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Financing the Construction of Distributor/Collector Roads in Thailand : A Pre-feasibility Study for a Road Construction and Special Assessment Pilot Project in Bangkok

by **Ray W. Archer and Nopanant Tapananont**

Acknowledgements

This paper draws on material prepared for the Study of Options for Financing Infrastructure Expansion in Thailand (SOFIE Thailand) made in early 1991. SOFIE was carried out for the Urban Development Coordination Division of the Office of the National Economic and Social Development Board, Bangkok, by PADCO Inc., Washington, D.C., and the Land Institute Foundation, Bangkok. The Study was sponsored by the U.S. Agency for International Development through RHUDO Bangkok.

The SOFIE Report identified seven main forms of beneficiary financing for the construction of urban infrastructure as appropriate for use in Thailand, these being: local government property taxes, user charges, subdivision regulations, special assessment projects, land pooling/readjustment projects, excess expropriation projects, and development charges. The Report noted that the first three were already in use, and recommended that priority be given to the special assessment and land pooling/ readjustment techniques for early adoption. Land pooling/readjustment is being adopted but the special assessment technique has been by-passed although it is a simpler technique with the potential for wider use than land pooling/ readjustment. This paper is a contribution towards correcting this oversight.

The authors are pleased to acknowledge with thanks the assistance of Messrs. Pepop Rotpai and Sopon Pornchokchai who provided some of the material included in the paper. They also thank Mr. Edward A. Lehan, an U.S. expert on local government finance, for his advice and guidance on the application of the special assessment technique to finance the construction of distributor/ collector roads in urbanising areas. His SOFIE Technical Paper, Financing Urban Network Infrastructure Expansion: Cost Recovery Options for Thailand, includes a chapter on special assessment and a draft "Special Assessment Regulation" as an appendix. His paper is recommended reading and it should be available from the Office of Housing and Urban Programs, U.S. Agency for International Development, Washington, D.C., and from PADCO Inc., Washington, D.C., U.S.A.

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Financing the Construction of Distributor/Collector Roads in Thailand: A Pre-feasibility Study for A Road Construction and Special Assessment Pilot Project in Bangkok

by Ray W. Archer and Nopanant Tapananont

This paper presents the results of a case study undertaken in early 1991 to demonstrate the possible application of the special assessment technique to finance the construction of distributor/collector roads in the newly urbanising areas around Bangkok and the provincial cities of Thailand (1). The scope of the study was to select a suitable project site and to prepare a draft scheme for the financing and construction of a road network in the site with project cost recovery from the benefitting landowners. The draft scheme was to design and explain the project and to justify it by showing its net benefits and feasibility, so that it could be accepted by the Bangkok Metropolitan Administration (BMA) for presentation to the landowners in the project site. The draft scheme could then be modified as appropriate so as to obtain majority landowner support for its implementation as a special assessment project by the BMA.

The paper is presented in five parts. The first part explains the need for the early construction of networks of distributor/collector roads (and the related drains and public utility service lines) in urban-fringe areas so as to improve the urban expansion process in Thailand. The second part describes the special assessment technique for financing the construction of network infrastructure works by collecting part of the increase in land values that the works generate. The third part describes the 128 hectare site in the Bangkapi District of Bangkok selected for the case study, and this is followed by a consideration of special assessment and land pooling/readjustment as alternative techniques for constructing the proposed road network. The fifth part outlines the draft scheme for the proposed Bangkapi special assessment pilot project.

The outline of the draft scheme given in part five of the paper is presented as it was proposed in early 1991 and is written in the present tense (1). The cost estimates and the land valuations shown are the 1991 figures and reflect the situation at that time when the property market was booming and there was no zoning regulation of urban land use, as the current Bangkok Metropolis General Plan was not issued for enforcement until July, 1992. The draft scheme was prepared as a case study in the Study of Options for Financing Infrastructure Expansion in Thailand (SOFIE Thailand).

Need for Distributor/ Collector Roads

The physical city has three main components, these being the land, the network infrastructure and the buildings. The network infrastructure is the networks of roads, drains and public utility service lines. The roads, drains, water supply, sewerage and electricity lines can be designated the key items of network infrastructure as most urban households and business firms desire all-weather vehicular access to their plots and buildings plus flood protection, piped water, sanitation and electricity supply connections. As the network infrastructure provides the basic services for living and working in urban areas, the proper provision of this infrastructure will be a major determinant of the efficiency of urban areas.

As well as its key role in facilitating an efficiently working city, the provision of network infrastructure is essential for environmental protection. A well-designed road network avoids traffic congestion and its resultant air pollution. It also facilitates efficient public transport services, enables efficient solid waste collection, and allows the quick provision of fire protection and other safety services. The drainage network provides protection from storm-water flooding, the piped water supply provides safe drinking water, and the sewerage system avoids pollution and health hazard.

The public road network is doubly important. First, in providing the routes for the movement of vehicles, people and goods within the urban area. Second, in providing the right-of-way land within which most of the networks of drains, water supply, sewerage and electricity supply lines are located. The layout of the road network therefore determines most of the layout of the drainage and public utility networks, and is an important determinant of the adequacy and efficiency of these networks.

Missing Distributor/Collector Roads in Bangkok:

An efficient urban road network has to be made up of a hierarchy of roads, of at least three main types, that cater for the different types of road traffic and separate the traffic that is mutually incompatible because it has conflicting needs. The urban road network has to carry all the traffic safely, quickly and directly to its destinations. The main traffic conflict is between the through traffic that wants to use the road to travel quickly and without interruption to its further destination and the local traffic that wants to use the road to gain access to the land and buildings along the road and which is therefore travelling slowly and turning, pulling in and out, stopping and parking. The conflicting needs of the through traffic and the local access traffic are best met by providing separate roads for them: some long and wide main roads for large volumes of through traffic, and many shorter and narrower local roads for small volumes of local access traffic. However, each junction where a local road connects to the main road is a point of traffic conflict and there would be many such junctions. Therefore, there is need for a third type of road, the distributor/collector (D/C) road, to operate as an intermediary step between the main roads

and the nearby local roads. These D/C roads are dual-purpose roads (carrying both through traffic and access traffic to the land and buildings along them) that reduce the number of road junctions on the main road and distribute and collect the local traffic to and from the local roads. They are also designed as a network within each city block so as to allow traffic to and from places in the block to cross it and to enter and exit it from each of the main roads around it, and thereby avoid long detours. Therefore, an efficient urban road network has to be designed and constructed as a hierarchy of at least three levels, these being: main roads, D/C roads and local access roads. (This hierarchy can be extended by dividing the D/C roads into primary, secondary and tertiary forms when it is useful to do so). The basic three level road hierarchy is also applicable to the drainage networks and the public utility networks as a hierarchy of main lines, D/C lines and local connector lines. The government agencies are mainly responsible for constructing the networks of main roads and lines and D/C roads and lines, while the private developers and landowners are mainly responsible for constructing the networks of local roads and lines within their land subdivision projects under the subdivision regulations.

In Bangkok, the city's notorious problem of severe traffic congestion and delays with its related serious air pollution are caused by too many motor vehicles, mainly private cars, trying to use the city's inadequate road network. This inadequate road network is caused by a combination of insufficient road area, lack of a three level road hierarchy, and lack of road networks. Bangkok's inadequate urban road network is the outcome of its development history, most of it since World War II. Located on the Chao Phraya River flood plain crossed by many canals, there were originally no roads and boats transported the rural people and their produce. Most of the city's growth has been since World War II and its expansion was led by the government construction of new main roads followed by the private subdivision of the adjoining parcels of irrigated farming land into layouts of local access roads and building plots. Many of these local roads were dead-end roads, stopped by a canal. The road pattern that emerged was one of main roads with many branching local roads, most of them narrow dead-end roads.

The main roads created large city blocks, and within them the inner land parcels away from the main roads were gradually developed by new land subdivision projects connecting to one or two of the local roads in earlier land subdivision projects. The road pattern that emerged within the large city blocks was a chaotic maze of local access roads, with some of them functioning as *de facto* D/C roads, but doing so very inefficiently. This suburban road pattern is illustrated by the road map of a case study city block in a suburban area commencing about 10 km. northeast from Bangkok GPO, as shown in Figure 1.

Most of Bangkok urban area has a two level road system of main through roads and local access roads plus a few cross-city expressways connecting the national highways. As many of the local roads are dead-end roads there is only a partial road network which was

not planned but which emerged as a combination of subdivision project local roads, and which is better described a maze rather than a network of local roads. In addition, whereas other cities have about 22% and more of their urban land as roadway land, in Bangkok about 17% of the urban land is roadway land. Bangkok's inadequate road pattern has crippled the city and this pattern is being continued in the new suburban areas, as is shown in Figure 1.

A review and diagnosis of Bangkok's road and traffic situation, with recommendations on remedial measures, was made in 1990/91 by a group of international and Thai transportation consultants for the preparation of the Seventh National Development Plan, 1992-1996 (2). Their Seventh Plan Urban and Regional Transport (SPURT) Study Final Report, March 1991, found that...

- "The outstanding weakness of the road network in Bangkok lies in its lack of distributor roads", (p.6-23)

- Outside the central area bounded by the Chao Phraya River and Sathorn, Witthayu and Ratchawithi Roads which has a workable road hierarchy and network... "there are almost 50 blocks, nearly all of which are totally or largely lacking in distributor roads", (p.6-24)

- "The road network in Bangkok has been developed with a disregard for distributor roads that is unique among the big cities of the world", (p.6-24)

- "The lack of distributor roads shows that there is no coordination between the planning and construction of main roads and their supporting roads", (p.6-26)

- "The overall result is a poor and insufficient road hierarchy which leads to excessively long trip distances and innumerable traffic bottlenecks", (p.6-27)

- Although earlier studies had recommended the development of distributor roads to create hierarchy of roads in Bangkok this had not happened, partly because... "the concept of hierarchy is not widely understood", (p.6-19). (3)

The SPURT Report recommended the development of a network of D/C roads in each of the city blocks in Greater Bangkok, and proposed a number of projects for implementation during the 1992/1997 period of the Seventh National Development Plan so as to commence a long term program to construct the missing D/C roads. (4)

