaires with target user groups to identify problem, situation, and needs. Transportation Interchange Sub-center, Aimsombat is community base case, as a result, we focused on interview, in and off site survey, and water pollution data gathering.

Proposed solution

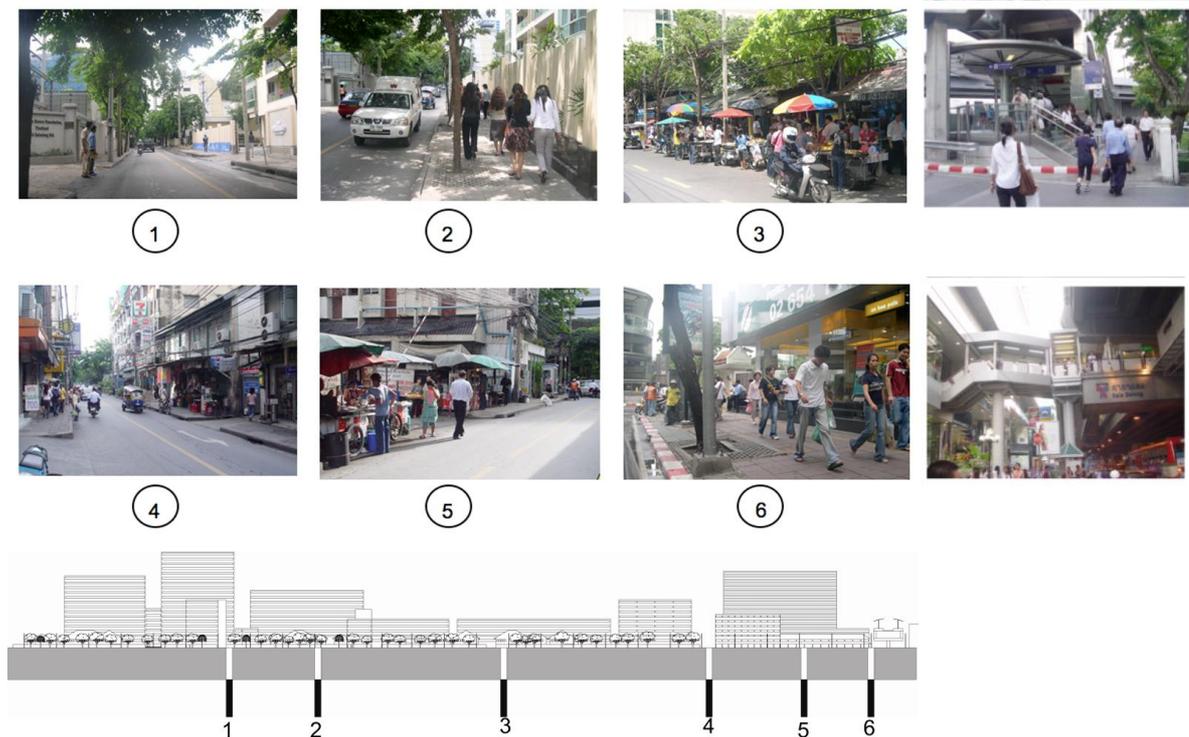
The integration models developed from traffic planning and urban landscape theories were proposed with the focus on public benefit instead of individual convenience.

Scenario 1 Inner City (CBD)-Saladaeng area

Result and Analysis

Land use components of Saladaeng area are mixed of commercials, residential, working places together with combination of urbanite needs such as dining places, retail stores and *Weekends*⁹. Because the area were extremely dense and very diverse, those functions were both disturb and in conflict with each other, such as the sidewalks were so narrow that it pushed people to walk on street, and blocked traffic, parking and venders took up road space and obstructed walkway, etc. However, the research showed that this area was conveniently accessible by public transportation, the road in Saladaeng, and public transit-use length were within comfortable walking distance. Many people in the area already preferred to walk or bike, although the street design had not yet accommodated pedestrian and bicycles. In addition, at presence, there were not enough small resting spaces (i.e. pocket parks and roadside shops/café) that would encourage walking and relieve the stress of urban life.

