The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
1.	Detailed Design of Water Supply System for Thai Petrochemical Industry Public Co.,Ltd.	Amphoe Muang, Rayong	● Detailed design of Raw Water Pumping System consists of a raw water pump station extracting raw water from Ban Khai River, and the transmission pipe ● Detailed design of Water Treatment Plant with a capacity of 1,000 cu.m/day including a clearwell and a transmission pump station ● Detailed design of Treated Water Transmission System consists of a treated water transmission pipe approximately 20 km. long ● Detailed design of Water Distribution System ● Detailed design of Factory Fire Fighting System		✓			Feb.1992 to Aug.1993	Thai Petrochemical Industry Public Co.,Ltd.	200.0
2.	Detailed Design on Water Supply System for Siam Cement Factory at Kao Wong I	Tambon Kaowong, Amphoe Phraphudtabaht, Saraburi	● Detailed design of the water supply system for reducing sludge in a raw water source in Klong Rerng Rang. The potential of water transmission is 325 cu.m./hr. ● Design of the storage pond at the water pumping station for pumping into the storage pond at Ban Teen None. The potential of water transmission is 250 cu.m./hr. in a current and 325 cu.m./hr. in the future. ● Design of a concrete storage tank with metal at Ban Teen None, with a capacity of 2,000 cu.m./hr. for storage water from the water pumping station at Klong Rerng Rang and from the groundwater pond at Ban Teen None. ● Design of water pumping station at Ban Teen None for transmitting to the storage pond with a capacity of 1,000 cu.m. at Kao Wong Factory and also transmitting to the storage pond at a stone mine, with a capacity of 50,000 cu.m. The potential of water transmission is 250 cu.m./hr. in a current and 325 cu.m./hr. in the future. ● Design of storage pump at water pumping station of Siam Cement Factory for pumping into the storage pond, with capacity 1,000 cu.m. The potential of water transmission is 250 cu.m./hr. in a current and 325 cu.m./hr. in the future. ● Design of the water pipe from the existing water pipe for transmitting to the storage pond, with 50,000 cu.m. ● Design of all water pumping control system for the sufficient water consumption. ● Analyse on the phenomenon of Water Hammer (hydraulic shock) of water pipe line between of Klong Rerng Rang and Ban Teen None and between of Ban Teen None and Siam Cement Factory at Kao Wong I. Besides, it was also designed of damaged protection system in water pumping system.		✓			10 Aug.1992 to 8 Sept.1992	Siam Cement Public Company Limited	73.14
3.	Detailed Design of Water Treatment System for Siam Eastern Industrial Park	Amphoe Puang dang, Rayong	● Detailed design of water treatment plant, with a capacity of 12,000 cu.m./day		✓			Sept.1993 to Feb.1994	Siam Eastern Industrial Co., Ltd.	45.0

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
4.	Feasibility Study and Detailed Design for Construction and Improvement of Rural Waterworks (Project Area II) Fiscal Year 1995	15 areas under the jurisdiction of PWA District Offices 2, 9 and 10	Survey, feasibility study and detailed design for the construction improvement of rural waterworks in the water system improvement after handling over scheme for 5 southern border provinces (area II), comprising of 15 areas under the jurisdiction of PWA District Offices 2, 9 and 10. The services provided include : *Feasibility Study* ● Survey, data collection and data analysis ; comprising physical, economical and development plan data. ● Determination of future population and water demand. ● Study of potential raw water sources. ● Study of water treatment system and distribution system. comparisons and selection of the best alternatives. ● Preliminary designs and cost estimates. *Detailed Design* ● Design and preparation of PWA's standard drawings for water treatment plants of 50 and 100 cu.m./hr. capacities. ● Raw water intake design. ● Analyze and design water transmission and distribution systems including the improvement of the existing distribution system by the addition of semi-automatic control system. ● Detailed cost estimates and preparation of tender documents.	✓	✓			9 June 1995 to 9 Jan.1996	Provincial Waterworks Authority	462.9(15 areas)
5.	Feasibility Study and Detailed Design for Ratchaburi and Samut Songkhram Waterworks Linking Projects	Ratchaburi and Samut Songkhram	Feasibility study ,survey and detailed design for Ratchaburi and Samut Songkhram Waterworks linking project.The Project area covers Samut Songkhram Municipality and the communities along the finished water transmission pipe route from Ratchaburi to Samut Songkhram. The services provided include : *Feasibility Study* ● Survey, data collection and data analysis ; comprising physical, economical and development plan data. ● Determination of future population and water demand up to the year 2011 for the project area. ● Study of potential raw water sources. ● Study of water treatment system and distribution systems, with emphasis on leakage reduction, including connections to other waterworks in the vicinity. ● Comparisons and selection of the best alternatives. ● Preliminary designs and cost estimates. ● Recommendation for the water supply system development/improvement in phases. ● Economic and financial analysis to perform water tariff at break even cost in different source of fund. *Detailed Design* ● Survey and detailed design for raw water ,water treatment plant with a capacity of 48,000 cu.m./ day, water transmission and distribution systems, including the instrumentation and control systems for the water supply system development/ improvement projects recommended for Phase I. ● Detailed cost estimates and preparation of tender documents for each construction contract.	✓	✓		✓	12 Apr.1996 to 12 Feb.1997	Provincial Waterworks Authority	992.92

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
6.	Feasibility Study and Detailed Design for Srisaket Waterworks Improvement and Expansion Project	Srisaket Municipality (area = 36.66 km^2), and Tambon Nongkrog, Yaplong, Po, Ponkha, Namkam, and Nongphai, Srisaket	Feasibility study, survey and detailed design of expansion and improvement for Srisaket Waterworks with the service area covers Srisaket Municipality and its suburb. The services provided include : *Feasibility Study* ● Survey, data collection and data analysis ; comprising physical, economical and development plan data. ● Determination of future population and water demand up to the year 2011 for the project area. ● Study of potential raw water sources. ● Study of water treatment and distribution systems, with emphasis on leakage reduction, including connections to other waterworks in the vicinity. ● Comparisons and selection of the best alternatives. ● Preliminary designs and cost estimates. ● Recommendation for the water supply system development/ improvement in phases. ● Economic and financial analysis to perform water tariff at break even cost in different sources of fund. *Detailed Design* ● Survey and detailed design for raw water, water treatment plant with a capacity of 24,000 cu.m./day water transmission and distribution systems, including the instrumentation and control systems for the water supply system development/ improvement projects recommended for Phase I. ● Detailed cost estimates and preparation of tender documents for each construction contract	✓	✓		✓	12 Apr.1996 to 12 Feb.1997	Provincial Waterworks Authority	446.88
7.	Detailed Design of Water Treatment System for Thai Petrochemical Industry Public Company Limited	229 Sukhumwit Rd., Amphoe Muang, Rayong	● Design of the water supply system expansion with a capacity of 2,000 cu.m./hr. in TPI filtration Plant at Ban Kai, Rayong. Total capacity of the water supply system is to 5,000 cu.m./hr. which directly impacts on the components of the existing water supply system design and construction, for example, raw water, disinfection and sludge treatment. Therefore, PTC has studied, designed, improve the components of the existing water supply system for the increasing of the water supply system expansion for the effectiveness of the components of the Filtration Plant.		✓			10 May 1996 to 10 Jan.1997	Thai Petrochemical Industry Public Company Limited	180.0
8.	Feasibility Study and Detailed Design for Sanitary District Water System Development and Improvement (Group I)	25 Sanitary Districts	Feasibility study of water supply system development / improvement for 25 sanitary districts in the North, Northeast and Central Regions. And detailed design of water supply system development/ improvement for the selected 5 sanitary districts. The services provided include : *Feasibility Study* ● Survey, data collection and data analysis; comprising physical, economical and development plan data. ● Population and water demand forecasts. ● Study of potential water sources. ● Study of water treatment systems and distribution systems. ● Comparisons and selection of the best alternatives. ● Preliminary designs and cost estimates.	✓	✓		✓	30 May 1996 to 13 Jan.1997	Public Works Department	148.95 (5 sanitary districts selected for detailed design)