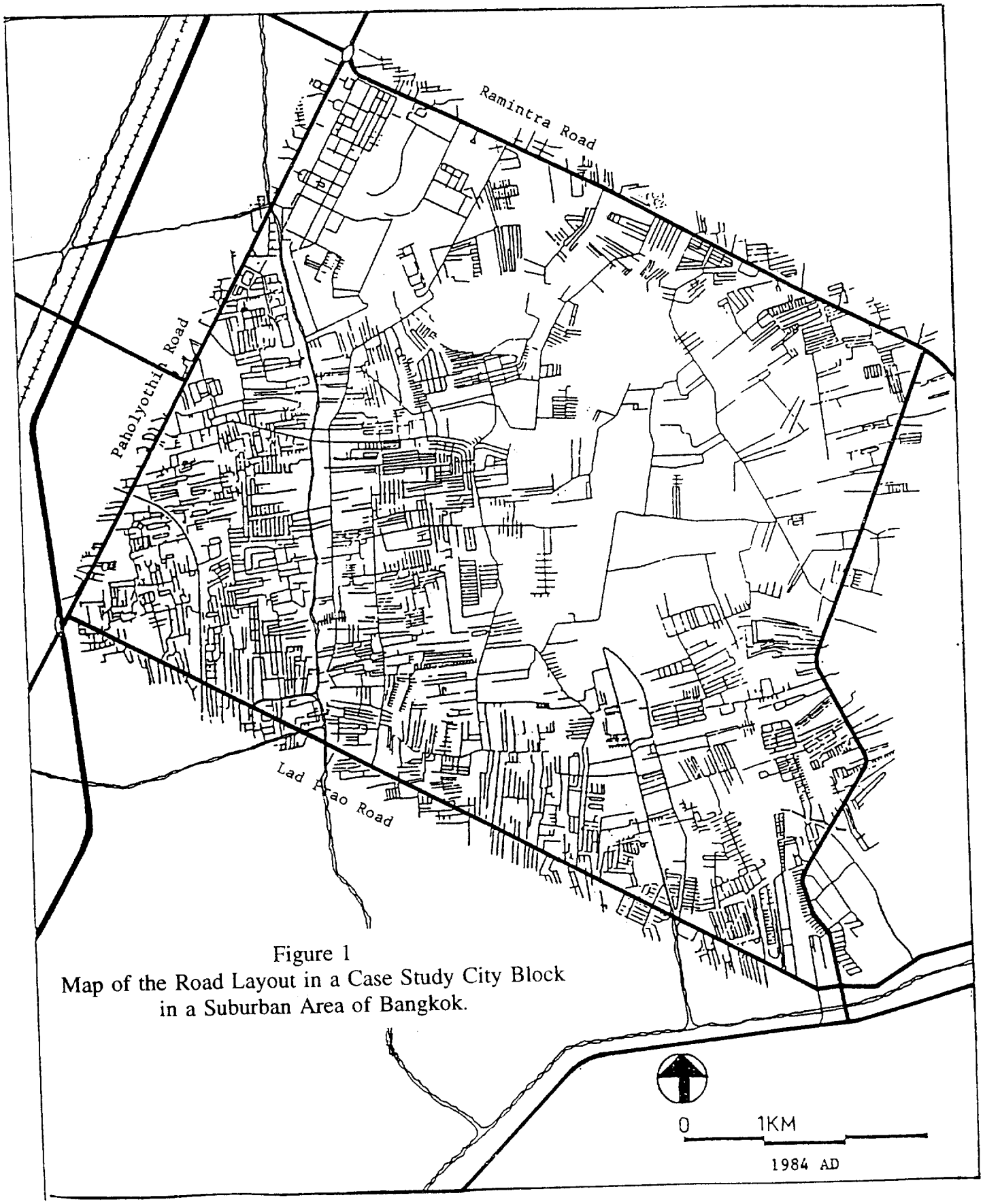


Figure 1
Map of the Road Layout in a Case Study City Block
in a Suburban Area of Bangkok.

Need for Advance Construction of Distributor/Collector Roads:

The SPURT Report focussed on the need to construct the missing D/C roads in the existing city blocks (some of them "super blocks") outside central Bangkok. They are missing because they were not constructed by the BMA or the Highways Department or the Public Works Department in association with their construction of the main roads that created the city blocks. The public road authorities should recognise the need for networks of D/C roads in urban areas and the desirability of constructing them early in the urbanization process, i.e., in advance of the private subdivision and building development of rural land in urban-fringe areas. This advance construction of the D/C roads is desirable for the expanding provincial cities and towns of Thailand, as well as Bangkok.

The potential benefits of constructing planned networks of D/C roads in association with the construction of main roads in urban-fringe areas, and in advance of the private land subdivision and building development, can be listed as follows...

- They create a three level hierarchy of roads which can meet the needs of through traffic and local access traffic more efficiently, economically and safely than the existing two level combination of main roads and local roads.

- They provide the routes for efficient public transport services, and facilitate efficient solid waste collection and emergency vehicle quick access, and divide the city blocks into residential environment areas free of through traffic.

- The early acquisition of the roadway land can be at pre-urban prices at the least financial cost and the least social cost.

- The networks of D/C roads create a physical framework on the ground that guides the private developers when they are selecting and assembling land for their project sites, and when they are designing their project layouts.

- The networks of D/C roads provide many land parcels with public road and utility line connections thereby converting them from rural land to subdivision land, and increasing the supply of land physically suitable for subdivision into building plots.

- The networks of D/C roads in the new city blocks and alongside the main roads "open up" the back land for private subdivision and building development, and therefore facilitate urban development in depth close to the established urban/suburban areas instead of by "ribbon development" along the main roads. The ribbon urban development is along many of the

main roads (and highways) in Thailand and it converts them from through-traffic roads into dual purpose through/local traffic roads that are doubly inefficient. The main road planners should support the advance construction of D/C roads as a measure for protecting the design purpose of their main roads.

This listing of the potential benefits of the advance construction of planned networks of D/C roads in newly urbanizing areas provides a strong case for reforming the government sector roles in the urban development process in Thailand. Government should adopt the objective of the advance construction of planned networks of D/C roads, drains and utility service lines, and set up a land management and funding system to achieve it (5). Until the central government reforms the system, local governments should be assisted and encouraged to make a beginning and undertake the advance construction of these networks in selected parts of their urban-fringe areas on a project basis by using beneficiary financing techniques such as special assessment projects and land pooling/readjustment projects (5). These projects can be self-financing and undertaken with professional consultancy assistance if the local government lacks the required professional staff resources.

The Special Assessment Technique (6)

Special assessment is a technique for financing local public works and facilities from the increase in land values generated by the public works/facility. When the need is to finance only the capital cost of constructing the public works/facility such as a road or flood protection dike, this can be done through a special assessment project. When the need is to be finance both the capital cost and the continuing operating costs of a public facility such as a fire station, this can be done by creating a special assessment district with a board of directors authorised to establish and operate the facility, to raise loans, and to levy an annual special assessment charge on all the benefitting land and buildings within the district.

Special Assessment Projects:

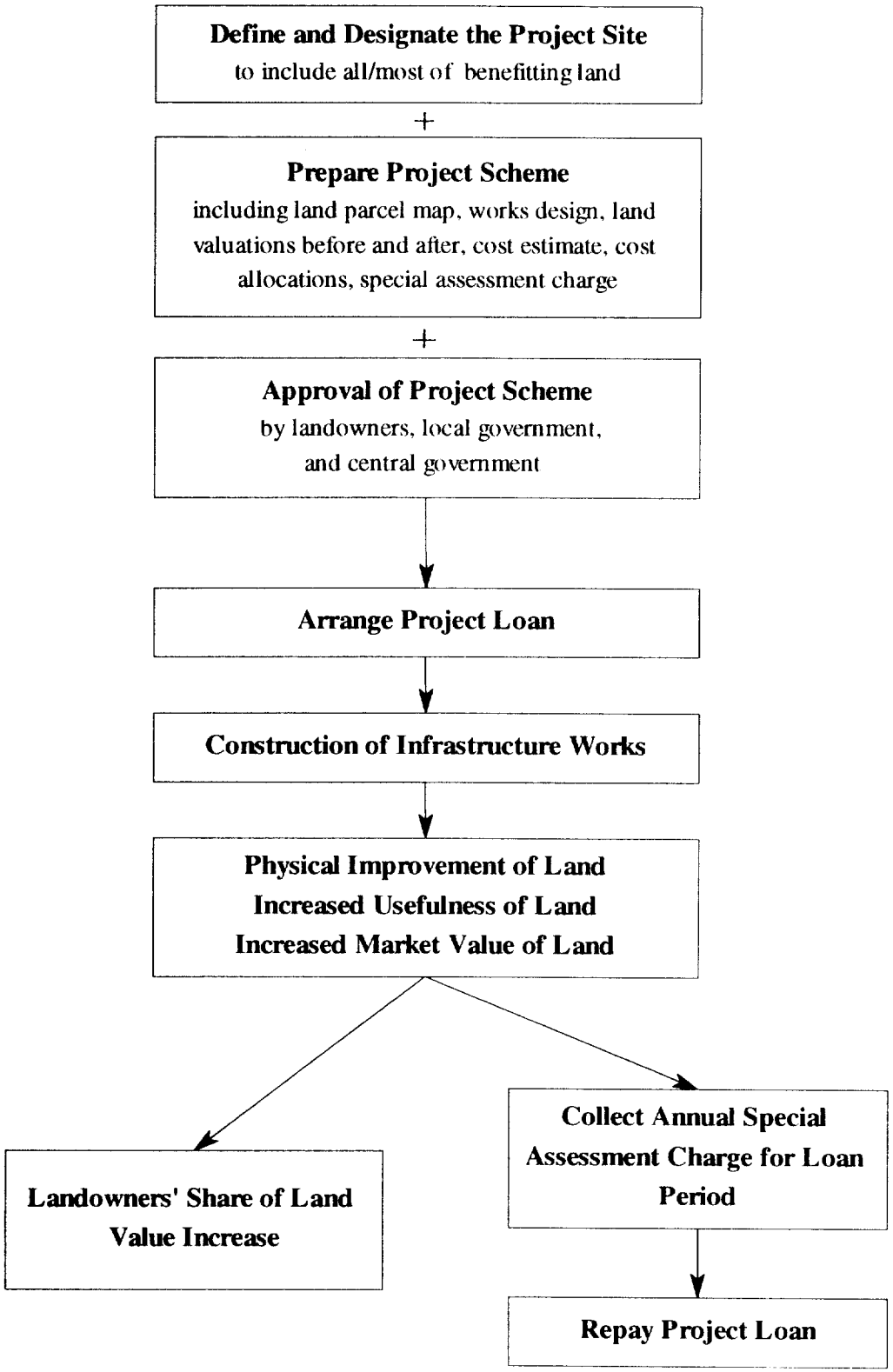
A special assessment project is a project undertaken by a local government to construct infrastructure works such as a public road or flood protection dike or land drainage project, and to recover the capital cost of the works through a special assessment charge on all the land parcels that benefit from the infrastructure works. Every special assessment project is a combined infrastructure design, financing, construction and cost recovery project. The logic of the technique is shown diagrammatically in Figure 2.

Special assessment is mainly a technique used by local governments because they have the main responsibility for local infrastructure works but with only limited funds

Figure 2

LOGIC OF THE SPECIAL ASSESSMENT TECHNIQUE FOR FINANCING THE CONSTRUCTION OF LOCAL PUBLIC WORKS THAT BENEFIT LAND

A LOCAL DRAINAGE PROJECT



available to them, and because they operate an annual property tax collection system that can easily incorporate the collection of the annual special assessment charge at little extra cost. Local governments usually use the technique on an *ad hoc* basis, often at the request of a group of landowners, to construct needed infrastructure works separately from the regular program of municipal public works. Whereas this regular programme of works is usually financed by regular loans which are repaid out of the annual property tax collections and other municipal revenues, the special assessment project works are financed by special loans that are repaid from the annual collections of the special assessment charges. As these charges are additional to the regular property taxes they have to be acceptable to the affected landowners, so that every special assessment project should be prepared in consultation with the landowners in the project site and have majority landowner support.

To be acceptable to the landowners, each special assessment project should be beneficial (profitable), equitable and affordable to all the landowners in the project site. The project benefit should be significantly greater than the project cost, and this is usually best measured by the amount of the total land value increase in excess of the total project cost. To be equitable, there should be fair sharing of the project costs and benefits. This means that the project boundary should be drawn to include, as far as is practicable, all the land parcels that will benefit from the project works. When some of the project benefit falls outside the designated project site, then the local government should contribute a corresponding share of the project cost. The project costing should include the compensation cost of the land (and buildings, if any) used for the project works, at its market value. The landowners' share of the project cost should be allocated to each of the land parcels in the project site according to the share of the project benefit received by each land parcel. This benefit is best measured by the increase in the market value of the land, or possibly by a formula acceptable to the landowners that reflects the determinants of land value.

A scheme should be prepared for each proposed special assessment project. The scheme is more than the plan/design for the project. It is a package of documents that also define, explain and justify the project, and it includes a land parcel map of the project site, a register of the landowners, valuations of the land parcels before and after the works, designs of the project works, an implementation programme, cost estimates, a financial plan, a financial viability analysis and the estimated special assessment charges. The scheme has a number of functions. The draft scheme will enable the local government to decide whether to proceed with the project, the landowners to decide whether to support the project (possibly with amendments), and the central government whether to approve the proposed project for implementation. The approved scheme is used to raise the project loan, and then to guide the implementation of the project.

The conditions to be met in order to prepare and implement successful special assessment projects are outlined in Figure 3.

Special Assessment Projects in Thailand:

No special assessment projects have been undertaken by local governments in Thailand. But the Ministry of Agriculture and Cooperatives undertakes projects to construct local irrigation works in rural areas and the BMA has proposed the use of the technique to pay for flood protection works in Bangkok. Many rural land consolidation projects to construct farm irrigation systems have been carried out since 1968, and they provide valuable precedents and experience to assist the adoption of the special assessment technique for urban infrastructure works.