Fig.2 Inner City, Saladaeng area

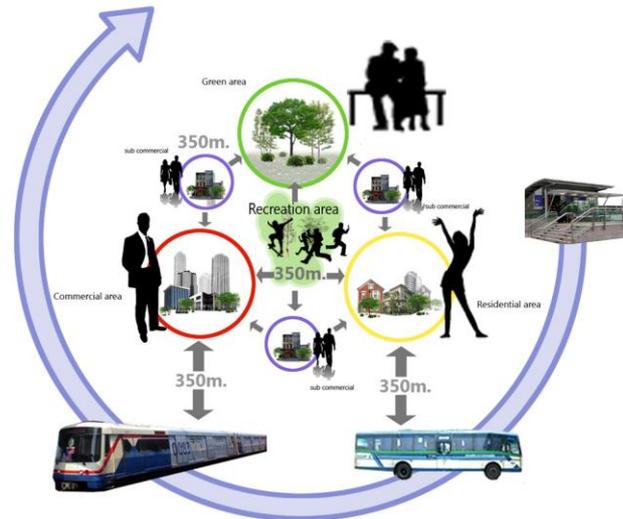


⁹ Weekends or Weekend plaza is the market that is set to open on certain days or certain time which might not be weekend but during weekday-noon. Weekend Plaza is mostly temporary set on street corner, vacant land along street side or on walking street. Products such as food and cloths may be sold on the floor or table or panel.

Theoretical Approach

In the case of Inner City, the proposed model was based on a practice of **Public space-Pedestrian Development, and Traffic Calming in Compact Urban Land Use**¹⁰ to create compact, walkable neighborhood in the city. Landscape improvement and traffic management encouraged a possibility of non-motorized traveling mode. As a result, it should reduce energy consumption as well as strengthen the socio-economic role of the area.

Fig. 3 Healthy-Living City Model by Traffic Calming in Urban Compact Land-use



Healthy-living City model in Urban Compact Land-use shows the diversity of usages in a compact urban structure. The main components, which are commercials, workplaces, housing and accessible green space should be in an appropriate proportion¹¹ to accommodate surrounding habitants. The linkage between each component should be within walking distance, which should not exceed 600-800 m.¹² Traffic Calming is an idea of modification of street design to give priority to pedestrians, cyclists and communities. It tends to reduce speed and share more space to encourage non-motorized activities within the community.

Planning/Design solution

The urban structure of Saladaeng area is closed to compact city with adequate transit connection within 0.8 km. walking length that connects residential area to work place and transit stations. It can be approached as Transit-oriented-Development (TOD) for Pedestrian-oriented design to maximize access to public transport. Traffic Calming concept was brought into urban landscape modification by reallocating road space from two ways to one way to increase the portion of right-of-way devoted to bicycle lanes, wider and shadier sidewalks and small green spaces. It must include good pedestrian facilities, such as quality crosswalks, street furniture and location, better air-quality, aesthetics, as well as support universal design objectives¹³.

Many urban planning strategies such as residential car zone allowance, access time management, bicycle rent/ride, inner-city tax fee, no street-side parking were proposed to reduce traffic volume and speed, and to promote mass public transportation.

¹⁰ Tolley, R. (1999), **Calming Traffic in Residential Area**, Bath: The Pitman Press

¹¹ 350m.Walking radius for facilities accessible per 5,000 people, Area for facilities=1000 sq.m. , Whitelegg, J. (1993), **Transport for a Sustainable Future: the case for Europe Belhaven**, London.