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			Detailed Design ● Survey and Detailed design for raw water, water treatment plant with the capacity of 50 and 100 cu.m./hr. and water distribution systems, including the control and electrical systems, for the water supply system development / improvement for the 5 selected sanitary districts. ● Detailed cost estimates and preparation of tender documents for each construction contract. ● Analyze cost recovery and develop water tariff structure.							
9.	Survey and Detailed Design for Nakhon Ratchasima Municipality Water System Improvement Project	Nakhon Ratchasima, project area approx. 41.0 km^2	*Survey and detailed design :* the works performed include ; ● Feasibility Study Report review ● existing water supply system performance evaluation. ● water demands forecast for the municipal area and communities along transmission pipelines. ● evaluation of options for water supply system improvement : engineering and financial viability. ● carried out the detailed design for : - raw water intake and pump station located in Lam Chae Reservoir. - raw water transmission pipe - water treatment plant with the capacity of 105,600 cu.m./day. - finished water transmission pipe. - distribution reservoir and pump station and rehabilitation of existing distribution pump stations. - distribution system piping improvements - instrumentation and control system. ● construction contracts breakdown. ● preparation of tender documents, cost estimation and construction schedule. *Financial Analysis :* perform financial analysis for cost recovery and development an appropriate tariff structure. *Terms of Reference Preparation :* Preparation of Terms of Reference (TOR) for consulting services for bids evaluation and construction supervision.		✓		✓	16 Sept.1996 to 8 May 1998	Public Works Department	3,265.0
10.	Survey, Detailed Design and Preparation of Tender Documents for the Construction/ Improvement of Rural Waterworks (Project Area II) Fiscal Year 1996	Area within the jurisdiction of Deputy Governor Area 2 (14 areas)	Survey and detailed design of water system expansion and improvement for the rural waterworks in 14 areas. The services provided include : ● Review of PWA's proposed developments and recommendation for project scheme improvement. ● Determination of design criteria. ● Carried out topographical and geotechnical surveys for each project area ● Determines raw water characteristics of possible sources. ● carried out detailed design for raw water, water treatment and water distribution systems for the recommended improvements and expansions. The treatment plants's capacities range from 50-100 cu.m./hr. ● Prepared cost estimation, tender documents and construction schedule for each construction contract.		✓			9 Oct.1996 to 6 May 1997	Provincial Waterworks Authority	317.0 (14 areas)

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
11.	Survey, Detailed Design and Preparation of Tender Documents for the Construction of Water System Improvement /Expansion for PWA's Waterworks in Project Area I, Fiscal Year 1996	5 PWA's : – Pak Thongchai, Nakhon Ratchasima, (32 Km^2) – Nakhon Nayok, (825.27 Km^2) – Kampaeng Phet, (14.9 Km^2) – Klong Yai, Trad (50.2 Km^2) – Kalasin (16.96 Km^2)	Survey and detailed design of water system expansion and improvement for the following PWA's waterworks : Pak Thongchai, Nakhon Nayok, Kamphaeng Phet ,Klong Yai and Kalasin The services provided include : ● Carried out topographical and geotechnical surveys for each project area. ● Determines raw water characteristics of possible sources. ● Evaluated the existing water supply systems performances. ● Investigated options for the designs of water supply system components and recommended the most suitable ones. ● Recommended measures to reduce leakage, and monitoring system. ● Analysed water transmission and distribution systems. ● Carried out detailed design for raw water, water treatment and water distribution systems, including the instrumentation and control systems, for the recommended improvements and expansions. The treatment plants's capacities range from 2,400 to 24,000 cu.m./day. ● Prepared cost estimation, tender documents and construction schedule for each construction contract.		✓			9 Oct.1996 to 6 May 1997	Provincial Waterworks Authority	841.7 (5 areas)
12.	Survey and Detailed Design of Municipality Water Supply System Improvement and Expansion Project (Group II)	6 Municipalities ; - Buayai Municipality, Nakhon Ratchasima (10.626 Km^2) - Kaeng Khoi Municipality, Saraburi (4.05 Km^2) - Saraburi Municipality, Saraburi (20.13 Km^2) - Takhli Municipality, Nakhonsawan (16.0 Km^2) - Sripanommas Municipality, Uttaradit (1.48 Km^2) - Uttaradit Municipality, Uttaradit (13.49 Km^2)	*Survey and detailed design :* the works performed include ; ● Determination of design criteria. ● Study of potential raw water sources. ● Carried out topographical surveys for each project area. ● Determine raw water characteristics of possible sources. ● Carried out the detailed design for : - raw water intake and pump stations - raw water transmission pipes - water treatment plants with the following capacities: 200 cu.m./hr. for Buayai Municipality 400 cu.m./hr. for Kaeng Khoi Municipality 1,250 cu.m./hr. for Saraburi Municipality 500 cu.m./hr. for Takhli Municipality 24 cu.m./hr. for SripanommasMunicipality 750 cu.m./hr. for Uttaradit Municipality - distribution reservoir and pump station and rehabilitation of existing distribution pump stations - distribution system piping improvements - instrumentation and control system - Recommend construction contracts breakdown - Preparation of tender documents, cost estimation and construction schedule *Financial Analysis :* perform financial analysis for cost recovery and development an appropriate tariff structure. *Terms of Reference Preparation :* preparation of Terms of Reference (TOR) for consulting services for bids evaluation and construction supervision.		✓		✓	31 July 1997 to 22 Oct.1998	Public Works Department	640.32 (6 areas)

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
13.	Survey, Detailed Design and Preparation of Tender Documents for Contruction of Water System Improvement /Expansion for PWA's Waterworks in Project Area II, Fiscal Year 1997	3 PWA's : – Sri Satchanalai, Sukhothai (6.04 Km^2) – Maha Sarakhram (36.02 Km^2) – Nan-Klangwieng, Nan (6.4 Km^2)	Survey and detailed design of water system expansion and improvement for the following PWA's waterworks : Sri Satchanalai, Maha Sarakhram, and Nan-Klangwieng The services provided include : ● Carried out topographical and geotechnical surveys for each project area. ● Determines raw water characteristics of possible sources. ● Evaluated the existing water supply systems performances. ● Investigated options for the designs of water supply system components and recommended the most suitable ones. ● Recommended measures to reduce leakage, and monitoring system. ● Analysed water transmission and distribution systems. ● Carried out detailed design for raw water, water treatment and water distribution systems, including the instrumentation and control systems, for the recommended improvements and expansions. The treatment plants's capacities range from 220, 750 and 1,000 cu.m./hr. ● Prepared cost estimation, tender documents and construction schedule for each construction contract.		✓			24 Sept.1997 to 15 Dec.1998	Provincial Waterworks Authority	417.0 (3 areas)
14.	Detailed Design of Water Distribution System Rehabilitation for Thammasat University, Rungsit Campus	Thammasat University, Rungsit Campus, Pathumthani, project area approx. 1,800 rais	Carried out the survey, detailed design, preparation of tender document of the construction of water pipe in the buildings of Thammasat University at Rungsit Campus. Water distribution system expansion and upgrading proposed by PTC has been operated in Thammasat University, Rungsit Campus which will be connected between from the water pipe in the Asian Game Stadium and Main water pipe at Chiang Rak of the Provincial Waterworks Authority to the storage station in the buildings. It can be divided into 2 groups as below: ● Lay the water pipe instead of the existing water pipe for transmitting water to the existing building groups, but canceled the existing water pipe which was damage and low effectiveness of pump pressure. ● Lay the new water pipe for transmitting to the new buildings in the future.		✓			4 Aug.1998 to 11 Nov.1998	Thammasat University	15.0
15.	Detailed Design of Water Treatment Plant for Malee Sampran Public Co.,Ltd.	Amphoe Talad, Nakhonpanom	● Detailed design of water treatment plant with a capacity of 50 cu.m./hr. ● Prepared technical specifications, cost estimation and tender documents ● Evaluate a bid document for the construction cost of the bidder		✓			8 Feb. 1999 to May 1999	Maleesampran Public Co.,Ltd.	10.8
16.	Feasibility Study and Detailed Design of Pumping Scheme for Water Supply and Agricultural Uses, Nakhon Ratchasima	Amphoe Non Soong, Non Thai, Khan Sagare Sang, Nakhon Ratchasima	To solve the problem on water deficiency in Amphoe Non Soong, Non Thai, Kham Sagare Sang, Nakhon Ratchasima by construction of pumping system to optimise utilisation of water from natural resources in order to supply sufficient water based on water supply as the first priority and agricultural use as the following priority. The services provided include : ● Collection and review of relevant carried-out development projects and related future projects of other organizations. ● Collection, review and analysis of all data related to the project. ● Study on project engineering. ● Project planing and feasibility study by comparison on advantages and disadvantages of each possible alternative for selection of the most feasible alternative	✓	✓	✓	✓	23 Aug.1999 to 6 Sept.2000	Royal Irrigation Department	655.0

