The Isthmus of Kra

Canal is cornerstone of Asian development

by Uwe Parpart-Henke

As far back as 1793 the younger brother of King Rama I of Thailand (Siam) had proposed to dig a canal across the peninsula of Thailand south of the Isthmus of Kra, connecting the Lake of Songkhla and the South China Sea with the Indian Ocean. The motivation at the time was to facilitate military and naval operations against frequent Burmese invasions. However, in spite of numerous military and, even more importantly, commercial advantages, no such canal has been constructed to date as the project remains a subject of political controversy.

From the standpoint of facilitating greatly increased trade and rapid ocean transport between the Indian Ocean basin and the Pacific basin and, more broadly, between the Western world and the countries of Southeast and East Asia, there is, however, no question about either the urgent need for the Kra Canal or its pivotal role in the economic development of Thailand and the entire region. The Straits of Malacca, which now handle most of the relevant traffic, are highly congested and will become quite inadequate by the end of this decade based on even modest projections of increased trade flows.

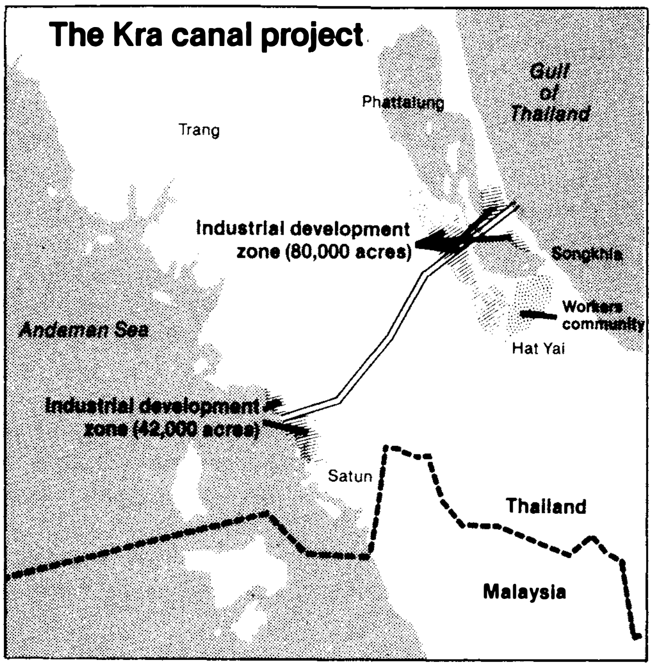
A relatively recent feasibility study for the Kra Canal, commissioned in the early 1970s by Mr. K.Y. Chow of the Thai Oil Refining Company, can serve as an excellent basis for initiating the project as soon as Thai government approval is secured. Of course, the feasibility study in question, carried out by engineers and planners of Tippetts-Abbett-McCarthy-Stratton (TAMS) and Robert R. Nathan Associates, Inc. (RRNA), in collaboration with Lawrence Livermore Laboratory of the United States and submitted in September of 1973, is now dated and requires extensive review. Such review would principally have to evaluate economic feasibility and financing proposals. The engineering conclusions of the TAMS-RRNS study, in the view of this writer, remain valid, though in certain instances very recently-developed technologies could shorten construction time and improve final performance.

The Kra Canal Project, as detailed in the TAMS report differs conceptually from earlier major canal projects with which it would reasonably be compared, e.g. the Suez and Panama Canals. The transport distance saved by building the Kra Canal—about 900 miles—would not by itself appear to justify the large expenditures in excavation and operating costs. There are two other principal factors which define the overall importance and viability of the project. These are: 1) the already mentioned growing *inadequacy of the Straits of Malacca*, and 2) the *industrial development potential* based on construction of *deep sea ports* at one or both of the canal outlets.

The Straits of Malacca are used by well over 50,000 ships a year and further significant increases in traffic are inevitable. Thus the Kra Canal could be expected to attract all excess traffic from the Malacca Straits as well as traffic which assigns a premium to speed. Emphasis on speed, as will be explained below, is a major reason why the TAMS study selected a canal route well south of the actual Kra Isthmus. This route, labeled 5A (see map), makes possible the construction of a *sea-level canal without locks* through which even large (up to 500,000 dwt) tankers could pass at normal speed. The integration of one (or possibly two) deep sea ports and associated industrial development zones with the Kra Canal proper can be expected to become the single greatest long-term economic asset of the entire project.

Taking the experience of the "Europort" of Rotterdam at the mouth of the Rhine River as a model, an "Asiaport" conjoined with the Kra Canal could become not only a major trade center for Southeast Asia, capable of eclipsing Singapore, but also has the potential—as proved by the Rotterdam and similar examples—of serving as a focal point for major industrial development.