The Land Consolidation Office in the Ministry of Agriculture and Cooperatives has implemented a program of land consolidation projects to construct canal-to-farm water distribution works in new irrigation areas where dry-land farms are being converted to irrigated-land farms (7). The projects construct the canal-to-farm water supply ditches, the roads alongside them, and the drains, together with the clearing and levelling of the farm lands. The landowners have to contribute up to 7% of their land without compensation to provide the land required for the ditches and roads, etc., and also to pay two levies. One is for the landowner's share of the cost of the roads, ditches, etc., and the second is to pay the cost of the clearing and levelling works on his/her land. These levies can be paid in installments over ten years. The first pilot land consolidation project was commenced in 1968 and the Agricultural Land Consolidation Act, 1974 was passed to authorise and regulate the preparation and implementation of projects.

The Act is administered by the Minister of Agriculture and Cooperatives through his Central Land Consolidation Committee of department heads, and with the support of the Central Land Consolidation Office. A provincial land consolidation committee is set up for each province in which there are consolidation projects and is supported by a provincial land consolidation office. The committee consists of the provincial governor (as chairman) and deputy governor, department provincial officers, up to five landowners, and the head of the provincial land consolidation office (as secretary). It is responsible for planning and implementing the consolidation projects. The work is done by the provincial land consolidation office working with the provincial and district offices of the Royal Irrigation Department, Lands Department and Department of Land Development.

The planning of a project is authorised by the publication of a Royal Decree showing a map of the project area and listing the landowners in the area. Alternatively, the central committee can conduct a poll of the landowners to ascertain if the majority support the preparation of a plan. Given the authorisation to plan, the Minister then publishes a

Figure 3

SPECIAL ASSESSMENT PROJECTS

A special assessment project is a project undertaken by a local government (or other authorized agency) to construct infrastructure works such as public roads and to recover the project cost by an annual special assessment charge on the benefitting lands. Special assessment is a technique for financing public works from the increase in land values generated by the public works. The central government should make a law and administration to authorize, regulate and supervise the implementation of special assessment projects by local governments.

To be acceptable to the landowners, each special assessment project should be profitable (beneficial), equitable and affordable to all the landowners in the project site.

The conditions for using the special assessment technique to finance the construction of municipal infrastructure works include...

- Selection of suitable project works and a suitable project site.
- Definition of the project site to include all/most of the land benefitting from the works.
- Preparation, in consultation with the landowners, of a scheme for the project. The purpose of this scheme is to design, to explain and to justify the project so as to gain landowner support for it, and official approval. The approved scheme is used to raise the project loan, and to then guide the implementation of the project. Preparation of the scheme includes...
    - Preparation of a land parcel map of the project site and a register of the landowners.
    - Costing of the works (including compensation for land acquisition) and allocation of the total cost between the internal and external beneficiaries, with external funding to be provided for the external benefit share.
    - Costing of the medium - term loan to be raised to finance the project.
    - Calculation of the landowners' project cost, this being their share of the works cost plus loan interest plus the assessment collection costs.
    - Allocation of the landowners' project cost to each of the land parcels according to the benefit received. This share of the project cost is collected as an annual charge (a "special assessment") on each land parcel for the period of the loan and used to repay the loan.
- Majority landowner support for the proposed project.
- Compulsory inclusion of all land parcels (and landowners) in the site in the project, when the project scheme is officially approved for implementation.
- Raising a short/medium term loan to finance the project.
- Full collection each year of the charge on each land parcel, with the money collected being used to repay the project loan plus the loan interest.
- An implementing agency (usually a local government) that benefits from the project, that can prepare the project scheme, can obtain a project loan, can manage the project implementation, and can impose the annual charge on the land and collect it each year, A local government can hire consultant project managers to prepare and implement special assessment projects.

notice authorising the landholdings in the area to be surveyed and assessed, and they are placed under a moratorium. A draft land consolidation plan is prepared under the supervision of the provincial committee and in consultation with the landowners. The draft plan shows the proposed layout of ditches, drains, roads and paths, and the new boundaries of the farms. It passes through successive amendments at discussions with the landowners until a final version is agreed upon. Any objecting landowner can appeal to the provincial committee and if not satisfied, to the central committee.

Each of the landholdings in the project area is valued at the commencement of the planning, together with the land to be taken for the ditches, drains, roads and paths, and the totals are used to calculate the average percentage land value contribution and the "net value" of each farm. The sharing of the project joint costs (for ditches, roads, etc.) is in proportion to the farm valuations with cash adjustments for any disproportionate land contributions.

In the case of urban infrastructure works, the BMA proposed that the special assessment technique should be used to recover part of the cost of flood protection works in Bangkok, but in December 1991 the Ministry of Interior rejected the BMA's draft bill for a law to authorise local governments to undertake special assessment projects.

Following the severe flooding of many parts of Bangkok in 1983 a consultant engineering firm recommended a Baht 4 billion program of flood protection works. The BMA compiled a Baht 2,059 million program of works (pumping stations, dikes, drainage, dredging equipment, etc), for nine inner Bangkok districts covering 94 sq.km. and with about 2.4 million population. The program was to be financed by Baht 442.6 million central government grant funds, Baht 442.5 million BMA current revenue fund plus a Baht 1,173.6 million loan from the World Bank. This loan was to be repaid by BMA collection of a special assessment levy on land and buildings in the 94 sq.km. project area at the rate of Baht 33 per Baht 100,000 of assessed value each year for 15 years (8). The Government approved the works program in October 1989, but not the proposed special assessment levy. As a sample survey of property-owners in the project area made by the National Statistical Office in 1987 had shown majority support for the proposed levy at the annual rate of Baht 33 per 100,000 of assessed value, the BMA continued to work for its adoption. In May 1991 it submitted to the Ministry for the Interior a draft royal decree to authorise local governments to impose special levies to recover the cost of flood protection, waste-water treatment and other infrastructure works. The Ministry returned this to the BMA saying that it should specify the special assessment levy rates to be charged. The Prime Minister was reported in September, 1991 as favouring the special assessment technique and requested further consideration of it (9). The alternative possibility was for the BMA to pass its own ordinance to authorise its collection of the proposed levy.

The Pilot Project Site

The SOFIE terms of reference called for a research site within the "built-up" area of Bangkok Metropolis, such site to permit the application of financing and cost recovery techniques in situations where additional infrastructure, especially D/C roads, might be constructed in an urbanising area so as to improve the efficiency of existing land use and to guide future development. The construction of D/C roads and other needed infrastructure will increase land values, and this provides a basis for the recovery of the infrastructure costs from the benefitting landowners within the area.

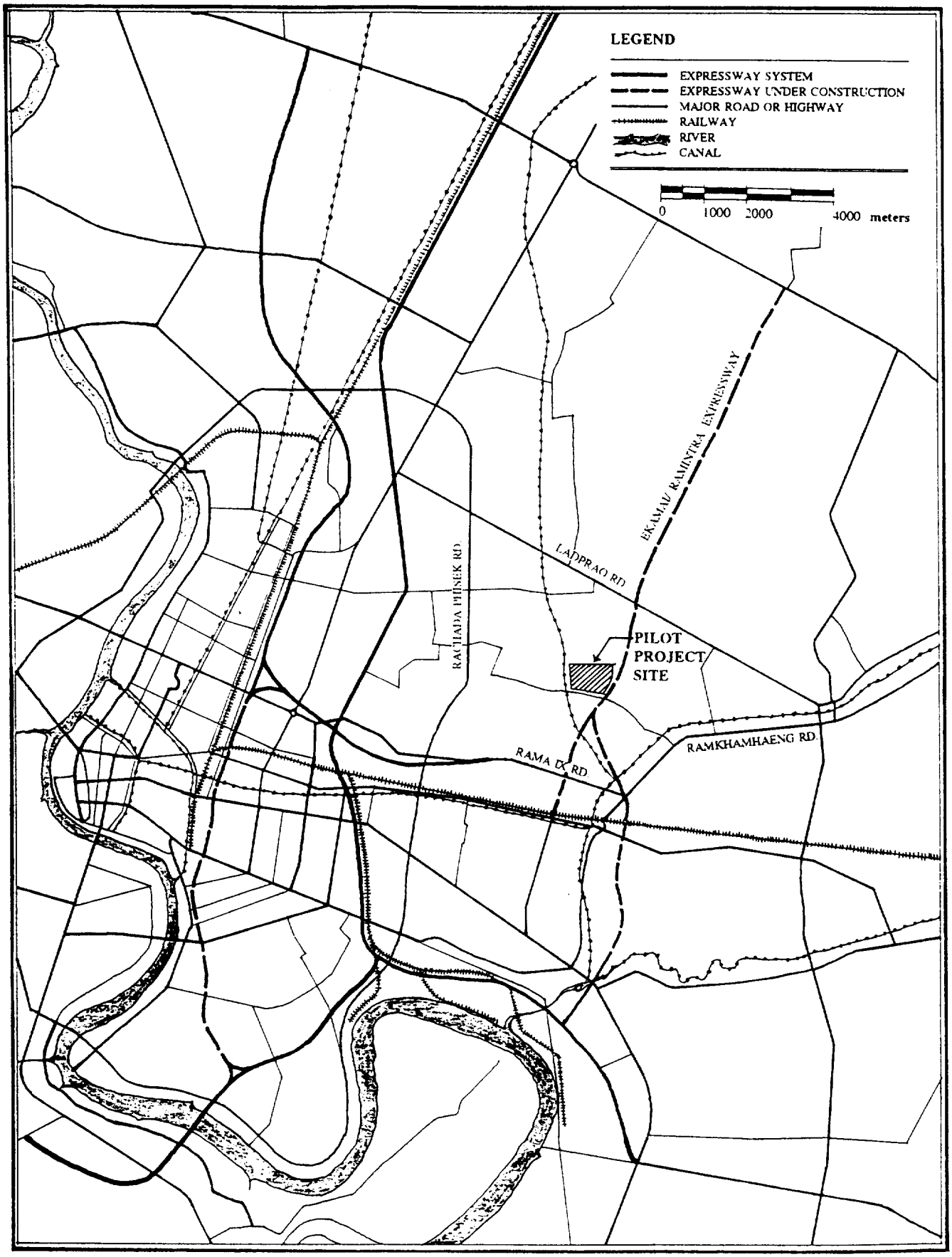
SOFIE Site Selection Criteria:

As the selected research site was to provide a practical opportunity to explore the impact and implications of cost recovery mechanisms, the search and selection within the Bangkok Metropolis area was guided by the following criteria:

- A location in one of the city blocks bounded by main roads, within the built-up area;
- An area needing the construction of new infrastructure (D/C roads) to support existing and/or new urban development;
- An area of mixed land use and under strong development pressure;
- The existence of current government plans/proposals for infrastructure improvement;
- Separate private ownership of land parcels;
- General representativeness of area conditions; and
- Convenient access for field work.

After considering several alternative city blocks by site visits and discussions with planning and infrastructure officials, the block bounded by Lad Prao, Ramkhamhaeng, Rama IX and Rachada Phisek Roads was selected. Its location is shown on the map of Bangkok in Figure 4. This large block includes subdistricts of both the Huai Khwang and Bangkapi Districts of Bangkok Metropolis. The City Planning Division of the Bangkok Metropolitan Administration (BMA) endorsed this block as a SOFIE study area featuring significant existing urban and suburban development, rising property values, serious infrastructure deficiencies and great potential for further intensive development. Site visits

Figure 4
Map of Bangkok Showing the Location of the Pilot Project Site.



confirmed that this block was undergoing significant commercial and residential development on its Rama IX Road and Rachada Phisek Road edges and in its interior. The proposed Ekamai/Ramintra Expressway will cross the block and have access ramps at Lad Prao Road, and its right-of-way will include a BMA main road at ground level. This new six lane road, running north and south, will divide this large block into two blocks, and strongly stimulate land and building development along its length and within the block.

