

3 議 事 録

MINUTES OF MEETING ON
MASTER PLAN AND FEASIBILITY STUDY ON
PHNOM PENH WATER SUPPLY SYSTEM IN
CAMBODIA

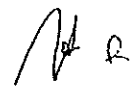
JICA preparatory study team headed by Haga Hidetoshi and officials of Regie Des Eaux headed by Keo Savin had meetings from 9 October to 13 October at Regie Des Eaux office in Phnom Penh.

The list of the participants is shown in the annex. During the meeting, the document "Scope of Work for Master Plan and Feasibility Study on Phnom Penh Water Supply System" was discussed.

Japanese side and Cambodian side confirmed the following subjects in a series of discussions.

1. Cambodian side strongly urged implementation of the urgent rehabilitation project, because current situation of water supply system in Phnom Penh city is very critical.

2. Cambodian side felt the difficulty of the providing office, furniture and equipment (vehicles, air conditioner, computer, copy machine etc.) to the study team and requested the provision of office and equipment by JICA. Cambodian side requested the donation of equipment after the study. JICA preparatory study team will convey the request of Cambodian side to JICA headquarters.

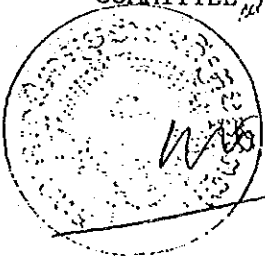


3. Cambodian side requested provision of several counterparts training in Japan. JICA preparatory study team will convey the request of Cambodian side to JICA headquarters.

PHNOM PENH, OCTOBER 14, 1992

FOR H.E. HOR NAMHONG, member of S.N.C.
Coordinator for Economic
Cooperation with Japan

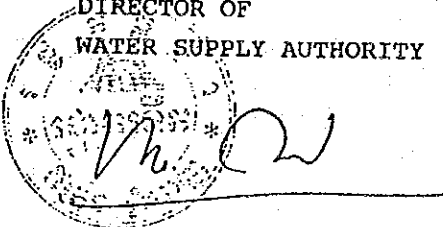
APPROVED BY
HOK LUNDI
FIRST VICE PRESIDENT
PHNOM PENH PEOPLE'S
COMMITTEE



HAGA HIDETOSHI
LEADER
PREPARATORY STUDY TEAM
JAPAN INTERNATIONAL
COOPERATION AGENCY

若賀秀壽

KEO SAVIN
PHNOM PENH
DIRECTOR OF
WATER SUPPLY AUTHORITY



គោ សាវិន

HA 4

LIST OF PARTICIPANTS

CAMBODIAN SIDE

KEO SAVIN	DIRECTOR PHNOM PENH WATERSUPPLY AUTHORITY
NOP SADUM	DEPUTY DIRECTOR PHNOM PENH WATER SUPPLY AUTHORITY
SEM BUN HENG	DUTY DIRECTOR PHNOM PENH WATER SUPPLY AUTHORITY
KONG SATHARA	CHIEF OF TECHNICAL OFFICER PHNOM PENH WATER SUPPLY AUTHORITY
ROS DETH	VICE CHIEF OF TECHNICAL OFFICER PHNOM PENH WATER SUPPLY AUTHORITY
LONG NARO	TECHNICAL OFFICER PHNOM PENH WATER SUPPLY AUTHORITY
KHENG CHENDA	CHEMICAL ENGINEER PHNOM PENH WATER SUPPLY AUTHORITY
ROS KIMLEANG	ECONOMICAL ENGINEER PHNOM PENH WATER SUPPLY AUTHORITY

JAPANESE SIDE

LEADER:	HAGA HIDETOSHI	EXECUTIVE DIRECTOR (REGISTERED CONSULTING ENGINEER) JAPAN WATER PIPE SYSTEMS RESEARCH CENTER
OPERATION AND: MAINTENANCE	YOSHIDA HIROAKI	DIRECTOR KAWASAKI CITY WATER WORK
WATER SUPPLY:	IWAHORI HARUO	DEVELOPMENT SPECIALIST JAPAN INTERNATIONAL COOPERATION AGENCY
COORDINATOR :	ENOMOTO HIROSHI	SECOND SOCIAL DEVELOPMENT STUDY DIVISION SOCIAL DEVELOPMENT DEPARTMENT JAPAN INTERNATIONAL COOPERATION AGENCY
WATERWORKS : FACILITIES	TAGUCHI MASAYUKI	KYOWA ENGINEERING CONSULTANTS CONSULTANTS CO., LTD.

OXFAM

LAURENCE CREEGAN	ELELCTRICAL/MECANICAL ADVISOR PHNOM PENH WATER SUPPLY AUTHORITY
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សី រ ា ម៍

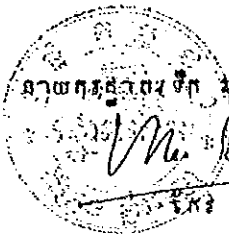
គំរោងប្រយោជន៍ លទ្ធភាព សិក្សារសី
ប្រព័ន្ធផ្គត់ផ្គង់ទឹក រដ្ឋធានីភ្នំពេញ

ក ម្ពុ ដ ា


ភ្នាក់ងារ ប្រមូលប្រតិបត្តិការ រដ្ឋាភិបាល

ក ម្ពុ ដ ា

អង្គការសហប្រតិបត្តិការអន្តរជាតិដប្បូន
ភ្នំពេញ, ១៨ តុលា ឆ្នាំ ១៩៩២


នាយករដ្ឋមន្ត្រី រដ្ឋធានីភ្នំពេញ
M. R. W.
ហែង . សារិន

ប្រធានក្រុមប្រឹក្សាគំរោងសិក្សារសីអង្គការ
សហប្រតិបត្តិការអន្តរជាតិដប្បូន
芳賀秀寿
ហារុណ . ប៊ុនដេន

បានឃើញ និង ឯកភាព
ដ. ឧបនាយករដ្ឋមន្ត្រី ទទួលបន្ទុករដ្ឋធានីភ្នំពេញ

អគ្គនាយករដ្ឋមន្ត្រី
W. S. P.
ហុក . ឡុងឌី

- ចំ ល ង ជ្រ ង
- ឯកឧត្តម ហោ ណាំហុង
 - សមាជិក SNC
 - អ្នកសំរេចសំរួល ការងារសហប្រតិបត្តិការរដ្ឋាភិបាល
 - ជា មួយដប្បូន

៦. បុណ្យការងារ :

ឆ្លើយតបទៅនឹងសំណើរបស់ប្រទេសកម្ពុជា រដ្ឋាភិបាលជប៉ុន បានសំរេចធ្វើគំរោងមេ និង សិក្សាលទ្ធភាព ប្រព័ន្ធផ្គត់ផ្គង់ទឹក នៅរដ្ឋធានីភ្នំពេញ ក្នុងនាមរដ្ឋាភិបាលជប៉ុន ការសិក្សា ដោយអនុលោមទៅតាមច្បាប់សិបបញ្ជាក់ ដែលមានទំហំទំនង ក្នុងប្រទេសជប៉ុន ។

ដោយពេញនេះ អង្គការសហប្រតិបត្តិការអន្តរជាតិជប៉ុន ក្នុងនាមរដ្ឋាភិបាលជប៉ុន ។

- JICA ។ ជាអង្គការផ្លូវការមួយ អាចចូលរួមចំណែកក្នុងការអនុវត្ត ទូទៅបណ្តាញទឹក សហប្រតិបត្តិការរបស់ប្រទេស របស់រដ្ឋាភិបាលជប៉ុន និងអនុវត្ត ក្នុងការសិក្សាគំរោងនេះ ។

ដោយរួមសហការយ៉ាងជិតស្និទ្ធជាមួយការងាររដ្ឋាភិបាលកម្ពុជា ។

ឯកសារនេះនៅជំពូកទី ២២ ស្តីអំពីទំនាក់ទំនងសហប្រតិបត្តិការសិក្សា ។

៦៦. បណ្តាញទឹក នៃការសិក្សា

កម្មវិធីនៃការសិក្សារួមមាន :

១. ដើម្បីរៀបចំអាណាឡូគីកែលម្អ គួរគំរោងមេ សំរាប់ប្រព័ន្ធផ្គត់ផ្គង់ទឹកនៅរដ្ឋធានី ភ្នំពេញ ។
២. ដើម្បីរៀបចំអាណាឡូគីកែលម្អ គួរគំរោងការដួសជុលទ្រៀងវិញដាបន្តាន់ គួរ ទុបករណ៍ទ្រៀងទ្រុឌដែលមានប្រសាស្តិ៍ ។
៣. ដើម្បីអនុវត្ត គួរលទ្ធភាពសិក្សាថវិកាគំរោងអាទិភាពដែលបានកំណត់ក្នុងការ សិក្សាគំរោងមេ ។

