

Physical and Economic Change in Bangkok, 1851-1925

Porphant OUYANONT*

Abstract

This paper explains the major patterns of physical change in Bangkok from 1851 brought about by the expansion of canals and roads and the attendant development of new suburbs. From around 1890 we see clearly a change in Bangkok from a water-based city to a land-based city. This paper argues that the period from around 1890 to 1910 is significant in Bangkok's development. One characteristic of road building in Bangkok is that it was accompanied by the active investment of the Privy Purse Bureau in row houses. Roads brought about great change in the physical and economic landscape of the capital from 1890.

I Introduction

This paper explains the enormous physical growth and economic diversification of Bangkok during the period 1851-1925.¹⁾ From the 1890s, the city changed from one based on water (river and canals) to one based on roads. This was the era of the building of row houses, the tram, and other innovations. Two of the themes highlighted here are: (1) the growth of Bangkok as a major international port; and (2) the role of investment, particularly by the Privy Purse Bureau, in changing the physical shape of the capital. In emphasizing change from the 1890s, this study adopts the perspective of economic turning points rather than the more familiar perspective of Thai historiography that usually looks at the various reigns as separate entities.

By the 1850s, Bangkok was a city in transition, changing from a moated and fortified city into a large commercial city. Before 1851, Bangkok was mainly concentrated within the area of

* School of Economics, Sukhothai Thammathirat Open University, Pakkred, Nonthaburi, 11120 Thailand, e-mail: ecasopor@samsorn.stou.ac.th (Guest Scholar and JSPS Postdoctoral Fellow, Graduate School of Asian and African Area Studies, Kyoto University from June 1998-December 1999). The author is grateful to Professor Malcolm Falkus and anonymous referees for their helpful comments on an earlier draft of this paper, and grateful too, to Professor Peter Hawkes for the editorial work. I should like to acknowledge with gratitude financial support for postdoctoral research from the Japan Society for the Promotion of Science (JSPS). Sole responsibility for the views expressed here, of course, rests with the author.

1) The author is at present preparing an economic history of Bangkok in the period 1880-1930, emphasizing aspects of population, physical change and urban government. The project is being conducted under the supervision of Professor Tsubouchi Yoshihiro, Graduate School of Asian and African Area Studies, Kyoto University. I am very grateful for his comments and encouragement.

the city walls with the palace as its centre. After 1851, the year of accession of Rama IV (1851-68), the city landscape gradually changed. After the signing of the Bowring Treaty in 1855, the growth of the city gradually accelerated. One of the most important aspects of the Treaty was that it abolished the state monopoly on international trade and allowed private business, mostly western and Chinese, to trade freely without state interference. As a result, more Westerners came to live in Bangkok and set up trading firms and a few industries. The growth of business generated demand for land for construction and some residential areas.

Under the Bowring Treaty, Bangkok developed essentially as an outward-looking port city, handling virtually all the kingdom's exports and imports. Rice exports, which were 75 percent of the value of total exports in the decade before 1914, grew from around 10,000 tons annually in the 1860s to around 500,000 tons in the 1890s and to over 1 million tons by the 1920s [Falkus 1993: 148]. Foreign trade had a considerable impact upon general economic activity in Bangkok. Shipping, warehouses, rice mills, and saw mills all developed in step with foreign trade. Trade also brought capital, technology, and labour to Bangkok.

We should not, however, exaggerate the impact of the Bowring Treaty on Bangkok's development. Bangkok was involved in international trade before the treaty in 1855. There are many studies of pre-1855 Siam, both in Thai and Western languages,²⁾ which show Bangkok's development in this period. In the 1820s and 1830s, in particular, Siam's "expansive" and "export-oriented" economy [Terwiel 1989: 236] led to the development of the capital city. It was, however, after the Bowring Treaty that Bangkok's large transformation took place.

II The Historical Significance of Transport Development

Three broad periods can be distinguished: before 1890, 1890-1910, and 1910-25.

Waterways Prior to the Advent of Roads

Throughout the nineteenth century, waterways dominated transportation in Bangkok. As Crawford wrote in 1821:

The face of the river presented a busy scene, from the number of boats and canoes of every size and description which were passing to and fro. The number of these struck us as very great at the time, for we were not aware that there are few or no roads in Bangkok, and that the river and canals form the common highways, not only for goods, but for passengers of every description. [Crawford 1977: 79]

Some thirty years later Pallegoix wrote:

2) See Nidhi [1982]; Sarasin [1977]; Cushman [1975]; Hong [1984]; Skinner [1957]; and Evers *et al.* [1987: 751-771].

There is not a single carriage in the capital: everyone travels by boat. The river and the canals are almost the busy roads, only rarely in the middle of the city and in bazaars or markets you find streets paved with large bricks.³⁾

It is impossible to exaggerate the continuing importance of canals for Bangkok's development in the late nineteenth century. They touched all aspects of commercial life, provided centres for residential areas, markets, recreation, drinking water, and ceremonies. Generally, canals linked various regions of Bangkok itself and linked Bangkok with the provinces. The rice trade was almost totally river and canal-based, and remained so well into the post-1900 era of railways and roads. The principal canals were: Bangkok Yai (dug in 1522), Mahachai (1704), Rawb Krung (1783), Mahanark (1797), Saen Saeb (1840), Padung Krungkasem (1851), Hualumpong or Tanon Trong (1856), Phasri Charoen (1864), Tawee Wattana (1878), Pravet Burirom (1878), Nakhon Nuang Khet (1876), Prem Prachakorn (1869), and Rangsit (1890s) [N. A. R. 5. M. of Agriculture (Department of Canals) 34/791 (1910)]. In addition, some minor canals were found within Bangkok: Wat Sampleum, Rongkata, Wat Patum Kongka, Sathorn, Orachorn, Suan Laung, Sarapratum, Ratchdamri, and so on.

In the late 1860s, the American consul, Townsend Harris wrote of the dominance of the Chaophraya River as the major route of transportation linking Bangkok and the provinces areas:

Bangkok situated on the river Manum, is the great center of the commerce, inland, coastwise, and foreign, of the kingdom. This river is the most important commercial channel in Siam; it provides the greater part of the kingdom, and monopolizes the heaviest share of its navigation and commerce. The principal articles brought down this river from the upper provinces are: rice and paddy, cotton, teak timber, sapanwood, lac, gum benzoin, ivory, and beeswax; while the district east and west of the Manum furnish gamboge, cardamums and sugar. [United States Consular Reports 1872: 991]

The river and canals provided a means of low-cost transportation that increased the kingdom's carrying capacity for rice and other crops. The bulk of goods transport from the central producing areas was bound for export through the chief port of Bangkok. About 70-80 percent of rice for export was shipped to Bangkok by boats until the outbreak of World War II. The central plain depended primarily upon the vast inland waterway transport system to carry rice to Bangkok for export or for domestic consumption [N. A. R. 7. M. of Commerce 8.1/1929].

Canals and the Growth of Bangkok

The extent of Bangkok changed little during the slack period of the 1840s, but in the years 1851-54, when the Padung Krungkasem Canal was dug, the area of Bangkok roughly doubled to 5,552 *rai* [Department of Fine Arts 1982: 57], and in the 1860s the canal prompted further expansion of the city eastwards. The physical growth of Bangkok was considerably influenced

3) Cited in Donner [1978: 787].

by canals at this time.⁴⁾

City and port grew together, and contemporary maps show how important was the river to city development. The headquarters, warehouses, and private wharves of the western trading companies, the rice and saw mills and their wharves, the custom house, and the principal consular buildings were all concentrated along the banks of the river, principally on the eastern side but also on the Thonburi side. The old commercial port was centred on the wharves of the Bangkok Dock Company, a private company launched in 1865 with British capital. Early in the twentieth century, the Company embarked on improvements and extensions; it then maintained two dry docks and three slipways and had extensive engineering works, as well as the principal wharves and storage facilities. Bangkok grew in elongated fashion along the river, with little extension away from the river until well into the twentieth century. Such extensions as there were tended to be along canals cut from the main river, and in this way grew such well-known present-day thoroughfares as Silom, Sathorn, and Rama IV roads [Falkus 1997: 226].

As foreign trade flourished, more than 15 canals linking Bangkok and the central hinterland were dug between 1860-1910. Canals facilitated trade, above all the rice trade. Canals contributed to the growth of Bangkok, and there was a close link between canals and foreign trade. Trade necessitated the digging of canals. From the 1880s, commercial rice production expanded rapidly in the provinces adjacent to Bangkok, especially in Ayutthaya and Chachoengsao, which were centres of fertile rice growing. Such development went hand in hand with Bangkok's expansion. Bangkok gradually extended to the north when the Prem Prachakorn Canal was dug in 1869-70. This canal, extending 51.3 kilometres [N. A. R. 5. M. of Agriculture (Department of Canals) 34/791 (1910)], facilitated transportation and communication between Bangkok and Ayutthaya and encouraged people to settle in the northern part of Bangkok [Chai 1976: 282]. After the 21.5 kilometre Nakhon Nuang Khet Canal (1876) and the 28.7 kilometre Pravet Burirom Canal (1878) were dug, Bangkok again expanded eastwards, because these canals provided more rapid communication and transportation between Bangkok and Chachoengsao, the centre of rice growing on the Bangpakong River [N. A. R. 5. M. of Agriculture (Department of Canals) 34/791 (1910)]. Waterways dominated rice transport until the 1940s. In 1929, the Ministry of Commerce recorded that 786,901 *kwien* of rice arrived

4) The *Bangkok Calendar* noted in 1871:

The great canal Klawng Padoong gave at once great expansion and life to suburban interests. Not far from the same time, the still longer canal Hua-Lampong going eastward through thousands of acres of the richest-paddy fields to the head of the Big-bend, was cut Such a convenience and privilege had never before been enjoyed by the residents of Bangkok. This canal shortened the distance from the Big-bend to Bangkok more than one half. The canal Mahaswas, leading from Bangkok-noi to Tacheen River, near the town of Nakawn-Chaisee [Nakhonchaisri], a distance of about 20 miles, and thence to Pra-Pra-Tom, 7.5 miles, was completed soon after. The canal also going to Tacheen River a distance of 17 miles, was made in the latter part of the same reign, and shortens the distance to the part of the great Sugar district by full 24 hours of travel. [*Bangkok Calendar* 1871: 151]

in Bangkok by water as compared to 121,656 *kwien* by rail [N. A. R. 7. M. of Commerce 8.1/1929]. Even in the 1930s, despite the existence of a railway network amounting to some 6,400 kilometres, more than 80 percent of exported rice was carried by water from the interior to the rice mills.

Road Construction, 1861-89

Before 1861, no roads existed in Bangkok outside the royal palace compound. Some roads around the royal palace had been brick-paved, but roads were not in daily common use. The primary purposes of roads were for palace beautification, royal ceremonies, and to help the king to undertake personal meetings and public administration. Most road construction therefore was within the royal palaces, or in the areas adjacent to the palace [Nij 1982: 6-12; Department of Fine Arts 1982: 555-558; Chulalongkorn University 1991: 118-128].

Foreign visitors described the characteristics of roads in the 1830s:

Like Venice, the city seemed to have arisen from the waters . . . the streets are narrow and dirty, the paved walk in the middle being barely wide enough for two persons to walk abreast. [Ruschenberger Fitzroy Hall, cited in Nij 1982: 8]

A pedestrian excursion into the town being totally impracticable, on account of the depth of the mud in the street It is very inconvenient to walk not only on account of the mud but from the number of dogs, these brutes appearing to consider Europeans fair game — during two or three excursions in this swampy town, I was attended by two of the boat's crew, armed with paddles, and we were therefore able to keep these troublesome animals at bay. [Earl George Windsor, cited in Nij 1982: 8]

Before 1890, there were few roads in Bangkok outside the royal compound. The first was Charoenkrung Road built in the early 1860s, followed by a handful of others in the succeeding quarter century.⁵⁾

Charoenkrung Road (1863)

This, the first and for a long time the most significant commercial artery in Bangkok, originated in the 1860s at the behest of the new resident Western community. In 1861 the Western consuls complained of ill health because there were no roads for making excursions in their horse-drawn coaches, and put pressure on the government to construct a road system in the capital.⁶⁾ Rama IV, who attempted to avoid conflict with foreigners, ordered Chaophraya

5) For the history of roads in Bangkok and economic impacts of road construction in the Fifth Reign (1868-1910), see Sayomporn [1983].

6) In the Fourth Reign, European merchants complained through western consuls about the obstacles of trading and proposed establishing a trading centre some eight or nine kilometres outside the city at a site near present day Prakanong. At their request, the government dug the Hualumpong Canal to that site. The earth dug from the canal was piled along its north bank to make a road named Tanon ↗

Srisuriwong and Phraya Indrathipbordee to construct the "New Road." The earth for the road building was provided from the digging of the canal linking the Bangrak and Hualumpong Canal. In 1863, the road was opened to traffic.