A major included *strategic factor* also deserves the attention of Thai policy makers. Contrary to some reported opinion and concern that a canal through the southern part of the Golden Peninsula would have negative security implications, severing the ethnically and religiously ill-integrated southern-most part of the nation from the rest of the country, the



Route 5A, the recommended option for the canal project

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opposite consequence would be the projected outcome. The canal complex as a major industrial growth-spot would function as an integrating and unifying factor, joining together the southern, central, and northern provinces in a large common endeavor capable of inspiring the entire nation, uplifting the economic condition of the southern population, and thus reducing the potential for dissatisfaction and dissension, while putting Thailand into a potentially commanding strategic position vis-à-vis its South and Southeast Asian neighbors.

Route selection and canal design specifications

Any canal-design study must give at least a preliminary answer to two basic questions: First, what size ships and what maximum volume of traffic are to be accommodated? Second, given preliminary answers to these questions, and given the geographical and geological constitution of the general area under investigation, what is (are) the optimal canal route(s) from the standpoint of these considerations.

1) Ship sizes and traffic volume projections. It is clear that tankers of at least 500,000 dwt must be accommodated, and handling of larger tankers may be desirable. Maximum safe canal transit speeds with respect to the land of about 7 knots (13 km/h) for ships of this size represent the presently established international standard; in the view of this writer, which differs from that of the TAMS study, a two-lane canal is necessary. The assumption that one lane, handling mainly west to east traffic, is sufficient is based on the untenable premise that for a long time to come the export potential of the East and Southeast Asian nations will be small relative to Western imports.

The canal should preferably be sea-level without locks, must accommodate drafts of at least 100 feet (fully-loaded supertankers), i.e., be at least 110 feet deep, and have a bottom width of approximately 500 meters. The alternative to one rather wide two-lane canal would be two one-lane routes of about 200 meters width each.

2) Route selection. Extensive geographical and geological investigations have been carried out to find the optimal route for a sea-level canal of the above design specifications. Included in these investigations were considerations concerning required canal crossings for railroads, highways, and utilities. Relative excavation costs and, in particular, the feasiblity of nuclear excavations methods were prominently taken into account.

The preferred route settled upon by the TAMS-report (route 5A—see map) would extend from about 30 km north of the city of Satun to the Gulf of Thailand. The total canal length through land for this route is 102 km, with sea approaches of 50 km in the west and 70 km in the east respectively. This is the shortest possible route for a sea-level canal, minimizes excavation costs and provides for the best possible sites on either end for harbor and industrial development. Construction time for route 5A using conventional excavation methods is estimated to be 10-12 years; partial nuclear excavation would cut both construction time and cost by at least 40 percent.

"Asiaport" and industrial zones

The construction of major deep sea port facilities and associated industrial development zones at either end of the Kra Canal is both feasible and highly desirable. However, phased port and industrial development, concentrating initially on the eastern canal outlet, appears to be the best strategy at this point.

This involves, in particular, a most interesting concept first proposed in the early 1970s by Mr. K.Y. Chow. Since most Southeast and East Asian ports with the exception of Hong Kong and Singapore are, at present, ill-equipped to handle large cargo vessels and could only be enlarged at very high cost, a port facility at Songkhla could rapidly develop into a major transshipment center for the entire region, capturing a very substantial portion of transshipment now handled by Hong Kong and Singapore.

This development, however, would only be Phase I and should rapidly be followed up by construction of a comparable facility at the western canal outlet. Even in the initial planning stage, both ports must also be laid out to handle not only transshipments, but also the subtantially greater berthing requirements that will arise out of area industrial development. The pattern of such industrial development requires intensive detailed study to be coordinated with existing Thai government plans for eastern seaboard development and construction of a deep sea port at Sattahip.

One possible outline pattern of industrial development for the Kra Canal Complex would look as follows:

1. Initial development of industries and servicing facilities supportive of the canal and transshipment port projects. This would from the outset have to involve dry-dock and shipbuilding facilities, building a modern fleet of rapid feeder vessels as specified above. Phase I development must also take into account the immediate as well as long-term power requirements of the Canal Complex. If nuclear excavation is used, then the right kind of expertise would already be assembled in the region to consider construction of one or several nuclear power plants. Ideas going back to the mid-1960s for nuclear-industrial complexes should be reviewed in this context.

2. Phase 2 should envisage the development of large and basic heavy industries developed both as an offshoot of the canal construction itself and as back-up for the proposed shipbuilding project—iron and steel as well as basic capital-goods industries as indicated.

3. In an environment already shaped by nuclear excavation and power plant development, having assembled the required advanced engineering and scientific manpower, the exciting possibility arises of developing a modern nuclear-based high-technology complex. Lawrence Livermore Laboratory experts have suggested that the world's first nuclear isotope separation plant of a significant scale might become associated with the Kra Canal Complex. Recent developments in laser technology would in that same context point to the possibility of developing new high-energy laser-based industries.