This proposed elevated expressway with a main road at ground level provided the first site selection factor within the block. The second selection factor was provided by the BMA City Planning Division proposal for a new D/C road to run east from Soi Ratchadanivate 5 to join the proposed main road under the expressway. This D/C road would cross a large "pocket" of unused farming land and would help to open-up the land for urban development. This was a third selection factor, as there are many similar "pockets" of undeveloped land within the built-up area of Bangkok Metropolis. Another selection factor pointing to this unused land between the Lad Prao Canal and the proposed Ekamai/Ramintra Expressway route as the research site, was its location within an area of mixed commercial, residential, industrial and recreational land uses, and in an area of strong development pressure. The need for a drainage system for this area of low-lying land was an additional consideration.

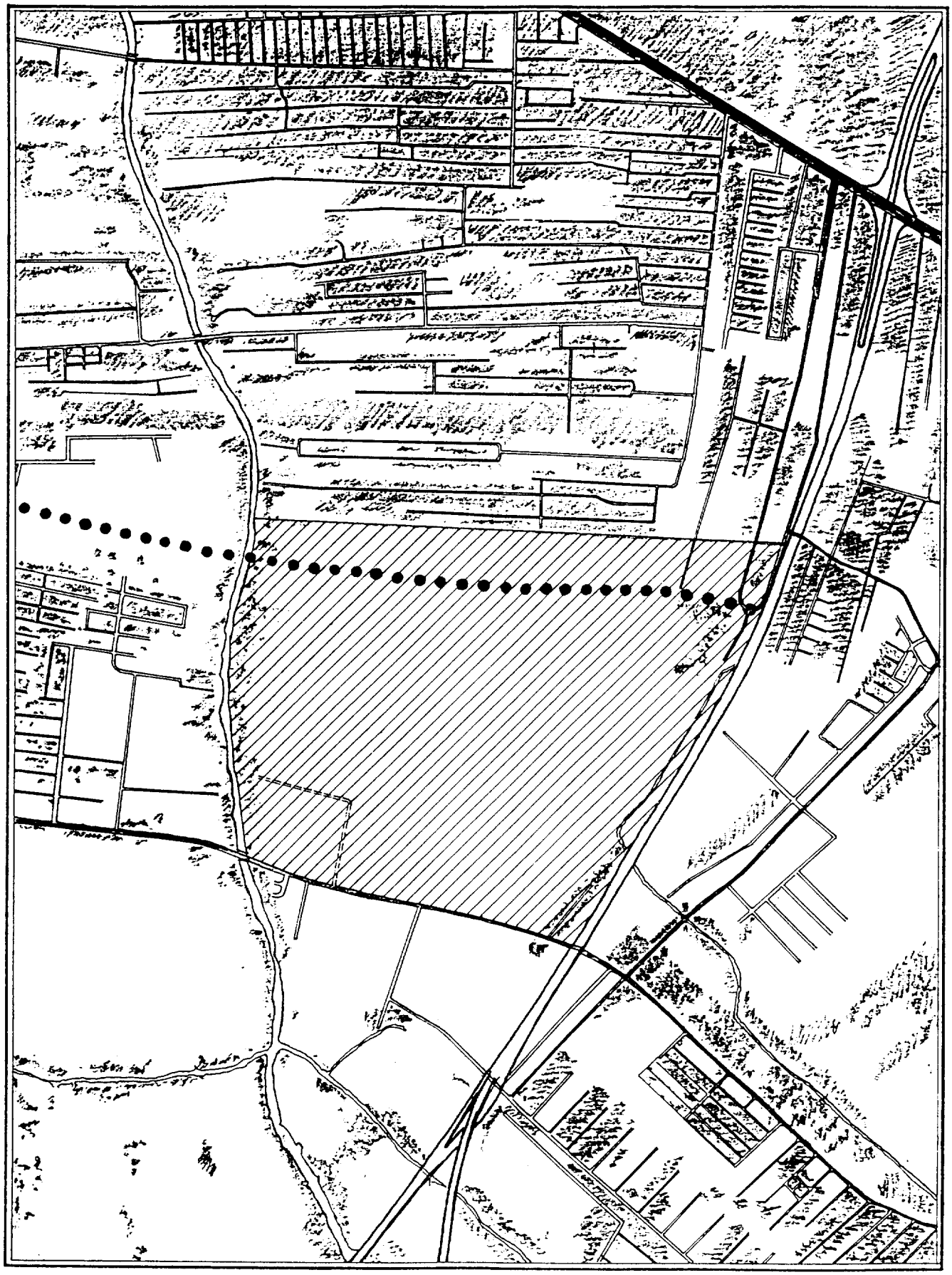
Pilot Project Site:

The site recommended to, and approved by, the SOFIE Steering Committee has well-defined boundaries, these being Pracha Uthid Road on the south, Lad Prao Canal on the west, the Ekamai/Ramintra Expressway route on the east and the Chokchai Panjasub Housing Estate on the north. The site is located in Wong Tong Larng Subdistrict (kwang) of Bangkapi District (ket) of Bangkok Metropolis.

The pilot project site and its surrounding area are shown in Figure 5. Its midpoint is about 2.0 km. south from Lad Prao Road and about 2.5 km. northwest from Ramkhamhaeng Road. The site is about 1040 m. deep from south to north and widens from about 900 m. across the southern boundary up to about 1400 m. across the northern boundary. It covers an area of 798.3 rai (127.7 ha.) in 181 land parcels with 117 owners. The D/C road proposed by the City Planning Division of the BMA is shown by the dotted line on Figure 5. The base map for Figure 5 is dated about 1987 and shows the mainly suburban housing development in the area around the site at that time. In recent years the projects completed near the site include a 4 star hotel, professional offices, high priced houses and condominium apartment buildings.

The land parcels and buildings within the pilot project site are shown in Figure 6. Most of the site was unused rice farming land with some building development along the western and southern edges. The buildings along Lad Prao Canal are houses plus a primary

Figure 5
Map of the Pilot Project Site.



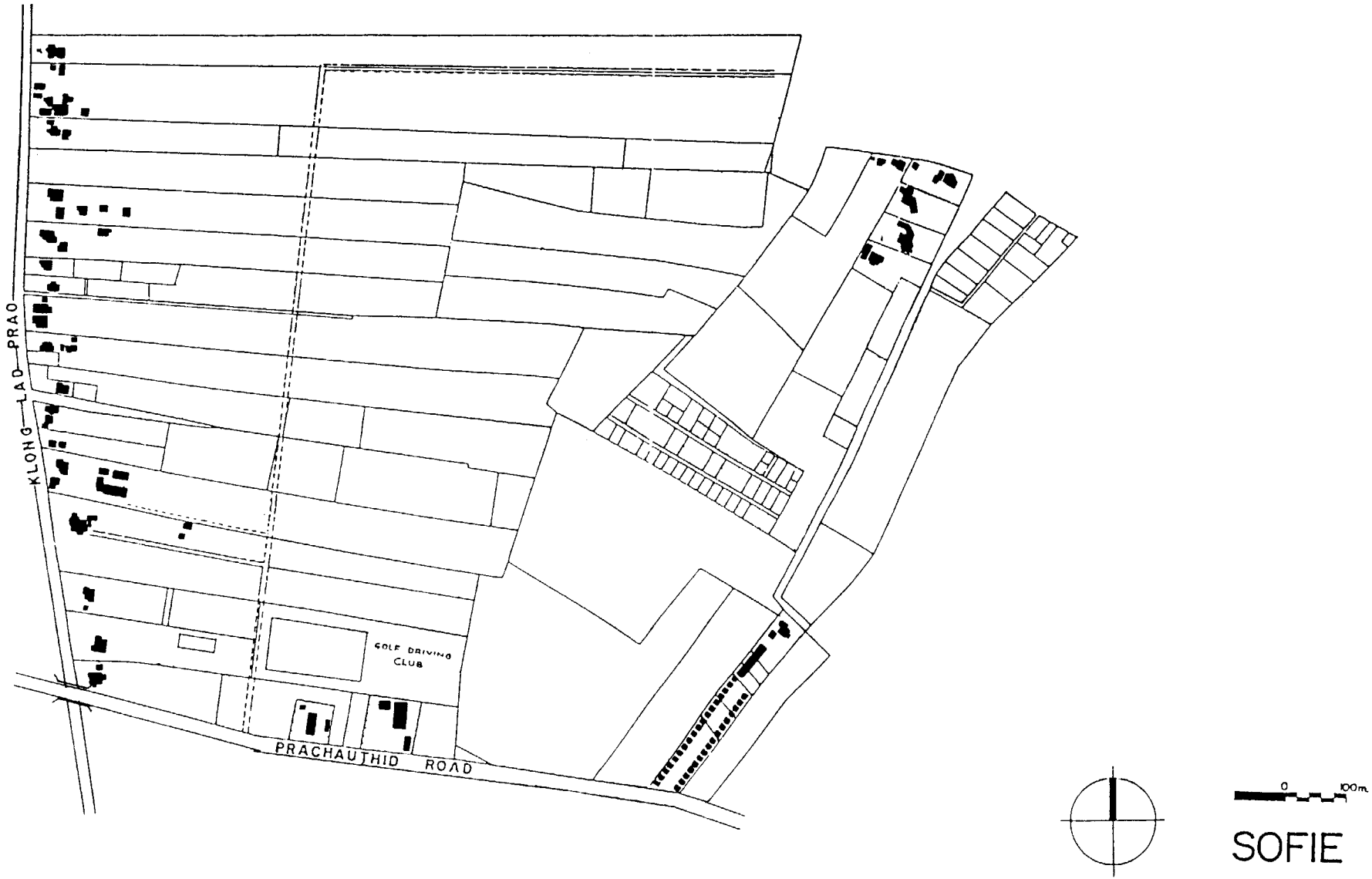


Figure 6
Map of Land Parcels and Buildings in the Pilot Project Site, 1991.

school. These houses and the west-to-east orientation of the long narrow land parcels reflected the irrigated rice farming land use for most of the site in previous years. The buildings along Pracha Uthid Road included a factory, sales office, sports centre and golf-driving range, and a row-house estate. There were also a few large houses on large plots on the northeastern corner of the site. The land parcel map also shows a suburban land subdivision layout on the eastern side of the site with building plots of 100 sq.wah (400 sq.m.) and above. But these plots have no connection to a public road and there is no building development in this area. (This can be described as a purely speculative land subdivision layout, and it raises the question of why did the Land Subdivision Control Committee permit such a subdivision that created building plots without a public road connection, and why did the Lands Department survey, peg and title them?)

The development pressure on the site itself was becoming visible. The Sri Chieng Roong Ltd. Company planned to construct the 900 unit Victoria Towers condominium apartment project in three towers of 38 floors each on one land parcel in the site. The company was actively pre-selling the apartment units from its sales office on Pracha Uthid Road at prices ranging from Baht 2.88 million for a 82.2 sq.m. unit up to Baht 21.20 million for a 385.2 sq.m. unit, but no building permit had been issued for the project. There was also a formed earth road, as is shown in Figure 6, running northward from Pracha Uthid Road and then east towards Lad Prao Soi 80. It could be used in dry weather only. The section of the earth road running east/west across the top of the site was not on the same alignment as the D/C road proposed by the BMA City Planning Division, which would be located about 80 m. south of the earth road.

There was no official land use plan covering the pilot project site. The draft Bangkok Metropolis General Plan (as published in the Prachachat Thurakit newspaper on 4 July 1990) showed the site as being within an area coloured yellow that would be zoned low density residential as the major land use, but with other compatible land uses being permitted as "minor land uses" on up to 10% of the land area (11). Prepared at 1 to 75,000 scale, the draft plan did not show any proposed public roads within the site, but it did show the Ekamai/Ramintra Expressway route and Pracha Uthid Road as a major distributor/collector road. The Department of Town and Country Planning (DTCP) which prepared the draft plan in 1987 had not issued a definition of "low density residential land use" other than a bar on "large buildings" (12). Within the Department low density was considered to be an average resident population of 10 persons per rai (62.5 persons per ha.) which would be equivalent to about two houses per rai (12.5 houses per ha.), which is very low. An alternative functional definition of low density would be in terms of suburban detached housing. As the Land Subdivision Regulations, 1987 set the minimum size of a plot for a detached house at 50 sq.wah. (200 sq.m.), the detached house definition of low density residential would indicate a figure of about 6.5 houses per rai (40 houses per ha.) assuming that about 20% of the land is allocated for road space.