Bumrungmuang and Fuangnakorn (1863)

In 1863, Rama IV ordered construction of two roads linking with Charoenkrung Road. First was Bumrungmuang. This road extended and improved an old road named Sao Chingha, which ran from Samamchai Road through Sao Chingcha to Prato-Samranraj (south of Pak-Klong-Talard). This road was 2 kilometres in length. Second was Fuangnakorn Road, which ran from south of Pak Klong Talard, passing Ban Mon, Ban Yuan, and cutting across Charoenkrung Road and Bumrungmuang Road to the north of Wat Borwonnivet. The total length was 4 kilometres [Chulalongkorn University 1991: 271].

Road construction in Bangkok was thus both tardy and limited, and remained so until the early 1890s. We should ask, therefore, why roads in Bangkok came very late. One factor is the city's geography. The Chaophraya delta where Bangkok is located was swampy and flat with low elevation. The entire city was approximately 1.5 metres above mean sea level. During the peak of the rainy season, many parts of the city were under water as the swollen river and canals caused temporary floods. The construction of roads under these circumstances was difficult and expensive. The frequent flooding made maintenance costs very high, especially because construction techniques were primitive. Road construction was undertaken by gangs of coolies using the simplest hand tools. Moreover, most people lived along the banks of the canals or the river, since all parts of Bangkok at that time were connected by either large or small canals. If there were no waterways in any area people would dig a canal or a ditch to make that place accessible by water. It was rather easy to construct additional canals attached to the main waterways, as is clearly evidenced by the multiple branching of small canals shown in contemporary maps [Sternstein 1982: 28]. The slow development of road construction was caused also by the low demand for roads for economic activities. Until the 1880s, outside the royal compound, there were no more than five roads in Bangkok, and this reflects our earlier point that the Bowring Treaty did not bring a sudden transformation in Bangkok. Even the rice mills and saw mills created little demand for roads, because waterways were the predominant modes of transportation from the provinces. Rice and paddy, teak and timber came to Bangkok by the Chaophraya River and its network of canals. Several trading agencies established themselves on river sites, and a western

↘ Trong (1858), which was renamed to Rama IV Road in the subsequent period (possibly the 1920s). Some segment of this road was called Woa Lumpong Road, later Hua Lumpong Road (circa the 1920s). This canal was then named "Klong Tanon Trong." The cost of canal construction was 16,633 baht. After this canal excavation was completed, the merchant westerners refused to move on the grounds that it would be too far away from Bangkok [Chaophraya Thipakornwong 1961: 184-185]. More discussion is contained in the writing of Nij [Nij 1982: 18-19]. Also see Sayomporn [1983: 18-25]. In my opinion, Tanon Trong or Rama IV could not be characterised as a "road" in the western sense. It was a by-product of canal digging.

commercial area evolved on the two banks near present-day Silom and Bangrak.

The Economic Impacts of Roads on Bangkok's Growth Prior to 1890

Roads were of much less importance than waterways. Such roads as existed before 1890 were usually built in parallel with canal excavation, because the existing canals provided the concentration of settlements, the major routes of transportation, and the materials for construction. The early major road constructions (Charoenkrung, Fuangnakorn, Bumrungruang) were all undertaken in parallel with canal excavation. In the case of Rama IV and Silom roads, the earth used for construction was dug out from adjacent canals. Some parts of Charoenkrung, Fuangnakorn, and Bumrungruang complemented existing canals.

Roads made only a minor contribution to Bangkok's growth prior to 1890. Roads acted as feeders to complement waterways and to facilitate the movement of products. However, the economic significance of Charoenkrung gradually increased and led to changes in the development of Bangrak district. Once a number of bridges had been built, a city landscape based on a road system gradually emerged with the development of clusters of communities, consulates, residences of foreigners, the harbor, docks, rice mills, saw mills, warehouses, and churches located in this district. Road construction between 1861 and 1889 certainly brought no sudden transformation from water to land. A substantial portion of Bangkok's population remained living along the banks of the river and canals until well after the 1880s. However, the building of roads gradually induced row house construction, mostly following the Singapore model, with buildings along both sides of roads.

A further noticeable impact of roads was the impulse they gave to the construction of palaces and other royal buildings. The expansion of palaces produced fine buildings within and outside the city walls. During the Fourth Reign (1851-68), three royal palaces were built for the king, Patumwan Palace, Nuntaautayarn Palace, and Saranrom Palace, and a further nine palaces for princes and princesses [M. R. Nangnoi 1982: 523]. Subsequently, as the many scores of the king's children reached adulthood, the numbers of royal buildings multiplied, some giving rise to new commercial and residential areas.

The multiplication of palaces accelerated the change from water to land. The *Bangkok Calendar* in 1871 observed:

Not only the royal palace of the 1st King was greatly improved in the late reign, but also many parts of the city and suburbs of Bangkok. Several new streets were made within the citadel, and a continuous block of buildings nearly half mile in length, was erected on each side of one of them. In the Third Reign, there were very few substantial buildings in the citadel excepting those comprised in the two royal palaces and the temples. By far the greater part of the princes and princesses who were not included within the walls of those palaces, lived in but poor houses made of wood, and not a few were even shabbily enclosed with bamboo watterling. But now you may see good dwelling both of wood and brick in very many localities besides the many which the late king [the Fourth Reign], at his own expense, caused to be erected for the improving of the city. And we feel happy in being able to

say, that His Majesty, the present supreme king, is giving many tangible proofs that he is determined to continue the spirit of improving the city, which his illustrious sire and predecessor inaugurated, and that in our opinion he will speedily make great and cheering changes in the appearance of it. [*Bangkok Calendar* 1871]

However, from the early 1880s onwards, settlements gradually moved from the banks of waterways to along the major roads, at that time mainly Charoenkrung and Bumrungmuang. A postal directory of 1883 indicated that there was already a considerable population living along Charoenkrung, Bumrungmuang, and Fuangnakorn roads. Table 1 shows that the Chinese constituted the largest proportion of ethnic groups resident along the roads, and they were well distributed throughout the city. Table 1 also shows the significance of Charoenkrung as a mainstay of Bangkok's population when compared to other roads.

Road Construction, 1890-1910

Before the 1890s, Bangkok remained tied largely to its waterways, with only a few urban streets challenging the dominance of water, and even these streets usually developed adjacent to waterways. But from the 1890s, there was nothing less than a transformation. A remarkable development of urban street construction took Bangkok far from its virtual sole water-base by the time of King Chulalongkorn's death in 1910.

We shall first examine the reasons underlying the changes before detailing the changes themselves.

First, population increased. With the growth of Bangkok's population came greater pressure for road construction to accommodate new settlements. Bangkok's population in the nineteenth century was much smaller than is often suggested. Indeed, at the time of the Bowring Treaty in 1855, Bangkok's population would be numbered in tens, rather than hundreds, of thousands, much of this population river-dwelling and transient. The major changes came only from about the 1880s and 1890s, with a marked acceleration of population growth (much of it caused by Chinese migration) and an expansion of permanent land dwelling. The number of Chinese immigrants entering the port of Bangkok was around 16,000 a year in the 1880s, 25,000 in the 1890s, 60,000 between 1900 and 1920, and over 100,000 a year in the

Table 1 Ethnic Distribution along Various Roads in Bangkok in 1883

| Roads | Thai | Chinese | Indian | Westerner | Other | Total |
|----------------|-------|---------|--------|-----------|-------|-------|
| Charoenkrung | 322 | 866 | 85 | 38 | 16 | 1,327 |
| Bumrungmuang | 114 | 210 | 23 | 1 | 6 | 354 |
| Bankhamin | 152 | 49 | 4 | - | - | 205 |
| Fuangnakorn | 163 | 145 | 7 | 5 | - | 320 |
| Rop Phranakorn | 578 | 174 | 2 | 5 | 3 | 762 |
| Sampeng | 12 | 483 | 24 | 1 | - | 520 |
| Total | 1,341 | 1,927 | 145 | 50 | 25 | 3,488 |

Source: [Wilson 1989: 54]

1920s [Skinner 1957: 173]. Estimates of Bangkok's population between the mid-nineteenth century and 1909 vary widely. A recent and careful consideration of the problem of various widely differing estimates by Terwiel concludes that the city contained no more than 50,000 to 100,000 people around the 1850s [Terwiel 1989: 233]. That is far from the 300,000-500,000 often quoted. A postal census in 1883 suggests a population then of perhaps 120,000 people [*ibid.*: 232]. Around the time of the First World War, Bangkok's population stood at some 360,000, heavily concentrated in districts around the royal Palace and commercial river areas. It is thought that perhaps half of the population was composed of Chinese migrants [Porphant 1997: 258]. In addition to population growth, improved technology for road construction to some extents affected the growth of road making in this period. A comment by L. R. De La Mhotiere, the City Engineer of the Bangkok Sanitary Department in the late 1900s, is worth quoting at length:

The first streets [prior to 1890] laid out were constructed in a very primitive manner. It was considered sufficient to make the earth from the sides of the roads in order to raise the centre, with the result that the roads were edged with swamps, at the rear of which the houses were constructed on piles. To make the roads firmly it was usual to spread a light layer of broken bricks and stones on the surface; consequently in the rainy season the thoroughfares were reduced to sloughs and puddles and quickly became impassable. Within the last decade or so the advantages of macadamising the roads with broken bridges and flints have been recognised, but the system has not been undertaken with any degree of thoroughness, the materials being merely spread over the roads, and the work of rolling them in being left to the chance instrumentality of the vehicular traffic. In that portion of the city, however, between the river and the city wall wherein are the king's palace and the residences of many Siamese princes, the work of road making has been carried out with more care; better materials have been used, and the steam-roller has been employed with advantage. The improvement has been the more marked since the king and other members of the royal family have taken to monitoring; indeed, some of the thoroughfares are maintained in a far more efficient condition than is actually demanded by the traffic upon them. [Cited in Wright and Breakspear 1908 (reprinted 1994): 291]

Second, we have growing economic activities in Bangkok, where from the 1880s onwards, several important developments took place. Above all, the international rice trade developed on a large scale. This was a crucial factor in attracting a substantial influx of Chinese coolies. Trade brought a range of economic activity to Bangkok, such as rice mills, shipping, warehousing, banks, manufacturing production, and distribution of imports and exports. Centres of trade and commerce such as Bangrak and Sampeng felt the growing demand for transport. As a result, roads were built within Bangkok principally as feeders for the river and canals. Subsequently, roads were built as feeders to the railways. The first major provincial railway between Bangkok and Korat was opened in 1900, and it sparked a growing demand for transport linking the city and the provinces. At about the same time, demand for roads was created by the growing number of motor vehicles in Bangkok, which increased during

the 1890s and the 1900s.

Third, the growth of trade and business in Bangkok resulted in a rise of the price of land, which in turn encouraged the king and certain others of the elite to build roads as business investments. For example, the first private road building was undertaken by Luang Sathornrajyukti around 1890, a road named "Sathorn." He developed his land southeast of Silom and constructed another road and canal running parallel to it. He divided the land into small plots and sold them. The construction of Sathorn Road helped turn the entire area into a residential centre noted for the many fine homes belonging to the resident foreign community [Anonymous 1992: 18]. Afterwards, the building of roads not only enhanced the capital investments of the elite but also helped the city area extend into the suburbs. According to one source:

The process continued rapidly when two more roads parallel to Silom were built in the northeast. Around 1893, Chaophraya Surawongsewattanasak ordered the construction of Surawong, a road parallel to Silom, and Decho, a cross road joining the two. Si Phraya Road, another road parallel to Silom and Surawong further in the northeast, was built shortly thereafter. This group of four roads then became a focal area for home owners who wanted to live away from the crowded inner city. The area became known as "The Four S's" as each of the four roads had its name beginning with an S. [*loc. cit.*]

Si Phraya Road was built in 1905, when four noblemen of the rank of Phraya (hence Si (four) Phraya) successfully petitioned the king to construct a road for the development of their business:

13 August 1905. To His Majesty: In regard to the land at the corner of Charoenkrung Road at Hongkong Bank, we bought land from a number of people. However, there are no comfortable roads cutting across this Tumbon [district]. In my opinion, if the construction of a road is undertaken, it will facilitate the transportation and communication. Conferring with the residents in this Tumbon, they are pleased to join co-operation by granting money to build a road. So I would like to ask you to give a permission to construct a road running from Charoenkrung Road to the corner Wat Hua Lumpong with a total length of 35 *sen* 8 *wa* and a width of 5 *wa*. The road will be surfaced by the brick pavings.

Phraya Indhrathipbordisriharajrongmuang

Phraya Piphatkosa

Phraya Noranijrajahuj

Phraya Noranartpakdi

[Office of the Prime Minister 1970: 148-149]

Many commercial activities in Bangkok such as tramways, hotels, and dock facilities, all created demand for roads. For example, in 1910, the Siam Commercial Bank petitioned the king

for the construction of the new road.⁷⁾

Fourth, there were developments from the 1880s brought by western technology that went hand in hand with city roads and streets, for example, tramways, electricity, the telegraph, and the telephone. For example, in the 1880s Danes introduced a horse-tramway, which was electrified and extended in 1893. The initiative of British and Danish merchants formed the first narrow gauge railway company running a line from Bangkok to Paknam in the early 1890s. In 1898 Danish capital also took over an ailing American electricity supply company. It later amalgamated with the tramway company and continued in operation until taken over by the Thai government in 1950 [Falkus 1989: 120-121].

