Preparatory Survey on Water Quality Improvement Project for Japanese Bridge Area in Hoi An City

Draft Final Report Explanation

December 2014

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
Nihon Suido Consultants Co., Ltd.

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I. Basic Information

1. Objective of the Project

- A sewage treatment plant is constructed and the Japanese Bridge Canal is rehabilitated, and treated wastewater is discharged into the Japanese Bridge Canal in Hoi An City.
- Improvement of water quality in the Japanese Bridge canal, to contribute to improve the living and sanitary conditions of citizens, and to upgrade the tourist attraction of the city.

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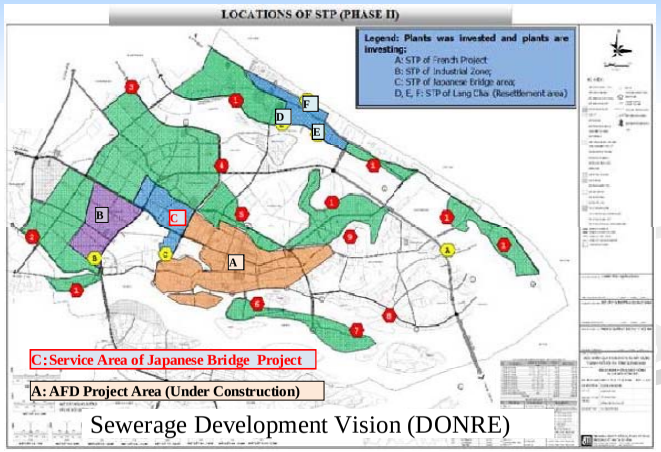
2. Objective Area



Sewerage Development Vision (DONRE)

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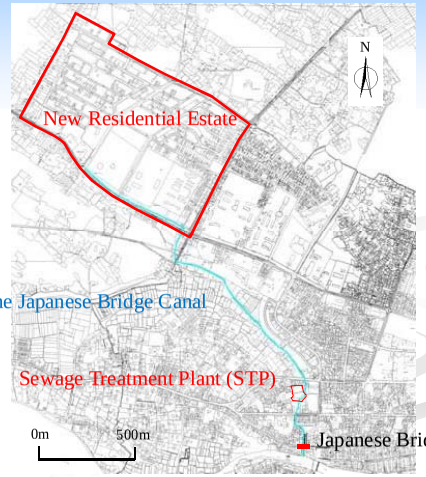
2. Objective Area



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3. Project Components

Item	Requested Components	Design Components
Sewage Treatment Plant (STP)	Treatment Capacity:2,000 m^3/day (daily maximum) with sludge treatment	Treatment Capacity:2,000 m^3/day(daily maximum) with sludge treatment Administration building (Floor area:264m^2)
The Japanese Bridge Canal	Upgrading with concrete and cover : 2.0km	Rehabilitation with concrete (partly covered and compound section) : 1.68km Dredging: 99m
Equipment Supply	A convertible truck Inspection equipment for water quality control A personal computer and a printer for data logging	A canopy truck
Soft component	-	Operation and Maintenance Guidance of STP Maintenance Guidance of the Japanese Bridge Canal Sewerage Financial Management Planning Assistance

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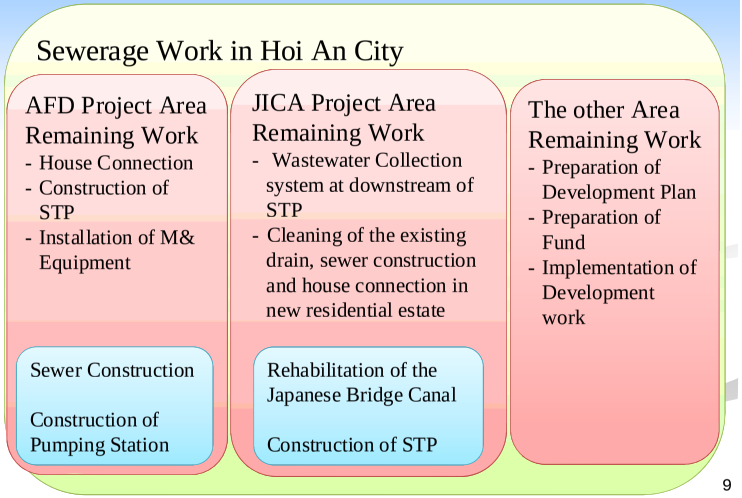
4. Overall Sewerage Work in Hoi An City