៦៦៦. តំបន់សិក្សា

តំបន់សិក្សាគំរោង និងកំណត់តែឯកបច្ចុប្បន្ននេះរបស់រដ្ឋធានីភ្នំពេញថវិកាគំរោងការ សិក្សាគំរោងមេ ។ កាលសិក្សាអំពីការដួសជុលទ្រៀងដាបន្តាន់ និង កំណត់តែឯកបច្ចុប្បន្ន និង បណ្តាគំរោងដែលបានកំណត់ក្នុងការសិក្សាគំរោងមេ ។ តំបន់សិក្សាសំរាប់គំរោងមេ មានបណ្តាញទឹក ទុបករណ៍ទ្រៀង ១ ។

៦៦៦. ទំនាក់ទំនងការសិក្សា :

១. ការប្រមូលទិន្នន័យ និងការវិភាគ
 - ការប្រមូល និងពិនិត្យរបស់ទ្រៀងវិញទិន្នន័យដែលអាចទទួលបានដូចតទៅនេះ :
 - លទ្ធភាពសេដ្ឋកិច្ច
 - លទ្ធភាពបច្ចេកទេស
 - គំរោងមេរបស់រដ្ឋាភិបាល និងផែនការបច្ចុប្បន្ន
 - ផែនការសំរាប់វិស័យសាធារណៈ ក្នុងទ្រៀងវិញ
 - ពិនិត្យតែឯក ទ្រៀងទុបករណ៍ដែលមានប្រសាស្តិ៍
 - ការសិក្សាអំពីប្រភពទឹក
 - វិភាគគុណភាពទឹក
 - ការសិក្សាអំពីប្រព័ន្ធចែកចាយទឹក
 - ការសិក្សាអំពីទឹកស្អាតចម្រើន
 - ការងារអំពីការវិនិយោគវិនិយោគសាងសង់ និងប្រតិបត្តិ

២. ការសិក្សាគំរោងរដ្ឋ :

- ១. ពង្រាងកន្លែងផ្គត់ផ្គង់ទឹកប្រូវ៉េដ្វី
- ២. ប្រដាប់ និង តម្រូវការទឹក
- ៣. លទ្ធភាពផ្សេងៗ លំដាប់ប្រព័ន្ធទឹក និង គ្រូបង្កប់កម្រិត
- ៤. ពង្រាងផ្នែកស្ថានភាពការងារ
- ៥. ធ្វើកម្មវិធីអនុវត្ត
- ៦. ធ្វើអត្តសញ្ញាណកម្មប្រព័ន្ធគំរោងអាទិភាព
- ៧. ដំណើរការ និង ថែទាំ
- ៨. ធ្វើសំណើការបំពេញប្រព័ន្ធប្រព័ន្ធចាត់តាំង និង គ្រប់គ្រង
- ៩. ផ្នែកស្ថានភាពការងារ

៣. ការសិក្សាអំពីគំរោងការដួលដួលរូបវិញជាបន្តបន្ទាប់

- ១. ធ្វើអត្តសញ្ញាណកម្ម គំរោងដួលដួលរូបវិញជាបន្តបន្ទាប់
- ២. គួររៀនសូត្រ " ភាពស្រប " ។
- ៣. ផ្នែកស្ថានភាពការងារ
- ៤. ធ្វើកម្មវិធីអនុវត្ត
- ៥. ដំណើរការ និង ថែទាំ
- ៦. វាយតម្លៃលើគំរោង

៤. លទ្ធភាពសិក្សាគំរោង

- ១. បំពេញប្រព័ន្ធប្រព័ន្ធដែលប្រមូលបាន និង វិភាគ
- ២. ការប្រដាប់ប្រដាប់វិស័យភាពខ្ពស់របស់ ទឹក និង លក្ខណៈ
- ៣. ពង្រាងប្លង់
- ៤. ផ្នែកស្ថានភាពការងារ
- ៥. កម្មវិធីអនុវត្ត
- ៦. ដំណើរការ និង ថែទាំ
- ៧. ផ្នែកស្ថានភាពការងារ

៥. កម្មវិធីសិក្សាគំរោង

ការសិក្សាគំរោងនិង ត្រូវបានអនុវត្តដោយរយៈពេលតាមកម្មវិធីដែលបង្ហាញក្នុង ឧបសម្ព័ន្ធទី ២ ។

Handwritten initials/signature

១៦ រដ្ឋការណ៍ :

និង រដ្ឋបាលនិងដាក់អោយភារកិច្ចដោយ ពិនិត្យនូវរដ្ឋការណ៍ដាក់ការងារ
អង្គការ ដូចខាងក្រោម :

- ១- រដ្ឋការណ៍ចាប់ផ្តើម លើកដំបូង :
- ខ្សែ " ២០ " ច្បាប់ចំលង នៅពេលចាប់ផ្តើមការងារដំបូងនៅកម្ពុជា ។
- ២- រដ្ឋការណ៍បណ្តោះអាសន្ន
- ខ្សែ " ២០ " ច្បាប់ចំលង ក្នុងរយៈពេលត្រឹម " ៨ " ខែ ក្រោយពីការចាប់ផ្តើមការងារ
លិក្ខនាវា ។
- ៣- រដ្ឋការណ៍ក្រោយពេលក្រោយ
- ខ្សែ " ២០ " ចំលងក្នុងរយៈពេលពី " ១២ " ខែ ក្រោយពេលចាប់ផ្តើមការងារ
លិក្ខនាវា ។
- ភារកិច្ច និង តម្លៃរបស់ខ្លួន វិញ ក្នុងរយៈពេលខ្សែ " ២០ " ខ្សែ
ក្រោយពេលពេលទទួលបានការងារ រដ្ឋការណ៍ត្រូវចាប់ផ្តើម ។
- ៤- រដ្ឋការណ៍ស្របច្រក
- តែមួយ " ៤០ " ចាប់ផ្តើមក្នុងរយៈពេលរបស់ខ្លួន " ៣០ " ខ្សែ បន្ទាប់ពីទទួលបាននូវការ ឆ្លើយតប
លើក្រោយ រដ្ឋការណ៍ស្របច្រក ។

១៧ ការទទួលខុសត្រូវនៃភារកិច្ច :

- ធ្វើឱ្យអោយដំណើរការលិក្ខនាវាបណ្តោះអាសន្ន ប្រសិន ភារកិច្ចនិងមនុស្ស
នូវបណ្តាវិធានការចាំបាច់ដូចខាងក្រោម :
- ១- ដំណើរការនៃក្រុមលិក្ខនាវាបណ្តោះអាសន្ន ក្នុងរយៈពេលដំបូងចំពោះ
" the Team "
- ២- អនុញ្ញាតិអោយបណ្តាវិធាននៃក្រុមលិក្ខនាវា " the Team " ចូល
ចូលចេញពីទីកន្លែង រដ្ឋការណ៍ កម្ពុជា ក្នុងរយៈពេលការងារ លើកដំបូងនៃការ
បង្កើនទិដ្ឋភាព ។
- ៣- លើកលែងតែការប្រកួតលិក្ខនាវា " the Team " រួចពីការបង្កើត
អាច ពន្យល់ និង ការងារនៃខ្លួន លើការងារចូលដៅ ចេញប៉ាន់ស្តង់ដារ រដ្ឋបាល
ក្រុមលិក្ខនាវា សំរាប់ធ្វើការលិក្ខនាវា ។
- ៤- លើកលែងតែការប្រកួតលិក្ខនាវា ក្នុងពេលចំណូលនិងការចេញចុះ
ដែលត្រូវអោយដំបូង ឬ ការងារផ្សេងទៀត លើការងារចូលដៅ ចេញប៉ាន់ស្តង់ដារ រដ្ឋបាល
ចំពោះការងារដំបូង ការងាររបស់បណ្តាវិធាននៃក្រុមលិក្ខនាវា ទាក់ទងទៅនឹង
ការងារនៃការងារលិក្ខនាវា " ប្រសិន បើការងារចាំបាច់ " ។
- ៥- ផ្តល់ចំពោះក្រុមនូវបណ្តាវិធានចាំបាច់ លើការងារ ធ្វើត្រូវការដំបូងការងារ
ត្រូវបង្កើត រដ្ឋបាលដំបូងកម្ពុជា សំរាប់ធ្វើការលិក្ខនាវា " ប្រសិន បើការងារចាំបាច់ " ។
- ៦- ផ្តល់ការអនុញ្ញាតិ ចំពោះការចេញ ចូល កន្លែងងងឹត ឬ កន្លែងទៀង
រដ្ឋបាល ក្នុងពេលធ្វើការងារលិក្ខនាវា ។
- ៧- ផ្តល់ការអនុញ្ញាតិ ចំពោះក្រុម ក្នុងការចាំបាច់ចេញពីកម្ពុជា ទៅកាន់ប្រទេស
ដំបូងនូវទិដ្ឋភាព និង បណ្តាវិធាន " រាប់បញ្ចូលទាំងរូបថតនិងផែនទី " ដែលទាក់ទងនឹង
ការងារលិក្ខនាវា ។
- ៨- ផ្តល់ដល់ក្រុមលិក្ខនាវា ការព្យាបាលរដ្ឋបាលតាមតម្រូវការ ។ រាល់ការចំណាយ
ក្នុងក្រុមលិក្ខនាវា ដោយឥតខ្ចោះ ។