The Government Power Station and the Siam Electricity Company together supplied the town of Bangkok and its environs with electric light. There was also a thoroughly up to date and well-equipped water-supply station, which was under the charge of a government department. There were two British dockyards, which had slipways able to deal with the various types of vessel that were able to come up the Chaophraya River, in addition to the Royal Naval Dockyard. Both these companies, in addition to several others, also undertook building contract work, and erected ferro concrete buildings in various parts of Bangkok [Anonymous n. d.: 40]. With respect to electric power, this was practically confined to Bangkok, where there were two stations in the 1880s. The larger and older station was under Belgian-Danish management with a normal running capacity of 12,000 KW and a reserve capacity of 15,000 KW, part of which was periodically employed. Apart from lighting most of the town, this plant owned and operated the city tramways and provided power for two suburban tram services, for operating the road bridge across the river, and for the oil refinery,

7) "The Siam Commercial Bank, Ltd., has purchased a piece of land on the banks of the Manam Chow Phya [Chao Phraya] and adjoining the Harbour Department, they have caused a handsome and decorative building to be erected thereon for the purpose of carrying on their increased banking business of which they now hold one of the biggest shares of all the Banks. The building will be finished in a few months time and Your Majesty's petitioners are anxious to have the surroundings of the new building beautified so as to bring them in accordance with the structure. One of the most effective improvements towards the achievement of this intent is the building of a new road leading to the river between the premises of the Harbour Department and those of the Bank. For this purpose it would be necessary to have a very old house belonging to the Harbour Department pulled down and the said department would have to give up a portion of their ground — which is not used for other purposes. On the other hand Your Majesty's petitioners are prepared to make over to your Majesty's government the portion of their ground which is wanted for the new road — if the road and a landing in the river shall be built. Your Majesty's petitioners humbly draw attention to the vast improvement which by this action would be effected not only to the Bank but also to the Harbour Department and the public in general as a public road leading to the river in this part of the town would be of very great benefit. Your Majesty's petitioners beg leave to state that the Ministry of Local Government H. E. Chow Phya [Chao Phraya] Yomaraj and the Director of the Harbour Department Phya [Phraya] Visutr — who have frequently inspected the place — have recognized the utility of this new road and they are in favour of it being constructed. Your Majesty's petitioners have ventured to present this petition knowing that Your Most Gracious Majesty will support the improvement of the town of Bangkok and in the hope that Your Most Gracious Majesty may be pleased to order the construction of the new road" [N. A. R. 6. M. of the Capital 21/7 (1910)].

tobacco factory and soap works, and several rice mills and industrial establishments. The other station, Samsen station, was Government owned. It had a capacity of about 10,000 KW and supplied light and power to the northern part of the city. About half the output served to drive the cement factory and also provided power to the airfield establishment at Don Muang and the military arsenal [*loc. cit.*].

Fifth, we must note the growing prosperity of Siam, and of king and state in the period. Fiscal reforms in 1892 led to the centralization of taxation. Greater revenue meant more expenditures on roads and other investment projects, such as railways. Greater revenue also came from the rapid economic development between 1880 and 1910.⁸⁾ The increased government revenues are summarized in Table 2.

Sixth, the Ministry of the Capital (Krasuang Nakornbarn) was established in 1892. With an increasing population and expanded economic activity, it was necessary to organize municipal government to administer Bangkok affairs. The Ministry of the Capital assumed complete responsibility for all arrangements affecting municipal or sanitary matters, such as construction and repair of public streets, cleaning of streets, construction and cleaning of canals, supply of water for consumption, the removal of garbage and its destruction at an appropriate place, and proper drainage. Roads were put in the hands of the Department for Sanitary Affairs within the Ministry. The Ministry's jurisdiction was (a) the *amphurs* within the city wall, (b) Amphur Sampeng, (c) Amphur Sapratum, (e) Amphur Bangrak, (f) Amphur Bangkoalam, (g) Amphur Banglumpoo Lang, and (h) the part of the *amphur* district of Bangsue, west of the Prem Prachakorn Canal [Porphant 1997: 240-260].

Until 1890, as we have seen, there were only a few roads in Bangkok. But from 1890, the situation changed. In that year Prince Narisaranuwatiwong, the Minister of Public Works, proposed a plan for road cutting in Bangkok. The plan was called the Amphur Sampeng project, and it proposed that no less than 18 roads be cut in the commercial district of Sampeng. It is not surprising that attention should turn to this area. Sampeng had been a hub of commerce in Bangkok almost from its establishment in 1782. The demand for roads was

Table 2 Government Revenue, 1889/90-1909/10 (in million baht)

| Year | Total | Year | Total |
|---------|-------|---------|-------|
| 1889/90 | 12.0 | 1902/03 | 38.4 |
| 1894/95 | 17.3 | 1903/04 | 42.5 |
| 1895/96 | 18.1 | 1904/05 | 44.9 |
| 1896/97 | 20.6 | 1905/06 | 50.5 |
| 1897/98 | 24.9 | 1906/07 | 55.5 |
| 1898/99 | 28.2 | 1907/08 | 54.3 |
| 1899/00 | 29.6 | 1908/09 | 58.9 |
| 1900/01 | 35.1 | 1909/10 | 60.7 |
| 1901/02 | 35.6 | | |

Source: [Wilson 1983: 242-243]

8) For fuller discussion, see Sompop [1989].

determined by the concentration of economic activity in that area, including retail and wholesale businesses and the head offices of distributors. The advantage of location of the Sampeng area was its proximity to the river ports which were centres of domestic water transportation. For example, Rajawong river port was the major port connecting Bangkok to Chon Buri, Bandon (currently Surat Thani province) and some major seashore provinces in Thailand [Department of Fine Arts 1982: 563-567]. Bangkok's domestic riverine transportation stimulated the expansion of trade and commerce. Sampeng, a centre of commerce of Bangkok, had very inadequate roads, and this hampered trade and business. We can imagine how the growth of the rice trade and the influence of Chinese in the 1880s put pressure on the district.

Prince Narisaranuwatiwong wrote in 1890:

In my opinion, there are no places which are more prosperous than Sampeng district, since its physical advantage is suitable for trading location, while its deficiencies of location are that the district has very few roads which in turn obstructed trading and prosperity. If roads in the district are constructed, the land will be developed and price of land will be increased many fold. [N. A. R. 5. M. of Public Works 9/1 no. 370/1 (1892)]

But there was another significant reason for the attention paid to Sampeng. The Privy Purse Bureau (PPB) was anxious to find profitable investment opportunities. Commercial activity in the 1880s resulted in a high price for well-situated land, which attracted the PPB to invest. The PPB was a major source of capital for the king. It was the largest land owner in Bangkok. Some major commercial activities of the PPB included rent collection from market places and row houses. In this way, the expansion in investment of elite capital was certainly a factor in the physical as well as commercial growth of Bangkok, for investment generated a need for physical infrastructure. Road construction went hand in hand with row house investment by the PPB to accommodate the swelling population, most of which was made up of Chinese immigrants. We referred earlier to the Sampeng Road project, and as a result of this the following roads were built in Sampeng district by 1898 (Table 3).

While commercial activity brought roads to the commercial districts, royal activities were causing road building elsewhere. In 1899, one year after visiting Europe, Rama V constructed the Suan Dusit Palace in the northern part of Bangkok between Padung Krungkasem Canal and Samsen Canal [Chai 1976: 297]. He personally proposed a project for road construction around Suan Dusit Palace to provide transportation and communication between the palace and surrounding areas. As a result, the following roads were cut: Rajawat (Nakornchaisri Road), Seaw (Sawankalok Road), Koa Sua (Phitsanulok Road) [N. A. R. 5. M. of Public Works 9/39 no. 36/44 (1900)], Prachairchin (Phetchaburi Road) [N. A. R. 5. M. of Public Works 9/90 no. 36/414 (1900)], Tubtim, Hongyom, Tek Neau, Tek Tai, Pak Po, Munkornyom, Pueypoa Nguan and Putthan [N. A. R. 5. M of the Capital 1/50 (1900)]. Also, Sanghi Nok Road (Rajawithee Road) and Duangduean Nok Road (Sukhothai Road) were cut from Samsen Road to the Chaophraya River. These roads encouraged considerable settlements around the Samsen

Table 3 A List of Some Major Road Construction around Sampeng District, 1892-98

| Year | Road Construction and Its Description | Sources |
|------|---|---|
| 1892 | Yaowaraj Road was constructed between Charoenkrung and Sampeng Roads. It started from Mahachai Fort and ran southwest to Charoenkrung Road at Wat Samchin (the area at Wat Samchin Bridge). This road was 35 <i>sen</i> in length and 10 <i>wa</i> wide the car lane was 7 <i>wa</i> wide; each footpath was 7 <i>sok</i> wide. | Government Gazette no. 8, p. 410 R.S. 110 |
| 1892 | Rajawong Road stretched from the east of the Chaophraya River bank passing Sampeng Road and Yaowaraj Road to Charoenkrung. Its length was 670 metres. | N. A. R. 5. M. of Public Works 9/1 no. 1 (1893) |
| 1892 | Sanamkwai Road (or Nang Lerg Road, currently renamed as Nakornswan Road) ran from Preatimas gate, which was located opposite the Mahakarn Fort, to Phitsanulok Road. The total length was 1,310 <i>sen</i> . | N. A. R. 5. M. of Public Works 4/25 no. 46 (1893) |
| 1892 | The road (no name) ran from Charoenkrung road to Klong Toey, and from Charoenkrung at Pak Trok Rongphasi exiting at Wua Lumpung field [Hua Lampong] along Silom Road. | as above |
| 1893 | Chakkrawat Road began at Charoenkrung Road (at Phraya Mahamontri's house) running south beside Wat Chakkrawat to the Chaophraya River. This road was 20 <i>sen</i> 2 <i>wa</i> in length and 10 <i>wa</i> wide. | Government Gazette no. 9. R. S. 111 p. 66 |
| 1893 | Kaosarn Road (now Chanasongkram Road) ran from Wat Chanasongkram to connect with Fuangnakorn Road. It was 10 <i>sen</i> 6 <i>wa</i> 1 <i>sok</i> in length and 7 <i>wa</i> 2 <i>sok</i> wide. | [<i>ibid.</i> : 46] |
| 1893 | Burapa Road linked Pahurat Road to the back of Burapapirom Palace joining Chalermkrung Road. This road was 6 <i>sen</i> 3 <i>wa</i> in length and 7 <i>wa</i> 2 <i>sok</i> wide. | N. A. R. 5. M. of the Capital 464/2 no. 1 (1894) |
| 1893 | This road, which was located at the north of Lawd Canal, ran from Seaw Bridge to the city wall at Pak Trok Rongmai. | as above |
| 1895 | Luang Road linked Charoenkrung and Bumrungmuang to the road in front of Wat Thepsirintarawat, Unakarn Road ran from Kaosarn Road through Preatamas Gate. | N. A. R. 5. M. of Public Works 9/4 (1895) |
| 1896 | Road was located along the south bank of Lawd Canal. | N. A. R. 5. M. of Public Works 4/23 (1896) |
| 1896 | Road ran from Chaochan Fort to Ta Pae Road. | N. A. R. 5. M. of Public Works 4/39 (1897) |
| 1897 | Worachak Road ran from Chaochan Palace to Prince Prida Palace. | as above |
| 1898 | Surawong Road branched from Charoenkrung to Hualumpong railway station at Sarapatumwan Road. | N. A. R. 5. M. of Public Works 9/28 (1899) |

Source: The information in the table mostly obtained from Nij [1982: 27-28].

Road area because they gave easy access to trade around the bank of the Chaophraya River.

Also in 1899, the Tanon Rajadamnoen area project was approved and started. Its primary purpose was to facilitate the king's travel between the grand palace and Dusit Palace, but it also served as a signal of the city's prosperity and also as a place for recreation and relaxation [*Collected Laws* 1929: 105-106]. Government offices were constructed in the Rajadamnoen areas [N. A. R. 5. M. of Public Works 9/41 (1899)], and in a short time this once rather lonely forest area became a bustling and developing area [Thailand, Government of Thailand 1899: 276].

Begun in August 1899, Rajadamnoen Road was completed on August 7, 1901. It stretched 760 metres from Preastimas Road (Nakornswan Road) to Benjamas Road [N. A. R. 5. M. of the Capital 2/86 (1900)]. In 1901, another project of Rajadamnoen was built, called Rajadamnoenklang Road. This road, 1,200 metres long and 58 metres wide, ran from Saphanleaw, passing Banglumpoo Canal, Rajadamnoen Nok, Parnhipoblila Bridge, and Ban Tanow Ban Dinsaw, to arrive at Parnfaleelard Bridge [Department of Fine Arts 1962: 37].