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5. Status of AFD Project

1) Construction of sewers and pumping stations have been constructed, and following works remain.
   - Construction of Sewage Treatment Plant (STP)
   - Installation of Mechanical and Electric Equipment for pumping stations
   - Some part of force main
   - House connection
2) Operation and Maintenance arrangement is required.
3) Relatively large amount of wastewater generated in the AFD service area have to be treated in new STP funded by JICA by completion of house connections and operation of STP of AFD Project.

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II. Project Components

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6. Rehabilitation of the Japanese Bridge Canal

Issues of the Japanese Bridge Canal

- Wastewater flow from new residential estate is quite little at the moment because of low house connection ratio and infiltration from earth drain etc., while discharge from hotels in AFD project area is relatively large amount.
- Relatively clean irrigation water flows in the canal during irrigation period. And the vicinity agricultural areas play important role of regulating function to mitigate flooding condition.
- Invert slope of the canal is irregular and sections having reverse slope and depressions exist. Stagnation of flow and odor are generated during dry season consequently.
- Untreated wastewater from AFD project area flows in the canal at downstream of the STP.
- Dredging and cleaning are required for the existing regulation pond and the section of about 100m close to Japanese Bridge where the section was constructed as scenery open canal with masonry wall.

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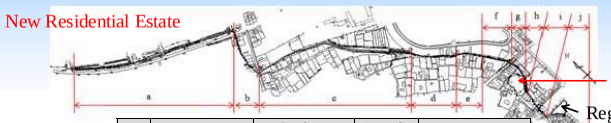
6. Rehabilitation of the Japanese Bridge Canal



Span	Size (mm)	Gradient (1/1000)	Length (m)	Remark
a	K2100 x 1500	0.80	560	Rehabilitation
b-1	K1600 x 800	1.80	100	Rehabilitation
b-2	B1200 x 1000	3.00	50	Rehabilitation
c	K2400 x 900	1.30	510	Rehabilitation
d	K2000 x 1100	1.30	160	Rehabilitation
e	K2400 x 1100	1.30	90	Rehabilitation
f	K3000 x 1000	2.01	90	Rehabilitation
g	K2300 x 1700	0.82	70	Rehabilitation
h	B2600 x 1300	1.80	50	Rehabilitation
i	B1700 x 2200	2.30	110	
j	K6000 x 2400	0.88	160	
Total	Rehabilitation		1,680	
	Grand total		1,950	

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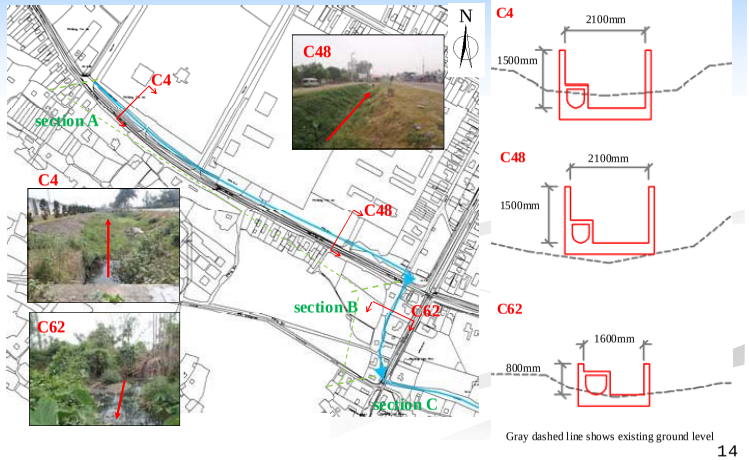
6. Rehabilitation of the Japanese Bridge Canal