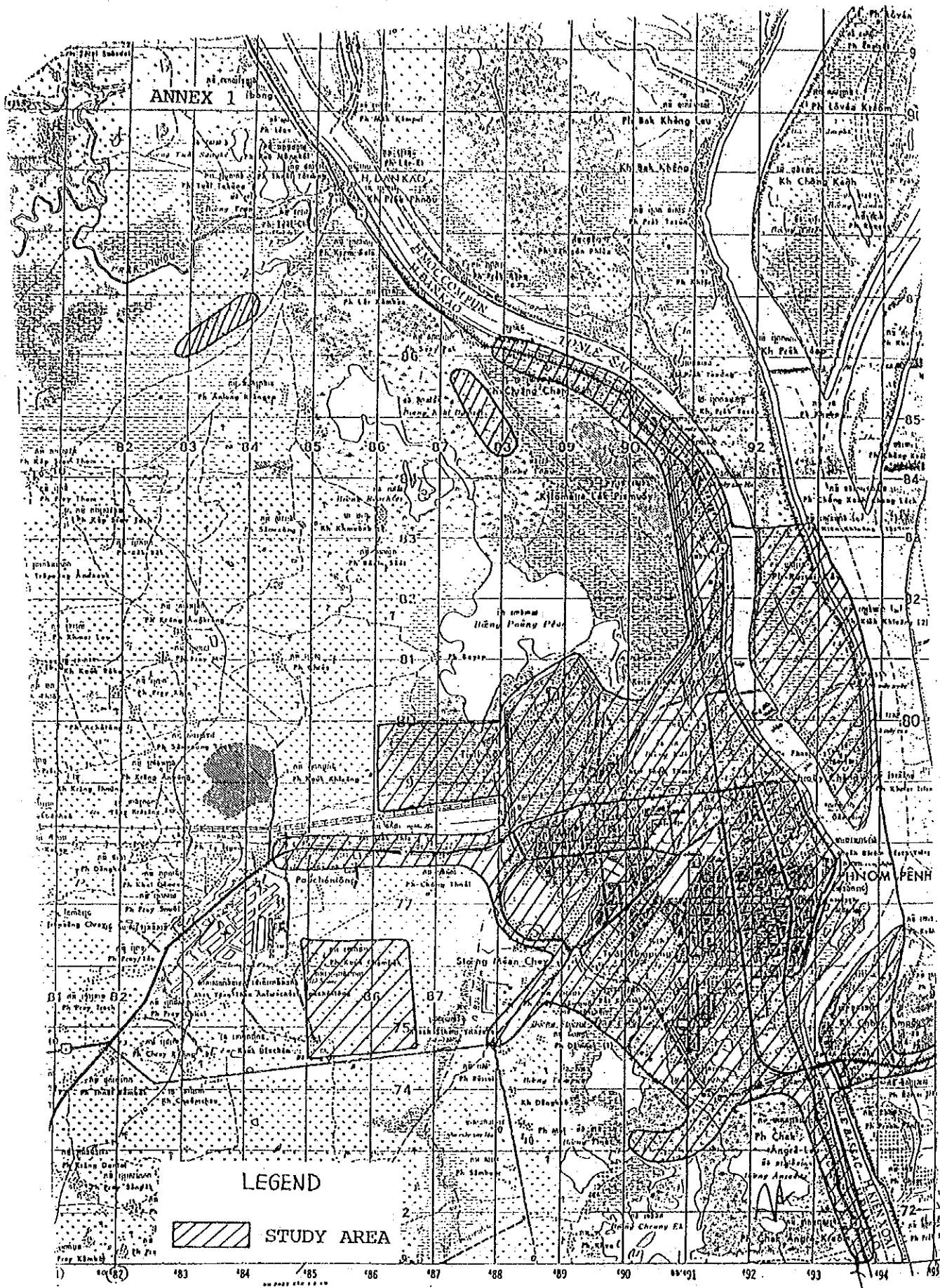
កម្មវិធីអភិវឌ្ឍន៍

ទម្រង់ ២

លំដាប់ទី	១	២	៣	៤	៥	៦	៧	៨	៩	១០	១១	១២	១៣
កិច្ចការណាមួយ	[Horizontal bar]												
កម្រិត	[Horizontal bar]												
កិច្ចការណាមួយ	[Horizontal bar]												
កម្រិត	[Horizontal bar]												
រយៈពេល	[Horizontal bar]												
	IC/R			IT/R			DF/R			F/R			

ជំនាញ

- IC/R: ការងារដែលបានបញ្ចប់
- IT/R: ការងារដែលបានចាប់ផ្តើម
- DF/R: ការងារដែលបានផ្តើម
- F/R: ការងារដែលបានបញ្ចប់



ក្រុមប្រឹក្សាភិបាលក្រុមហ៊ុនភូមិសាស្ត្រកម្ពុជា
ក្រុមហ៊ុនសម្រាប់ការសាងសង់ប្រព័ន្ធបណ្តាញទឹកនៅភ្នំពេញ
ក ម ជ ១

ក្រុមប្រឹក្សាភិបាលក្រុមហ៊ុនភូមិសាស្ត្រកម្ពុជា ដឹកនាំដោយលោក HAGA HIDETOSHI
និង មន្ត្រីនៃរដ្ឋាករទឹកភ្នំពេញ ដឹកនាំដោយលោក តែវ ឆារិន "KEO SAVIV"
បានធ្វើការប្រជុំលើថ្ងៃទី ០៨ តុលា ២០០៧ ទី ១៧ តុលា ២០០៧ នៅទីស្នាក់ការរដ្ឋាករទឹកភ្នំពេញ
ភ្នំពេញ ។

បញ្ជី រាយនាមអ្នកចូលរួមប្រជុំមានដូចខាងក្រោម៖
ក្នុងរយៈពេលប្រជុំ អង្គប្រជុំបានលើកឡើងបញ្ហាសាងសង់ប្រព័ន្ធបណ្តាញទឹកនៅភ្នំពេញ
សំរាប់ការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ ។

ក្នុងការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ មានការចូលរួមពីភាគីពាក់ព័ន្ធនានា
បណ្តាញទឹកភ្នំពេញ ។

១. ភាគីពាក់ព័ន្ធនានាដែលបានចូលរួមក្នុងការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ
គឺមានដូចខាងក្រោម៖

២. ភាគីពាក់ព័ន្ធនានាដែលបានចូលរួមក្នុងការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ
គឺមានដូចខាងក្រោម៖

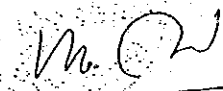
៣. ភាគីពាក់ព័ន្ធនានាដែលបានចូលរួមក្នុងការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ
គឺមានដូចខាងក្រោម៖

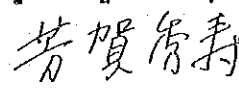
ភាគីពាក់ព័ន្ធនានាដែលបានចូលរួមក្នុងការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ
គឺមានដូចខាងក្រោម៖

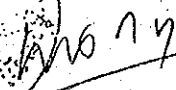
៤. ភាគីពាក់ព័ន្ធនានាដែលបានចូលរួមក្នុងការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ
គឺមានដូចខាងក្រោម៖

៥. ភាគីពាក់ព័ន្ធនានាដែលបានចូលរួមក្នុងការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ
គឺមានដូចខាងក្រោម៖

ភ្នំពេញ ថ្ងៃទី 14 ខែ 10 ឆ្នាំ ២០០៧

នាយក រដ្ឋាករទឹកភ្នំពេញ

តែវ ឆារិន

ក្រុមប្រឹក្សាភិបាលក្រុមហ៊ុនភូមិសាស្ត្រកម្ពុជា
សម្រាប់ការសាងសង់ប្រព័ន្ធបណ្តាញទឹកភ្នំពេញ

ហាហា អ៊ីដេតូស៊ី

បានដេញ និង ឯកភាព
ក្រុមប្រឹក្សាភិបាលក្រុមហ៊ុនភូមិសាស្ត្រកម្ពុជា
អង្គប្រជុំលើថ្ងៃទី ០៨ តុលា ២០០៧

ហាហា អ៊ីដេតូស៊ី

Minutes of Discussion
on
Master Plan
of
Phnom Penh Water Supply System

Preparatory Study Team headed by Dr. Magara Yasumoto, and officials of Regie Des Eaux headed by Mr. Nop Sadum had meetings from August 4 to August 6, 1992, at Regie Des Eaux.

Japanese side and Cambodian side confirmed the following subjects in a series of discussions.

1. Cambodian side stressed the importance of formulating the Master Plan of Phnom Penh Water Supply System (hereinafter referred as "the Study") that was one of the projects officially requested by Cambodian side through Japanese Embassy in advance dated May 8, 1992.

2. Cambodian side stressed the urgent need of the rehabilitation of existing water supply system and requested the inclusion of the urgent rehabilitation plan in the Study.

3. Japanese side agreed the implementation of the Study and promised to send the mission for signing the Scope of Work as soon as possible.