Completed in 1903, the last road construction in the Rajadamnoen project was Rajadamnoen Nai. This road stretched from the angle of Napralarn Road and Sanamchai Road to Prachan Road (around the eastern part of Sanum Luang), connecting Rajadamnoenklang at Parnhipobleela Bridge [Department of Fine Arts 1982: 81]. A symbol of Siamese independence and prosperity, the road vied with the great thoroughfares of Europe.

The Rajadamnoen project was built by the king. At the same time, increasing road construction was initiated privately by various wealthy merchants and nobles, indicating the growing participation of land speculators and construction interests in the extension of economic activity to more suburbs. During the period 1890-1910, newly built private roads included Sathorn Tai, Surasak, Pramuan, Rongmuang, Sunthorn Pimon, Visudkasat (old), and Si Phraya.

Road Construction, 1910-25

New road construction in the period to 1910 helped transform the central areas into industrial, residential, and commercial areas including Sampeng, Dusit, Sarapratum, Bangrak, Bangkoalam, Banglumpoo Lang, the part of Bangsue west of Klong Prem Prachakorn, and the district within the city wall [N. A. R. 5. M. of the Capital 5.4/10 (1908)].

Between 1910 and 1925, however, few new roads were cut. Most road expenditure was on the extension and improvement of existing roads. Only six new roads were built as shown in Table 4.

Discussion

Unlike his predecessor, King Vajiravudh had little interest in seeing great progress in his capital or in seeking profitable investment through road extension. The PPB paid little attention to investment in land and row houses over the period 1910-25. No records exist of large scale row house construction in this period. One reason is probably that Rama VI spent a large portion of his personal budget on his own activities, especially travelling. The Ministry

Table 4 A List of Road Construction in Bangkok, 1917-18

In 1917, three roads were cut within Tumbon Hualumpong. The main reason for road cutting in this area was fire prevention.

Road no. 1 from the intersection of Hualumpong Nai and Krungkasem Road (at Charoen Sawas Bridge) to the intersection of Plubplachai and Wang Road. Its length was 23 *sen* 17 *wa*.

Road no. 2 from Charoenkrung Road (at Songward Road) to Road no. 1, and the intersection of Krungkasem Road and Luang Road (at Nobpawong Bridge). Its length was 17 *sen* 6 *wa*.

Road no. 3 from Plubplachai Road passing roads no. 1 and 2 to Krungkasem Road. This road was 13 *sen* in length.

On 3 September, 1918, fire damaged a house at Tumbon Troktao Hoo. The cutting of three roads was proposed to help fire prevention:

Road no. 1 from Charoenkrung Road at Rajawong Road to Luang Road besides the central hospital. Its length was 208 *wa*.

Road no. 2 from Worachak Road to Plubplachai Road (at the southern part of Wat Mai Kanikaphol) through the new piled Chakkrawat Road to Road no. 1 and Trok Tao Hoo Road. Its length was 236 *wa*.

Road no. 3 from Klong Thom Chakkrawat Road to Plubplachai Road (at the northern part of Wat Maikanikaphol). The total length was 79.5 *wa*.

Source: [N. A. R. 6. M. of the Capital 21/36 (1917); N. A. R. 6. M. of the Capital 21/49 (1920)]

of Finance allocated the crown a private travel allowance of 200,000 baht per year in 1913-15, but this sum was overspent in each of the three years by 49,138, 247,241 and 416,184 baht respectively [Thaweasilp 1985: 138, based on N. A. R. 6. M. of Finance 8.3/1 (1913-1915)]. Rama VI not only spent a large proportion of expenditure of his personal budget for his own personal affairs but was also allocated a substantial state expenditure budget for the PPB and royal affairs. The government allocated expenditure for the PPB of 15 percent of the total government expenditure budget in the period 1910-17, and 12 percent over the years 1918-25 [Suntharee 1990: 108]. Overspending continued until 1925 and was covered by the revenue derived by the PPB. This resulted in the PPB facing financial difficulties which, in turn, significantly affected the rate of row house construction and other investments.

Furthermore, the slow development of road construction compared to the previous period was closely related with government financial difficulties. The government spent a large portion of its expenditure on defence, royal affairs, and public investment such as railways and irrigation.⁹⁾ In addition, government revenue decreased after 1919. Total government revenue in 1919 was 90.7 million baht, and this significantly declined between 1919 and 1925, as shown in Table 5.

One important reason for the decrease in government revenue was the great drought

9) Works in Thai concerning the rapid growth of defence and royal affairs expenditure budget during 1910-25 include Suntharee [1990] and Pornpen [1975].

Table 5 Government Revenue, 1919/20-1924/25

| Year | Million Baht |
|---------|--------------|
| 1919/20 | 90.7 |
| 1920/21 | 80.3 |
| 1921/22 | 79.6 |
| 1922/23 | 78.1 |
| 1923/24 | 81.6 |
| 1924/25 | 85.2 |

Source: [Wilson 1983: 242-243]

Table 6 Treasury Funds, 1919/20-1925/26

| Year | Million Baht |
|---------|--------------|
| 1919/20 | 44.0 |
| 1920/21 | 25.3 |
| 1921/22 | 5.7 |
| 1922/23 | 8.5 |
| 1923/24 | 3.2 |
| 1924/25 | 10.2 |
| 1925/26 | 17.3 |

Source: [Suntharee 1990: 90]

between 1917 and 1919, which obliged the government to limit rice exports [*ibid.*: 88]. In addition, the government lost around 51 million baht in revenue between 1919 and 1921 through speculation on exchange rates. These losses were financed by Treasury funds of around 34 million baht, resulting in a decline in the balance available (Table 6).

Many if not most of Rama V's new roads were constructed not to serve existing traffic but rather to open up new areas. To this extent they were the beginning of a process of development: the development of buildings, branching lanes, and so on. The street infrastructure established before 1910 laid a pattern of new settlement and commercial activity which was developed during the subsequent decades, and established the physical shape of the city that was still recognisable in 1950.

Financing Road Construction before 1925

Prior to 1892, all revenues were the king's personal income, and were in turn allocated by him to such purposes as defence, salaries, and public works. For example, Rama IV spent his own money in constructing Bumrungmuang Road. For the construction of Charoenkrung Road the money came from two years' revenue from the poll tax on the Chinese as recorded by a royal proclamation:

By the royal command all Chinese who had to pay taxes to help affairs of the kingdom are hereby informed that the taxes for the year of the cock were allocated to construction of Charoenkrung Road . . . and for construction of Bumrungmuang road, the King gave his money to hire Chinese and bought bricks For Bumrungmuang road, the money spent on its construction was his money not Chinese poll taxes. [Thailand, Government of Thailand 1869]

Data on expenditures and sources of finance for road construction in Bangkok between 1890 and 1932 are scant and not systematically collected. Based on the available data, the building of roads in Bangkok was financed by four broad categories of source: (1) donations by the king; (2) the Privy Purse Bureau revenue; (3) private donations; and (4) taxes. In 1892, Rama V separated the government income from the king's personal income. Henceforth, the expenditure needed to provide public services was derived from central government income.

Taxes were raised for the specific support of public services as well as for the support of the royal family. The Ministry of Finance was established in 1892. All ministries had to submit budget estimates to the king and cabinet each year. Systematic budgets for road construction and maintenance dated from 1892. At that time the agencies responsible for road cutting were the Ministry of the Capital, the Ministry of Public Works, and the Privy Purse Bureau.

Government road expenditure could be broadly categorised into two parts. The first part of the budget was the expenditure on land purchase and the second part was the cost of construction. As to land purchase, if land was partly lost by road cutting and, in turn, the owner of the land could gain in terms of a rise in the price of land, the land owners were not compensated, but had to contribute to the cost of road construction. Secondly, if land was totally lost by road cutting, land owners were fully compensated at market price [Nij 1982: 25]. Rama V himself observed that:

Capital on road construction was derived from taxes paid by all people all over the whole country, but spending on road building was undertaken in a particular area, thus providing benefits to that locality more than others and this is unjust for citizens in other localities. [Thailand, Government of Thailand 1899: 276]

To solve this problem, land adjacent to newly built roads was purchased, and after construction of the roads, was sold back to the owners at the original price of the land plus a proportional amount added to cover cost of construction. In many cases, the land owners had to contribute toward road construction if the road was seen as bringing benefit to them. With respect to the government expenditure budget on road construction in Bangkok, figures are presented in Table 7.

The question of who should pay for roads in the long term remained unsolved. No information is available concerning any criteria that were followed, for example, the benefit principle or ability to pay principle. Revenue raising for road construction was arranged piecemeal, with each road constructed separately. An interesting observation on the financing of Bangkok's roads was made in December 1927. It was written by Sir Edward Cook, Financial Advisor to the Ministry of Finance, and forwarded to the Revenue Department:

Nevertheless, the condition of the Bangkok roads (though it has perhaps slightly improved during the past year or so) cannot be regarded as creditable to the capital city of a prosperous and progressive country The roads are, of course, very much worse where the traffic is at all considerable than in the less frequented areas.

.....
Bangkok already absorbs (so it is contended) a proportionate share of the general revenues, and it is not fair that tax-payers outside Bangkok, the vast majority of whom are people of very humble means, should contribute toward the amenities of those fortunate beings who live in the capital. Those who hold this view would maintain that the interests of the country at large, where so much requires to be

done, have a prior claim on any surplus funds that the government may now possess.

.....
 One of the most pressing needs of the moment is, however, said to be for additional expenditure on roads: more particularly, expenditure of a non-recurring nature, in order that asphalt roads can be laid down properly, which will not only mitigate the plague of dust which seems to be endemic in Bangkok, but will also, in the long run, pay for itself by reducing maintenance charges.

.....
 I suggest that the most suitable as well as the most simple, means of raising new revenue (to finance the road construction) is to increase the taxation on motor cars. At present the owners of private motor cars pay only 12 baht a year, which is absurdly small. As I have mentioned, the number of cars must have increased enormously in the past few years, a fact which of course has added a great deal to the wear and tear of the roads. [N. A. M. of Finance 0301.1.19/4 (1927-1928)]

This indicates that around the 1920s, road construction was financed by revenue from the central government. Expenditure on road construction therefore came from tax payers from the

Table 7 Selected Estimated Road Construction Expenditures, 1861-1902

| Name | Total Expenditure (baht) | Sources |
|--|-----------------------------|--|
| 1. Charoenkrung (1863) [second part] | 19,700 | [Nij 1982: 18] |
| 2. Bumrungmuang (1863) | 15,002 | [<i>loc. cit.</i>] |
| 3. Fuangnakorn (1863) | | |
| 4. Preatimas (1884) | 55,622 | [Sayomporn 1983: 51] |
| 5. Rajadamnoen Klang (1902) | 758,618 | [<i>ibid.</i> : 110] * |
| 6. Unakarn (1898) | 8,000 | [Piyanart 1985: 24] |
| 7. Larn Luang (c. 1902) | 21,150 | [N. A. R. 5. M. of the Capital 5.4/5 (1902-1903)] |
| 8. Lookluang (c. 1902) | 6,640 | as above |
| 9. Damrongrak (c. 1902) | 16,911 | as above |
| 10. Panieng (c. 1902) | 16,278 | as above |
| 11. Krungkasem (c. 1902) | 8,000 | as above |
| 12. Visuthkasat (c. 1902) | 74,360 | as above |
| 13. Roads from the end of Lookluang (c. 1902) | 7,611 | as above |
| 14. Sanam Krabua (c. 1902) | 27,342 | as above |
| 15. Road at the end of Sanghee road (c. 1902) | 5,403 | as above |

* 236,607 baht for road construction cost, 522,011 baht for the purchase of land and buildings.

whole kingdom. This financing criterion was unfair for the mass of Thai citizens, for the roads benefited only Bangkok.

III The Economic Significance of Roads, 1890-1925

Over 135 roads were built between 1890 and 1925. From the 1890s onwards, Bangkok was transformed from a "floating" city to a "land-based" city. The traditional landscape of Bangkok, which consisted of city moats and a network of canals, underwent a marked change. The city landscape based on roads rapidly took shape. Bridges were built to span the canals. By the mid 1920s, around 41 bridges had been built [Chulalongkorn University 1991: 268]. Built-up areas of new buildings such as row houses extended along the roads. Canal construction slowed, then ceased. Klong Sathorn, dug in 1895, was the only major new canal in Bangkok at the end of the nineteenth century. It extended from the Chaophraya River to Klong Hualumpong at its intersection with Wittayu Road. After 1900, a few Thonburi canals were dredged for transport purposes, but for the most part the age of canals in Bangkok was over. After 1915, no new ones were excavated [Beek 1995: 62]. Some canals, such as Trok Tao, Nawaree, Wat Sampleum, Suanluang, Wat Kok, Wat Tuk, Chakkrawat, were filled to build roads. The city wall and city gate were demolished in the 1910s for building roads, housing, and rowhouses.