Gray dashed line shows existing ground level

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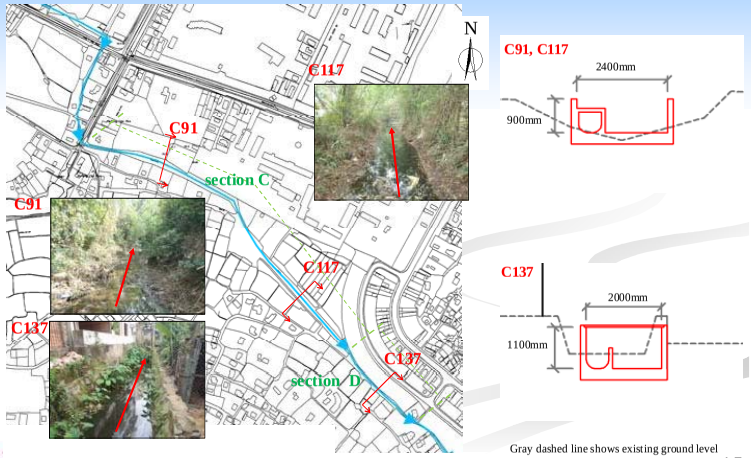
6. Rehabilitation of the Japanese Bridge Canal



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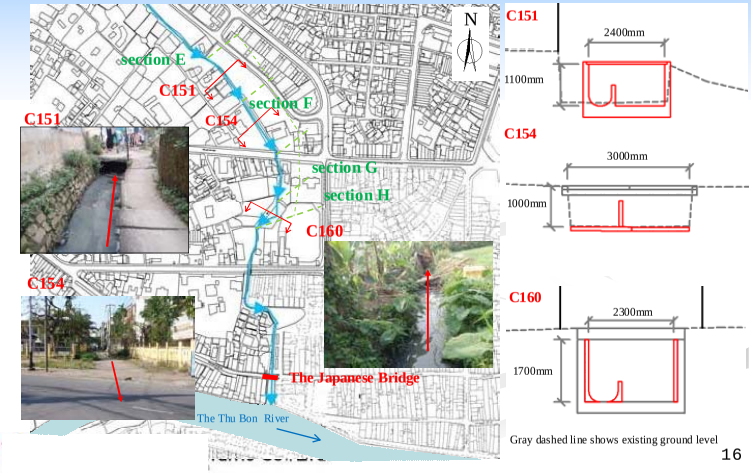

Gray dashed line shows existing ground level

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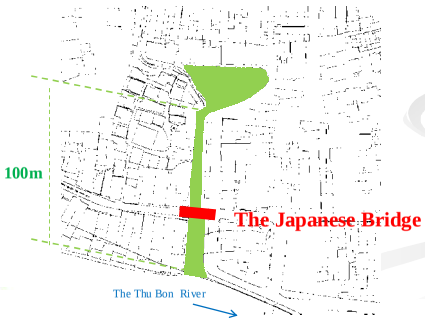
6. Rehabilitation of the Japanese Bridge Canal (Dredging and Cleaning)

- For Keeping the scenery attractive
- Dredging and Cleaning by manpower and construction Machine



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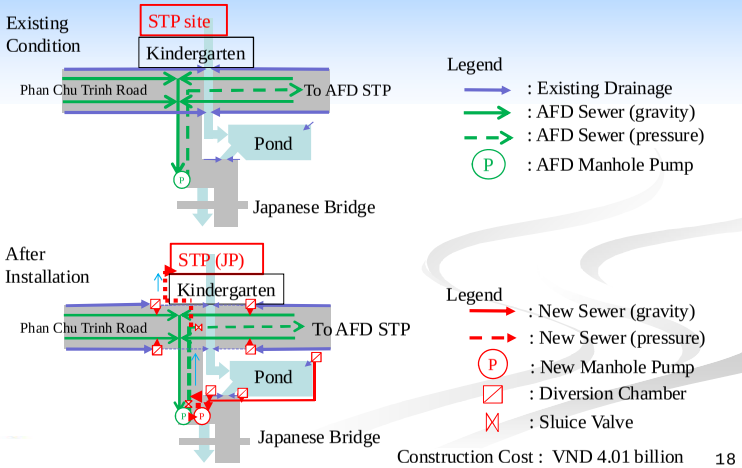
6. Rehabilitation of the Japanese Bridge Canal