4. Japanese side will positively consider the inclusion of the urgent rehabilitation plan in the Study.

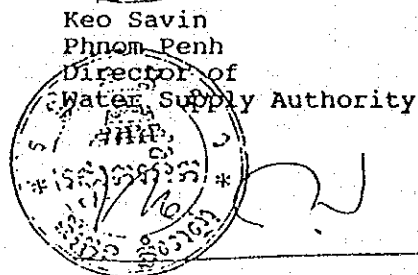
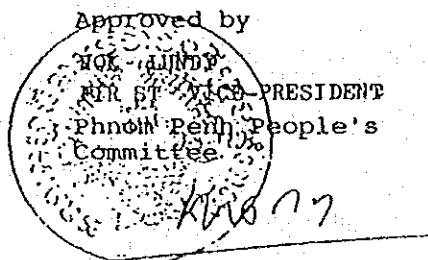
5. Japanese side and Cambodian side agreed that the Study should be conducted through close coordination with other external support organizations.

Phnom Penh, August 7, 1992

For H. E. HOR NAMHONG, member of
S.N.C., Coordinator for Economic
Cooperation with Japan

真柄 泰基

DR. MAGARA YASUMOTO
Leader
Preparatory Study Team
Japan International
Cooperation Agency



4 質問書・回答

質問書 1 (事前予備調査時)

CONTACT MISSION FOR MASTER PLAN AND FEASIBILITY STUDY FOR PHNOM PENH WATER SUPPLY SYSTEM IN CAMBODIA

QUESTIONNAIRE ON FACILITIES OF WATER SUPPLY

1. Service Area and Population
 - 1.1 Please provide some data mentioned below,
 - a. A map of the service area of the Phnom Penh Water Supply System.
 - b. A total population and an areawized population in the service area.
 - c. A ratio of annual population increase in the service area.
2. Water Requirement
 - 2.1 How much do you set for the daily water requirement per capita.
 - 2.2 If you have the consumption units for the special facilities such as factory, hospital, office building, hotel and so on, please provide them.
3. Water Quality
 - 3.1 Please provide data on the monthly mean of quality of raw water at the Intake Plant for the past 3 years.
 - 3.2 Please show us records of river water level at the Intake Plant for the past 3 years.
 - 3.3 Please provide data on the monthly mean of quality of water supplied from the Treatment Plant for the past 3 years.
 - 3.4 Please provide data on served water quality in the city as follows,
 - a. Kind of analyses on water quality carried out in the service area.
 - b. Number of observation points.
 - c. Frequency of observation at the each point.
 - d. Ratio of water supply quality conformity with the criterion.
 - 3.5 Do people drink the city water directly? If not, how do people manage themselves for drinking water?
 - 3.6 How do you procure chemicals used at the Treatment Plant? If there are some difficulties to procure chemicals, please describe the reasons of it.
4. Condition on Facilities
 - 4.1 Please describe water supply facilities located in Phnom Penh city.
 - 4.2 Please provide drawings of the main facilities such as Intake Plants, Treatment Plants, Booster Pumping Stations, Reservoirs, Elevated Tanks, pipeline facilities etc.
 - 4.3 Please list up items and their basic specifications of each equipment installed in the Intake and Treatment Plant and describe their conditions like no use, out of order or abandoned and the reasons for them.
 - 4.4 Please provide data on frequency and duration of electric power cut in a day, a week, a month.
5. Institutional Capacity of the Undertaking Agency for Water Supply in Phnom Penh city
 - 5.1 Please provide an organization chart of the Agency and describe tasks of each section, an allotment of staff and qualification of the staff.
 - 5.2 Please provide data on the organization and number of staff for the repair work section.
 - 5.3 Has preventive maintenance been performed? If yes, please describe the concrete contents of the performance.
 - 5.4 Please describe about equipment owned by the Agency and present condition of them as follows,
 - a. Construction equipment
 - b. Vehicles
 - c. Laboratory equipment
 - d. Workshop equipment
 - e. Others
6. Water Tariff
 - 6.1 Please provide a water tariff structure and a system of billing and collection of it.
 - 6.2 What factors were considered when the present water tariff was decided.

7. Financial Condition

7.1 Please provide the revenue and the expenditure of the Undertaking Agency for water supply.

7.2 What is the financial sources of the Agency.

7.3 Please provide financial data concerning the Intake and Treatment plant and Distribution facilities of Phnom Penh Water Supply System as follows,

- a. Annual personnel expenditure and labor cost
- b. Annual repair cost
- c. Annual chemical cost
- d. Power rate

8. Relevant Projects on the Water Supply Sector

8.1 Are there any urban development plan in Phnom Penh city? If available, please provide us.

8.2 Please describe the other projects concerning water supply sector, which are on-going or scheduled in future in Phnom Penh city as follows,

- a. Title of the project
- b. Scope of the project
- c. Undertaking of the Government of Cambodia for the project and the budget for it.
- d. Total project cost and its brief breakdown.
- e. Financial source or country involving.

8.3 Do you have staff training programs managed by yourself or other assisting organizations. If you have, please describe its contents as follows,

- a. Fields of training
- b. Categories of trainee
- c. Objectives of the training
- d. Duration of the training
- e. Undertaking organization



លេខក្រឹត្យលេខ ០២

ស្តីពីគំរោងផ្សាយផលវេជ្ជាការក្រសួងពេទ្យ

ក្រុមប្រឹក្សាដំបូងភាគីជម្រុញដឹកនាំដោយលោកបណ្ឌិត ម៉ាតារ៉ា យ៉ាស៊ូម៉ូតូ និង
បណ្ឌិតម្នាក់ទៀតនៃគណៈកម្មាធិការជាតិរដ្ឋបាលសុខាភិបាល ដឹកនាំដោយលោក លុប ណាម បានធ្វើការប្រជុំ
ចាប់ពីថ្ងៃទី ០៤ ដល់ថ្ងៃទី ០៦ សីហា ឆ្នាំ ១៩៩២ នៅរដ្ឋាករក្រសួងពេទ្យ ។

ភាគីទាំងពីរបានពិភាក្សាឯកភាព លើលទ្ធផលប្រជុំដូចខាងក្រោម ៖

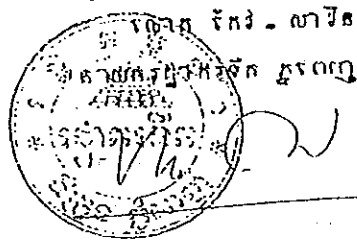
- ១ - ភាគីកម្ពុជា ទ្រង់ឯកភាព និងរក្សាទុកក្នុងខ្លឹមសារដែលបានកំណត់ដោយរដ្ឋា -
ភិបាលដំបូង ផ្តល់កម្រិតដ៏ខ្ពស់តាមលិខិតចុះថ្ងៃទី ០៨ ខែ ឧសភា ឆ្នាំ ១៩៩២ របស់គណៈកម្មា -
ធិការប្រជាជនរដ្ឋធានីភ្នំពេញ តាមរយៈល្ខោនទូរទស្សន៍ប្រចាំនៅកម្ពុជា កន្លងមក ។
- ២ - ភាគីកម្ពុជា ឆ្លើយតបដល់សុំផ្តល់ និង ល្អិតរឿងរឿងជាបន្តបន្ទាប់និងចាំបាច់
ក្នុងប្រព័ន្ធផ្សព្វផ្សាយ និង ផ្តល់ដំណឹង ដែលមានស្រាប់បច្ចុប្បន្ន ។
- ៣ - ភាគីជម្រុញឯកភាព និង សិក្សាគំរោងតាមលំដាប់ខាងលើ ដោយសន្យា
ថាគឺបញ្ជូន របស់កម្មាធិការសុខាភិបាល លើគំរោងការងារ ដែលត្រូវអនុវត្តជាបន្តបន្ទាប់
ចំពោះមុខ ។
- ៤ - ទន្ទឹមនេះ ភាគីជម្រុញឯកភាព បញ្ជាក់ការសិក្សាគំរោងផ្តល់ផ្តល់ និង
ការរៀនរៀនវិញបន្តគំរោងចំពោះមុខ ក្នុងការសិក្សាគំរោងរួម ។
- ៥ - ភាគីទាំងពីរបានឯកភាព និង សហការជាប្រយោជន៍គ្នា រក្សាទុកជាតំណាង
ដែលមានប្រសិទ្ធភាពផ្សាយផលវេជ្ជាការក្រសួងពេទ្យ ក្នុងការសិក្សាគំរោងរួម ។

ភ្នំពេញ, ថ្ងៃទី ០៧ ខែ ៩ ឆ្នាំ ១៩៩២

លោក ម៉ាតារ៉ា យ៉ាស៊ូម៉ូតូ
ប្រធានក្រុមប្រឹក្សាគំរោង វិនិយោគ
សហប្រតិបត្តិការអន្តរជាតិដំបូង

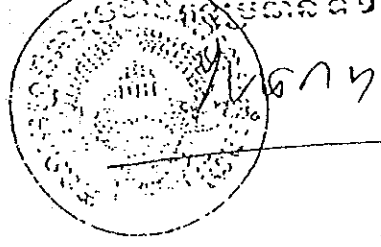
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ចំពោះឯកភាព លោក ណាម ណាម
ទីស្នាក់ការកណ្តាល ក្រសួងពេទ្យ
សម្រាប់ការងារ របស់ក្រុមប្រឹក្សាគំរោង វិនិយោគ
សហប្រតិបត្តិការអន្តរជាតិដំបូង