A British Consular report in 1900 noted:

Thirty-five years ago there were no streets in Bangkok. All traffic was carried on by boats, and the numerous canals still compete with the street traffic. As late as ten years ago there were no more than 9 miles of paved streets in the whole city. Today there are over 47 miles, and many new streets are being opened up each year, on which the old iron and wooden bridges are being replaced by modern steel bridges. The King himself builds one steel bridge each year out of his private funds as a gift to the city, and this is opened to the public with some ceremony on his birthday. The government imports from England every year considerable quantities of bridge materials. [Account and Paper 1900]

We may note that from the 1890s onwards there was even more rapid rates of areal expansion than in the previous period as the city absorbed more of the surrounding countryside. Changes were now caused by the construction of roads rather than canals. Roads brought the

10) For example, between 1890 and 1910, large areas outside the city walls, formerly used for growing rice, Chinese cabbage, green onions, mangoes, and betel nuts were developed as commercial, residential and industrial areas, including Tung Woalumpong (currently Hualumpong), Tung Samsen (currently Samsen district), Tung Phayathai (currently Phaya Thai district), Tung Bangkokapi (currently Bangkokapi district), Suan Dusit (currently the area around Suan Dusit Palace), and Tung Sompoy (location uncertain). The very names suggest the encroachment of the city on cultivated fields (*Tung* in Thai means field and *Suan* means garden).

expansion of trade and business and increased the size of the residential area.¹⁰⁾ Before the 1890s most residential areas were on the banks of the Chaophraya River and canals, but from the 1890s settlements developed further afield. This was the beginning of the residential and commercial quarter in the inner area, and the urban area expanded. Such transformation was helped by the introduction of Western vehicles such as trams, bicycles, and later automobiles, from the late 1880s.

A good example of the impact of road construction on the growth of the city's area was the Suan Dusit project. Finished in around 1898, the Suan Dusit palace in the northern part of the city was regarded as the most beautiful of the king's palaces. Roads built around this palace in the 1900s included Rajadamnoen Nok, Rajadamnoen Klang, Rajavithae, Benjamas Nai, and Somchin [Office of Royal Palace 1976: 21-40]. The construction of roads provided convenient communication between the grand palace and Suan Dusit Palace. Roads also facilitated close communication with and transportation to more distant districts such as Bangsua and Samsen.

We should not underestimate the influence of palaces and other royal residence on the growth of Bangkok. It may be recalled that Rama V had literally hundreds of children and grandchildren by the time of his death in 1910, and Rama IV had been similarly prolific. Palace construction and new road construction together went hand in hand. A number of palaces were built within and outside the city walls from the late 1890s, for instance, around Rajadamnoen Nok Road, Samsen Road, Suan Dusit Palace, Luang Road, and at the corner of Patumwan Road. As a result, the prosperity and settlement of communities earlier concentrated on the banks of the Chaophraya River extended to the northern, eastern, and the southern parts of the old city. The growth of palaces stimulated state officials and others to construct houses around the palaces [Pussadee 1982: 117-118]. Some palaces in Tumbon Klong Padung Krungkrasem are given in Table 8.

The Grand Palace and other royal palaces were large. They constituted a substantial

Table 8 A List of 13 Palaces at Tumbon Klong Padung Krungkrasem in 1898

| Names of Palace | Total Area (square <i>wa</i>) | Cost of Construction (<i>chang</i>) |
|-------------------------------------|--------------------------------|---------------------------------------|
| Prince Kittiyakorn | 6,065 | 439 |
| Prince Rapipattanasak | 12,467 | 181 |
| Prince Prawattanakodom | 12,302 | 194 |
| Prince Jirapratworadej | 7,917 | 111 |
| Prince Apakorn | 11,177 | 160 |
| Prince Burachat | 10,311 | 193 |
| Prince Pattanawong | 9,454 | 175 |
| Prince Wuttichai | 5,459 | 102 |
| Prince Diloknoparat | 13,090 | 195 |
| Prince Suriyong | 13,091 | 212 |
| Not decided | 10,321 | 626 |
| Not decided | 13,519 | 225 |
| The lesser concubine of the king | 146,619 | 3,314 |

Source: [N. A. R. 5. M. of the Capital 18.1/49 (1897-1898)]

Table 9 Area of Some Major Palaces in Bangkok, 1890-1920

| Names of Palace | Area (square <i>wa</i>) |
|------------------|--------------------------|
| The Grand Palace | 54,704 |
| Saranrom | 2,344 |
| Dusit | 56,720 |
| Suan Sununta | 48,855 |
| Suankwang | 12,506 |
| Suankularb | 24,740 |
| Parusakawan | 13,380 |

Source: [N. A. Office of the Prime Minister 0201.94.5/1 (1931-32)]

feature of the landscape of Bangkok in the 1890s, 1900s, and 1910s. For example, some were shown in Table 9.

In summary, then, Rama IV initiated a movement away from the river in the 1860s, eschewing boats in favour of horse-drawn carriages. The process continued for the remainder of his reign and through the Fifth Reign as more roads and bridges were built. In 1893, the railway line was opened between Bangkok and Paknam, eliminating the need for a boat journey. By the 1900s, horse-drawn carriages were being replaced by electrified tram and cars, which further reduced the role of water transport [Beek 1995: 62].

By 1910, the map of Bangkok had changed remarkably from its appearance of the 1880s [Royal Thai Survey Department 1984]. Many industrial, residential, and commercial areas developed along the arterial roads: Sampeng, Dusit, Sarapratum, Bangrak, Bangkoalam, Banglumpoo Lang, the part of Bangsue west of Klong Prem Prachakorn, and the district within the city wall [N. A. R. 5. M. of the Capital 5.4/10 (1908)]. In particular, Bangrak district was located south of the Padung Krungkasem Canal and was linked to the central district area by New Road. Roads had significant effects on the growth of this district. Consulates, the residences of foreigners, the port, rice mills, and saw mills were located in this area. Charoenkrung Road became the hub of commercial Bangkok and remained so until the 1950s, the headquarters of many of the principal trading houses, banks, and other enterprises, and containing most of the leading hotels. Also, Sampeng district became the centre of trade and business in Bangkok and remained so until the 1950s. It was the headquarters of many of principal trading houses, banks, warehouses, and leading hotels.

A revision of the 1910 census undertaken in 1913 shows that by the early 1910s, settlements had already moved away from the river and canals. Bangkok's population (excluding Thonburi) clustered around the districts of Chakkrawat, Prarajawang, Samphuntawong, Pomprab, Bangrak, and Pahurad, where roads were concentrated (Table 10). More interesting is an estimate of the population living in the floating houses. Only 32,212 inhabitants, or not more than 7-8 percent of Bangkok's population, lived in floating houses in the 1910s (Table 10).

Between 1910 and 1925, the most significant areal development was the extension of the

Table 10 The Distribution of Population in Bangkok in 1913

| <i>Tumbon</i> | Number |
|------------------------------|--------------|
| Phrarajawang | 34,086 |
| Sathorn | 14,992 |
| Sumphuntawong | 29,982 |
| Chanasonghkham | 20,154 |
| Bangrak | 21,624 |
| Phayathai | 1,926 |
| Samyaek | 9,996 |
| Samsen | 9,556 |
| Pomprab | 29,638 |
| Nanglerng | 13,162 |
| Dusit | 4,296 |
| Prachairchin | 4,588 |
| Sarapatum | 19,696 |
| Bantawai | 32,716 [sic] |
| Sumrunraj | 15,618 |
| Samyawd | 16,490 |
| Pahurad | 28,074 |
| Bangkhunphrom | 10,252 |
| Chakkrawat | 46,730 |
| Total | 363,576 |
| Unidentified floating houses | 32,212 |
| Number of monks | 7,012 |
| Vagrants | 115 |
| Grand Total | 402,915 |

Source: [N. A. R. 6. M. of the Capital 27/8 (1920-21)]

Note: Spelling is from the original.

built-up area to the west from Siphraya to Tanon Tok [Department of Fine Arts 1982: 91]. Across the city, urban boundaries were pushed outwards as adjacent rural areas which met the minimum official criterion for urban areas under the administration of the Ministry of the Capital, were reclassified as urban. In the late 1920s, the city's area expanded from the bank of the Padung Krungkasem Canal to Patumwan, Phetchaburi, and Ploenchit [Chulalongkorn University 1991: 459]. In addition, parts of other Bangkok districts such as Tungmahamek, Yannawa, Bangkhen, and Don Muang were also absorbed by the urban area. Also during the period 1910-25, Bangkok became more urbanized and more extensive. In 1923, the built-up area included: (1) the old district in the city wall or the heart of the city, Sampeng and Pranakorn; (2) Suan Dusit, the bank of the Samsen Canal, Phayathai, and Patumwan; and (3) Bangrak, Siphraya, and Silom [Collected Laws 1929: 100-101]. Roads were powerful factors which generated change in the physical growth in Bangkok, especially through the expansion of trade and business, the investment in row houses, and the growth of land transport.

The first published census in 1910/11 (Table 11) also indicated the city transformation. Some 182,253 residential buildings were constructed on land. A number of land vehicles were running on the roads, for example, cars, rickshaws, horse-drawn carriages, and trams.

Table 11 Some Statistics of Bangkok from Population Census, 1910/11 and 1929/30

| Item | 1910/11 | 1929/30 |
|----------------------|---------|---------|
| Boats | 125,316 | 80,465 |
| Cars | 401 | 3,361 |
| Steamships | 259 | 232 |
| Houses | 182,253 | n. a. |
| Horse-drawn carriage | 372 | 123 |
| Carts | 268 | 193 |
| Rickshaws | 2,463 | 3,000 |
| Bicycles | n. a. | 5,248 |
| Trucks | n. a. | 635 |
| Motorcycles | n. a. | 308 |

Source: [Thailand, Government of Thailand 1913: 257-259; 1929: 398-400]

Note: Figures above omit the inner *amphurs* in Bangkok.

Table 12 A List of Housing Located on Some Major Roads in Bangkok in 1901

| Road Name | Houses with Tile Roof | Houses with Zinc Roof | Houses with Atap Thatch |
|---|-----------------------|-----------------------|-------------------------|
| Charoenkrung | 244 | 212 | 211 |
| Fuangnakorn | 77 | 153 | 259 |
| Bumrungmuang | 182 | 170 | 137 |
| Pahurud | 79 | 128 | 193 |
| Roads outside the city wall ¹⁾ | 428 | 430 | 562 |
| Total | 1,010 | 1,093 | 1,362 |

Source: [N. A. R. 5. M. of the Capital 5.5/5 (1901)]

1) Roads outside the city wall covered a road running from the mouth of Ong Ang Canal to Banglumpoo Canal, thence to the eastern part of the Chaophraya River and back to the mouth of Ong Ang Canal.

Bangkok's water transportation was gradually being replaced by land vehicles. Growing road construction helped quicken the distribution of goods and services throughout the city, and people within the city became dependent upon roads for moving from one part of the city to another for such purposes as commerce, education, entertainment, and private business. As time passed, land vehicles became more common, while waterway transportation declined. For example, between 1910 and 1929 the number of cars increased from 401 to 3,361, and the number of rickshaws from 2,463 to 3,000, while vehicles for water transportation decreased significantly, for example, boats from 125,316 to 80,465 (Table 11).

To reiterate, the roads were of considerable importance since, for the first time, Bangkok began to lose its all-embracing connection with water and became a land-based city. Land-based activities, including building construction, tramways, electricity, gas-lighting, and other urban developments followed. From the 1890s, the shape and aspect of the city had been gradually transformed. Table 12 provides some idea of the rapid growth of land-based housing.

Table 12 shows how Bangkok was being transformed from an old and fortified city to a

modern city. In the early nineteenth century, Bangkok housing had a certain style:

The ordinary style of building is to erect two small houses in proximity to each other, on the same level. One of these is occupied by the husband and the other by his women. The posts are sunk into the earth three or four feet. The floor is raised six or eight feet from the surface of the ground, and above this the elevation of the room is ten or twelve feet. Thus the houses are all two stories high; but in consequence of the dampness and the spring tides, the lower story is seldom occupied, or even enclosed. Some of these buildings are made of bamboo wicker work, and some of bamboo slats and covered with a species of palm leaf. [*Bangkok Calendar* 1871]

By the 1890s, houses thatched with atap leaves declined in favour of houses roofed with tile or zinc [N. A. R. 5. M. of the Capital 5.5/5 (1901)]. Houses and row houses were often more convenient for business transactions. They had more capacity to store commodities and more space than floating houses. Row houses could incorporate modern offices, import-export distributors, wholesale and retail business, and so on. Several European and Chinese businessmen rented row houses to run their businesses such as dispensaries, branch offices and printing presses.¹¹⁾

A number of economic activities were concentrated along the roads. For example, the number of pawn shops increased from 39 in 1902 to 61 in 1904 and 93 by 1909, and these were usually located along the main roads, such as Chareonkrung, Sampeng, and Chakkrawad [*The Collection of Dynasty* 1964: 192; N. A. M. of the Capital 8.9 Ko/3 (1904)]. After the outbreak of World War I, modern machinery was brought into Bangkok by foreign investors, and a number of plants were set up, including the British-American Tobacco Company, soap factories, coconut oil and bean oil plants, textile factories, waterworks, and power stations [Anonymous 1985a: 74]. The government also ran the Bangkok waterworks and the Samsen Power station [*ibid.*: 75]. In the 1920s, there were several factories in Bangkok, big and small, for making nails, soap, tobacco, fireworks, bricks, medicines, and matches as well as for tanning leather, furniture-making, boot and shoe-making, boat-building, and tailoring [Anonymous n.d.: 27]. A match factory, for example, The Min Sae Co. Ltd, was registered by a group of Chinese in 1928, with capital of 200,000 baht. The Min Sae factory opened on a 20 *rai* site on Rama IV road, employing some 700 workers, 600 of whom were day labourers, most being Chinese women and children, with Siamese employed as outworkers making boxes at home. A reporter described the complicated automatic machinery, partly driven by electric motor and partly driven by hand. The company hoped to capture 20 percent of the local market [Hewison 1986: 10].