Even at this higher figure of 6.5 houses per rai, it is clear that the proposed low density residential zoning for the pilot project site was not realistic alongside the 1991 market value of the land (about Baht 20 million per rai for land parcels on Pracha Uthid Road) and the high-value building development projects that were in-progress and planned in the area. This uncertainty about the future official land use zoning for the site hindered the planning of infrastructure for the site and affected the choice of the technique for financing the construction of this infrastructure.

A Special Assessment or Land Pooling/Readjustment Project? (10)

Special assessment and land pooling/readjustment (LP/R) are alternative techniques that could be used to finance the construction of network infrastructure in the pilot project site, but it is recommended that both techniques should be used, in two stages. First, a network of D/C roads and drains should be planned for the whole site with the construction of this network to be financed by a project loan to be repaid through an annual special assessment charge on each land parcel over a period of years. This network will divide the site into ten blocks (i.e., groups of land parcels encircled by roads). Second, some of these blocks should be planned, serviced and subdivided through separate LP/R projects for each block. These LP/R projects could be undertaken as a mix of voluntary landowner cooperative projects, developer/ landowner partnership projects, and government managed projects. The BMA would desirably encourage and assist these LP/R projects for the new blocks.

The main reason for proposing this two stage approach to the construction of network infrastructure in the site is uncertainty about the timing and scale of building development in the site. The subdivision of land into building plots should be close (in time) to the building development. But the site is a large one and building development will be spread over many years, so that it is inappropriate to subdivide it all into building plots at the present time. The proposed low density residential zoning for the site is obsolete and will cause uncertainty and delay building development. There is also uncertainty about the timing of the construction of the BMA main road under the Ekamai/Ramintra Expressway, as the BMA will have obtain funds to pay for this road. In this situation, it is appropriate to first plan and construct a network of D/C roads and drains for the pilot project site so as to open it up for development and to provide a physical framework to guide this development. This network would divide the site into blocks which will allow the land subdivision and construction of the local network infrastructure within each block to be carried out close to the time each block is to be developed with buildings. The division of the site into blocks will also assist land assembly by developers and provide opportunities for LP/R projects at the city block level.

Another reason for recommending using both the special assessment and LP/R techniques is to take advantage of the features of each technique. The main difference between them is that a special assessment project is typically for the construction of one or two types of infrastructure in a defined area with cost recovery by instalment payments from the benefitting land owners over a period of years, whereas a LP/R project is typically for the construction of all the network infrastructure necessary to convert an area of rural land into a layout of streets and serviced building plots with immediate cost recovery by the sale of some of the new building plots. A LP/R project is usually more comprehensive and more detailed than a special assessment project because every land parcel has to be reduced and reshaped so as to contribute its share of land for public roads, etc. plus land to be sold for cost recovery. This detailed planning and land "replotting" requires both good planning skill and time-consuming negotiations with the landowners. (There have been a number of studies and reports on LP/R in Thailand and a list of this material is appended as Attachment 1.)

Accepting that the planning and construction of the network infrastructure in the research site be undertaken in two stages, there are four reasons why the first stage should be as a special assessment project rather than as a LP/R project. First, special assessment is a simpler and quicker technique for implementing projects. When the construction of the proposed network of D/C roads and drains is financed by a special assessment charge on the benefitting land parcels there is minimum disturbance to the land parcels, whereas under LP/R every land parcel has to be reduced and reshaped. This reshaping of every land parcel can provide benefits but it requires greater professional skill and effort and time.

Second, the planning and construction of the network of D/C roads and drains needed in the pilot project site can be carried out adequately through a special assessment project without the need to resort to LP/R with its complexities. Third, special assessment is a technique for minimal government intervention in the private land development process, which accords with current government policy. Fourth, the special assessment technique has greater potential than LP/R for adoption by the BMA for financing the construction of D/C roads in Bangkok Metropolis. It could become a standard technique for the BMA to use to implement many of the needed D/C roads as recommended in the Seventh Plan Urban and Regional Transport (SPURT) Report. With this potential application of the technique it is desirable that the BMA carry out pilot special assessment projects so as to demonstrate its benefits and to also refine the technique so as to suit local conditions, in the light of the experience gained.

Bangkapi Special Assessment Pilot Project, 1991

The project is to construct the planned layout of two bridges and 7.2 km. of D/C roads and drains in the 798.3 rai (127.7 ha.) Bangkapi pilot project site and to recover the

landowners' full share of the project costs within five years by an annual special assessment charge on the benefitting land parcels within the site. The layout plan is shown superimposed on the land parcel map in Figure 7. As is shown by the road cross-sections in Figure 7, there are to be three types of D/C roads with right-of-ways of 20.0 m., 16.0 m. and 14.0 m., and with pavement widths of 14.0 m., 11.0 m., and 11.0 m, respectively. These roads will have concrete paved surfaces and footpaths, and concrete pipe drains along each side. The two concrete bridges, one for the Pracha Uthid Road widening and one for the BMA D/C road, will be 18.00 m. wide and 40.00 m. long.

The construction of the bridges and roads will attract developers to the site and guide their land assembly and building development. The road layout will divide the site into ten blocks, eight of which will provide good potential sites for their unified planning, servicing and subdivision by LP/R projects. The small number of land parcels within each block will facilitate this landowner cooperation. The BMA should encourage and assist the landowners, and developers and government agencies (such as the National Housing Authority) to prepare and implement LP/R projects to develop these blocks.

The network of bridges and roads to be constructed by the project includes two bridges and roads that will benefit the movement of through traffic more than the flow of local traffic travelling to and from locations within the site. This means that part of the project costs should be met from sources outside the site.

Project Objectives:

The objectives of the Bangkapi pilot project are ...

- To gain majority landowner support for the early construction of the planned bridges, D/C roads and drains, and for the levy of a specified annual assessment charge on their land to pay for this construction;

- To construct the planned network of bridges and roads and drains so as to open-up the site for urban development and then guide this development;

- To facilitate and assist the adoption of the LP/R technique for the unified planning, subdivision and servicing of some of the new blocks within the site;

- To reconstruct the Pracha Uthid Road as a major D/C road as shown in the draft Bangkok Metropolis General Plan, and to construct the proposed BMA D/C road;

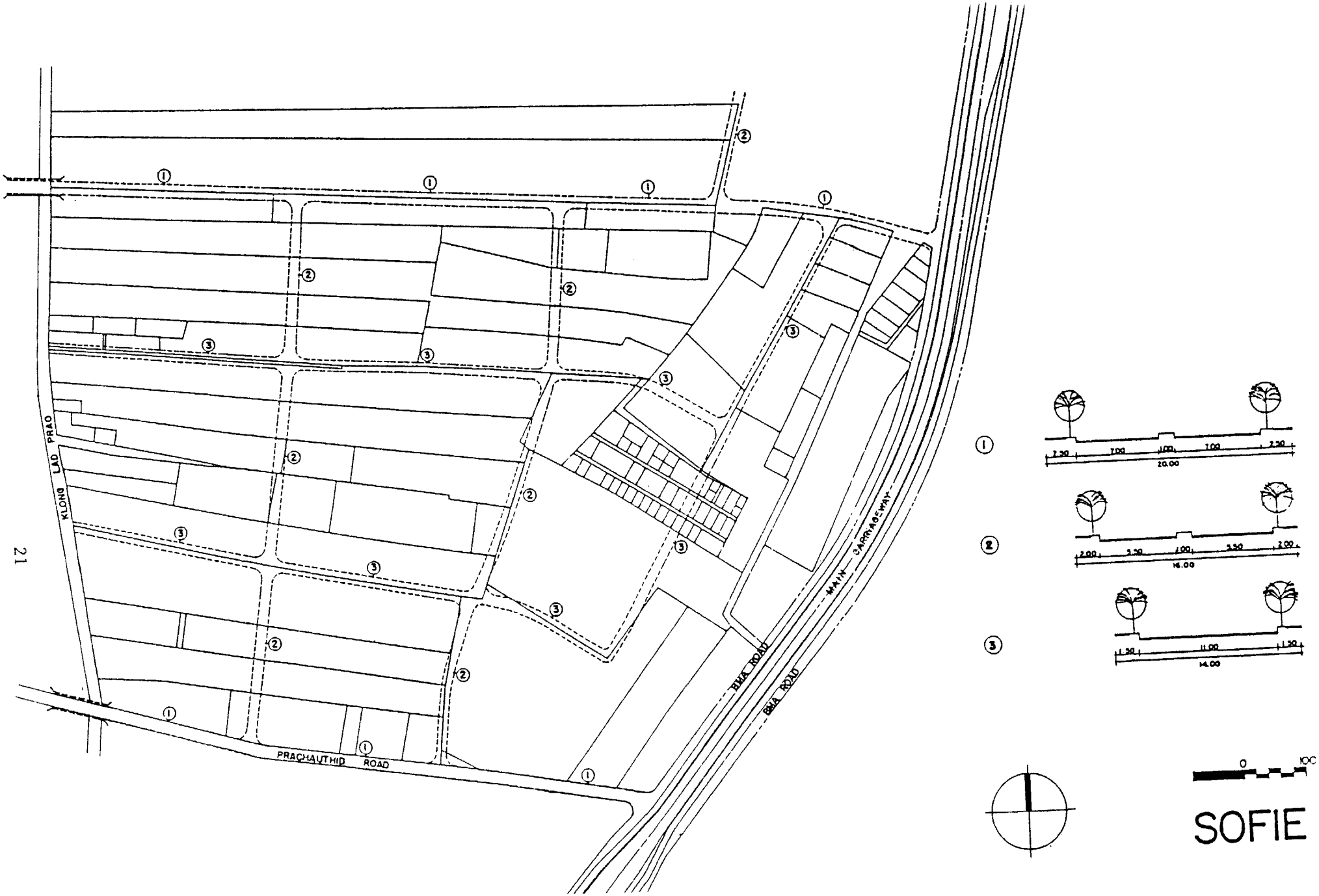


Figure 7
Plan of the Distributor/Collector Road Network in the Pilot Project Site, 1991.

- To recover the landowners' share of the cost of the project from the landowners in the site through a charge on the benefitting land parcels, with the charge reflecting the project benefit to each land parcel (and its owner); and

- To demonstrate the use of the special assessment technique to finance the construction of D/C roads, and to identify appropriate procedures to facilitate its wider application in Bangkok Metropolis and in provincial cities and towns.

Project Costs:

The estimated cost of constructing the bridges, roads and drains is Baht 200.63 million as shown in Table 1. This figure was calculated using the current BMA cost rates and adding a 30% contractor's margin plus a 4% design and supervision fee. It does not include the compensation cost of acquiring the land for the road right-of-ways and the interest charges on the loan raised to fund the project. The roadway land acquisition was costed at the market value of the land as estimated by the consultant valuers TEAM D Co. Ltd. The two at 3 m. strips of land to be acquired for the widening of Pracha Uthid Road from 14.0 m. to 20.0 m. were valued at Baht 20.0 million per rai (12,500 Baht per sq.m.), while the other land to be acquired was valued as "blind land" at an average of Baht 2.3 million per rai (1,450 Baht per sq.m.). The total cost of the 65.925 rai (105,480 sq.m.) of land to be acquired for the road right-of-ways was estimated as Baht 217.92 million as shown in Table 2, so that the total project land acquisition and construction costs amount to Baht 418.55 million.

As well as these land and construction costs there will be project financing costs, which will depend on the way the project is financed and the costs recovered. The project cost can be divided into two parts according to whether the project benefits fall on the land within the site or on land and others outside the site. Only that part of the project considered to benefit the land within the site would be included in the special assessment scheme and financed as part of it.