¹² Suitable walking distance which should not be longer than 600-800 m. or 300-350 walking radius in warm-humid region

¹³ Making transportation systems accommodate people with disabilities and other special needs

Fig.4 conceptual diagram of Saladaeng



Criteria for urban planning and landscape improvement

1. Promoting public transportation by providing convenient linkage.
2. Encouraging non-motorized transportation with pedestrian friendly design by Pedestrian linkage priority, partially Walking Street, improve crosswalk and street furniture, bicycle rental parking zone,
3. Encouraging job-housing balance of surrounding land use (Sathorn, Silom, Suanlum districts),
4. Street furniture designing, Clearing signage location and interpretation, improving visual perception, and
5. Encouraging District identity
6. Promoting public green space that supports urban activities such as pocket park, sidewalk cafe and shop, and small multipurpose plaza.

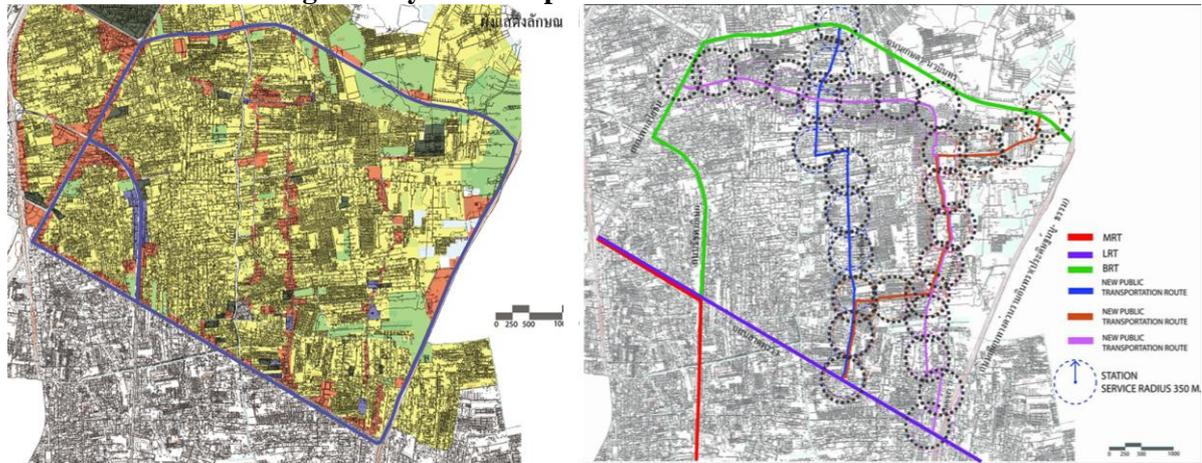
Fig.5 Pedestrian Friendly Design and Walking street/plaza



Scenario 2 Mixed-use residential Super-block Ladpraw-Chokchai4 area
Result and analysis

Ladpraw-Chokchai4 used to be quiet suburban residential area. During 1995-2003 the roads surrounded Chokchai4 were expanded to be main north-east city linkages, provided this area to be more accessible from the city, thus it was targeted as new middle to high density residential district. Even though there were more population and usages in the area, there was no street hierarchy to replace traditional local alleys. Therefore, the traffic problem occurred when inner roads block main roads, and vice-versa. The questionnaire showed that even though 54.5% of residents travelled by private car, 81% prefer to use public transportation if it provides complete network, accessible from their home with a safety/comfortable commuters. More than 89% agreed that public transportation network would strengthen the sense of neighborhood in the community with local stores along the route.