11) Aspects of change in the landscape in Bangkok in relation to the growth of roads, business, and trade from the nineteenth century are contained in Tomosugi [1993: 1-70], Wright and Breakspear [1908 (reprinted 1994): 257-275], Sayomporn [1983], Chulalongkorn University [1991], Department of Fine Arts [1982: 32-114, 554-623]. *The Composition of Physical Growth of Bangkok* [Chulalongkorn University 1991] is a book providing maps and photos useful for historical studies of change in the landscape of Bangkok.

Table 13 Shop and House Tax (Phasri Rongran) Collected by District in Bangkok, 1911-21

| <i>Amphur</i> | 1911 (baht) | 1919 (baht) | 1920 (baht) | 1921 (baht) |
|------------------|----------------|----------------|----------------|----------------|
| Sampeng* | 335,142 | | | |
| Chakkrawat | | 88,149 | 117,667 | 109,384 |
| Sumphuntawong | | 38,521 | 49,349 | 49,806 |
| Pahurud | | 52,460 | 62,441 | 42,837 |
| Pomprabsatroopai | | 32,250 | 32,617 | 28,383 |
| Bangrak | 24,246 | 39,827 | 45,602 | 43,331 |
| Sathorn | | 23,761 | 24,473 | 22,898 |
| Chanasongkram | | 13,949 | 22,280 | 19,452 |
| Patumwan | | 8,559 | 12,250 | 20,046 |
| Dusit | 19,956 | 2,535 | 3,286 | 3,322 |
| Phayathai | | 250 | 1,408 | 1,918 |
| Bangkhunprom | | 3,635 | 5,635 | 5,727 |
| Nanglerng | | 8,860 | 15,034 | 10,719 |
| Samsen | | 1,078 | 1,297 | 1,254 |
| Bangkhen | | n. a. | 388 | 398 |
| Bangkapi | | n. a. | 535 | 971 |

Source: Data for 1911 are from [N. A. R. 5. M. of the Capital 4.4/7 (1909)]; those for 1919-21 are from [N. A. R. 6/1. M. of the Capital 11.4/18 (1922)].

*In 1914/15, the boundaries of the districts of Bangkok were redefined and the name of Amphur Sampeng was abolished [N. A. M. of the Capital 20.2/32 (1915)]. The area of Sampeng under the new administration from 1914/15 was included in Chakkrawat, Sumphuntawong, Pahurud and Pomprabsatroopai districts.

Road building was significant for trade and investment. Business tax collection was greatest in districts where roads were concentrated. Figures on shop and house tax collections (Phasri Rongran) in 1911 show that Sampeng generated the highest amount of tax followed by Bangrak and Dusit (Table 13).

Table 13 also indicates that shop and house tax collections in 1921 remained highest around Sampeng district (including Chakkrawat, Sumphuntawong, Pahurud and Pomprabsatroopai). The areas around the Bangrak district including Bangrak and Sathorn came second. The areas around Dusit district such as Dusit and Nanglerng (also Bangkhen and Bangkapi) contributed less.

The rates of rental on row houses also show the expansion of commerce due to roads. Around 1905 the highest rental rates of general row houses were found in Sampeng district. The rates were 10-15 baht a month for row houses along Chakkrawat Road. Rental rates were higher (40-45 baht a month) if they were located at road junctions. A high rental rate was also found in the Rajawong Road area, where it was 16 baht a month for a general row houses, and jumped to as much as 60 baht if the row house was located at an intersection [Sayomporn 1983: 187]. Around Bumrungmuang Road and Charoenkrung Road, rental rates were about 12-15 baht a month for general row houses [N. A. R. 6. Office of Royal Secretariat 21.4/43

(1920)] and about 3-10 baht a month for old wooden row houses [N. A. R. 5. M. of Finance 9.4 Ko/65 (1907)]. Rental rates for row houses were lower in Dusit district than in Sampeng and Bangrak, and many row houses were vacant around the beginning of the century (Table 14).

The high rates of vacancies of row houses reflected the slow growth of trade and business in Dusit district, in part because road cutting did not facilitate trade and commerce. Roads such as Rajadamnoen Road were built with the primary objective of enabling the king and royal family to travel and visit people outside the palace. The proclamation of Rama V on the construction of Rajadamnoen Road in 1899 claimed:

His Majesty decided that the area between Tumbon Pantom and Tumbon Pom Hak Kamlang Dusakorn was so lonely because of the lack of roads For the purpose of developing this area he then decided to construct a road from Pra Sumain Road across Klong Bang Lampoo at Tumbon Pantom straight to Pom Hak Kamlang Dusakorn; across Klong Padung Krungkasem then to meet Banjamas Road . . . having its name Rajadamnoen Road. [Thailand, Government of Thailand 1899: 276]

There were also positive correlations between road construction, the value of land transactions, growth of the city, and growth of land development. The figures in Table 15 show that a large amount of land was bought and sold. For example, in 1910, land transactions in Sampeng and Bangrak were valued at 1,010,298 baht and 451,802 baht respectively. Table 15 also shows the value of loan agreements in 1910, confirming the importance of Sampeng and Bangrak as the most valued areas for business operation.

Table 16 shows that the numbers of land transactions were substantial in 1910-12 in Sampeng, Pranakorn, and Bangrak. The high rate of land transactions indicates the intensity of business activity, since land was a valuable asset as security for borrowing money.

The development of Bangkok's streets and roads should be considered alongside the introduction of new forms of transport. Roads and road transport combined to shape the new city that was emerging from the end of nineteenth century. As far as general passenger movement was concerned, the main road-based forms of transportation were the light rail, the tramway (horse and electric), the bus, and the rickshaw. Of growing significance after 1900

Table 14 Number of Row House Occupancies around Dusit District in 1900

| No. of Rooms Available | Location | Number of Room Occupancies |
|------------------------|---|----------------------------|
| 239 | Sukhothai Road | 21 |
| 133 | Daokang Road | 90 |
| 215 | Samsen Road | 28 |
| 12 | Rajawithee Road | 0 |
| 17 | Daokang Road along the Chaophraya River | 0 |
| Total 616 | | Total 139 |

Source: Adapted from Sayomporn [1983: 168-169, based on N. A. Office of Royal Secretariat 195 no. 4/87 (1901)]

Table 15 Value of Land Transactions and Loan Agreements in Bangkok in 1910 (baht)

| Inner <i>Amphur</i> | Sale of Land | Loan Agreements |
|---------------------|--------------|-----------------|
| Pranakorn | 367,581 | 58,446 |
| Sampeng | 1,010,298 | 52,469 |
| Dusit | 130,070 | 31,582 |
| Bangrak | 451,802 | 23,209 |
| Bangkok Noi | 1,600 | 7,340 |
| Bangkok Yai | 12,400 | 1,619 |
| Banglumpoolang | n. a. | 8,738 |
| Outer <i>Amphur</i> | Sale of Land | Loan Agreements |
| Bankapi | - | 338 |
| Bangsua | 1,489 | 7,660 |
| Bangkhen | - | 6,351 |
| Bangkhuntien | 1,840 | 3,114 |
| Ratchaburana | 160,000 | n. a. |
| Talingchun | 1,360 | 360 |
| Pasricharoen | 3,360 | 2,325 |
| Nongkham | n. a. | 8,260 |

Source: [N. A. R. 5. M. of the Capital 1.4/1 (1906-1910)]

Table 16 Land Transactions in Various Purposes Classified by *Amphur*, 1910-12

| <i>Amphur</i> | No. of Mortgages | No. of Sales |
|----------------|------------------|--------------|
| Sampeng | 116 | 202 |
| Pranakorn | 79 | 216 |
| Bangrak | 144 | 190 |
| Dusit | 45 | 106 |
| Bangsua | 2 | 2 |
| Banglumpoolang | 2 | 2 |
| Bankapi | - | 7 |
| Bangkok Yai | 4 | 5 |
| Bangkok Noi | 84 | 6 |
| Phasricharoen | 1 | 6 |
| Talingchun | 1 | 7 |
| Bangkhunthien | - | 4 |
| Daokanong | - | 1 |
| Rajburana | 3 | - |

Source: [N. A. R. 6. M. of the Capital 15.2 Ko/1 (1901-1912)]

(through for long the prerogative of the elite) was the automobile. The ubiquitous Bangkok canals and the lack of road communication with the provinces until after 1945 meant that long-distance truck (and bus) communication between Bangkok and the provinces was delayed. The public bus made its appearance on certain Bangkok streets. The pioneer in this development was Lert Setabutra, long remembered as Nai Lert for his active development of motorized bus service. His first endeavor was a horse bus, which made its debut in 1907 and ran along

Charoenkrung in the 1910s, later extending to Yosse, Pratunam, and Banglumpoo [Piyanart 1985: 117-118].

The first tram in Bangkok was introduced in 1888 by a Danish company operating under a concession from the government. The line began as a horse tramway, but was electrified in the 1890s. Trams required a relatively large capital investment and involved the transfer of western ideas and technology. According to Carter [Office of the Prime Minister 1982: 167], tram companies had a capital of some 3 million baht in 1903 and carried around 10 million passengers annually [*ibid.*]. By 1925, Siam Electric Corporation Co. Ltd, which ran both tramways and power generation, had registered capital of over 22 million baht [N. A. R. 7. M. of Commerce 12/2 (1926)].

In the 1900s, trams served mainly the commercial areas around the river, such as Charoenkrung and Sampeng, with extensions to suburbs such as Bangkoalam and Samsen. Major routes in the 1900s included Charoenkrung, Bangkoalam, Samsen, Ausdang, and Rajawong [Kuakul 1977: 175]. The length of line then open was 17.3 kilometres [Office of the Prime Minister 1982: 167]. Trams helped transportation and communication between the commercial districts and the suburbs. Trams helped settlements extend to more suburbs. Receipts on the routes from Charoenkrung to Bangkoalam and Samsen between 1899 and 1907 (Table 17) show increasing demand for trams.

From the 1920s, trams helped the city move further away from the river and canals. In 1925, the Siamese Tramway Co. Ltd, built three new lines. One started at the western end of Silom Road, near the Bangrak market on the side of the road near the klong, ran along the whole length of Silom Road, crossed Klong Hualumpong on a special bridge, and continued along the same side of Rajadamri Road up to the foot of Sapan (bridge) Chalerm. A second line branched off at Hua Lumpong, ran along Bumrungruang, crossed Sapan Yosse, ran along the

Table 17 Revenue Earned by the Tramway on the Charoenkrung-Bangkoalam and Samsen Routes, 1899-1907

| Year | Charoenkrung-Bangkoalam | | Samsen | |
|----------------------|-------------------------|-----------------|---------------|-----------------|
| | Car Miles Run | Receipts (baht) | Car Miles Run | Receipts (baht) |
| 1899 | 326,552 | | | |
| 1900 | 370,812 | 247,983 | September | September |
| 1901 | 361,746 | 275,268 | Started | Started |
| 1902 | 437,388 | 305,786 | 422,609 | 256,054 |
| 1903 | 518,976 | 404,051 | 433,217 | 303,013 |
| 1904 | 536,802 | 449,321 | 432,443 | 315,431 |
| 1905 | 652,067 | 531,256 | 495,175 | 337,155 |
| 1906 | 879,324 | 581,586 | 630,365 | 324,870 |
| 1907 | 900,929 | 568,036 | 764,540 | 322,996 |
| Increase in previous | 7 years | 7 years | 4 years | 4 years |
| | 169% | 206% | 49% | 27% |
| Increase last year | 2% | 2% | 21% | -1% |

Source: [Wright and Breakspear 1908 (Reprinted 1994): 191]

southern side of Rama I Road to cross Klong Rajadamri on a special bridge connecting with the Silom line. Thirdly, the Dusit line started in front of Prince Chumporn's palace, ran along the eastern side of Rama V Road, and terminated in front of Bangsue railway station [N. A. R. 6. M. of the Capital 13/6 (1925)].

IV The Privy Purse Bureau and Bangkok's Development

The Privy Purse Bureau (PPB)¹²⁾ was also crucial to Bangkok's development. Bangkok's new streets were often laid out as part of row house (*hong taew*) construction for royal investment, especially between 1890 and 1910.