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			● Feasibility study consists of : - Collection and review all related data - Feasibility Design of pumping scheme based on topographic map, geological, meteorological and hydraulic data - Pumping system design - Study on Indemnity of private and government properties - Economic and financial analysis - Cost estimation on construction cost and operating and maintenance cost and preparation of construction schedule - Preparation of water management and maintenance plan - Study on management and organization of the project ● Study on Initial Environmental Examination. ● Detailed design for pumping system, include construction drawings, Bill of quantity, construction cost estimation, tender document and technical specification. • Surge analysis for water transmission system and determine surge suppression system							
17.	Survey, Detailed Design and Preparation of Tender Documents for Construction of Water System Improvement /Expansion for Surin Waterworks in Project Area I	Surin Municipality and its vicinity	● Carried out topographical and geotechnical surveys for each project area. ● Determines raw water characteristics of possible sources. ● Evaluated the existing water supply systems performances. ● Investigated options for the designs of water supply system components and recommended the most suitable ones. ● Recommended measures to reduce leakage, and monitoring system. ● Analysed water transmission and distribution systems. ● Carried out detailed design for raw water , water treatment and water distribution systems, including the instrumentation and control systems, for the recommended improvements and expansions. The treatment plant's capacities range from 300 and 1,000 cu.m./hr. ● Prepared cost estimation, tender documents and construction schedule for each construction contract. • Surge analysis for raw water transmission system and determine surge suppression system		✓			1 June 2000 to 26 Sept.2000	Provincial Waterworks Authority	316.0
18.	Dambreak Study of Klong Tha Dan Dam, Amphoe Muang, Nakhon Nayok Province Project	Ban Tadan, Nakhon Nayok, covers the area of 1,367.62 km^2 (854,765 rais)	● Study and analysis Dam Break for Klong Tha Dan Dam. ● Study and Setting up of Emergency Preparedness Plan (EPP). ● Study and Setting up of the Klong Tha Dan Management Plan to ensure safety, risk reduction and efficiency. ● Provide a training for RID officials to transfer the community EPP and Klong Tha Dan Management Plan to ensure safety, risk reduction and efficiency.			✓		10 July 2000 to 8 Mar.2001	Royal Irrigation Department	-

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
19.	Project of the Environmental Impact Assessment and Analysis after the Construction of the Bang Pakong Barrage and the Environmental Deterioration Assessment	Bang Pakong River Basin (Chachoengsao, Chonburi, Nakhon Nayok and Prachinburi), covers the area of 8,679 km^2	• Determine status of natural resources, for example, study and survey of natural resources, environmental, ecological system, economic and social conditions of the study area in the past and the present using both primary data and secondary data as well as conduct a study to review results of previous studies conducted by various organizations operating within the Bang Pakong River Basin. • Evaluate environmental deterioration caused by operating the Bang Pakong Barrage, level of impact and duration of problems including identify the limit of impacted areas both upstream and downstream of the dam. The main issues as specified hereby shall be addressed as well as additional issues if found any during the study. • Analyze and compare expected impacts and benefits gained after project operation. RID's previous study shall be reviewed to compare the expected impacts and benefits with the actual ones after project operation. • Determine status of natural resources, for example, study and survey of natural resources, environmental, ecological system, economic and social conditions of the study area in the past and the present using both primary data and secondary data as well as conduct a study to review results of previous studies conducted by various organizations operating within the Bang Pakong River Basin. • Evaluate environmental deterioration caused by operating the Bang Pakong Barrage, level of impact and duration of problems including identify the limit of impacted areas both upstream and downstream of the dam. The main issues as specified hereby shall be addressed as well as additional issues if found any during the study. • Analyze and compare expected impacts and benefits gained after project operation. RID's previous study shall be reviewed to compare the expected impacts and benefits with the actual ones after project operation. • Propose appropriate and effective preventive, corrective and mitigate methods and plans for problem/impacts as well as monitoring program for both short and long terms for each problem/impact in the area. The existing plans/projects of each organization shall be considered in the feasibility study. Furthermore, involved organizations and stakeholders within the project area should have an opportunity to participate to propose opinion and suggestion for such plans. • Appropriate technology shall be utilized in the study of the conditions of natural resources and environment, the identification of limits of impacted area including the classification of degree of these impacts so that the study results are clearly concluded. Examples of these technology are GIS, Remote Sensing, etc.			✓		1 Feb.2001 to 30 Aug.2002	Office of the Natural Resources and Environmental Policy and Planning	-

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
20.	Survey, Detailed Design and preparation of Tender Documents for Construction of Water System Improvement / Expansion for Nongkhai Waterworks (Project Area I)	Nongkhai Municipality, Nong songhong Municipality and its vicinity	● Carried out topographical and geotechnical surveys for each project area. ● Determines raw water characteristics of possible sources. ● Evaluated the existing water supply systems performances. ● Investigated options for the designs of water supply system components and recommended the most suitable ones. ● Recommended measures to reduce leakage, and monitoring system. ● Analyzed water transmission and distribution systems. ● Carried out detailed design for raw water, water treatment and water distribution systems, including the instrumentation and control systems for the recommended improvements and expansions. The treatment plant's capacity 750 cu.m./hr. ● Prepared cost estimations, tender documents and construction schedule for each construction contract. • Surge analysis for raw water transmission system and determine surge suppression system		✓			2 Aug.2001 to 19 Dec.2001	Provincial Waterworks Authority	201.13
21.	Feasibility Study and Detailed Design of Pumping Scheme for Natural Resource Replenishment, Nakhon Ratchasima	Amphoe Ban Leoum, Kong, Non Soong and Pimai, Nakhon Ratchasima, covers the area of 1,009,462.50 rais	To solve the problem on water deficiency in Amphoe Ban Leoum, Kong, Non Soong and Pimai, Nakhon Ratchasima by construction of pumping system to optimise utilisation of water from natural resources in order to supply sufficient water based on water supply as the first priority and agricultural use as the following priority.The services provided include : ● Collection and review of relevant carried-out development projects and related future projects of other organizations. ● Collection, review and analysis of all data related to the project. ● Study on project engineering. ● Project planing and feasibility study by comparison on advantages and disadvantages of each possible alternative for selection of the most feasible alternative ● Feasibility study consists of : - Collection and review all related data - Feasibility Design of pumping scheme based on topographic map, geological, meteorological and hydraulic data - Pumping system design - Study on Indemnity of private and government properties - Economic and financial analysis - Cost estimation on construction cost and operating and maintenance cost and preparation of construction schedule - Preparation of water management and maintenance plan - Study on management and organization of the project ● Study on Initial Environmental Examination. • Surge analysis for water transmission system and determine surge suppression system ● Detailed design for pumping system, include construction drawings, Bill of quantity, construction cost estimation, tender document and technical specification.	✓	✓	✓	✓	8 June 2001 to 29 Nov. 2002	Royal Irrigation Department	455.5