លោក ណាម ណាម

៨. គណៈកម្មាធិការប្រជាជនរដ្ឋធានីភ្នំពេញ



PHNOM PENH, AUGUST 13th 1992

THE ANSWERS FOR JICA MISSION

1. Service Area and Population:

- a. A map of the service area : we sent already.
 b. A total population and an urbanized population in the service area :

	OF THE CITY	OF SERVICE AREA :
- Boulevard District :	100,496	100,496
- 7. JAN District :	87,882	87,882
- Tonle Sap # :	94,008	94,008
- CH. PAR HORN # :	121,983	121,983
- Russey Keo # :	110,796	2,950
- Mean Chey # :	96,263	450
- Dang Kao # :	63,081	-
Total :	674,509	407,769

- c. A ratio of annual population increase in the city :

- In 1990 :	615,867	Ratio increase	3,29%
- In 1991 :	637,733	Ratio increase	2,54%

2. Water requirement:

e.1. The daily water requirement : 200 l/jpd

2.2. Some of the consumption units for the special facilities per month :

a. State department:

- railway company	4,179 m ³
- Post office	506 m ³
- Printing house of Finances Ministry	497 m ³
- Fibro cement factory	1,810 m ³

b. Hotel:

- Monorom Hotel 1,474 m³ (7 Jan district)
- Pavilion Hotel 670 m³ — " —
- Paradise Hotel 1,340 m³ — " —
- Neakpon Hotel 978 m³ — " —
- Sokhalay Hotel 1,816 m³ (Dum Paek district)
- Le Royal Hotel 1,453 m³ — " —
- Cambodiana Hotel 897 m³ — " —

c. Water sellers:

- Mr. Dy Ro 1,977 m³ (7 Jan district)
- Mr. Kung Kun Thea 1,841 m³ — " —
- Mr. Men Thy 615 m³ — " —
- Orsay Market 1,187 m³ — " —

3. Water quality:

3.1.
3.2.

PHUM PREK WATER PLANT (TONLE SAP RIVER)

YEAR	1989			1990			1991		
	LEVEL	pH	NTU	LEVEL	pH	NTU	LEVEL	pH	NTU
JAN	3.3	6.9	20.5	3.0	6.72	20.7	3.35	7.1	26.3
FEB	3.0	6.8	6.5	2.7	6.6	15.5	3.0	7.0	17.7
AR	3.0	6.9	16.0	2.5	6.4	18.6	2.9	7.0	17.0
APR	3.0	7.05	9.6	2.85	6.8	16.2	2.85	7.0	16.8
MAY	3.7	7.3	10.0	3.1	7.3	14.5	2.88	7.1	15.5
JUN	6.0	7.0	89.0	5.7	7.2	210.0	4.4	7.1	30.0
JUL	7.1	6.9	238.0	8.3	7.3	268.0	4.5	7.2	193.0
AUG	8.5	7.0	315.0	9.6	7.3	329.0	8.8	7.1	176.4
SEP	9.0	6.9	182.0	10.0	7.1	156.0	10.5	7.1	65.0
OCT	8.2	6.7	14.1	9.0	6.9	24.0	10.0	7.0	13.5
NOV	5.7	6.7	40.5	6.1	6.9	32.9	6.0	7.1	24.3
DEC	3.6	6.7	41.0	3.9	7.2	43.2	4.2	7.1	21.5

* This is the list of raw water.

3.3. Treated water

YEAR	1989			1990			1991		
	MONTH	pH	NTU	pH	NTU	pH	NTU	NTU	
JAN	6.7	5.5		6.5	4.96		6.7	6.0	
FEB	6.7	2.5		6.4	4.3		6.8	4.6	
MAR	6.8	6.0		6.2	7.1		6.8	3.0	
APR	6.9	4.9		6.6	5.1		6.8	5.0	
MAY	7.2	4.3		7.2	5.7		7.05	4.2	
JUN	6.7	19.6		6.7	14.0		7.0	7.7	
JUL	6.8	13.7		6.6	9.2		6.8	3.3	
AUG	6.5	9.9		6.5	7.3		6.8	5.7	
SEP	6.3	9.0		6.4	5.0		6.8	4.0	
OCT	6.6	4.6		6.6	5.0		6.8	2.8	
NOV	6.8	8.1		6.7	2.7		6.9	2.2	
DEC	6.6	4.7		6.8	5.5		6.8	2.1	

3.4. Data on served water quality in the city
None

3.5. People don't drink the city water directly. Most of them boil water to drink; some use with private filters equipments

3.6. chemicals used at the treatment plant we bought from ^{Vietnam} Vietnam (Alum and chlorine) since we can buy in Cambodia
A.D.

4. Condition on Facilities:

4.1.

4.2.

4.3. List of basic equipment:

a. raw water pumps:

Motor: Mark GFC LARGE MACHINE UNITED
Rugby - England.

P: 185 kw V: 2000V

Amps 45 Rv/min: 990

N: D74526203 Year: 1988

-4-

Pump: Mark : KSB
Type : SNW 500-550 year 1988
Q : 0.611 m³/sec
H : 21 m.
N : 990 RPM.

There are 3 sets, installed in 1988 by ODFAM.

b. Treated water pumps:

Motor: Mark ALSTHOM BELFORS (GERMANY) 1965
Type NP 4006
P : 440 HP Rev/min : 1470
V : 2000 3 phases, 50 Hz.
Amps: 76
Serial N^o: 221057653

Pump: Mark : EHRHARDT & SEHMER
Type : MD 500
Q = 2100 m³/h.
H : 42 m.
Speed : 1470 RPM.
Serial N^o: 106280 - Date 1965

There are 4 sets, install in 1966.

4.4. Data on frequency and duration of Electric power cut: Supplied 4th AM - 6th PM - Frequent bid short ³⁻¹⁰ min.

- Day:
- week:
- Month:

5. Institutional capacity of P.ens water supply Authority:

5.1. Organization:

- a. Board of directors: 3 persons.
- Director
 - Deputy director for technical works.
 - Deputy director for Business works.

b. offices and the plants:

	- Administrative office	22 persons (includ 7 female)
	- Distribution office	46 + (+ 2 +)
	- Technical office	38 +
3. by collection:	- Exploitation office	214 + (+ 28 +)
	- Accounting office	25 + (+ 8 +)
	- Phum Prek plant	49 + (+ 3 +)
Engineer	chem. car work plant	21 + (+ 2 +)
Too Young 5	Chemichangwar plant	6 + (+ 1 +)
Sensar 5	Inspection	5 +
	Total	429 persons (includ 51 female)

5.2. Repair work section:

Repair work section is a part of technical office, we call as workshop. It organized as follow:

- a. Mechanical general team: 8 persons.
- b. Electrical repair team: 3 +
- c. Welding & lathing team: 6 +
- d. construction repair team: 3 +
- e. Driving team: 5 +

5.3. Preventive maintenance is not yet performed.

5.4. Equipment owned by P.Pens water supply Authority as follow:

a. construction equipment: none.

b. vehicles:

- Crane 14 Tons : 01 Russian.
- Lorry 10 Tons : 01 KAMAZ - Russian.
- Excavator : 01 Russian. (not good)
- Small Tractor : 01 +
- Pickup : 02 (Russian - Japanese)
- water truck : 03

- car - - - - 5

c. Laboratory equipment:

- Jartext machine.
- pH meter - Model 200 Laboratory.
- Turbidity meter - HACH Model 2100A.
- Raised microscope equipment (Russian)
Mark: ТЕРМОСТАТ ТС-80М-2
- Magnetic stirrer regulator hotplate.
- Refrigerator (Russian)
- Electrical dryer - Solid state (VINDON)
- Analytical Balance - Mark CAMLAB
- Raised microscope equipment, Mark: Vindon
scientific LTD - Diggle Oldham.
- Electrical steamer for bottles.
- Water distiller.
- Glass cupboard.

d. Workshop equipment:

- 01 - Lathe machine.
- 01 - Metal cutter Mark BEHINGER (Hacksaw machine)
- 01 - Shaping machine.
- 01 - Drilling machine.
- 01 - Milling machine (press)
- 02 - Welding machines.

e. Another:

- Pipe detector 01.
- Valve detector 01.

6.2 Water tariffs:

6.1- water tariff structure and a system of billing and collection:

* Price:

a- From Jan 91 to Jul 91 : water price was 20⁺/m³

b- From Aug 91 until now : water price is 166⁺/m³.