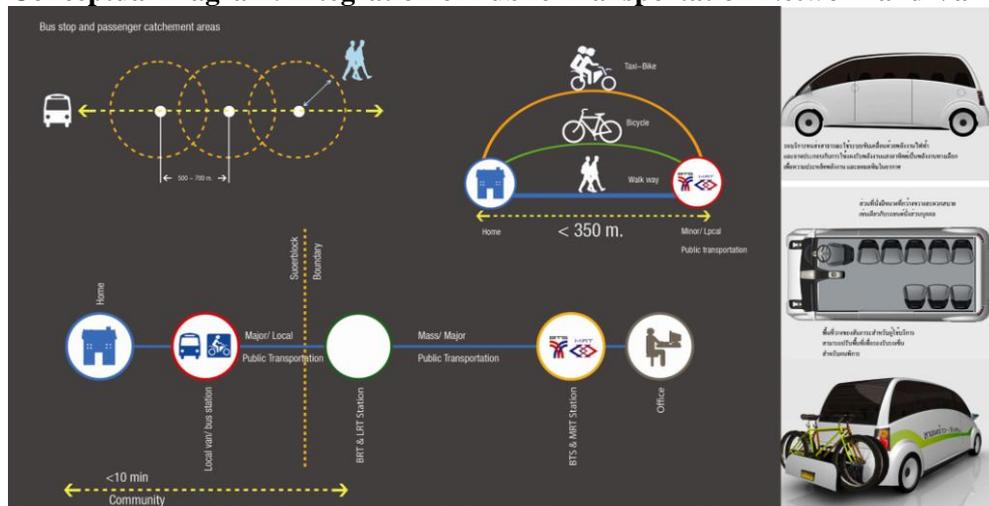
Fig.6 Analysis of Ladpraw-Chokchai4 road network



Theoretical Approach

The proposal of residential-commercial super-block case was **the integration between multi-model of public transportation network and non-motorized mobility**. The **neighborhood cluster facilities** at public transportation node would reduce traveling distance as well as restore neighborhood sense of the community. Additionally, **pedestrian-friendly roads and land use redevelopment** may possibly be achieved by landscape improvement within the limited shared space.

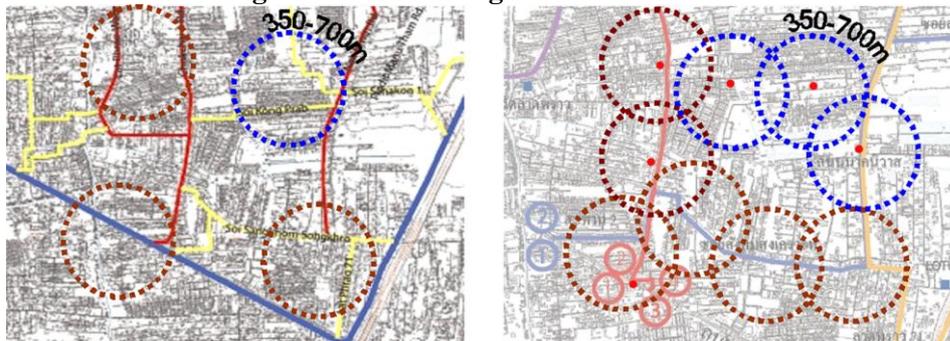
Fig.7 Conceptual Diagram: Integration of Public Transportation Network and Van model



Planning/design solution

Chokchai4 is a super block with constraint in inner road space limitation, and no proper public system to support in the block. However, there was opportunity in terms of local and national policy to develop mass public transportation on main roads. Instead of expanding the inner roads to achieve street hierarchy as in traditional solution, this study proposed that improving alternative traveling modes that responded to target user's needs and behavior to connect with major mass transit was more suitable solution. The development of urban land use structure integrated with minor and local public transport network, which accessible from all area to cover service radius within walking distance (pedestrian catchment area 350-700m. in radius). Each station should be complemented with neighborhood cluster facilities¹⁴ to reduce necessity of car traveling and bring back a chance of social-interaction. The vehicle used may possibly be either small buses or vans with low emission and/or environmental-friendly engines, since they will pass through residential zone.

Fig.8 Network of Neighborhood Clusters



Supports Strategy objectives

- Most areas within walking distance of centre
- Supports public transport
- Neighbourhoods clustered to support larger centre

Less successful

- No or minimal, public transport
- Street pattern makes walking between places and bus connections difficult
- Many people cannot walk to a centre

Fig.9 Streetscape Development



Criteria for Urban Planning and Landscape Improvement

1. Integration of Mass Public transportation network,
2. User-oriented and environmental friendly model of public service vehicle,
3. Street space sharing and design for pedestrian and bicycle friendly,
4. Local non-motorized transportation facilities such as bicycle rental/parking zone, meeting point, resting area, newspaper kiosks,
5. Bringing back neighborhood concept by creating neighborhood cluster

¹⁴ Neighborhood Cluster facilities: Convenient store or food stalls to be center of 0.8 km. catchment area.