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
22.	Action Plan to Rectify the Hydraulic Impact and River Bank Erosion Problems Caused by Bang Pakong Dam	Chachengsao	• Data collection • Hydraulic data, river cross section • Topographical, hydrological, monthly river runoff into Bang Pakong Dam storage for present and future conditions in accordance with water management plan, tide levels, and existing and planned irrigation project • Erosion of riverbank in the past and the collapse during dam gate operation including the soil characteristics • Identify the causes of the collapse of riverbank downstream of the dam by analyzing the changes in hydraulic behavior and saline intrusion from dam operation, as well as physical changes such as water levels, river morphology and sediments etc. • Conduct an socio-economic survey to identify public need and attitude towards the project. • Study to identify appropriate operation of dam gates to fulfil planned purposes and causes minimum impact. • Evaluate the impact from the recommended dam gate operation. These impacts should include the hydraulic change downstream, riverbank stability, sediment and saline intrusion etc. • Identify the options to rectify hydraulic impact and saline intrusion for both upstream and downstream of the dam from the recommended dam gate operation, for the present and future conditions. Structural measures should be considered such as off-line reservoirs, river weir, increasing roughness in the river, side-canals connection, riverbank protection etc. These measures should be implemented in addition to the dam gate operation which is a management measure. • Formulate an action plan to rectify hydraulic impact and saline intrusion, identify the related costs and propose implementation plan. • Conduct economic analysis. • Prepare a manual for dam gate operation. • Carry out the detailed design for the recommended rectifying measure on hydraulic impact, which has high priority. • Study the telemetry system for flow measurement and water quality monitoring for both upstream and downstream of the dam. These monitored data will be used to assist in the control of water release from upstream reservoirs, Bang Pakong dam operation and for emergency warning. • Conduct a public relation campaign and a public hearing.	✓	✓	✓		22 Oct.2001 to 8 Sept.2003	Royal Irrigation Department	465.86

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
23.	Feasibility Study and Detailed Design of the Improvement of Mae Faek - Mae Ngad Irrigation Project	Chiengmai	● Data Collection and Review: The consultant performed survey and gathered data in order to implement project planning and project procurement. It includes primary and secondary data collection, data analyzing and evaluation of the data. This step concern on current status and forecast condition of the project and shall apply to all aspects such as engineering, water distribution and allocation management, economic, environment and ecology, and organization management. ● Feasibility study for project improvement and water management - Reviewing of existing objectives and targets of the irrigation project set in the planning stage. Revising those objectives and targets conform with the project current status. - Water demand surveying and estimation. - Surveying and analyzing of actual irrigation deliveries. - Study and evaluating of engineering, management, economic, social and environment. - Analyze and identification of the problem and constraint of the project compare to project standard, possible potential and efficiency. Scaling and ranging degree of problem. - Performance diagnosis, problem and cause analysis. - Feasibility study and purpose project improvement in both water delivery and drainage. - Economic analysis of the on project and water users. - Evaluation of current database. Emphasis on data utilization by improvement of database. Transferring of primary data to secondary or tertiary data for decision making. - Organization study, evaluating current institutions, and water user groups performances for the purpose of potential study and proposing organization improvement. - Propose water allocation and management during project construction period - Public involvement and participation ● Study the initial environmental examination. ● Detailed Design for project improvement, prepare technical specifications and cost estimation.		✓			25 Mar.2002 to 15 Sep.2003	Royal Irrigation Department	136.02

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
24.	The Formulation of Integrated Plan for Water Resources Management in the Bang Pakong - Prachinburi River Basin	Bang Pakong - Prachin Buri and Upper Tonle Sap Basins, but excludes Khlong Luang sub-basin which is included in the East Coast Basin, covers the area of 19,430 km^2	• Survey and collect fundamental socio-economic data, natural water sources and man-made water sources data, including surface water sources and groundwater sources, as well as problems occurring in the basin, and other data necessary for the water resources management. • Study and analyze the water-resources potential in each sub-basin and also classify the water sources as the developed ones and the ones with sufficient potential to be developed in the future in harmony with the potential of other related resources such as land, forest and environment. • Collect and analyze the studies and plans undertaken by diverse organizations so as to summarize them as the previous works and suggest guidelines for the future implementation. • Coordinate water-resources management works through the process of joint meetings of the basin management sub-committee, local organizations, people and stakeholders in order to interview and collect opinions on problems, needs and water resources management concepts. • Formulate some strategic plans for water-resources management, which have to be consistent with public needs and provincial strategic plans in the basin as well as the country's plan. • Propose a master plan in water-resources management, which will have to be implemented in the future systematically and as the integrated system. This plan will be used in water sources development, flood prevention and flood relief, sustainable water-resources management, and conservation of water-resources and water quality. • Propose some effective measures to solve the problems comprising both constructional measures and non-constructional measures, by considering the framework of 5, 10, 15 and 20-year implementation. The measures shall include the preliminary details, which must be approved by the organizations and people in the basin including other related government agencies.		✓			22 Aug.2002 to 16 Mar.2004	Water Resources Department	-
25.	Feasibility Study on the Improvement of Phetchaburi Operation and Maintenance Project	Amphoe Muang and Amphoe Thayang, Phetchaburi and Amphoe Hua Hin, Prachuab Khiri Khan, covers the area of 532,050 rais	• Data Collection and Review: The consultant performed survey and gathered data in order to implement project planning and project procurement. It includes primary and secondary data collection, data analyzing and evaluation of the data. This step concern on current status and forecast condition of the project and shall apply to all aspects such as engineering, water distribution and allocation management, economic, environment and ecology, and organization management. • Project Evaluation: A project evaluation on the Phetchaburi Operation and Maintenance Project to assess its performance on water delivery, service level, water users' satisfaction, as well as to investigate the engineering aspects of the Project's irrigation canals and control structures. The evaluation results were used to formulate project improvement measures.	✓		✓		1 Aug. 2003 to 30 Mar. 2005	Royal Irrigation Department	972.99

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			● Feasibility study for project improvement - Reviewing of existing objectives and targets of the irrigation project set in the planning stage. Revising those objectives and targets conform with the project current status. - Study to determine appropriate Haeng Krachan Reservior's operation Procedure to maximize its utilization to its potential. - Conduct a physical survey on Phet Diversion Dam to assess its current conditions. - Water demand surveying and estimation. - Surveying and analyzing of actual irrigation deliveries. - Analyze and identification of the problem and constraint of the project compare to project standard, possible potential and efficiency. - Performance diagnosis, problem and cause analysis. - Feasibility study and purpose project improvement in both water delivery and drainage. - Study existing flood mitigation plans, and recommend any improvement to achieve high efficiency. - Economic study on the project and farmers - Evaluation of current database. Emphasis on data utilization by improvement of database. Transferring of primary data to secondary or tertiary data for decision making. - Develop the Project's Geographical Information System. - Study and identify the appropriate telemetry system for the Project. - Organization study, evaluating current institutions, and water user groups performances for the purpose of potential study and proposing organization improvement. - Survey and design necessary improvement work for Phet Diversion Dam and irrigation structures. - Study the initial environmental examination. - Public involvement and participation - Developing a public relations work plan and preparing media to promote water conservation.							
26.	The Formulation of Integrated Plan for Water Resources Management in Mun River Basins	The Mun Basin, covers the area of 71,060 km^2	● Survey and collect fundamental socio-economic data, natural water sources and man-made water sources data, including surface water sources and groundwater sources, as well as problems occurring in the basin, and other data necessary for the water resources management. ● Study and analyze the water-resources potential in each sub-basin and also classify the water sources as the developed ones and the ones with sufficient potential to be developed in the future in harmony with the potential of other related resources such as land, forest and environment. ● Collect and analyze the studies and plans undertaken by diverse organizations so as to summarize them as the previous works and suggest guidelines for the future implementation. ● Survey and collect fundamental socio-economic data, natural water sources and man-made water sources data, including surface water sources and groundwater sources, as well as problems occurring in the basin, and other data necessary for the water resources management.	✓				19 Mar.2004 to 15 Jun.2006	Water Resources Department	-