Installation of collection facilities for Downstream Area of STP



Construction Cost : VND 4.01 billion

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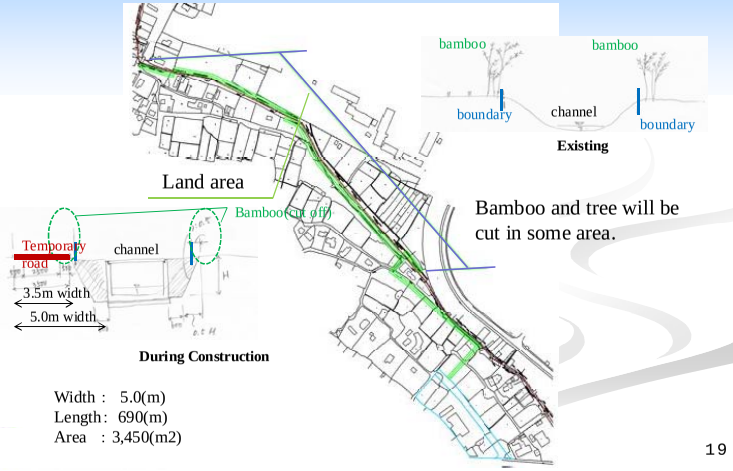
6. Rehabilitation of the Japanese Bridge Canal

Temporary Approach Road for Canal rehabilitation



Width : 5.0(m)
Length: 690(m)
Area : 3,450(m2)

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6. Rehabilitation of the Japanese Bridge Canal

New Residential Estate

- Cleaning of the existing drains to make smooth flow from individual houses to the Japanese Bridge Canal in dry and wet whether conditions
- Construction of house connections to accommodate wastewater to the existing drains, or
- Construction of separate sewer to ensure wastewater treatment in the future and to comply national orientation

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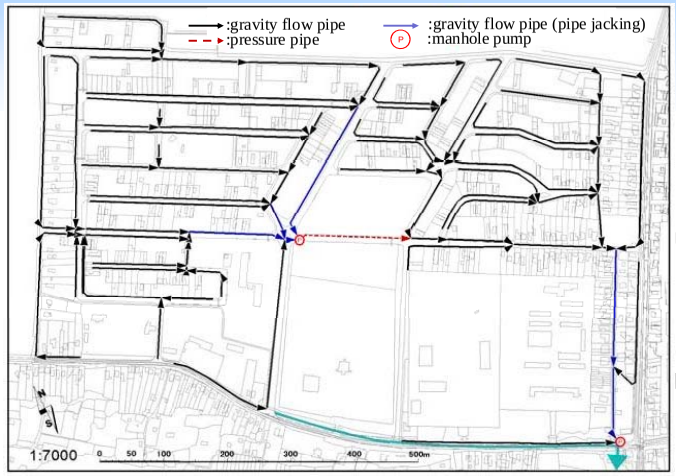
6. Rehabilitation of the Japanese Bridge Canal



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6. Rehabilitation of the Japanese Bridge Canal

Noted Points

- Parts of canal will be covered, but some parts will remain as open canal
  - Odor generation will be prevented, as sections for wastewater are covered.
  - To keep some open parts as it is to prevent from changing flood locations, since storm water comes in and out at many places in wet weather
  - To collect wastewater separately from irrigation water, which flows into the canal occasionally in dry weather
- Periodical inspection and cleaning of the canal, and canal clean campaigns are inevitable.