* billing system:

Exploitation office divided to 6 branches, and each branch work actively both of billing and collection. They are:

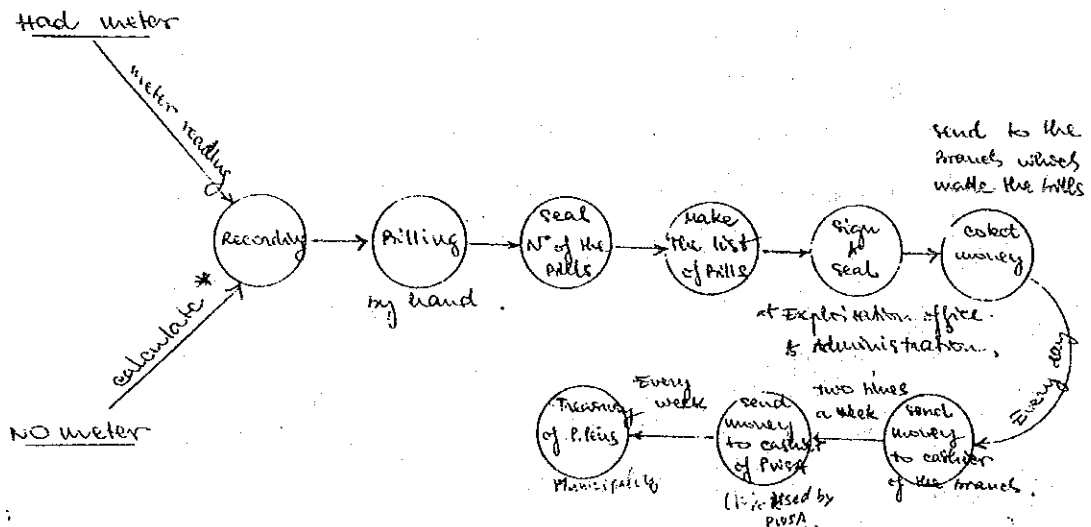
- Don Pent's branch : 48 persons
- 7. Jan → : 26 →
- Chancarmorn → : 47 →
- Toul Kork → : 43 →
- Sussaykeo → : 12 →
- A.D.M branch : 7 → (for state officers)
- center of the office : 21 →

There are two kinds of consumers

a- had water meter.

b- no water meter (Estimate)

Line of the work is:



Not:

calculate by multiply amount of members in consumption unit with 2, 4 m³/month consumption.

6.2 Factors of present water tariff: in a year

a- chemicals :	243,926,160	rupees
b- Fuel, Oil, grease	11,232,500	+
c- spareparts	37,658,500	-
d- Furniture & office materials	2,160,000	+
e- Electricity	1,271,000,000	+
f- salary	95,475,200	+
g- Amortisement	17,167,060	+
h- spenditure for managing	29,946,000	+

Total : 1,712,565,520 rupees (91)

Total water produced : 21,000,000 m³

* Production price : $\frac{1,712,565,520}{21,000,000 \times 65\%} = 125.46$

* profit 15% : $125.46 \times 15\% = 18.82$

* selling price : $125.46 + 18.82 = \underline{144.28}$

7- Financial condition: discussed already.

8- Relevant projects on the water supply sector:

8.1- 8.1.1 - a- Title of project : Russay keo development

b- scope of project : New town project

on the north-west of Phnom Penh

surface area about 300 ha and have

about 800 units of habitation. Including

public infrastructure about 45%.

not supplies to 60% private house.

8.1.2: a- Title : O-BEK - KH-OM development

b- on the west of Phnom Penh.

Surface area about 300 ha. In this area is divided into (2) parts, they are:

- Small industrial area: 225 ha
- Infrastructure area: 157 ha

8.3: Staff training programs ^{public...}

None - we had only the small training programs with the short time courses by ~~OPAN~~



KEO SAVIN
DIRECTOR OF PWSA

Technical office.

NEA ENG NEOUN

質問書 2 (事前調査時)

CONTACT MISSION FOR MASTER PLAN AND FEASIBILITY STUDY FOR PHNOM PENH
WATER SUPPLY SYSTEM IN CAMBODIA

QUESTIONNAIRE ON FACILITIES OF WATER SUPPLY

1. Please describe problems you have on the matters mentioned as follows,
 - 1.1 Intake Facilities
 - 1.2 Transmission main
 - 1.3 Treatment Plant
 - 1.4 Distribution main
 - 1.5 Service network
 - 1.6 The other matter

2. If you improve / expand the existing water supply facilities, what do you think of the difficulties for it.
 - 2.1 On the performance of the staff
 - 2.2 On financial matter.
 - 2.3 On the other matters.

3. Please describe the reasons for the above paragraph 2.

4. Water Quality Test
 - 4.1 What kinds of items are tested on water quality in your laboratory.
 - 4.2 Time for the testing (per day, week or month)
 - 4.3 Duration of the recorded data (From when?)
 - 4.4 Do you have data on water pollution in the rivers of Tonle Sap and Tonle Mekong?

5. Availability of pipe materials for execution of the study for the distribution net.
 - 5.1 Please introduce shops which sells pipes and fittings.
 - 5.2 How can the team obtain working staff for test pit excavation, piping and restoration work?

6. How technical assistance from donor countries or NGO are proceeding now? Please describe in detail.
 - 6.1 OXFAM
 - 6.2 UNDP
 - 6.3 France
 - 6.4 Italy
 - 6.5 Others

P. Penh, October 14th 1992

The Answers for SICA mission

2. Problems

1. Problems with the intake facilities:

In 1988 Oxfam started to replace 3 new low lift pumps with the capacity 2200m³/hr per each (two duty, one standby). A dedicated with 3kV power lines runs from the treatment plant to the intake the condition of which is unknown. and now Oxfam has undertaken to repair the pumps house, will be complet in this month. So that at the present we still have some problem with following:

①. the 3 kV cable should be checked from the Treatment Plant to the intake. They ^{are} 3 lines.

②. Control desk at the intake should be inspected and replaced.

③. Compressor for pulling the air to the anti-water hammer should be replaced with the ^{new} automatical system.

④. ^{Instrument} Instrument for checking the water level should be install.

⑤. Overhaul the crane.

for maintenance ⑥. Repair the 4 intake gates around the well.

2. Problems with the transmission main.

The transmission main should be clean, ^{\$ 700k 22.} because there are a lot of rust sediment into the inlet chamber at the treatment plant and the line valves should be checked. 4 valves.

3. Problems with Treatment Plant.

We have had some help from Oxfam up to now but there are still some problems that should be repaired as soon as possible.

- For treated water Aluminium sulfate and chlorine are used. However the lime system is broken and should be replaced.

- All flocculator paddles ^{1966's} should be replaced.

- Flocculator basins and sedimentation basins should be repaired, because they are some cracks in the basins.

- Rapid Sand filters with the control clocks should be repaired and replaced some of the parts.

^{2.5 km} Distribution pumps with the priming system and the control panels ^{should be} ~~not~~ replaced

- Electrical system including HV and LV ^{High Voltage Low Voltage} should be inspected and replaced.

* - We don't have enough power to run the treatment plant.

2 - Ventury

No water

- Instruments for measurement the flow from the intake and treated water in each line should be installed.

21570

8000

Ventury - broken

- Auxiliary machine (backwash pumps, air blower) should be overhauled or replaced.

- finish the russian reservoirs (2 x 5000m³)

- New Laboratory should be constructed and equiped.
- Lack of maintenance and operation. and have no Schedule.

4. Distribution main.

35% to 60% are leaks in the distribution system this is the problems. That we don't know about the condition of the pipe, we don't know the position of the valves. we don't have so much drawings. The air relief valves should be repaired on the line. We don't have enough materials and equipment to do the work. we don't have people to have enough experience.

5. All the people use water from the water line have no tapes, no watermeter and until now we don't know how many house connection do we have in the city? The material for house connection what we use every day are not standards. The people didn't know ~~not~~ so much about the water law.

6. Not enough training people. Billing system should be changed with the new system. the store have no index.

Q. If we expand the existing water supply facilities. the difficult problems what we should have:

- on the performance of the staff.
- on the financial matter.

I. At the present for the existing we have a lot of problems. because we don't have enough technical people to respon the work and the operation should be trained to use machine and equipment. The Enguener have not enough experience about the work. Therefore if we expand the new water supply we should have people that can run the water supply and is better ~~try~~ to repair the existing water supply to increase the capacity to be equal with the ^{design} existing capacity. After that we can think about new water supply.

2. The running cost to run the 2 Treatment Plants are very low if we compare to the ^{amount} amount of money what we collect from the people. That means finance is one of the part for the Water supply to think about to expand the new Treatment Plant.

IV. Water Quality Test.

1. Quality of instruments are in doubt. ^{not accurate} not enough ~~testing~~ testing chemical.

2. 4 times ^{Testing} in day.

- 7 0'clock in the morning

- 11 0'clock ——— " ———

- 2 0'clock in the afternoon.

- 4 0'clock ——— " ———

• Turbidity

• PH

• Conductivity

• Color

• Jar test

3. Begun from 1983.

4. No.

V. 1. There are no shops available in Phnom-Penh that we can ^{not} buy pipes and fittings.

2. For JICA team to work on the distribution side for testing pipe (condition) or pressure leak to know them about 5 places we have material to ~~make~~ ^{make} the test but we need some outside labors to help us. (Excavate 0.25M²)

VI Technical Assistance from Donor Agencies.

1. Oxfam will leave Phnom-Penh water supply Authority end of 1992.

2. UNDP Programms will start in this year December or January 1993. They have 4,1 million US\$ for P. Penh - Kompong-Som water supply projects. They will work on the production side, distribution management, billing system, finance and personnel. There are 5 Chief technical advisors and some UNV work with them.