Although most of the benefit of the project network of D/C roads and drains will go to the land within the project site, some of the benefit will go to land outside the site and to the motorists travelling through the site. Thus, the widening of Pracha Uthid Road and its second bridge will be primarily to facilitate the flow of through-traffic, and the BMA proposed D/C road and bridge would also carry substantial through-traffic. It is therefore assumed (as a first assumption which might be changed after further enquiry) that all the benefit of the Pracha Uthid Road widening and second bridge, and that half the benefit of the BMA road and bridge will go outside the project site, so that the cost of

TABLE 1

BANGKAPI SPECIAL ASSESSMENT PILOT PROJECT
ESTIMATED CONSTRUCTION COST, 1991
(using BMA cost rates)

	Baht
No. 1 Roads (20.0 m R of W), 2,400 m length (including rebuilding of Pracha Uthid Road- 980m)	
Fill - 64,800 cu.m. @ 150 Baht/cu.m	9,720,000
Sub-grade 0.30 m and road base 0.30 m - 33,600 sq.m. @ 170 Baht/sq.m	5,712,000
Concrete surface 0.20 m - 33,600 sq.m @ 340 Baht/ sq.m	11,424,000
Kerb and gutter - 9,600 m @ 105 Baht/ m	1,003,000
Foot path (concrete block) - 7,200 sq.m @ 155 Baht/ sq.m	1,116,000
Drain pipe @ 1.20 m and base - 4,800 m @ 3,300 Baht/ m	15,840,000
Drain box @ 0.60 x 0.60 x 1.50 m - 400 @ 13,200 Baht/ box	5,280,000
Sub total	50,100,000
No.2 Roads (16.0 m R of W), 2,000 m length	
Fill - 44,400 cu.m @ 150 Baht/cu.m	6,660,000
Sub-grade 0.25 m and road base 0.25 m - 22,000 sq.m @ 150 Baht/ sq.m	3,300,000
Concrete surface 0.15 m - 22,000 sq.m @ 250 Baht/sq.m	5,500,000
Kerb and gutter - 8,000 m @ 105 Baht/m	840,000
Foot path (concrete block) - 4,800 sq.m @ 155 Baht/sq.m	744,000
Drain pipe @ 1.00 m - 4,000 m @ 2,000 Baht/m	8,000,000
Drain box @ 0.60 x 1.50 m - 334 @ 12,500 Baht/box	4,175,000
Sub total	29,219,000

No.3 Roads (14.0 m R of W), 2,800 m length

Fill - 55,440 cu.m @ 150 Baht/cu.m	8,316,000
Sub-grade 0.20 m and road base 0.30 m - 30,800 sq.m @ 120 Baht/sq.m	3,696,000
Concrete surface 0.15 m - 30,800 sq.m @ 120 Baht/ sq.m	7,700,000
Kerb and gutter - 5,600 m @ 105 Baht/m	588,000
Foot path (concrete block) - 5,600 sq.m @ 155 Baht/sq.m	868,000
Drain pipe @ 1.00 m - 5,600 m @ 1500 Baht/m	8,400,000
Drain box @ 0.60 x 1.50 m - 936 @ 7,500 Baht/box	3,510,000
Sub total	33,078,000

Bridges (2 @ 18.00 m x 40.00 m)

Construction (material and labor)	36,000,000

Contractor's margin

For operating costs, taxes and profit (30% of Baht 148,397,000)	44,519,000

Engineering design and supervision

(4% of baht 192,916,000)	7,717,000
Total	200,633,000

Note:

Road construction costs do not include tree and grass landscaping costs.

N.T.
25/3/91

TABLE 2

BANGKAPI SPECIAL ASSESSMENT PILOT PROJECT
ESTIMATED TOTAL COSTS, COST SHARING AND SPECIAL ASSESSMENT CHARGE
1991

TOTAL CAPITAL COST AND COST SHARING

	Baht
Roadway land acquisition compensation (Pracha Uthid Road widening - 980 x 6 m @ 12,500 Baht/sq.m, Other roads - 1,420 x 20 m, 2000 x 16 m and 2800 x 14 m @ 1,450 Baht/sq.m	217,920,000
Road and drain construction (from Table 1)	151,961,000
Bridge construction (from Table 1)	48,672,000
Total land and works cost	418,553,000
Less BMA share of capital cost (full cost of Pracha Uthid Road and bridge - Baht 125,471,000, half cost of BMA Road and bridge - Baht 52,808,000)	178,279,000
Landowners' share of capital cost	240,274,000
Loan interest on landowners' share of cost (5 year loan through M of F at 10.0% p.a. interest)	76,647,000
Total project cost	316,921,000

TOTAL ANNUAL SPECIAL ASSESSMENT CHARGE

Annual loan installments due for five years	63,384,000
Annual special assessment administration cost (2% of annual loan installments)	1,268,000
Annual special assessment collection	64,652,000

these works should not be charged to the land within the project site and recovered by a special assessment charge on the land. This means that the full cost of the Pracha Uthid Road widening and second bridge, and half the cost of the BMA distributor road and bridge (Baht 125.47 million and Baht 52.81 million, respectively, as shown in Table 2) would be financed through the regular BMA road construction programme and not financed through the special assessment scheme.

The landowners' share of the total project land and construction cost of Baht 418.55 million is therefore estimated as Baht 240.27 million. This expenditure would be funded by a five year bank loan arranged through the Ministry of Finance with the interest rate at the 10.0% p.a. maximum rate set by the Ministry. (This rate is well below the prevailing market interest rate of about 18.0% p.a.) The loan would be repaid by the special assessment charge on the land. The total cost to be paid by the landowners to cover land compensation, construction costs and interest charges, is estimated at Baht 316.92 million, as shown in Table 2.

This expenditure of Baht 316.92 million would open-up the site area and provide 732.4 rai (1,171,800 sq.m.) of "subdivision land" (excluding the roadway land), so that the average unit cost is 432,714 Baht per rai (270.45 Baht per sq.m.). This amount is only a fraction of the estimated increase in the market value of the land that the construction of the bridges, roads and drains would generate by converting most of the land parcels from rural land into urban subdivision land.

Impact on Land Values:

A study was made by Sopon Pornchokchai, General Manager of TEAM D Co. Ltd., to assess the impact of the construction of the planned network of bridges and roads on the market value of the land in the site (13). The TEAM D report, "Valuation of Vacant Land at Klong Lad Prao Site, Wang Tong Larng, Bangkapi", issued in March, 1991 concluded that...

> "In brief, the total value of the property on a vacant land, vacant possession and undeveloped basis, is approximately Baht 3,326.32 million. The land to be lost for road construction is worth approximately Baht 211.80 million. After the development is completed in December 1991, the total site would have a value of approximately Baht 10,674.22 million."

This means that the project is estimated to increase the market value of the land in the site from an average of Baht 4.176 million per rai (2,610 Baht per sq.m.) of rural land at March 1991 up to an average of Baht 14.525 million per rai (9,078 Baht per sq.m.) of "subdivision" land at December 1991, an increase in the average unit land value of 247%.

But as 8.26% of the land area was taken for roadways the increase in the total value of the land retained by the landowners was 221%, an increase of Baht 7,347.90 million on the original value of Baht 3,326.32 million. The landowners' share of the project cost, as shown in Table 2, is Baht 240.27 million.

The TEAM D valuation of the 181 land parcels in the project site before and after the project was made using multiple regression analysis. This analysis was based on the data for 144 property sales at 45 locations around the research site during the five year period from January 1986. The five factors (variables) found to be significantly related to the unit value of each land parcel were ...

- o size (area) of the land parcel;
- o width of the land parcel or its road frontage;
- o location accessibility of the land parcel using the categories (and weightings) of: "blind land" (0.47), a secondary road frontage (2.25), a main road frontage (2.50), and a corner location (2.75);
- o width of the paved road surface which the land parcel faces; and
- o month of sale of land parcel (1 to 72, from January 1986 to December 1991)

The unit values of each land parcel before and after the project were estimated, using the equation ...

$$y = z + x1*a1 + x2*b1 + x3*c1 + x4*d1 + x5*e1$$

where y = value of land in Baht per sq. wah
z = constant value = 0
x1*a1 = -1.90 x area of parcel in sq. wah
x2*b1 = 12.94 x width (frontage) of parcel in wah
x3*c1 = 3458.70 x location accessibility factor
x4*d1 = 593.09 x road pavement width in m.
x5*e1 = 513.96 x month of sale

TEAM D reported that the correlation coefficient for this equation was 0.89, which is quite high. An extract from the TEAM D report showing the main results is appended as Attachment 2.

It will be noted that the TEAM D valuation analysis was made on the assumption that the land is vacant and without internal roads at the commencement of the project. That is, the earth road across the site and the existing buildings, as shown in Figure 5, have not been taken into account when estimating the unit value of each land parcel before the construction of the C/D roads and drains.

Special Assessment Charge:

The bank loan of Baht 316.92 million to be raised to fund the landowners' share of the project costs would be repaid in five equal installments of Baht 63.38 million a year, covering both capital and interest. These installments would be funded by annual collections of a special assessment charge on the land within the site. The cost of administering these collections should also be included and this cost is calculated as 2.0% of the amount to be collected each year. This would increase the total amount to be collected as the annual special assessment charge to Baht 64.65 million a year, over five years. This would average out at 220.12 Baht per sq.wah (55.03 baht per sq.m.) a year across all the land parcels coming out of the project.

The total amount of the special assessment charge to be collected from the landowners over five years is Baht 323.25 million. This amount compares with the increase of Baht 7,374.90 million in the total market value of the land in the site, as estimated by TEAM D. The total special assessment charge is only 4.4 per cent of the total increase in land value which indicates that the project is financially viable.

The special assessment charge of Baht 64.65 million a year over five years has to be shared by all the land parcels in the site in proportion to the benefit that they receive from the project. This benefit could be estimated using alternative measures/indicators such as each land parcel's share of the total area and total road frontage, or each land parcel's share of the total final land value, or each land parcel's increase in market value. The increase in the market value of the land parcel provides the best base for calculating the special assessment charge to be levied because it is a measure of both the benefit that each land parcel receives from the project and of each landowners ability to pay the special assessment charge. In the present case, where the total increase in land value was estimated at Baht 7,374.90 million, an annual special assessment charge of 87 satang per 100 baht of land value increase would recover the landowners' share of the project cost over five years.

Although the increase in land value is conceptually the best measure of the project benefit to each land parcel and each landowners ability to pay, it may not be the assessment base that the landowners prefer. It has to be calculated by the valuation of each land parcel before and after the project and there could be disputation about the estimated land values as many landowners have their own firm ideas about land values. It may be appropriate to use a cruder measure of benefit such as a combination of land parcel area and road frontage after the project to calculate the special assessment charge, if it is preferred by the landowners because they find it a more comprehensible and visible measure of benefit. This is an issue for discussion with the landowners in the site.

The landowners considering whether to support a proposed special assessment project will require that each landowner pays his/her fair share of the project costs. This means that every benefitting land parcel has to be correctly assessed using the agreed assessment basis and then that the charge payable is collected each year. To ensure this 100% billing and collection the BMA will have to improve its property tax assessment and collection procedures. A case study of the western half of the pilot project site made in 1990 for the RTI/LIF Property Tax Study found that 19 out of the 51 land parcels liable for property tax did not pay it in 1989. These 19 land parcels totalled 30 per cent of the area. A summary of the case study findings is given in Attachment 3.

One measure that can be adopted towards achieving full collection of the special assessment charge is to make it a charge against the land rather than a charge on the owner or occupier of the land, possibly by registering a lien on each land parcel. This would make the charge fully payable if the land is sold in whole or part within the five year period. It would also be desirable to prescribe a fine for any late payment of the annual charge that is sufficient to cover the additional interest cost to the project caused by such late payment.

Landownership in the Project Site:

The site area of 798.3 rai (127.7 ha.) is divided into 181 parcels held by about 117 owners. The land parcels range from 25 sq. wah (100 sq.m.) building plots up to a 66 rai (10.6 ha.) parcel, with a spread of parcel sizes as shown in Table 3. Most of the land is held in parcels of over 5 rai each, and as shown in Table 4 the ten largest landowners own 16 parcels encompassing half of the project site.

It is noteworthy that six of the ten largest owners are groups or syndicates, that six have addresses on or near the site, and that three have the same family name. This, plus the cessation of farming use of the land, suggest that the landowners would have a positive interest in supporting the Bangkapi Special Assessment Pilot Project so as to convert their rural land into subdivision land.

Further Work To Be Done:

The SOFIE Thailand study was terminated in early 1991 before the pre-feasibility study of the Bangkapi pilot project could be completed. The further work would have included ...