Scenario 3 Transportation Interchange Sub-center, Aimsombat Community area

Results and Analysis

From the research, the analysis and evaluation of the result of interviewing, testing and surveying to propose land use master plan that might be developed by community and/or landowner, was used. This would accommodate the expansion plan of transportation network, as well as, be more sustainable in order to strengthen the community identity and living standard.

For land use, social and environmental factors, this area was local fresh market, row house-retail stores and apartments. There were 2 temples as community centers within walking distance, accessible from communities. The interesting observation was each temple serves different religions; one was Buddhism while the other was Islam. There was no conflict between them, although both were in strong religious practice. One side of the area was main canal with local bus-boat route connected to inner city; the communities and environment on both sides of the canal were still traditional and very beautiful. Along the waterfront next to Buddhist temple was a piece of vacant land, thus there was a potential to develop into waterfront-community space. This public open space would attract tourists or passer-by that come to this area after the whole network of infrastructure finished.

Theoretical approach

In last case, **Winning back Public space**¹⁵ and **Enhancing Communities' strength** was the main idea to develop new community center within existing cultural context. To provide a desirable transportation transition and sustained community and environment, public open-space must be facilitated through planning process. Community structure such as old market, temple, and canal were seen as a magnet to bring people from street side to Waterfront Park, and thus, provide linkage that response to user behavior and needs from BTS with boats and buses.

Fig.10 Conceptual Diagram of Community Transportation Linkage



The main idea of urban design Site Master Plan is “THE LINKAGE” which is to plan a clear zoning, provide directed and unobstructed linkage, by walking or cycling and handicapped riding from different traveling modes to destination by using Green Network¹⁶. The clear separation of vehicle and pedestrian must be achieved to maintain people’s safety.

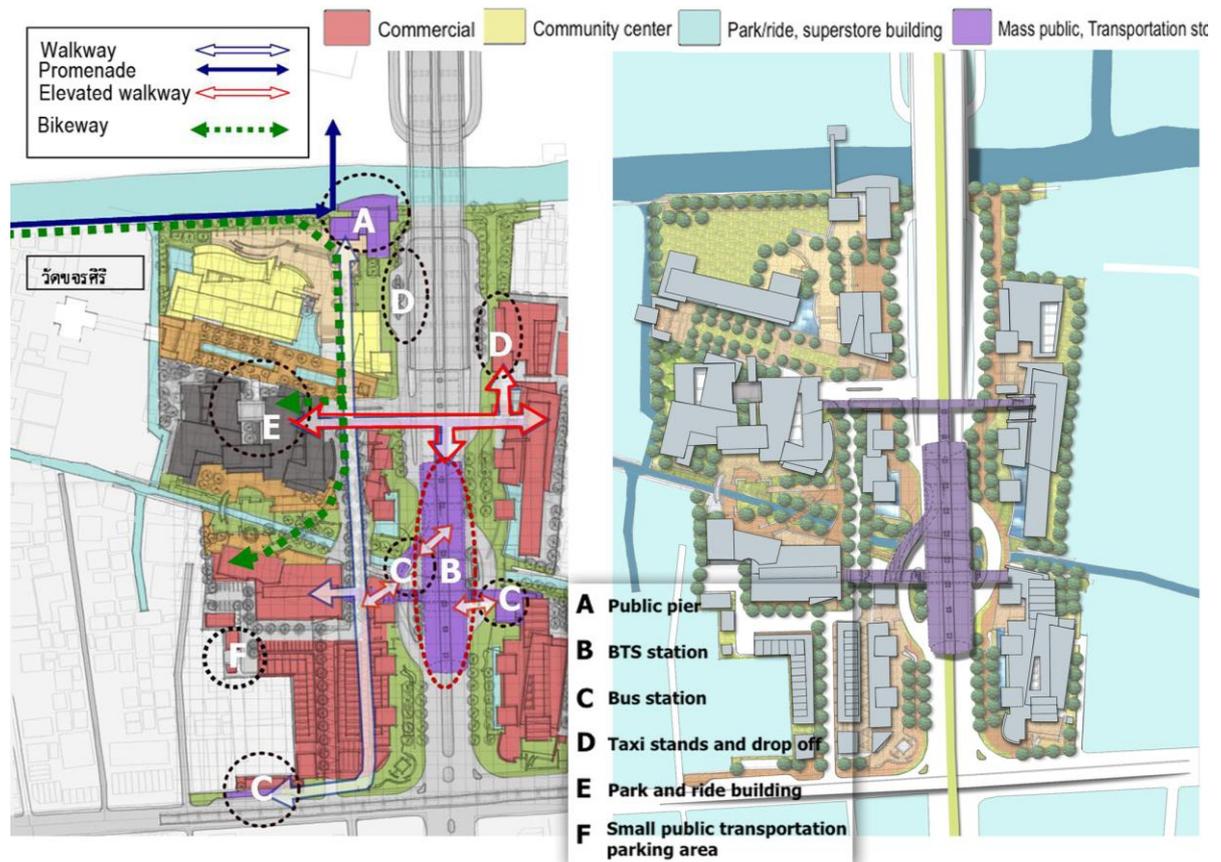
¹⁵ Newman P. and Kenworthy J. with Robinson L. (1992), **Winning Back The Cities**, Australian Consumers Association, Australia