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			● Study and analyze the water-resources potential in each sub-basin and also classify the water sources as the developed ones and the ones with sufficient potential to be developed in the future in harmony with the potential of other related resources such as land, forest and environment. ● Collect and analyze the studies and plans undertaken by diverse organizations so as to summarize them as the previous works and suggest guidelines for the future implementation. ● Coordinate water-resources management works through the process of joint meetings of the basin management sub-committee, local organizations, people and stakeholders in order to interview and collect opinions on problems, needs and water resources management concepts. ● Formulate some strategic plans for water-resources management, which have to be consistent with public needs and provincial strategic plans in the basin as well as the country's plan. ● Propose a master plan in water-resources management, which will have to be implemented in the future systematically and as the integrated system. This plan will be used in water sources development, flood prevention and flood relief, sustainable water-resources management, and conservation of water-resources and water quality. ● Propose some effective measures to solve the problems comprising both constructional measures and non-constructional measures, by considering the framework of 5, 10, 15 and 20-year implementation. The measures shall include the preliminary details, which must be approved by the organizations and people in the basin including other related government agencies.							
27.	Detailed Design of Water Treatment Plant with capacity of not less than 12,000 cu.m./day for Beer Thip Brewery (1991) Co., Ltd.	Bangban, Phra Nakhon Si Ayuthaya	● Detailed design Work : Water Treatment Plant - Capacity : surface water 12,000 cu.m./day - Source of Water : Noi River - Clear Water Tank with capacity of 1,000 cu.m. - Main Distribution system ● Preparation of Tender Document, Cost Estimation ● Instruction for tender evaluation ● Recommend for machine and equipment selection		✓			1 Sep 2004 to 5 Aug 2005	Beer Thip Brewery (1991) Co.,Ltd.	123.5
28.	Study on Installation of Telemetering System for Flood Forecasting and Warning Purpose for the Bang Pakong River Basin	The project area spreads from the Bang Pakong river mouth to the upstream area covering Nakhorn Nayok, Mainstream Prachin Buri, Khlong Tha Lat and Khlong Luang sub-river basins.	● Created implementation plans and developed a network of hydrological and meteorological telemetering stations which provide real-time data to be primarily used for flood forecasting, early warning system, water quality monitoring, and flood management system that will improve efficiency of water resource management in the Bang Pakong river basin. ● Developed a new and improved the link and integration system of the existing network that can be seamlessly integrated with the expanded system. The existing networks include the following remote telemetering stations located in the Bang Pakong river basin: - *Horthong Station*, Amphoe Ban Sang, Prachin Buri province. - *Somboon Station*, Amphoe Ongkharak, Nakorn Nayok province. - *Phanthong Station*, Amphoe Bang Pakong, Chachoengsao province.		✓			1 Dec.2004 to 20 Nov.2006	Royal Irrigation Department	37.3

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			- *Ban Pho Station*, Amphoe Ban Pho, Chachoengsao province. - *Saphan Chachoengsao Station*, Amphoe Ban Pho, Chachoengsao province. - *Bang Pakong Diversion Dam*, Amphoe Mueang Chachoengsao, Chachoengsao province. The data acquired from both existing and expanded networks is not only integrated but also applied to flood forecasting model also developed under the project. ● Improved and enhanced the capabilities of the existing flood forecasting system based on state-of-the-art mathematical modeling and developed a reliable and consistent early warning system for automatic real-time flood forecasting and warning applications. ● Developed a decision support system (DSS) used for flood management in the Bang Pakong river basin. ● Established data base system that is compatible and applicable to other systems or activities (e.g. public information and warning system)							
29.	Integrated Water Resources Management Plan for Petchaburi and the West Coast (Prachuab Khiri Khan) Basins	Petchaburi, Prachuap Khiri Khan (except for some parts of Amphoe Bang Saphan Noi), and partial areas of Ratchaburi, Samut Songkhram, and Chumphon, covers the area of 13,350 km^2	● Survey and collect fundamental socio-economic data, natural water sources and man-made water sources data, including surface water sources and groundwater sources, as well as problems occurring in the basin, and other data necessary for the water resources management. ● Study and analyze the water-resources potential in each sub-basin and also classify the water sources as the developed ones and the ones with sufficient potential to be developed in the future in harmony with the potential of other related resources such as land, forest and environment. ● Collect and analyze the studies and plans undertaken by diverse organizations so as to summarize them as the previous works and suggest guidelines for the future implementation. ● Coordinate water-resources management works through the process of joint meetings of the basin management sub-committee, local organizations, people and stakeholders in order to interview and collect opinions on problems, needs and water resources management concepts. ● Formulate some strategic plans for water-resources management, which have to be consistent with public needs and provincial strategic plans in the basin as well as the country's plan. ● Propose a master plan in water-resources management, which will have to be implemented in the future systematically and as the integrated system. This plan will be used in water sources development, flood prevention and flood relief, sustainable water-resources management, and conservation of water-resources and water quality. ● Propose some effective measures to solve the problems comprising both constructional measures and non-constructional measures, by considering the framework of 5, 10, 15 and 20-year implementation. The measures shall include the preliminary details, which must be approved by the organizations and people in the basin including other related government agencies.	✓				8 Jul.2005 to 21 Aug.2006	Water Resources Department	-

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
30.	Detailed Design of Water Treatment Plant with capacity of not less than 300 cu.m./hr. for Cosmos Brewery (Thailand) Co.,Ltd.	Wangnoi, Phra Nakhon Si Ayuthaya	● Detailed design work : water treatment plant - Capacity : surface water 300 cu.m./hr - Source of Water : Khlong Rapipat - Clear Water Tank with capacity of 600 cu.m. - Carbon Filtration System for Process Water - Main Distribution system ● Preparation of tender document, cost estimation ● Instruction for tender evaluation ● Recommend for machine and equipment selection		✓			14 Nov 2005 to 31 Mar. 2006	Cosmos Brewery (Thailand) Co.,Ltd.	158.32
31.	Improvement of Detailed Design Drawing and Cost Estimation of Water Supply System for Nakhon Ratchasima Municipality	Nakhon Ratchasima Municipality, Nakhon Ratchasima, project area approx. 41.0 km^2	● Revise and update the earlier design drawings of water transmission pipelines and distribution network. The revisions have to take account of any completed distribution network implemented by Nakhon Ratchasima Municipality in order to ensure that the system can be operated as planned. The additional design works included: - Raw water intake and transmission system at Lam Sae Dam: raw water pumping station (5,140 m^3/hr) and transmission pipeline (∅ 1,100 – 1,200 mm, 70 km) - Ban Mai-Nong-Bon water treatment system: a 4,400 m^3/hr filtration system - Distribution pipe network: distribution pipes (∅ 900 – 1,000 mm, 16 km) - New Atsadang pumping station: clear water storage tank (24,000 m^3) and distribution pumping station (6,000 m^3/hr) - Retrofitting of Makham Thao distribution pumping station: new distribution pumps (4,125 m^3/hr) - Atsadang pumping station: new distribution pumping station (1,125 m^3/hr) - Retrofitting and expanding of water distribution network - SCADA system for integration control of raw water intake and transmission, water treatment and water distribution systems ● Update technical specifications ● Update cost estimates of 4 construction contracts ● Prepare tender documents ● Prepare documents describing procedures in hiring consultant to supervise construction of the project ● Prepare prequalification bidding documents		✓			7 Dec.2005 to 4 Feb.2006	Nakhon Ratchasima Municipality	3,679.58
32.	Improvement of Khok Kathiam Operation and Maintenance Irrigation Project	3 provinces ; Lop Buri, Saraburi and Ayuthaya provinces, covers the area of 255,122 rais	● Data collection and analyses ● Field assessment of existing irrigation system components ● The assessment of project operation using FAO's Rapid Assessment Procedure and Benchmarking as indices. ● The study of present landuse and agricultural practices and the forecast of future development trends and changes. ● Survey and study of socio-economic conditions. ● Data collection and analyses ● Field assessment of existing irrigation system components ● The assessment of project operation using FAO's Rapid Assessment Procedure and Benchmarking as indices.	✓		✓		11 Jan.2006 to 3 July 2007	Royal Irrigation Department	361.61