As roads were built the price of land increased, and this attracted the elite and the PPB to invest in land and land-related business such as market places and row houses. A survey of land prices in Bangkok in the first decade of the twentieth century shows that the price of land was highest in the areas where roads were cut (Table 18).

The figures indicate that land prices rose considerably along roads such as Charoenkrung, Sampeng, Rajawong. The price of well and poorly situated land in some adjacent areas varied by as much as 250-fold. For example, in 1911 land along Talard Kaosarn Sampeng Road was 300 baht per square *wa*, while that at the northern part of Tumbon Samsen was 2 baht per square *wa* (Table 18). Bangkok's commercial development expanded whenever roads were cut, for instance, along the south side of Charoenkrung Road, Siphraya, Bangrak, Silom, Suriwong, Sampeng, and Pomprab. Trading companies and merchant residences were mostly located along the main roads. Thus the traditional city plan of Bangkok, which consisted of city moats and a complicated network of canals, underwent a marked change to land-base building after the 1890s.

The PPB acquired land in various ways. It was able to occupy public land, including unused land belonging to government ministries, unused palaces, and unused land conferred on government officials [Orathip 1981: 10-13; Chollada 1986: 114-192].

Land was also obtained through reclaimed mortgage. The PPB frequently lent money against mortgaged land and real estate, their major customers being Chinese tax-farmers, aristocrats, and senior bureaucrats. When borrowers were not able to pay their debts, the properties were transferred to the PPB. For example, a plot of PPB land around Tawejnareamitree Bridge (5,321 square *wa*) had previously belonged to Chaophraya Tawej, who failed to pay a debt of 40,000 baht in 1910 [N. A. R. 5. M. of Finance 9.2/14 no 76/1003

12) The PPB was formally established as an independent department within the Ministry of Finance (Phraklang) in 1890. Its predecessor was established during the reign of King Rama II under the name Ngoen Khang-thi, which was changed to Phara Khlang Khang-thi in the following reign. This organization was the king's personal institution. He was able to manage money to allocate to his own interests. During the reign of King Rama IV, 5 percent of the total state revenue, around 2,000 *chang* (160,000 baht), was regularly allocated to the PPB, together with the extra revenue from the land tax, another 2,000 *chang* [Thaweasilp 1985: 124-128]. In 1890, 15 percent of the total revenue was allocated to the PPB [N. A. R. 5. M. of Finance 9.1 no. 1 (1892)].

Table 18 Price of Land in Bangkok, 1905-11

Unit: baht per square *wa*

| Year | I: Land Adjacent to Road (Name of Road) | Year | II: Land not Adjacent to Road |
|------|--|------|---|
| 1905 | 20 Charoenkrung | 1905 | 12 Tumbon Silom |
| 1905 | 293 Suriwong | 1908 | 2 Tumbon Silom |
| 1908 | 160 Rajawong | 1909 | 20 Tumbon Silom |
| 1910 | 450 Rajawong | 1910 | 30 Tumbon Rimboon Klong Silom |
| 1910 | 300 Junction Sampeng Road and Trok Kaosarn | 1910 | 50 Tumbon Tanon Pahurud |
| 1910 | 170 Chakkrawat | 1911 | 59 Tumbon Trok Sibbia |
| 1910 | 400 Sampeng | 1911 | 2 Tumbon Bangprakaew |
| 1911 | 300 Luang | 1911 | 6 Tumbon Bangrak |
| 1911 | 160 Charoenkrung | 1911 | 18 Tumbon Wat Yuan Khumloki |
| 1911 | 300 Talard Kaosarn Sampeng | 1911 | 12 Tumbon Banknanghong |
| 1911 | 500 Rajawong | 1911 | 12 Tumbon Bangprakok |
| 1911 | 350 Songward | 1911 | 98 Tumbon Nawat Sungwejwisayaram |
| | | 1911 | 35 Tumbon Sarn Chaokao |
| | | 1911 | 50 Tumbon Rimtanonluang |
| | | 1911 | 60 Tumbon Talard Nanglerng |
| | | 1911 | 4 Tumbon Tung Banmai |
| | | 1911 | 2-6 Tumbon Bangsua |
| | | 1911 | 2 Tumbon Samsen (at The Northern Part) |
| | | 1911 | 10 Tumbon Hualumpong |
| | | 1911 | 20-30 Tumbon Trok Wat Phrayakrai |
| | | 1911 | 2 Tumbon Bangpong |

Source: [N. A. R. 6. M. of the Capital 15.2 no. 1 (1909); N. A. M. of the Capital 15.2 no. 2 (1909-1910); N. A. M. of the Capital 15.2 no. 3 (1913)]

Table 19 Land Owned by the PPB, Classified by Commercial Districts in Bangkok, 1902

| <i>Amphur</i> | <i>Tumbon</i> | Land Acquisition (<i>rai</i>) |
|----------------------|--|------------------------------------|
| Sampeng | Pomprabsatropai, Samyawd, Sumphuntawong, Chakkrawat, Patumwan | 1,831 |
| Bangrak | Sathorn, Bangkwang, Ban Tawai | 458 |
| Within the city wall | Wat Chanasongkram, Prarajawang, Sumrarnraj, Pahurud | 86 |
| Dusit | Bangkhunprom, Nang Lerng, Samsen | 1,708 |
| Total | | 4,083 |

Source: [N. A. R. 5. M. of Agriculture 6/6153 (1903)]

(1910)]. Chaophraya Surawongwattanasuk bought land beside Talard Hualumpong (23,159 square *wa*) and mortgaged it with the PPB for 16,000 baht. Chaophraya Surasakmontri bought land (23 *rai*) and a house at Tumbon Saladaeng, and mortgaged it with the PPB for 2,755 *chang* 42 baht (220,442 baht) [N. A. R. 5. M. of Finance 8.1/39 (1897)]. In both cases, the properties were transferred to the PPB when the mortgagees were unable to repay the loan.

The PPB also bought land directly from ordinary people and always had the advantage in terms of obtaining information on road cutting, the price of land, the advantages of its location, and so on. In this way, the PPB acquired many plots of land in good locations and commercial centres. As a result, PPB investments in markets and row houses grew in the quarter century before 1910 in the main commercial centres such as Bangrak, Rajawong, Suriwong, Patumwan, Pahurud, Sampeng, Samsen, and Banglumpoo. By thus acquiring land by forfeiture or purchase in various parts of Bangkok, the PPB controlled both prime commercial land and valuable cultivated land. Table 19 shows PPB landholdings in 1902.

As the largest and most important land owner in Bangkok, the PPB was a contributing factor to the growth of Bangkok, influencing road cutting and land use. Road building was heavily influenced by the king and the PPB, and road construction and row houses went hand in hand. For example, the PPB would advance money to purchase a plot of land to build row houses, and then demand road cutting nearby or through the land to increase the price of land and properties. As recorded in King Chulalongkorn's handwriting in 1901 [Office of the Prime Minister 1970: 129]:

Chakkri Mahaprasas

4 November 1901

No. 26/1001

Dear Prince Naresworarit

In dealing with a purchase of a plot of land to construct a road and the buildings [row houses] at the back of Talard Sao Chingcha, this should be done as soon as possible. The construction of the row houses is almost completed in this year So road construction in this area should be completed very soon. The expenditure for purchasing land has been charged to the Privy Purse Bureau, while

the cost of road construction is financed by another department [Ministry of the Capital].

(Signature)

Chulalongkorn

We should consider further the impact of road construction on row house investment. Throughout the years 1890-1932, the PPB was the largest owner of row houses, which were usually constructed along both sides of newly cut roads. Row house investment was closely related to land investment by the PPB, and construction was undertaken along major roads in the main commercial districts, in Sampeng, Yaowaraj, Pahurud, Charoenkrung, and Fuangnakorn. The first available figure for row house building can be obtained from the postal census survey in 1883. Unfortunately, some parts of the postal roll in the National Library in Bangkok are missing. The available data for row houses on Fuangnakorn Road indicate that 83 of 315 households resided in the PPB's row houses and 94 of them dwelt in private tenements [Tomosugi 1993: 27, 29].

Scattered records of market transactions give a picture of growing activity in the twenty years or so before 1910:

In 1892, the PPB had 63 row houses for rent collection along the edge of Bumrungmuang Road. In 1899, the PPB bought the markets and 134 row houses of Krommuan Putharesthumrongsak whose mortgaged properties were transferred to the Ministry of Finance. [N. A. R. 5. M. of Finance 9.4 ng/11 (1900)]

In 1899, the PPB bought a group of buildings belonging to the Oriental Hotel along the bank of the Chaophraya River. Total value was 375,000 baht. [*ibid.*]

In 1900, the PPB had 215 row houses around the edge of Samsen Road, and 239, 133, and 17 row houses around the edge of Sangheenok Road, Duangduan Nok (Sukhothai Road), and Daokang Road respectively. [N. A. R. 5. M. of Finance 4.1/24 (1903)]

In 1902, the PPB constructed 140 row houses at Sampeng, Pahurud, Plublachai, Chakkrawat, and Hualumpong. [N. A. R. 6. M. of Finance 1/64 (1912)]

In 1902, there were some 616 row houses constructed by the PPB in Suan Dusit area. [N. A. R. 5. Office of Royal Secretariat 58/272 no. 120/1172 (1902)]

In 1909, the PPB had a plan to construct hundreds of row houses around Tumbon Samsen. [N. A. R. 5. M. of Finance 4.1/24 (1903)]

In 1910, the PPB bought 20 row houses at the edge of Charoenkrung Road from Kromkhun-sabprasart Suphakit at a price of 96,000 baht. [N. A. R. 5. Office of Royal Secretariat 1.3/ (1910)]

Rental rates for row houses were low. In 1907, rental rates for row houses at the edge of Bumrungmuang Road and Charoenkrung Road ranged between 20 and 100 baht a month. The rates tended to decline for old wooden row houses, the monthly rate being 3-10 baht for one room [N. A. R. 5. M. of Finance 9.4 Ko/65 (1907)]. Between 1900 and 1910, unskilled Chinese coolies earned 0.75-1.0 baht a day. If they lived together by sharing the same row houses, rental rates were cheap. Such low rents also attracted people to run their businesses from row houses.

In addition, low rental rates attracted low income groups to live in row houses. Some documents suggest that residents in row houses around the Talard Nang Lerng belonged to low income groups. In 1901, 613 people lived here, of whom 252 were Thais and 361 were Chinese [N. A. R. 5. M. of the Capital 8.1/201 (1901)]. Of this group, 284 persons engaged in trading, 229 persons were general workers, 58 males worked in gambling places, and another 58 persons worked as watchmen. Some 60 children lived in the row houses. The Thais' occupations included trading in cigarettes, bananas, desserts, and sugarcane. Among the self-employed were painters, blacksmiths, and carpenters. The Chinese traded in tea, cigarettes, rice, sugar, and rice noodles, or served as general workers in canal digging, road construction, and coolie labourers [N. A. R. 5. M. of the Capital 80.1/201 (1901)].

No reliable data are available on the rate of return on row house investments. The low rental rates suggest that the PPB did not calculate rent from the standpoint of maximizing profit. The PPB differed from a general private business firm. The role of the PPB (and the king) was to provide cheap accommodation to the public and welfare to society. Nonetheless, the availability of moderately high returns on investment was a major factor influencing road cutting.

V Conclusion

This paper has analysed the major patterns of physical change in Bangkok from 1851, concentrating on the expansion of canals and roads and the attendant development of new suburbs. From around 1890, Bangkok began the transition from a water-based city to a land-based city, and the period from around 1890 to 1910 was clearly significant in Bangkok's development. Key elements here include the rice trade, Chinese immigration, and the activities of the Privy Purse Bureau and groups of foreign investors. In particular, the Privy Purse Bureau played an important part in Bangkok's development: Bangkok's new streets were often laid out as part of row house construction for royal investment.

Glossary

| | |
|--------------------------------|--|
| <i>Amphur</i> | District, administrative subdivision of province |
| <i>Ban</i> | Village, house, home |
| <i>Chang</i> | Unit of Thai currency, 1 <i>chang</i> =80 baht |
| Chao Phraya | The highest rank of the Thai ancient civil nobility |
| <i>Changwat</i> | Province |
| <i>Klong</i> | Canal |
| <i>Kwien</i> | A Thai capacity measure equal to 2.000 litres. |
| <i>Menam</i> or <i>Manam</i> | River |
| <i>Nakombam</i> | City administration |
| Phraya | Conferred rank, higher than Phra, below Chaophraya |
| <i>Rai</i> | Unit of land; 1 <i>rai</i> =0.16 hectare=1,600 square metres |
| <i>Sen</i> | Unit of linear measure equivalent to 40 metres |
| <i>Sok</i> | An ancient Thai measure of length equal to the distance from the elbow to the extremity of the middle finger: roughly 50 centimetres |
| <i>Talard</i> | Market place |
| <i>Tanon</i> | Road |
| <i>Tumbon</i> or <i>Tambon</i> | Group of villages, official administrative subdivision under <i>amphur</i> |
| <i>Wa</i> | A measure of length equal to two metres |
| <i>Wat</i> | Temple |

Bibliography

(1) *Documents from Bangkok National Archives*

References to the archives begin with "N. A." The citation "N. A. R. 5. M. of the Capital 14/4 (1899)" refers to documents of the Ministry of the Capital from the Fifth Reign and the accompanying numbers identify to a specific series and file. The citation "N. A. M. of Finance 0301.1.1/139 (1931)" refers to the date and file number for the archive of the Ministry of Finance.