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7. Construction of Sewage Treatment Plant (STP)

1) Design Horizon ： Year 2020

2）Connection ratio and Served Population of STP

Area	Item	2015	2020	2025	2030
New Residential Area	Connection Ratio (%)	10	75	80	90
	Served Population (Person)	573	4,870	5,635	6,929
AFD Area	Connection Ratio (%)	100	85	60	20
	Served Population (Person)	7,854	6,855	4,938	1,689
Total Served population		8,427	11,726	10,573	8,619

3)Unit Wastewater Flow

130ℓ/cap./day (daily average flow for the are not served by piped water system)

162ℓ/cap./day (daily maximum flow including administrative and commercial flow)

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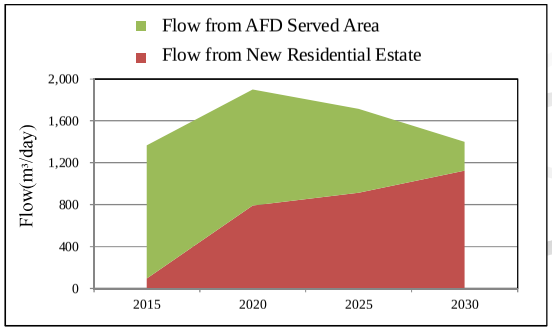
7. Construction of Sewage Treatment Plant (STP)

3) Wastewater to be Treated (m³/day: daily Maximum)

Area	2,015	2,020	2,025	2,030
New Residential Area	93	790	914	1,124
AFD Area	1,274	1,112	801	274
Total	1,367	1,902	1,715	1,398



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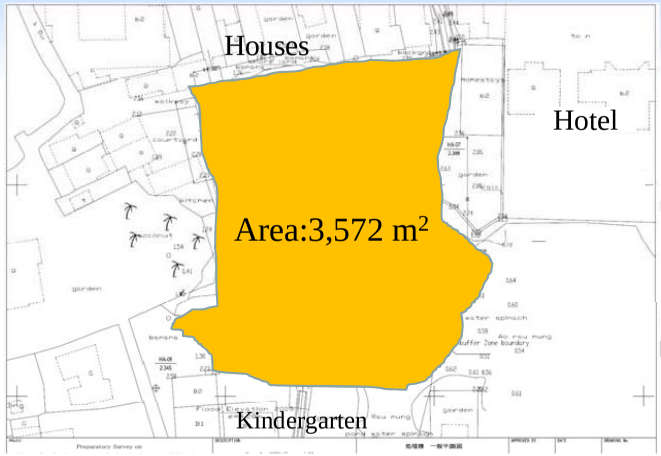
7. Construction of Sewage Treatment Plant (STP)

3) Design Condition

- **STP Site**



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7. Construction of Sewage Treatment Plant (STP)

3) Design Condition

- Inflow Water Quality
  BOD 220 mg/L, SS= 110mg/L
- Required Treated Water Quality

Item	BOD	SS
QCVN 14-2008/BTNM[1)]	Less than 50 mg/L	Less than 100mg/L
TCVN 7222:2002[2)]	Less than 10 to 30mg/L	Less than 10 to 30mg/L
Designed Treated Water Quality	Less than 10 to 30mg/L	Less than 10 to 30mg/L

Note;

1) Water Quality Standards for Domestic Wastewater Discharge, MONRE
2) Treated Water Quality Standards of STP, MOC

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7. Construction of Sewage Treatment Plant (STP)

3) Design Condition

- Buffer Zone of STP (QCVN07:2010/BXD)

No.	Items	Buffer zone (m) based on capacity (×1000m³/day)			
		< 0.2	0.2 - 5	5 - 50	>50
1.	Pumping Station	15	20	25	30
2.	Wastewater treatment plant				
a.	Physical treatment (combine with Sludge drying bed)	100	200	300	400
b.	Biological treatment (with Sludge drying bed)	100	150	300	400
c.	Biological treatment without Sludge drying bed (but with Sludge treated equipment)	10	15	30	40
d.	Underground sewage filter yard	100	150	300	500
e.	Sewage farming	50	200	400	1,000
f.	Biological pond	50	200		
g.	Sewage Oxidation channel	50	150		