3. France

1991-92. They have 8 million francs to spend on the distribution side (spare parts, fitting, pipe for secondary pipe and house connections) and to do survey on the house connections by Sufège program and 1 Engineer works now in the P. Penh. Water supply Authority.

- 1992-1993 French plan to give money to the P. Penh Water Supply Authority about 20 million francs. Those money will cover by repairing 12 Rapid sand filters including machine (new backwash pumps - -) at the Phum Prek treatment plant and to be ^{continued} contribute the Safegate program and send people to have training in France and here.

4. Italy: 5,2 million US\$ to repair the existing treatment plant, built a new treatment plant with the capacity 10.000 m³/day, Total 20.000 m³/day. (Cham car morn).

P. Penh, 14.10.1992.

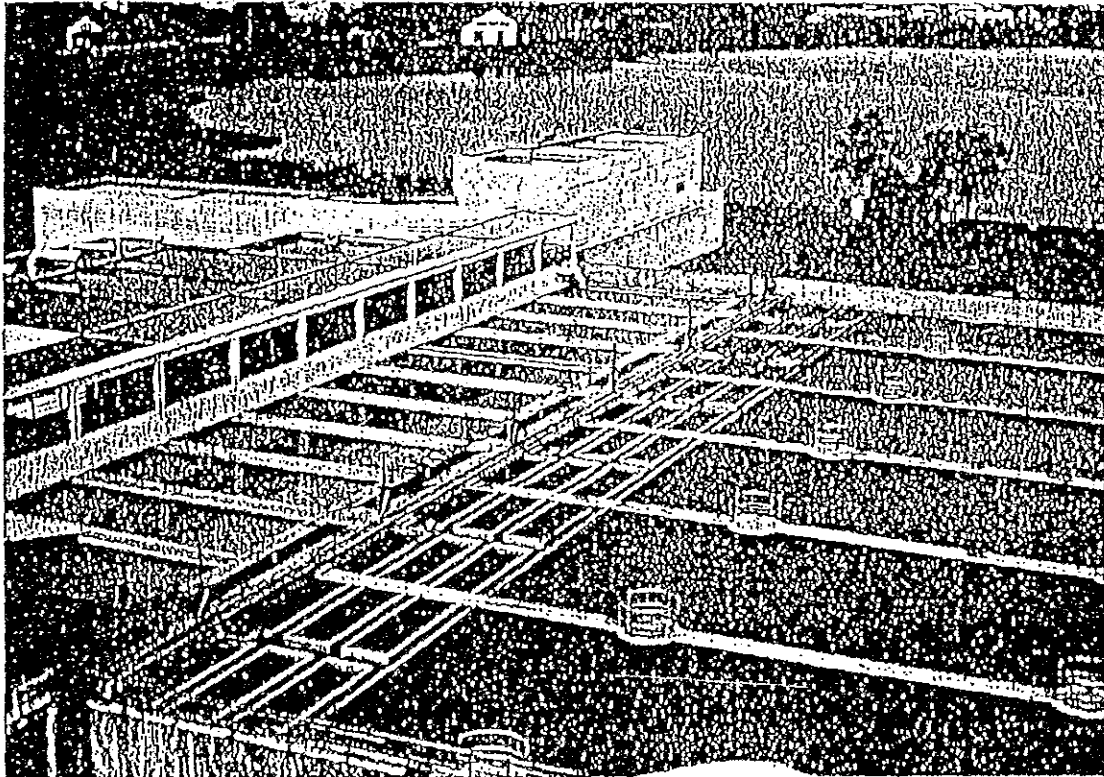

LONG NARO
Deputy Chief of the Techn.
Office

5 プンプレック浄水場施設概要

ブンプレック浄水場施設概要

REGIE DES EAUX

de Phnom-Penh

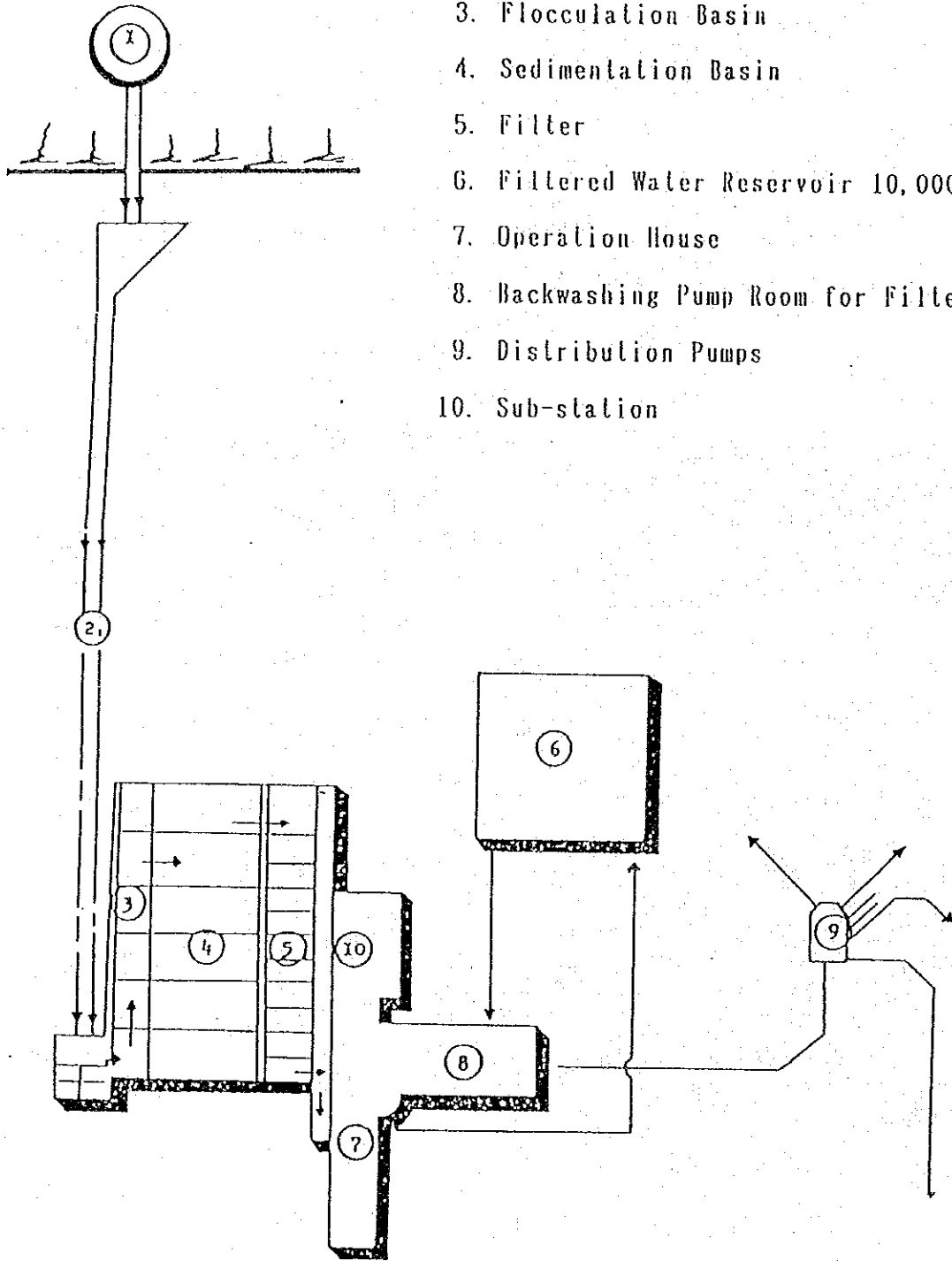


USINE DES EAUX DE
PHUM-PREK

CAPACITE DE TRAITEMENT

100.000 m³/jour

1. Water Intake Tower
2. Raw Water Pipe
3. Flocculation Basin
4. Sedimentation Basin
5. Filter
6. Filtered Water Reservoir 10,000 m³
7. Operation House
8. Backwashing Pump Room for Filter
9. Distribution Pumps
10. Sub-station



I. WATER INTAKE TOWER (1)

The Water Intake Tower is constructed as Cylindrical Tube shape having inside diameter of 10.70 m. The tower is planted in Tonle-Sap River at 46 meter from the river bank.

Access to the tower connected by the metal-bridge with single gate, and supported by three(3) transmission pipes in 900 mm diameter each.

This Pumping Station is equipped with:

- Three(3) units of Vertical type electrical drive pumps having the following characteristics:

Volume per hour.....	2.270 m ³
Total head	19,70 m
Motor output	220 cv (HP)
Electric current at the rate of three phase	3.000V/50Hz

II. RAW WATER TRANSMISSION --- 800MM MAIN PIPE ----- ---- ELECTRICAL CONTROL METHOD (2)

This installation includes:

1. The Raw Water Transmission starts from the chamber with valves situated at edge-side of access bridge of the Water Intake Tower to the Raw Water Receiving Basin beside the Sedimentation Basins.