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			• The study of present landuse and agricultural practices and the forecast of future development trends and changes. • Survey and study of socio-economic conditions. • Survey and analyze present and future water demands. • Conduct hydraulic survey to determine flows in the canal system, and to develop empirical formula for flow measurement, as well as to assess water delivery efficiency. • Study, analyze and prioritize current problems, propose solutions and alternatives for project improvement, and identify suitable alternative. • Undertake the design for structural measures at feasibility study level, and cost estimation. Develop project implementation plan and budget planning. • Conduct economic and financial analyses on the project improvement work. • Organization study to recommend improvement plan. • Develop the information system, and the decision support system for water management. • Conduct public relations work and public participation meetings to publicize the study work and its findings, as well as providing venues for public opinions.							
33.	The Improvement and Water Management with Public Participation of The Phra Ong Chaiyanuchit Operation and Maintenance Project, Chachoengsao	Chachengsao and Samutprakarn, covers the area of 532,578 rais	• Data Collection • Project Assessment Study : Project assessment study comprises performance evaluation of current irrigation system, socio-economic benefits and environmental impact assessments. The study shall cover the project area and its vicinity as appropriate. The study results shall be utilized to identify suitable project improvement measures which allow highest benefits but affect the environment least. • Feasibility Study and Detailed Design of Project Improvement • Review the project's original objectives and goals and revise them to better suit Revise the existing objectives and goals in project development process and adjust them to farmers' needs, other water demands, governmental policies on the area development, and the present environment. • Assess the irrigation structures' conditions and their performance as well as study the improvement measures in order to meet the efficiency enhancement of the project. • Survey and analyze the water demands in the present and forecast for the future. • Survey and analyze the actual amount of conveyed irrigation water. • Analyze and propose alternatives for the improvement of water delivery and water drainage. The improvement shall be in 2 phases; the first phase should be the management improvement to raise the efficiency under existing irrigation system. The second phase should involve infrastructure and management improvement so as to achieve the highest efficiency. The implementation and investment plans shall be prioritized. • Study and propose solutions for other problems that might obstruct the project efficiency enhancement such as project management problems, personnel problems, communication problems, etc.	✓	✓	✓		27 Feb.2006 to 21 May 2007	Office of Regional Irrigation 11, Royal Irrigation Department	743.65

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			● Study economic aspect of the project and farmers' financial conditions. ● Study the existing database system. Improve the database system by changing from primary data to secondary or tertiary data for more convenient use. The database system shall be developed from general database software and utilized to assist decision-making process for fast and efficient operation and maintenance. The work includes the preparation of the operation manuals for major regulator and main canals. ● Review the current organizations in both government and agricultural sectors as well as water user groups, and recommend institutional improvement. ● Conduct an initial assessment of the environmental conditions at the present and in the past. ● Conduct an initial environmental examination on the project improvement. ● Study the methodologies for the transfer of the irrigation system's operation and maintenance responsibility to the local administrative. ● Study the feasibility of privatizing the water management. ● Conduct public relations work and hold public participation meetings to publicize the study project as well as collect public opinions on the problems and recommendations for project improvement. This is to show that the RID is willing to solve problems in irrigation and water management with good intentions and seriously encourage public participation. ● Survey and conduct the project improvement at feasibility study level. ● Carry out detailed design for at least three water control structures proposed for the project improvement.							
34.	Pathum Thani Water Supply Project Enhanced Supply Works	43 Moo.3 Chiangrak Noi-Bangsai Rd., Baan Pathum, Samkhok, Pathumthani	● Pathum Thani water supply extension project planning; phase 3 and 4, and detailed design of water treatment plant at capacity of 100,000 cu.m./day. ● Provide consulting during construction ● Provide consulting during start-up and commissioning		✓			12 Oct.2006 to 30 June. 2008	CH.Karnchang Public Co.,Ltd.	693.0
35.	Feasibility Study and Detailed Design of Water Supply Expansion for Ratburi Municipality	Ratburi Municipality	Feasibility Study and Detailed Design for increase in capacity of Water Treatment Plant in capable to handle raises in water demand of the municipality and extended service area. The scope of works are consisted of: ● Improvement of raw water pumping station at WAT Chonglom ● Detailed Design of water treatment plant at capacity of 800 cu.m./hr. and expansion of existing 700 cu.m./hr. WTP to 1,300 cu.m./hr at Kri Phet Water Treatment Plant. ● Surge analysis for raw water system and determine surge suppression system ● Detailed design of raw water transmission line. ● Detailed Design of other facilities include power supply, lighting, drainage system, internal road and fire protection system. ● Architectural work for site plan layout.	✓	✓		✓	16 Oct. 2006 to 11 June 2007	Ratburi Municipality	145.33 (Phase 1) 65.81 (Phase 2)

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			• Site survey, geotechnical survey for site plan layout and foundation design. • Preparation of detailed design drawings, specification, bill of quantities, tender document and contract. Documentation is referred to municipality format. • Financial analysis for cost recovery and development an appropriate tariff structure. The Feasibility study and Detailed design can be divided into 2 phases: *Phase I (2008)* Improvement of the WTP capacity by construction of new water treatment plant at capacity of 800 cu.m./hr. The works shall include: - Improvement of Raw Water Pumping Station at WAT Chonglom - Detailed Design of Raw Water Transmission Line dia. 600 mm, 600 m. length. - Detailed design of retaining wall for control of wastewater not to contaminate raw water. - Detailed design of water treatment plant at capacity of 800 cu.m.hr. - Improvement of chemical system. - Improvement of supply system. - Construction of sludge disposal facilities. - Electrical and control system. *Phase II (2018)* Expansion of existing 700 cu.m./hr to 1,300 cu.m./hr. The works shall include: - Improvement of raw water pumping station at WAT Chonglom (Installation of 1 raw water pump) - Expansion of existing 700 cu.m./hr to 1,300 cu.m./hr. - Improvement of chemical system (Installation of 1 PACl Pump) - Improvement of sludge disposal facilities (Installation of 1 sludge dewatering belt press)							
36.	Pathum Thani Bulk Transmission Main System, Surge Analysis (Water Hammer)	43 Moo.3 Chiangrak Noi-Bangsai Rd., Baan Pathum, Samkhok, Pathumthani	• Construction and analysis of hydraulic model for Pathum Thani Bulk Transmission Main System. The system consisted of transmission mains varied from ∅700 mm. to ∅1400 mm. with overall length of 18,200 metres. and 400 MLD capacity. • Hydraulic model testing and deviation correction. • Compare the result to actual field test. • Construction and analysis of water hammer model for Pathum Thani Bulk Transmission Main System. • Surge analysis model verification • Scenarios setting for water hammer. • Water hammer analysis and solutions • Determine surge suppression system • Preparation of water hammer analysis report and detailed design drawing.					16 Mar.2007 to 3 Jan. 2008	CH.Karnchang Public Co.,Ltd.	-