1) Review of the project cost-sharing between the BMA and the landowners and the proposed allocation of all the Pracha Uthid road and bridge cost and half the BMA distributor road and bridge cost to the BMA, according to the extent that project benefits fall inside or outside the site.

TABLE 3

BANGKAPI SPECIAL ASSESSMENT PILOT PROJECT LANDOWNERSHIP INFORMATION, 1991

Site Area: (excluding canals and public road)	798 rai 1 ngan 37 sq.wah 1,277,384 sq.meters = 127.7 hectares
No. of Land Parcels:	181 parcels (i.e., pieces of land with separate titles) including 1 BMA parcel of 2 rai 61 sq.wah
No. of Landowners:	113 private owners and 1 government parcel (BMA road) plus 4 canals and 1 road

Size Distribution of the Private Land Parcels and Owners:

	Parcels	Owners
Under 1 rai	84	62
1 to under 5 rai	57	40
5 to under 10 rai	14	13
10 rai and over	25	22
Total	180	117

TABLE 4

BANGKAPI SPECIAL ASSESSMENT PILOT PROJECT
LANDOWNERSHIP CONCENTRATION, 1991

TEN BIGGEST LANDOWNERS

NAME AND ADDRESS	AREA rai-ngan-sq.w.	Total sq.w.	Percent of Total Site	PARCEL NO. ON MAP
1. Mrs. Tomya Arminsen and Associates Moo 5, Wang Tong Lang	66 - 0 - 08 =	26,408	8.27	19,18
2. Mr. Hayenamudin Mesuwan Soi 39, Wang Tong Lang	46 - 2 - 07 =	18,607	5.83	2,133 135,147
3. Khunying Dusadee Supamolkol and Associates Prakanong District	44 - 2 - 97 =	17,897	6.60	171
4. Miss Adna Mudroj and Associates Moo 3, Wang Tong Lang	42 - 1 - 48 =	16,948	5.31	134
5. Mrs. Lamom Wangsumitra and Associates Yannawa District	38 - 1 - 56 =	15,356	4.81	155
6. Miss Somjit Arminsen and Associates Prakanong District	35 - 3 - 0 =	14,300	4.48	17
7. Mr. Sem Pengsalae Moo 13, Wang Tong Lang	35 - 2 - 40 =	14,240	4.46	3,25,26
8. Mr. Saroj Muden Moo 9, Klong Kud Mai	32 - 3 - 40 =	13,140	4.11	139
9. Mr. Anun Chommanee and Associates Moo 13, Wang Tong Lang	28 - 3 - 39 =	11,539	3.61	140
10. Mr. Dawud Arminsen Moo 13, Wang Tong Lang	28 - 1 - 60 =	11,360	3.56	154
Total	399 - 1 - 95 =	159,795	50.04%	16 parcels
Total Project Site	798 - 1 - 37 =	319,337	100.00%	181 parcels

2) Consideration of the possible inclusion of the construction of water supply and electricity supply distributor lines in the project.

3) Review of the TEAM D regression equation for estimating land valuers, with possible revision of the estimated increase and distribution of land values due to the project.

4) Determination, by discussion with landowners, of the basis to be used for calculating the annual special assessment charge to be levied on each land parcel, and calculation of the charge for a representative sample of the land parcels;

5) Consideration of the legal and institutional questions of implementation, so as to identify and recommend appropriate arrangements for the BMA to implement the project using the special assessment technique; and

6) Meetings with landowners within the site so as to obtain their views and suggestions, and to ascertain and record the likely the extent of landowner interest and support for the project and willingness to pay the proposed special assessment charge, or otherwise.

This additional work to consult with the landowners and to refine the project proposal would have enabled the BMA to decide whether to take the next step of preparing a complete project scheme for submission to the landowners for their formal endorsement, and then for submission to a financial institution for loan funding for the project. This scheme would also guide the implementation of the project.

The project is focussed on the construction of a network of D/C roads and drains because they will open-up the site and create a physical framework to guide its urban development. Roads and drains are also the responsibility of the BMA as the implementing agency. But electricity and water supply are also essential utility services for urban land and buildings, and the landowners may prefer to include the construction of water and electricity distributor lines in the project with their cost recovered through a higher special assessment charge. This expansion of the project would be desirable in order to construct the essential network infrastructure at the outset so as to assist private land and building development, and to also get landowner commitment to full cost recovery at the point of time when there is the largest increase in land values, i.e., at the time the land parcels are provided with a public road connection. It would be necessary to discuss the construction of the water and electricity distributor lines with the Metropolitan Waterworks Authority and the Metropolitan Electricity Authority, respectively, as the responsible agencies, so as to formulate the appropriate proposals for discussion with the landowners.

Although the increase in land values generated by the construction of the network infrastructure is conceptually the best basis for calculating the special assessment charge to be levied, the landowners may prefer the use of a more tangible and visible basis such as a physical measurement covering each landowner's road frontage and land area. This should be discussed with landowners and decided. When the basis is decided, a representative sample of the land parcels in the site should be selected and the amount of the special assessment charge to be levied on each land parcel calculated, so as to demonstrate the likely amounts to be payable each year. It would be necessary to review the cost sharing before making this calculation, and also desirable to review the cost estimate given in Table 2, particularly with regard to the compensation cost of the right-of-way land for the roads, which should be at the market value of the land.

Conclusion and Recommendation

This pre-feasibility study demonstrates the possible application of the special assessment technique for financing the advance construction of networks of D/C roads in the urbanising areas of Bangkok and the provincial cities of Thailand. Although the study was interrupted before completion, it had progressed sufficiently to cover most of the components of a scheme for a road construction and special assessment project. The coverage of the five key components (definition of the project site, the land parcel map, design of the project works, cost estimates and land parcel valuations before and after road construction), meant that the financial viability of the project could be demonstrated. Although there was no opportunity for consultation with the landowners on the draft scheme the potential profitability of the project for them suggests that they would have endorsed it and supported its implementation, possibly with some modifications.

The high profitability of the project, a land value increase of Baht 7,347.9 million from a D/C road network costing Baht 418.6 million to construct, reflects the rather special situation of the project site and the buoyancy of the Bangkok property market in 1991. The site, with the expressway and main road to be constructed along its eastern border, was seen and valued as suitable for commercial and medium/high density housing development. The proposed low density housing zoning for the site in the draft general plan was not taken seriously by the market, as no government had adopted any of the successive plans proposed since 1960 as the official plan for Bangkok Metropolis.

This high profitability of the project could also be an embarrassment in a pilot/demonstration project as it is atypical and might lead the landowners in later special assessment projects to adopt unrealistic expectations of their prospective land value gains.

Four years after the pre-feasibility study was proposed, most of the project site remains undeveloped. (The Victoria Towers condominium apartment project was cancelled

in 1992). The Ekamai/Ramintra Expressway and main road are under construction and are scheduled for completion in 1996. The high profitability of the Bangkok special assessment pilot project in 1991 suggests that a revised project would still be very profitable to the landowners. Although the project site is zoned for low density residential land use in the official Bangkok Metropolis General Plan, this zoning can be varied by the Town and Country Planning Board, if it is convinced that a variation is desirable.

There is still need for the construction of networks of D/C roads in the urbanising areas of Bangkok and the provincial cities. Four years after the Bangkapi pilot project was proposed, there have been no projects to demonstrate the use of the special assessment technique to finance the advance construction of these D/C road networks. The Bangkapi site could still be a good site for a pilot/demonstration project and the BMA is recommended to review this site with a view to revising and updating the present study, or reformulating it if necessary, and then begin negotiations with the landowners so as to prepare a formal scheme for implementation.

Notes and References

(1) This paper is based on the SOFIE progress report by Ray W. Archer, Report on the Bangkapi Research Site for an Infrastructure/Special Assessment Pilot Project, (Urban Development Coordination Division, Office of the National Economic and Social Development Board, Bangkok, 1991, p.40). This progress report included extracts from the land valuation report by TEAM D Co. Ltd. and shows the valuations of each land parcel before and after the project. SOFIE was interrupted by the cessation of USAID sponsorship of the study in response to the military coup on 23 February, 1991, against the Royal Thai Government.

(2) Halcrow Fox and Associates, Pak-Poy and Kneebone Pty. Ltd. and Asian Engineering Consultants Corp. Ltd., Seventh Plan Urban and Regional Transport (SPURT) Study, Final Report, March 1991, (Office of the NESDB, Bangkok, 1991). See "Section 6.9: Road Hierarchy", (pp. 6-18/ 6-27), and the recommendations in "Section 12.3.4: Distributor Roads" (pp. 12-27/ 12-31).

(3) These earlier studies included...
JICA Study Team, Study on Medium to Long Term Improvement/ Management of Roads and Road Transport in Bangkok, Final Report, March 1990, (Public Works Department, Bangkok Metropolitan Administration, Bangkok, 1990), and
Halcrow Fox Associates, *et al*, Short Term Transport Review, Metropolitan Bangkok, Final Report, 1985, (Office of the NESDB, Bangkok, 1985).

(4) The Seventh National Development Plan proposed to ..." speed up construction of networks of artery and secondary roads..." (p.92). But very few such networks have been constructed, partly for financial reasons and partly because the concept of road hierarchy is not generally understood, and the importance of D/C road networks is not generally recognized. Bangkok needs a Baron Hausmann.

(5) See... Ray W. Archer, Network Infrastructure for Sustainable Urban Development: Implementing the Formula L+P+F+NI = SUD, HSD Working Paper No. 53, (Asian Institute of Technology, Bangkok, 1995, p.22).

(6) The technique is widely used in the U.S.A. as an element of the local government finance system, as both special assessment projects and special assessment districts. See... T.P. Snyder and M.A. Stegman, Paying for Growth; Using Development Fees to Finance Infrastructure, (Urban Land Institute, Washington, D.C., 1986, p. 133), and Financing Infrastructure: Innovations at the Local Level, (National League of Cities, Washington, D.C., 1987, p.140).
Also see... E.A. Lehan, "Financing Urban Network Infrastructure Expansion: Cost Recovery Options for Thailand", SOFIE Technical Paper, (Urban Development Coordination Division, Office of the NESDB, Bangkok, 1991). Includes... "Cost Recovery Mechanisms, 3.4: Special Assessments", (pp. 43-57), and "Appendix A: Model Special Assessment Regulations", (pp. 94-102).

(7) A brief outline of "Rural Land Consolidation in Thailand" is presented as Appendix 2 in R.W.Archer, The Prospect for Urban Land Pooling/Readjustment in Thailand, Second Edition, HSD Working Paper No. 28, (Asian Institute of Technology, Bangkok, 1990, pp. 25-28).

(8) See... "BMA Seeks to Increase Flood Fee", The Nation, 16 July 1990, and "Keeping Bangkok High and Dry", The Nation, 9 December, 1990.

(9) See... "Flood Prevention Tax Gets Cabinet Nod", Bangkok Post, 10 September, 1991

(10) This and the following sections of the paper are mainly drawn from the SOFIE progress report prepared in April, 1991. They retain the present tense of that report, and the information, data and analysis presented is for the situation as at that time.

(11) The Bangkok Metropolis General Plan was issued as Minister for Interior Regulation No. 116 in July, 1992 for enforcement over a five year period by the Bangkok Metropolitan Administration.

(12) Minister for Interior Regulation No. 181 issued in 1994 authorises the national Town and Country Planning Board to permit on a case by case basis and on the recommendation of the DTCP and the BMA, on a case by case basis, large buildings to be constructed in low density residential zone areas.

(13) Sopon Pornchokchai later presented a modified version of the pilot project, describing it as a land readjustment project. His project is to implement the planned network of bridges, roads and drains shown in Figure 7, but with the 1991 cost estimates and land valuations somewhat different from those shown in the present paper. He proposes that in addition to the roadway land to be purchased from the landowners, some 10% of the "subdivision" land should be allocated for "public uses" (including low cost housing) at no cost to government. He does not identify this land and does not propose any land to be sold for project cost recovery (as is usual in LP/R projects), and nor does he explain how the project would be financed and the project cost recovered. He apparently intends that the B.M.A. pay the project costs totalling Baht 486 million and set them off against the additional land taken for "public uses" valued at Baht 1,193 million (as 10% of all the "subdivision" land valued at Baht 11,931 million).
See... "Chapter 14: Land Readjustment to Provide More Land", in Sopon Pornchokchai, Bangkok Slums: Review and Recommendations, (Agency for Real Estate Affairs, Bangkok, 1992, pp.173-184)

ATTACHMENT 1

PUBLICATIONS ON URBAN LAND POOLING/READJUSTMENT IN THAILAND

"Outline of Rama 9 Road L/R Project", (Department of Town and Country Planning, Bangkok, 1994, p.14).