¹⁶ Green Network means providing corridor trees and open space linkage to accommodate walkway and bike way, that is not only function properly but also feel and looks good.

Planning/design solution

The changing role of old Aimsombat market community after the infrastructure finished, was to become an important transportation interchange sub-center that connect Rapid rail network (BTS) with other mass public transportations which are buses, small buses, suburban-vans, boats and public cars (Taxi). Master plan for the future development is very important to manage more diversity zoning and density of land use requirements. This area should also provide Park/ride building for private cars, motorcycles and bicycles. The strategy to encourage non-motorized linkage and winning back public space is “Green network”, which will connect community open space, Waterfront Park with shady path and trendy small shops to the market-place. It will create pleasant atmosphere and provide necessities to travelers and locals’ needs and behavior. As a result, it will increase local-economic activities.

Fig.11 Conceptual Master Plan of Aimsombat market Transportation Sub-center



Criteria for Land Use Plan

1. Creating appropriate and manageable land-use by separate zoning that will bring liveliness as well as tidiness to the whole area,
2. Good Planning of Mass Public Transportation station linkage for convenient connection by providing Clean clear and pleasurable path,
3. Economic sustainability by encouraging side-walk shops, market and park/ride building, and tourist cultural attractions,
4. Environmental improvement by increasing non-motorized transportation and enhance sense of belonging to the communities,
5. Creating Public Space by providing water front park for relaxing and social-interaction between trips, exercising and social activities for cultural events.

Fig.12 Waterfront and Market Development



Conclusion

Urban Landscape Design is one of the key factors to successful sustainable urban transportation, in order to create appropriate factors for environmental friendly and healthier City. The study has shown in 3 different scenarios in Bangkok: how to apply to real sites and situations. Saladaeng site was visualized as the idea of street calming to share more space for present walking/cycling in Inner-Center area. Ladpraw-Chokchai4 site proposed complete local public transportation network combined with neighborhood cluster to fill in Super-block Urban blight. Aimsombat masterplan showed well organized zoning with public open space as circulation linkage in transportation sub-center community. These three different scenarios clearly demonstrated that the collaborative approach of transportation planning and urban landscape is possible, even in limitation of urban-context. Further more, it has to be done with public benefits in mind so more study of physical constraints and public hearing are suggested, before proceeding the implementation stage.

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