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
37.	Detailed Design of Water Treatment Plant for Bangpa-in Industrial Estate	Bangpa-in Industrial Estate, Phra Nakorn Sri Ayuttaya	*Part No. 1 : Preliminary Design* The work includes the following tasks: ● Data collection and analysis for detailed design works ● Site inspection ● Study of the appropriate water treatment process, capacity 48,000 cu.m./day ● Preliminary hydraulic analysis for water treatment system ● Preliminary design for water treatment system ● Preparation of preliminary design report *Part No.2 : Detailed Design of Water Treatment Plant with Capacity 48,000 cu.m./day* The work includes the following tasks: ● Data collection and analysis for detailed design works. ● Detailed design of general arrangement for water treatment plant and facility. ● Hydraulic analysis for water treatment system. ● Detailed design of structural works, foundation works and architectural works for water treatment system . ● Detailed design of mechanical and piping works for water treatment system. ● Detailed design of electrical works for water treatment system. ● Detailed design of instrumentation and control system for water treatment system. ● Detailed design of site plan pipe works for water treatment system. ● Preparation of machine and equipment specification for water treatment system, consulting for machine and equipment procurement.		✓			22 Mar.2007 to 22 Oct.2007	Bangpa-in Land Development Co.Ltd.	304.55
38.	Integrated Water Resource Management Project : Bangpakong River Basin (Study and Construction of Hydrological - Meteorological - Water Quality Telemetry and Early Warning System)	Bangpakong River Basin, 20,357 sq.km.	● Study, design and installation of hydrological monitoring station network, both of manual and telemetry stations ● Study, design and installation of early warning stations, covering landslide/flash flood risk areas ● Study, design and development of SCADA / Database system, including data exchange system between the new network and the existing system ● Study, design and development of the operation center of the project ● Mathematical models and Database Development ● Project Website Development, presenting measured/ forecasting data and warning announcement ● Preparation of user manual and training DWR's appointed personnel		✓			7 June 2007 to 20 Nov.2008	Water Resources Department	67.88

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
39.	Water Distribution Model Analysis for Bangpa-In Industrial Estate, Phra Nakhon Sri Ayuttaya	Bangpa-In Industrial Estate, Phra Nakhon Sri Ayuttaya	• Estimation of water demand. • Construction of mathematics model for water distribution system. • Analysis of Model. • Preparation of summary report. - Water Distribution system work with pipes vary from ∅200 mm. to ∅710 mm, overall length of 5,660 m. - Water Distribution Station with capacity of 2,170 CMH.					29 June 2007 to 5 Nov.2007	Bangpa-in Land Development Co.Ltd.	-
40.	Study, Survey and Installation of Flood Forecasting and Warning Telemetry System and Regional Data Center for Middle and Lower Chi River Basin Project	Upper, Middle, and Lower Chi River basins as well as Lower Mun river basin	• Study and design of the network of telemetry stations which measure meteorological, hydrological and water quality data. The network shall consist of not less than 15 new telemetry stations which shall be integrated with the 6 existing stations to monitor and collect rainfall, water level (discharge), and water quality data in Upper, Middle, Lower Chi river basins and Lower Mun river basin. There shall be not less than 6 water quality monitoring stations, not less than 12 water level (discharge) monitoring stations, and not less than 15 rainfall monitoring stations. The master station shall be located at Water Crisis Prevention Center, DWR Headquarter, Bangkok with sub master station located at Hydrological division, DWR Regional Office 4, Khon Kaen. • Study and design of wireless communication system, which uses GPRS or satellite communication system as communication media. • Study and development of mathematical model including Decision Support System (DSS) which shall automatically perform forecasting and warning in real time, as well as be manually used. The model and system shall cover Chi river basin as well as Lower Mun river basin. • Construction of field stations. Installation of CCTV system, survey of river cross-section and rating curve at every water-level station. • River cross sectional surveys shall be conducted at the maximum of 5-km intervals, as well as at the locations of hydraulic structures obstructing the river. • Supply of hardware and software and system commissioning to ensure that the system can work as specified in TOR. • Installation of equipment and instruments at master station, sub master station and field stations as well as refurbishment of existing space to fit with at master station, sub master station design (as necessary). The system shall include the integration of the existing telemetry system in Upper Chi river basin. • Working jointly with DWR's appointed officials at master station to commission the system, develop operation guideline, and fine-adjust the system for a period of 360 days starting after the project completion date, as well as carrying out technology transfer through on-the-job-training to ensure that the officials have sufficient knowledge and skill to perform • Warranty of the system and equipment for not less than 720-day from the project completion date.		✓			11 June 2008 to 10 Apr. 2009	Water Resources Department	52.59

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
41.	Banglen Water Treatment Plant, Expansion Phase 1	Amphoe Banlen, Nakhonpathom	• Detailed design of mechanical works for water treatment plant expansion from 320 MLD to 420 MLD • Detailed design of mechanical works for Booster Pumping Station : BP1, BP2 • Surge analysis and detailed design of surge protection for transmission system		✓			23 Dec.2008 to 29 Oct.2010	S.Napa (Thailand) Co.,Ltd.	420.0
42.	Detailed design of structural and civil works for water treatment system expansion of Banglen Water Treatment Plant, Phase 1	Amphoe Banglen, Nakhonpathom	• Detailed design of structural and civil works for water treatment plant expansion from 320 MLD to 420 MLD		✓			12 Feb.2009 to 28 Dec.2009	CH.Karnchang Public Co.,Ltd.	580.0
43.	Conceptual Landscape Design on Water Resources Conservation and Rehabilitation Project : Nong Harn Kumpawapee Reservoir	A part of Nong Harn Kumpawapee (40 rais) Amphoe Kumpawapi and Pajaksilpakom, Udonthani	• Compilation of conceptual landscape design manual for water resources conservation and rehabilitation project • 18-hours training of at least, 30 DWR officials on the subject. Including training document preparation and training evaluation • Conceptual landscape design of Nong Harn Kumpawapee reservoir		✓			23 Mar. 2009 to 18 Sept. 2009	Water Resources Department	29.06
44.	Dambreak Study of Kio Kho Ma Dam, Lampang Province Project	Lampang	• Collect and analyse hydrological data, engineering data and actual dam construction data for dambreak analysis. • Study causes of dambreak such as earthquake, overtopping, piping through dam body or foundation, failure of water control equipment, failure of dam body, foundation failure, and sabotage etc. • Study possible damage to dams in the terms of dimension, shape, time to fail, by using assumptions for the analysis and utilizing appropriate and up-to-date mathematical model. • Study flood hydrographs caused by dam failure. The study shall include factors such as geometrical characteristics, water surface area, downstream water level, and other related factors to determine flood hydrograph and peak discharge. The study shall use appropriate and up-to-date mathematical model. • Collect and conduct additional topographical survey if necessary for developing land use map, and development trend for the risk area. • Collect and conduct additional topographical survey if necessary for developing digital map with details sufficient for the study of flood movement. Check the details of existing DEM (1:4,000 scale) and use as base map for the study. • Study flood movement hydraulically, procure and use a 2D mathematical model to study downstream area with the following conditions prior to dam failure: normal, flood and extreme flood. • Develop inundation maps due to dam failure which show topographical details, land use, town planning, land development trend for risk areas. • Develop inundation maps due to dam failure which show flood severity level for risk areas.			✓		30 Mar. 2009 to 16 Sept.2010	Royal Irrigation Department	-

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			• Study and develop Emergency Preparedness Plans (EPP) for dam failure case, and for flood caused by large discharge from dam. • Study and formulate action plan for involved authorities. The action plans shall address normal condition, prior-to the effect of dam failure condition, during the effect of dam failure condition, and after the effect of dam failure condition. • To study and formulate the guideline for involved authorities in damage assessment. • To study possible related damages from flood caused by dam failure such as damage in flooded areas. • Study and formulate remedial plan for damaged area.							
45.	Master Plan and Feasibility Study for Water System Improvement/Expansion of Provincial Waterworks in Chonburi	Chonburi	• Master Plan: Survey, data collection, analysis and preparation of Master Plan on potable water system improvement/expansion of Provincial Waterworks in Chonburi and neighborhood area to meet the demand in the next 10 and 20 year (BE.2563 to 2573), by taking into account the potentialities of raw water sources both in the present and future. The study comprises of; (1) General data of Chonburi (2) Data on PWA and non-PWA water treatment system (3) Study of land-use, population and economics conditions (4) Survey on existing water demand (5) Study of water supply demand (6) Study of meteorology, hydrology, hydrogeology and water resources development plan (7) Study on alternatives of water system improvement/expansion (8) Study on water system management efficiency improvement (9) Preparation of short-term and long-term water system improvement/expansion plan • Feasibility Study: preparation of feasibility study on engineering, social, economics, financial and invesment of the project, to cover 10-year project on, starting from the end of the short term plan, mentioned in Master Plan. The study comprises of; (1) General data of Chonburi (2) Summary on the feasible alternative from Master Plan (3) Detailed study on improvement/expansion for each PWA branch office (4) Study the economic and financial evaluation (5) Undertake the initial environmental examination (6) Recommendation on water system management in chonburi	✓		✓	✓	6 May 2009 to 17 .Sept.2010	Provincial Waterworks Authority	14,904.37 (FS)