Socio-Economic Consultants Co. Ltd., Study of Options for Financing Infrastructure Expansion, Phase 2, Final Report, February 1994, (Urban Development Coordination Division, Office of the N.E.S.D.B., Bangkok, 1994, p.130).

Thira Phungsundra, "Preparation for L/R Pilot Project in Thailand", Land Readjustment and Urban Development Seminar Proceedings, 1993, (National Land Agency, Jakarta, 1994, pp. 305-323).

Yachiyo Engineering Co. Ltd., The Study on Application Scheme of Land Readjustment in National Urban Development Thrust, Final Report, June 1993, (Department of Town and Country Planning, Bangkok, 1993, p.410).

Pree Buranasiri and Chantana Chanond, "An Experimental Land Readjustment Project for the Thai National Housing Authority", Paper to the Conference on Urban Development Policies and Projects, October, 1992, Nagoya, (National Housing Authority, Bangkok, 1992, p.32).

Ray W. Archer, "Introducing the Urban Land Pooling/Readjustment Technique into Thailand to Improve Urban Development and Land Supply", Public Administration and Development, Vol.12; 1992, (pp.155-174). Also available as HSD Working Paper No. 28, from the Asian Institute of Technology, Bangkok.

JICA Study Team, The Study on Applied Technology for Making City Plans, Final Report, (Department of Town and Country Planning, Bangkok, 1989) Includes... "Section 5.1: Land Readjustment Technique", (pp. 5.1-5.17), and "Appendix C; Land Readjustment Case Study", (pp. C.1-C.35).

Tuan Seik Foo, A Road-Based Land Pooling/Readjustment Scheme in Minburi District, Bangkok, Doctoral degree special study report, (Human Settlements Division, Asian Institute of Technology, Bangkok, 1988, p.56).

Ray W. Archer, "The Possible Use of land Pooling/Readjustment for the Planned Development of Bangkok", Third World Planning Review, Vol.9, No.3; August, 1987, (pp. 303-331). Also available as HSD Working Paper No. 17, from the Asian Institute of Technology, Bangkok.

9.3 Regression Analysis

In addition, we run a regression program to estimate the value of land. The data of the run came from the survey of actual transactions of properties located in the site and those located in the vicinity areas of the site.

The dependent variable is land value (Baht) per sq. wah.

The independent variables in this analysis are varied. However after the test run, the significant variables used consist of the following:

a. land area (sq.wah),
b. width of the property or road frontage (metre),
c. location of the property
   0.47 = blind land,
   2.25 = on secondary road,
   2.50 = on main road,
   2.75 = corner location,
d. width of fronting road (road surface - metre),
e. month of sale
   where 1 = January 1986
   13 = January 1987
   25 = January 1988
   37 = January 1989
   49 = January 1990
   61 = January 1991 etc.

The results of the computation is as follows:

Constant	0
Std Err of Y Est	3578.5007323
R Squared	0.8923502206
No. of Observations	144
Degrees of Freedom	139

The X Coefficients of the above independent variables and their standard Error of Coef. are worked out and shown as follows:

	X Coef.	Std Err of Coef.
Variable a:	-1.9032406042	0.2096450778
Variable b:	12.9429197161	8.5583555702
Variable c:	3458.6970946	891.14870018
Variable d:	593.08531515	210.84122612
Variable e:	517.95584525	17.165295135

The application of the results is as follows:

$$y = z + x1*a1 + x2*b1 + x3*c1 + x4*d1 + x5*e1$$

where y = value of land per sq.wah
z = constant value
x 1...5 = X Coef.
a..e = actual attributes of each variable.

10.0 SPECIAL COMMENTS

10.1 It should be restated that some scattered development of properties in the site at present are not taken into consideration. It is assumed that there is no development on site. Land is considered vacant.

10.2 Subsequently, some recently-constructed roads developed by land owners and a developer as mentioned, are not taken into consideration either. It is assumed that most of the land parcels off Pracha-Ootit Road are blind land with no development at present.

10.3 The date of construction completion of the proposed road networks (Roads A, B and C and the two bridges) is assumed to be completed at the end of 1991.

11.0 VALUATION

11.1 Date of Valuation

The date of valuation is March 12, 1990.

11.2 Limiting Conditions

The statement of standard limiting conditions applicable to the subject property is attached as Appendix VIII.

11.3 The Value

As a result of the analysis made and conclusions reached and on the assumption that there exist no unusual restrictions, covenants or outgoings about which we have no knowledge, it is our opinion that the current open market value and the open market value as of the road construction completion of each subject property in the site is as follows:

NO. TO THE MAP	TOTAL GROSS AREA	TOTAL ROAD ALLO-CATION	NET AREA LEFT	-CURRENT ATTRIBUTE- SITE FROM TAGE	LOCA TION	ROAD SUR-FACE	N. OF SALE	-END 91 ATTRIBUTE- SITE FROM TAGE	LOCA TION	ROAD SUR-FACE	N. OF SALE	PRESENT VALUE GROSS AREA	PRESENT VALUE ROAD AREA	END 1991 VALUE NET AREA
	(SQ.WAH)											(VALUE IN MILLION BAHT)		
1	3,760	771	2,990	360	0.47	0	63	360	2.50	14	72	26.10	5.35	159.08
2.1	7,064	120	6,944	70	0.47	0	63	70	2.50	11	72	22.52	0.38	278.83
2.2	3,428	98	3,330	72	0.47	0	63	72	2.50	11	72	11.02	0.31	156.70
3.1	5,113	98	5,015	51	0.47	0	63	51	2.50	11	72	15.04	0.29	218.53
3.2	3,103	98	3,005	50	0.47	0	63	50	2.50	11	72	9.09	0.29	142.39
4.1	5,365	103	5,262	54	0.47	0	63	54	2.50	11	72	15.99	0.31	227.04
4.2	2,880	103	2,777	53	0.47	0	63	53	2.50	11	72	8.55	0.31	132.92
5	932		932	29	0.47	0	63	29	0.47	0	72	2.48	0.00	6.82
6	606		606	30	0.47	0	63	30	0.47	0	72	1.62	0.00	4.44
7	525		525	30	0.47	0	63	30	0.47	0	72	1.40	0.00	3.35
8	505		505	29	0.47	0	63	29	0.47	0	72	1.34	0.00	3.70
9	525	10	515	88	0.47	0	63	88	2.50	11	72	1.80	0.03	27.10
10	25	1	24	5	0.47	0	63	5	2.50	11	72	0.06	0.00	1.26
11	525	36	489	38	0.47	0	63	88	2.50	11	72	1.80	0.12	25.76
12	1,028	132	896	170	0.47	0	63	170	2.50	11	72	4.61	0.59	47.45
13	696	232	464	48	0.47	0	63	33	2.75	11	72	2.02	0.67	24.53
14	589	119	470	53	0.47	0	63	38	2.75	11	72	1.75	0.35	24.87
15	588	74	515	42	0.47	0	63	42	2.50	11	72	1.66	0.21	26.77
16	1,765	240	1,525	142	0.47	0	63	41	2.50	11	72	7.27	0.99	76.39
17	14,300	122	14,178	1068	0.47	0	63	1068	2.50	11	72	230.31	1.96	557.23
18	14,500	126	14,375	1054	0.47	0	63	1054	2.50	11	72	230.90	2.00	556.97
19	11,908	2,572	9,336	1053	0.47	0	63	1044	2.75	14	72	189.47	40.92	474.75
20.1	768	225	542	80	0.47	0	63	80	2.75	14	72	2.55	0.75	29.87
20.2	3,890	919	2,971	400	0.47	0	63	400	2.75	14	72	29.02	6.86	162.31
20.3	382	146	236	40	0.47	0	63	31	2.75	14	72	1.07	0.41	12.99
21.1	1,746	104	1,642	57	0.47	0	63	57	2.50	11	72	5.27	0.31	82.23
21.2	195	104	91	57	0.47	0	63	57	2.50	11	72	0.59	0.31	4.83
22	545		545	37	0.47	0	63	37	0.47	0	72	1.50	0.00	4.05

NO. TO THE MAP	TOTAL GROSS AREA	TOTAL ROAD ALLO-CATION	NET AREA LEFT	-CURRENT ATTRIBUTE- SITE FROM TAGE	LOCA TION	ROAD SUR-FACE	M. OF SALE	-END 91 ATTRIBUTE- SITE FROM TAGE	LOCA TION	ROAD SUR-FACE	M. OF SALE	PRESENT VALUE GROSS AREA	PRESENT VALUE ROAD AREA	END 1991 VALUE NET AREA
	(SQ.WAH)											VALUE IN MILLION BAHT		
177	400		400	40	0.47	0	63	40	0.47	0	72	1.12	0.00	2.98
178	2,000		2,000	40	2.50	14	63	40	0.47	14	72	92.58	0.00	31.53
179	2,118	164	1,954	68	0.47	0	63	68	2.50	14	72	6.70	0.52	100.44
180	816		816	10	0.47	0	63	0	0.47	0	72	1.97	0.00	5.67
181	289	119	171	5	0.47	0	63	5	0.47	0	72	0.68	0.28	1.19
181	318606	24651	293955	SQ.WAH								3,326.32	211.80	10,674.22
	796.51	61.63	734.89	RAI										
	127.44	9.86	117.58	HA										
	318.61	24.65	293.95	ACRES										

N.B. For blind land, the land area is stipulated for 16,800 sq.wah for the computation of the mentioned regression formula. Actual size of the parcels cannot be applied in the formula because it would alienate the probable land valued computed.

In brief, the total value of the property on vacant land, vacant possession and undeveloped bases, is approximately Baht 3,326.32 million. The land lost for road construction worths approximately Baht 211.8 million. After the development completed in December 1991, the total site would have a value of approximately Baht 10,674.22 million.

Sincerely Yours,
TEAM D Co.,Ltd.

Sopon · Pornchokchai
General Manager

Appraised by
Sopon Pornchokchai, M.Sc. (Land & Housing, AIT),
Cert. Appraisal (LRTI-Lincoln Inc. ROC-USA),
V.A.T. Certified Member No.235.

ATTACHMENT 3

1989 PROPERTY TAX DATA FOR THE WESTERN PART OF THE BANGKAPI PILOT PROJECT SITE

Area:

442.95 rai (70.87 hectares) with 54 land parcels and 43 buildings, in Wang Tong Lang Sub-district, Bangkapi District, Bangkok Metropolis.

Land Use:

Mainly a pocket of unused farming land awaiting subdivision and building development, with some houses along Lad Prao Canal and some buildings along Pracha Uthid Road.

Official Land Valuation for Land Value Tax: (medium value as at 1978)

Baht 80,000 and 200,000 per rai

CVA Land Valuation: (estimated market value as at mid 1988)

Baht 866,792 per rai (Baht 541.7 per sq.m) average value, and ranging from Baht 800,000 to Baht 1,200,000 per rai (Baht 500 to Baht 750 per sq.m)

Exempt Land Parcels: 13 parcels (20.3% of total 64 parcels), averaging 0.85 rai per parcel

Land Parcels Liable to Land and Building Tax:

Taxable land :	Nil
Paying tax :	Nil
Evading tax :	Nil

Land Parcels Liable to Land Value Tax:

Taxable land :	51 parcels (79.7%), 8.47 rai average area
Paying tax :	32 parcels (50.0%), 9.49 rai average area with 15 owners, and paying Baht 66,404 tax
Evading tax :	19 parcels (29.7%), 6.75 rai average area

Source: Nopanont Tapananont and Pepop Rotpai, Land Institute Foundation, Bangkok.