Ductile Iron Pipe, inside diameter 700mm, divided into Two(2) branches:

- one brand new, length of 1.214 m
 - other branch consisted of 2 parts which jointed with existing Japanese pipe, length of 1.270 m
2. The main transmission line 800mm dia. is connected to safety-overflow at Receiving Basin of Raw Water from Tonle-Sap.

It is consisted of single concrete pipe of inside diameter 800 mm, with Man-holes for inspection and supervision.

3. Electrical Control Line is related between Central Control Room and Raw Water Intake Tower.

III. TREATMENT PLANT

A. Sedimentation Basins and Filters

The Plant has capacity of treatment at 1.200 l/s. Consisting of:

1. One(1) Raw Water Receiving Basin
capacity 190 m³
2. Two(2) Rapid Mixing Tanks,
each capacity 20,50 m³
3. Six(6) Flocculation-Sedimentation Basin
having each capacity of 1.715 m³ and
effective inside-dimensions are as follows:

Flocculation Basin (3)

Length	11 m
Width	8 m
Depth of center-bed.....	3,27 m
Capacity	262 m ³
Duration for total flocculation....	20 mn

Sedimentation Basin (4)

Length	53 m
Width	11 m
Depth of center-bed	2,52 m
Capacity	1.453 m ³
Duration for total sedimentation..	1 h 50 mn

Filters (5)

Four(4) Rapid filtration basins consists total length of Flocculation-Sedimentation Basins.

These filters, gravity type with Sand-bed calibration, having the following characteristics:

Unit surface area	53 m ²
length	11,90 m
Width	4,50 m
Depth of filtering couch.....	1,00 m
Granule-metrie	1 to 1,4 mm
Water flow per unit, normal	390 m ³ /h or 108 l/s
Water flow per unit, maximum	425 m ³ /h or 118 l/s
Filtration speed, normal	7,30 m ³ /m ² /h
Filtration speed, maximum	7,95 m ³ /m ² /h
The head loss, maximum	1,65 m

B. Filtered Water Reservoir (6)

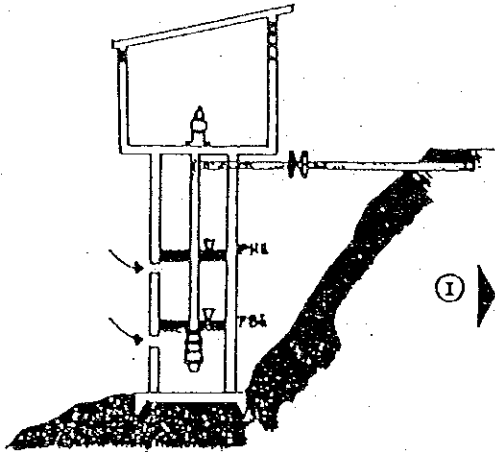
The semi-embanked Reservoir having dimensions and capacity is as follows:

Square numbered	:	50 m x 50 m
Height	:	4,50 m
Capacity	:	10.000 m ³

C. Utility Building (7)

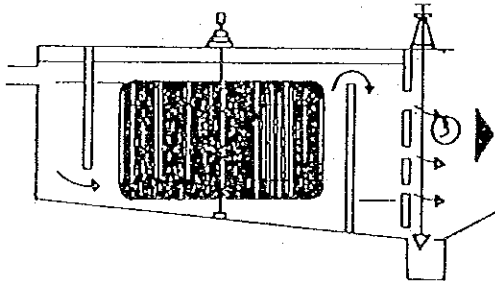
The utility building consists of:

- Entrance hall
- Machinery Room :
 - 2 groupes electric pump for washing filters (P1-P2)
 - 2 groupes electric air-booster for re-generating of filter-couch
 - 1 group electric pump of reversing Main water pipe
 - 1 group electric pump of backwashing Flocculation-Sedimentation Basins
- Storage and Bay for connection parts
- Administrative office
- Control room
- Water Quality control room



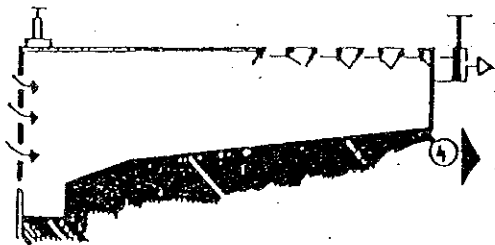
WATER INTAKE TOWER

Diameter : 10.70 m
 Implanted in The Tonle Sap at: 46 m from river bank
 Pumps : 3 electric pumps
 vertical type:
 2.270 m³/h per unit
 Q' ty 1 unit



FLOCCULATION BASIN

Dimensions : 11 x 8 m
 Depth : 3.27 m
 Capacity : 262 m³
 Q' ty 6



SEDIMENTATION BASIN

Length : 53 m
 Width : 11 m
 Depth : 2.52 m
 Capacity : 1.453 m³
 Q' ty 6

IV. The Hall of Filtered Water Transmission Pumps (8)

The hall of filtered Water Transmission Pumps consists of:

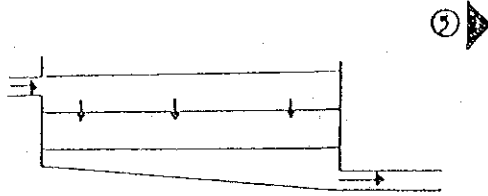
4 groupes electric pumps, horizontal type, each unit having the following characteristics:

Continuous Rate	2.100 m ³
Total head at manometer.....	42 m
Motor Output	440 HP
Electrical current at 3 phase	3.000V/50Hz

V. Transmission Line to the Town (9)

Exit of flitered water at Treatment Plant connected and reached to the House of distribution valves consist of:

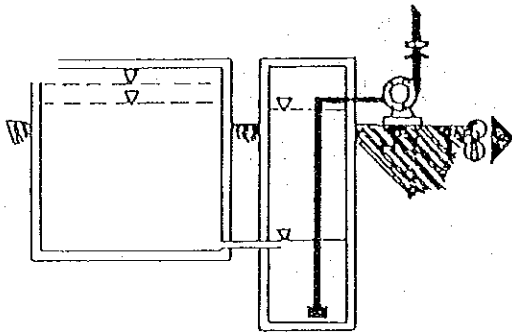
- 1 transmission pipe line of dia. 1.250 mm
- 3 transmission pipe lines of dia. 700 mm
- 2 transmission pipe lines of dia. 600 mm
- 1 transmission pipe line of dia. 350 mm



FILTERS

Surface : 53 m²
 Length : 11.90 m
 Width : 4.50 m
 Depth for couch filter: 1.00 m
 Sand Granulation : 1 to 1.4 mm

Q' ty 12



RESERVOIR AND FILTERED WATER PUMP

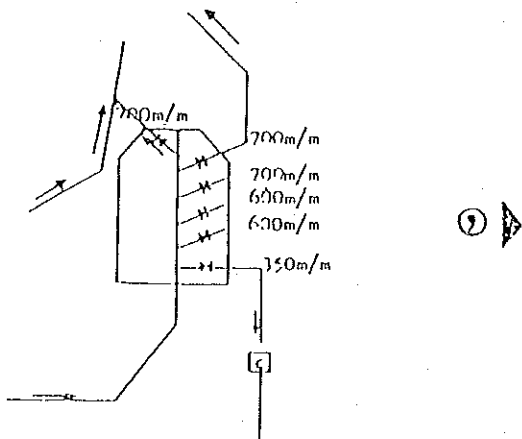
Reservoir

Pump

Semi-embanked:
 Squared : 50 x 50 m
 Height : 4.50 m
 Capacity: 10.000 m³

electric pump, horizontal
 continuous rate: 2.100 m³
 Total head(meter): 42 m
 Electric power : 440 HP

Q' ty 1



DISTRIBUTION TO THE TOWN

(FUTURE)

- 1 pipe line of dia. 1.250 mm
- 3 pipe lines of dia. 700 mm
- 2 pipe lines of dia. 600 mm
- 1 pipe line of dia. 350 mm

(EXISTING)

At present, only 2 lines are existed:

- 1 pipe line of dia. 700mm (to P. Penh)
- 1 pipe line of dia. 350mm (to T. Kork)

VI. POWER STATION

A. Generator group

- 3 groupes of Electric Generators MT, each equipped with motor of:

Diesel engine of nominal power.....	2.000 HP
Alternator	1.500 KVA
Current Output	3.000V/50hz

- 2 groupes of Electric Generators BT, each equipped with motor of:

Diesel engine of power output	400 HP
Alternator	300 KVA
Current BT	50 hz
Tension phase and neutral.....	220 V
Phase	380 V

- 2 Electric air-Compressors of starting output 20 m3/h at 21 Kg/cm2. Electrical control for Motor, connecting and disconnecting ON-OFF.

B. Fuel Storage

- 2 metal tanks installed 180 m3 each
asphalt pavement on sand-bed

- 1 mobile tank on trailer, and fuel component with valve dia. 80/90 (3")

- 1 fuel pump unit:

including 2 fuel pumps PETZ & CO. type AGV 3611 (P1-P2)
with motor CONZ EX. UMY-16-4
power : 0.8 kw
speed : 1.410 T/mn