Ministry of the Capital

- N. A. R. 5. M. of the Capital 464/28 no. 1 (1894)
- N. A. R. 5. M. of the Capital 18.1/49 (1897-1898)
- N. A. R. 5. M. of the Capital 1/50 (1900)
- N. A. R. 5. M. of the Capital 2/86 (1900)
- N. A. R. 5. M. of the Capital 5.5/5 (1901)
- N. A. R. 5. M. of the Capital 8.1/201 (1901)
- N. A. R. 5. M. of the Capital 5.4/5 (1902-1903)
- N. A. R. 5. M. of the Capital 80.1/201 (1901)
- N. A. R. 5. M. of the Capital 1.4/1 (1906-1910)
- N. A. R. 5. M. of the Capital 5.4/10 (1908)
- N. A. R. 5. M. of the Capital 4.4/7 (1909)
- N. A. R. 6. M. of the Capital 15.2 no. 1 (1909)
- N. A. R. 6. M. of the Capital 21/7 (1910)
- N. A. R. 6. M. of the Capital 15.2 Ko/1 (1901-1912)
- N. A. R. 6. M. of the Capital 21/36 (1917)
- N. A. R. 6. M. of the Capital 21/49 (1920)
- N. A. R. 6. M. of the Capital 27/8 (1920/21)
- N. A. R. 6. M. of the Capital 13/6 (1925)

- N. A. R. 6/1. M. of the Capital 11.4/18 (1922)
N. A. M. of the Capital 8.9 Ko/3 (1904)
N. A. M. of the Capital 15.2 no. 2 (1909-1910)
N. A. M. of the Capital 15.2 no. 3 (1913)

Ministry of Public Works

- N. A. R. 5. M. of Public Works 9/1 no. 370/1 (1892)
N. A. R. 5. M. of Public Works 9/1 no. 1 (1893)
N. A. R. 5. M. of Public Works 4/25 no. 46 (1893)
N. A. R. 5. M. of Public Works 4/23 (1896)
N. A. R. 5. M. of Public Works 4/39 (1897)
N. A. R. 5. M. of Public Works 9/28 (1899)
N. A. R. 5. M. of Public Works 9/41 (1899)
N. A. R. 5. M. of Public Works 9/39 no. 36/44 (1900)
N. A. R. 5. M. of Public Works 9/90 no. 36/414 (1900)

Ministry of Finance

- N. A. R. 5. M. of Finance 9.1 no. 1 (1892)
N. A. R. 5. M. of Finance 8.1/39 (1897)
N. A. R. 5. M. of Finance 9.4 ng/11 (1900)
N. A. R. 5. M. of Finance 4.1/24 (1903)
N. A. R. 5. M. of Finance 9.4 Ko/65 (1907)
N. A. R. 6. M. of Finance 9.2/14 no. 76/1003 (1910)
N. A. R. 6. M. of Finance 1/64 (1912)
N. A. M. of Finance 0301.1.19/4 (1927-1928)

Ministry of Commerce

- N. A. R. 7. M. of Commerce 12/2 (1926)
N. A. R. 7. M. of Commerce 8.1 (1929)

Ministry of Agriculture

- N. A. R. 5. M. of Agriculture 6/6153 (1903)
N. A. R. 5. M. of Agriculture (Department of Canals) 34/791 (1910)

Office of Royal Secretariat

- N. A. R. 5. Office of Royal Secretariat 58/272 no. 120/1172 (1902)
N. A. R. 5. Office of Royal Secretariat 1.3 (1910)
N. A. R. 6. Office of Royal Secretariat 21.4/43 (1920)

Office of the Prime Minister

- N. A. Office of the Prime Minister 0201.94.5/1 (1931-32)

(2) *Newspapers*

Bangkok Calendar, 1871.

(3) *Official Government Publications*

- Thailand, Government of Thailand. 1869/70. *Government Gazette Proclamation of Rama IV*. Vol. 4. (in Thai)
———. 1892/93. *Government Gazette R. S. 110*. no. 8. (in Thai)
———. 1893/94. *Government Gazette R. S. 111*. no. 9. (in Thai)
———. 1899. *Royal Government Gazette*. Vol. 16. (in Thai)
———. 1913. *Thesapiban*. Vol. 13 (Special Issue) August. (in Thai)
———. 1929. *Thesapiban*. Vol. 30. no. 2 August. (in Thai)
———. 1984. *Maps of Bangkok A. D. 1888-1932*. Bangkok. (in Thai)

(4) *Published Works*

- Account and Paper. 1900. *Parliament Commons*. Vol. 87.
- Anonymous. n. d. *Siam Resources*.
- . 1977. *Royal Duties of King Rama VII*. Bangkok: Ruang Rueng Silp Publishing Office. (in Thai)
- . 1985a. Kon Chathung Niyom Thai. *Silapawattthanatham* 7(1). (in Thai)
- . 1985b. Sethakit Niyom Thai Yuk lung Plianplaeng Kan Pokkhrong Ph. S. 2495. *Silapawattthanatham* 7(1). (in Thai)
- . 1992. *Yesterday and Today of Silom Road*. Bangkok: Amarin Printing Group.
- Beek, S. V. 1995. *The Chaophya River in Transition*. Kuala Lumpur: Oxford University Press.
- Carter, C. A. 1988. *The Kingdom of Siam 1904*. Reprint Editions, Bangkok: The Siam Society.
- Chai Ruengsilp. 1976. *The History of Thailand: Social Aspects, B. E. 2352-2453*. Bangkok: Amarin Publishing Office, Kurusapa Press. (in Thai)
- Chaophraya Thiphakornwong. 1961. *The Bangkok Dynastic Chronicle Rama IV*. Bangkok: Kurusapa Press. (in Thai)
- Chulalongkorn University. 1991. *The Composition of Physical Growth of Bangkok*. Bangkok: Chulalongkorn University Press. (in Thai)
- Collected Laws*. 1929. no. 36. (in Thai)
- Crawford, J. 1977. *Journal of an Embassy to the Courts of Siam and Cochin China*. Kuala Lumpur: Oxford University Press.
- Department of Fine Arts. 1962. *A Directory Part II: Roads in Changwat Pranakorn and Thonburi*. Bangkok: Cremation Volume. (in Thai)
- . 1982. *The Record of Krunggrattanakosin*. Bangkok. (in Thai)
- Donner, W. 1978. *The Five Faces of Thailand: An Economic Geography*. Queensland: University of Queensland Press.
- Evers, H. D.; Rudiger, K.; and Suparb Pas-Ong. 1987. Trade and State Formation: Siam in the Early Bangkok Period. *Modern Asian Studies* 21(4) October: 751-771.
- Falkus, M. 1989. Early British Business in Thailand. In *British Business in Asia Since 1860*, edited by R. P. T. Davenport-Hines and Geoffrey Jones, pp. 118-156. Cambridge: Cambridge University Press.
- . 1993. Bangkok: From Primate City to Primate Megalopolis. In *Megalopolis: The Giant City in History*, edited by Theo Baker and Anthony Sutcliffe, pp. 143-165. London: The Macmillan Press.
- . 1997. Bangkok in the Nineteenth and Twentieth Centuries: The Dynamics and Limits of Port Primacy. In *Gateways of Asia Port Cities of Asia in the 13th-20th Centuries*, edited by Frank Broeze, pp. 211-222. London and New York: Kegan Paul International.
- Hewison, K. 1986. Industry Prior to Industrialisation: Thailand. Paper presented at Conference on Industrial Elites in Southeast Asia Sukhothai, Thailand, 8-12 December.
- Hong, Lysa. 1984. *Thailand in the Nineteenth Century: Evolution of the Economy and Society*. Singapore: Institute of Southeast Asian Studies.
- Hubbard, R. V. 1977. Canal Construction in the Chao Phraya River Central Thailand. In *The History of Inland Waterway Development in Thailand*. Michigan: The Department of Geography, University of Michigan, Ann Arbor.
- Kuakul Yuanyonganan. 1977. *The Development of Land Communications*. Bangkok: Department of Teacher Training. (in Thai)
- M. R. Nangnoi Saksri. 1982. *Royal Palaces and Palaces in Bangkok, 1782-1982*. Bangkok: Chulalongkorn University Press. (in Thai)
- Nidhi Aeusriwong. 1982. *Bourgeoisie Culture and Literature of Early Bangkok*. Bangkok: Thaikhadi Research Institute, Thammasat University. (in Thai)
- Nij Hincheeranun. 1982. Road in Bangkok: An Evolution in 200 Years. Paper Presented at Conference on the Growth and Change of Bangkok in 200 Years, Chulalongkorn University, 17-18 February. (in Thai)
- Office of the Prime Minister. 1970. *A Collection of King Chulalongkorn's Manuscripts*. No. 3, part I, Bangkok. (in Thai)
- . 1982. *Foreign Records of the Bangkok Period up to 1932*. Bangkok: Aksornsmat Press.
- Office of Royal Palace. 1976. *The Record of the Construction and Repairing Vimmamek Palace, 1900-1975*. Bangkok: Office of Royal Palace. (in Thai)

- Piyanart Bunnag. 1985. *The Development of Land Transportation in the Fifth Reign (1868-1910)*. Bangkok: Chulalongkorn University. (in Thai)
- Porphant Ouyyanont. 1997. Bangkok's Population and the Ministry of the Capital in Early 20th Century Thai History. *Tonan Ajia Kenkyu* [Southeast Asian Studies] 35(2): 240-260.
- Pussadee Thippawas. 1982. *Housing in Bangkok: Models and Changes in 200 Years, 1782-1982*. Bangkok: Chulalongkorn University Press. (in Thai)
- Royal Thai Survey Department. 1984. *Map of Bangkok, 1888-1931*. Bangkok.
- Sarasin Viraphol. 1977. *Tribute and Profit: Sino-Siamese Trade 1651-1853*. Cambridge: Massachusetts, Harvard University Press.
- Skinner, G. W. 1957. *Chinese Society in Thailand: An Analytical History*. Ithaca: Cornell University Press.
- Sompop Manarungsan. 1989. *Economic Development of Thailand 1850-1950: Response to the Challenge of the World Economy*. Bangkok: Institute of Asian Studies, Chulalongkorn University.
- Sternstein, L. 1982. *Portrait of Bangkok*. Bangkok: Bangkok Metropolitan Administration.
- Suntharee Asavai. 1987. *The History of Rangsit Canal: Land Development and the Social Impacts*. Bangkok: Thammasat University Press. (in Thai)
- . 1990. *The Economic Crisis after World War I*. Bangkok: Thammasat University Press. (in Thai)
- Terwiel, B. J. 1989. *Through Travellers's Eyes: An Approach to Early Nineteenth Century Thai History*. Bangkok: Editions Duang Kamol.
- Thaweetilp Subvattana. 1985. The Role of Privy Purse in Economic Investment, 1900-1932. *Thammasat University Journal* 14(2): 122-159. (in Thai)
- The Collection of Dynasty*. 1964. Vol. 12 (part 15-18). Bangkok: Kurusapa Publishing Office. (in Thai)
- Tomosugi, Takashi. 1993. *Reminiscences of Old Bangkok: Memory and the Identification of a Changing Society*. Tokyo: The University of Tokyo.
- United States Consular Reports. 1872. *Annual Report on Foreign Commerce, Siam for 1872*.
- Wilson, Constance. M. 1983. *Thailand: A Handbook of Historical Statistics*. Boston: G. K. Hall & Co.
- . 1989. Bangkok in 1883: An Economic and Social Profile. *Journal of the Siam Society* 77(2): 49-58.
- Wright, A.; and Breakspear, O. T. 1908 [Reprinted 1994]. *Twentieth Century Impressions of Siam*. Bangkok: White Lotus.

(5) *Dissertations*

- Chollada Wattanasiri. 1986. The Privy Purse and the Business Investment, 1890-1932. M. A. Thesis: Silapakorn University. (in Thai)
- Cushman, J. W. 1975. Fields from the Sea: Chinese Junk Trade with Siam during the Late Eighteenth and Early Nineteenth Centuries. Ph. D Thesis, Cornell University.
- Orathip Tessiri. 1981. Land Holding in Thailand from 1901 to 1932: A Case Study of Monthon Krungthep. M. A. Thesis, Chulalongkorn University. (in Thai)
- Porpen Hantrakul. 1975. The Government Spending during the Region of King Rama VI, 1910-1925. M. A. Thesis, Chulalongkorn University. (in Thai)
- Sayomporn Tongasari. 1983. The Impact of the Building of Roads in Bangkok during the Reign of King Rama V (1868-1910): A Study in the Area within the City Walls, the Northern and the Southern Parts of the City. M. A. Thesis, Silapakorn University. (in Thai)