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
46.	Study Survey and Installation of Flood Forecasting and Warning Telemetry System for Chao Phraya and Middle Mun river basins	Chao Phraya and Middle Mun river basins	1) Study and design of new telemetry stations, which shall be at least 8 stations. The telemetry stations shall be situated in appropriate locations for meteorological, hydrological and water quality data measurement in Middle Mun river basin. There shall be not less than 1 water quality/ water level (discharge)/ rainfall stations, not less than 4 water level (discharge)/ rainfall stations, and not less than 3 rainfall stations. The new system shall be integrated to include 31 existing stations in Chi-Mun river basin. 2) Expansion/ Upgrading of the water management center of Chi-Mun river basins of which the master station is located at Water Crisis Prevention Center, DWR Headquarter, Bangkok and sub master station is located at Hydrological division, DWR Regional Office 5, Nakhon Raschasima. 3) Study and design of data communication networks, which uses appropriate wire or wireless communication system as communication media. 4) Study and development of mathematical models including Decision Support System (DSS) for water management and for monitoring, forecasting, warning, as well as recommending alternative scenarios during water crisis period. The system shall feature automatically and/or manually-generated data displays, in forms of maps, data tables, graphs and executive summary both in 1) Chao Phraya river basin and 2) Chi-Mun river basins. 5) Construction of field stations and related components, designed in 10 to 3). 6) River cross sectional surveys, which shall be conducted at the maximum of 5-km intervals, as well as at the locations of hydraulic structures in the river. Rating curve surveys, which shall be conducted at every water level monitoring station 7) Installation of CCTV system at every water level monitoring station in Chao Phraya river basin and at least 1 station in Middle Mun river basin. 8) Development of Digital Elevation Model (DEM) of chronic floods area in Chao Phraya river basin. The DEM shall be of resolution suitable for flood plain calculation, as required by DWR. 9) Supply of hardware and software and system commissioning to ensure that the system can work as specified in TOR. In Middle Mun river basin, using of existing facilities of Chi-Mun telemetry system shall be considered. 10) Development of new database system and internet-based data presentation system in Chao Phraya river basin and upgrading/ integrating of existing system in Chi-Mun river basins with the newly developed additional system of Middle Mun river basin to work as a unified system.		✓			29 May 2009 to 21 May 2010	Water Resources Department	69.95 (Chao Phraya river basin) 34.99 (Middle Mun river basin)

Table 5 The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			11) Jointly working with DWR's appointed officials at master station to commission the system, refine operation guideline, and fine-adjust the system for a period of 360 days, starting after the project completion date. And carrying out technology transfer by mean of on-the-job-training to ensure that the officials have sufficient knowledge and skill to perform. 12) Organizing Public relations seminar on the objectives of the project in Chao Phraya and Middle Mun river basins. 13) Responsible for operating cost for 360 days from the project completion date. 14) Warranty of the system and equipment for not less than 720 days from the project completion date.							
47.	Study Survey and Installation of Flood Forecasting and Warning Telemetry System for Mekong Basin and Songkhla Lake Basin	Mekong Basin and Songkhla Lake Basin	● Mekong Basin - Study and design of 11 new telemetry stations. The telemetry stations shall be situated in appropriate locations for meteorological, hydrological and water quality data measurement in Mekong basin in Northeastern region. - Link measuring data from 7 MRC's station in Kong river (AHNIP project) - Link measuring data from MRC's station in Mekong basin (HYCOS project) - Study and design of Integrated Water Resources Management center for Mekong basin, consisting of a Master station, situated at Water Crisis Prevention Center, DWR headquarter, Bangkok and a Sub master station at Nong Khai Hydrology Center. - Integration with DWR's Chi-Mun telemetry system and MRC's telemetry system into the systems developed in this project, i.e. SCADA, DSS and web based data presenting system, to covers the entire northeastern region. ● Songkhla Lake Basin - Study and design of 11 new telemetry stations, which shall be at least 10 stations. The telemetry stations shall be situated in appropriate locations for meteorological, hydrological and water quality data measurement in Songkhla lake basin in Northeastern region. - Study and design of Integrated Water Resources Management center for Songkhla lake basin, consisting of a Master station, situated at Water Crisis Prevention Center, DWR headquarter, Bangkok and a Sub master station at DWR Regional Office 8, Songkhla. ● Study and design of data communication networks, which uses appropriate wire or wireless communication system as communication media. ● Study and development of mathematical models including Decision Support System (DSS) for water management and for monitoring, forecasting, warning, as well as recommending alternative scenarios during water crisis period. ● Construction of field stations and related components.		✓			9 Feb. 2010 to 2 Feb. 2011	Water Resources Department	45.08 (Mekong basin) 42.90 (Songkhla Lake basin)

The Consultant's Project Experience in the Feasibility Study, Detailed Design and Tariff Study of Water Supply System and Water resources (cont.)

No.	Project Name	Project Area	Project Description	Type of Project				Project Duration	Client	Project Cost (MB)
				FS	DD	IEE	TF			
			● River cross sectional surveys, which shall be conducted at the maximum of 5-km intervals, as well as at the locations of hydraulic structures in the river. Rating curve surveys, which shall be conducted at every water level monitoring station ● Installation of at least 4 CCTV system at water level monitoring station in Mekong basin and Songkhla Lake basin. ● Development of Digital Elevation Model (DEM) of chronic floods area. The DEM shall be of resolution suitable for flood plain calculation, as required by DWR. ● Supply of hardware and software and system commissioning to ensure that the system can work as specified in TOR. ● Development of database and internet-based data presenting system, of which the web pages can be selected to display the contents in Thai or English. ● Jointly working with DWR's appointed officials at master station to commission the system, refine operation guideline, and fine-adjust the system for a period of 360 days. ● Organizing Public relations seminar on the objectives of the project. ● Responsible for operating cost for 360 days from the project completion date. ● Warranty of the system and equipment for not less than 720 days from the project completion date.							
48.	Detailed Design of Water Treatment Plant with capacity 17,000 cu.m./day, Ladkrabang Industrial Estate	Ladkrabang, Bangkok	Detailed Design of Water Treatment Plant for Ladkrabang Industrail Estate with the capacity of 17,000 cu.m./day. The work includes the following tasks: ● Data collection and analysis for detailed design works ● Site Inspection ● Study of the appropriate water treatment process ● Preliminary hydraulic analysis for water treatment system ● Preliminary design for raw water transmission system ● Preliminary design for water treatment system ● Preliminary design for sludge handling system ● Preparation of preliminary design report ● Detailed design of general arrangement for water treatment plant and facility ● Hydraulic analysis for water treatment system ● Detailed design of structural works, foundation works and architectural works for water treatment system ● Detailed design of mechanical and piping works for water treatment system ● Detailed design of electrical works for water treatment system ● Detailed design of instrumentation and control system for water treatment system ● Detailed design of site plan pipe works for water treatment system ● Preparation of machine and equipment specification for water treatment system, consulting for machine and equipment procurement.		✓			20 March 2011 to 29 Feb.2012	S.Napa (Thailand) Co.,Ltd.	242.89

Remarks : **FS : Feasibility Study** **DD : Detailed Design and Tender Documents Preparation** **IEE : Initial Environmental Examination** **TF : Water Tariff Study and Organization and Administration Study**