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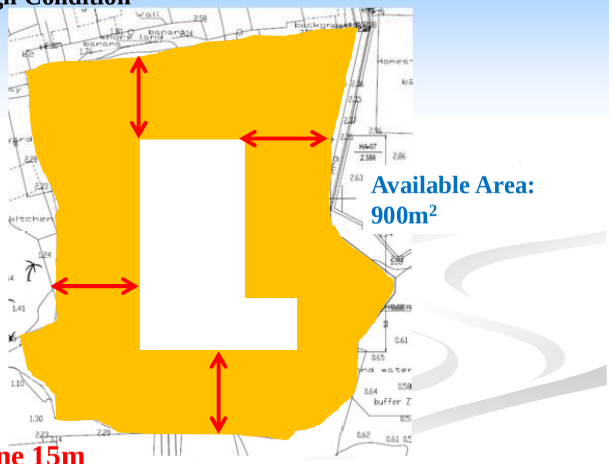
7. Construction of Sewage Treatment Plant (STP)

3) Design Condition



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7. Construction of Sewage Treatment Plant (STP)

3) Design Condition

Heritage Preservation are: Zone II-A
(No.2337/2006/QD-UBND)

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7. Construction of Sewage Treatment Plant (STP)

3) Design Condition

- Requirement of Zone II-A
  - Height of building: 10.5m
  - Design of building: roof, color of wall, materials of building, etc.

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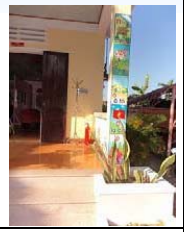
7. Construction of Sewage Treatment Plant (STP)

3) Design Condition

- Natural and Social Requirements
  - Flood level : 4.28m in 2009



Kindergarten

Plate of Water Height Record

- Social Requirement
  - Reduce impact of odor on neighbors

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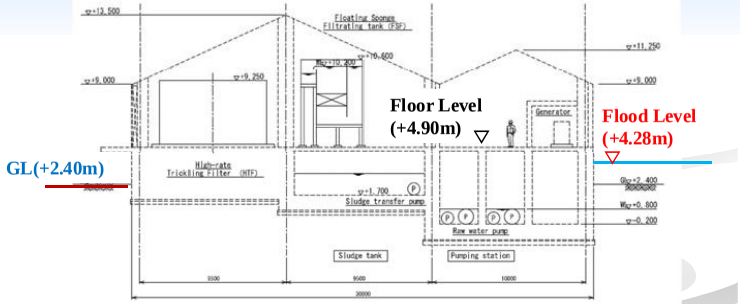
7. Construction of Sewage Treatment Plant (STP)

3) Design Condition

- Structural Arrangement



- Floor Level: 4.9m is higher than Flood Level of 4.28m.

- Deodorization system is installed and odor is treated.

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7. Construction of Sewage Treatment Plant (STP)

- Capacity : 2,000 m^3/day (Daily Maximum)
- Process : Pre-treated Trickling Filtration (PTF)
  (the First International Technology Certificate by Japan Sewage Works Agency)
- Building for Treatment Facilities: Building to cover treatment facilities is required by Hoi An Centre for Monuments Management and Preservation (HCMMP) to keep scenery of World's Cultural Heritage Preservation
- Administration Building : Floor area of 284 m^2 with electrical room, administration office, and water quality analysis room on the second floor

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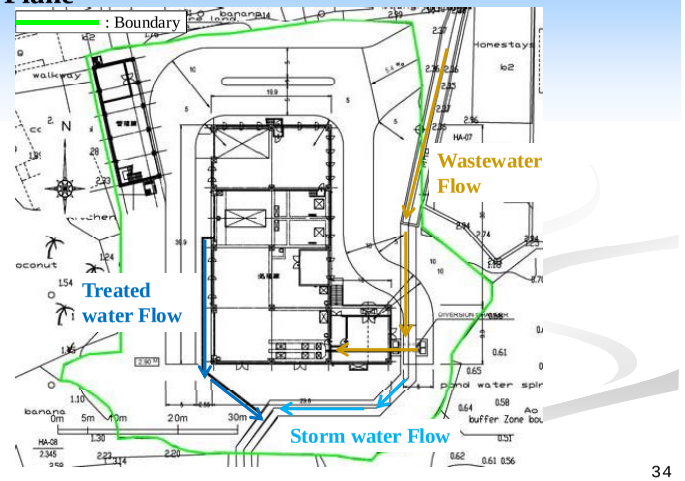
7. Construction of Sewage Treatment Plant (STP)

Plane



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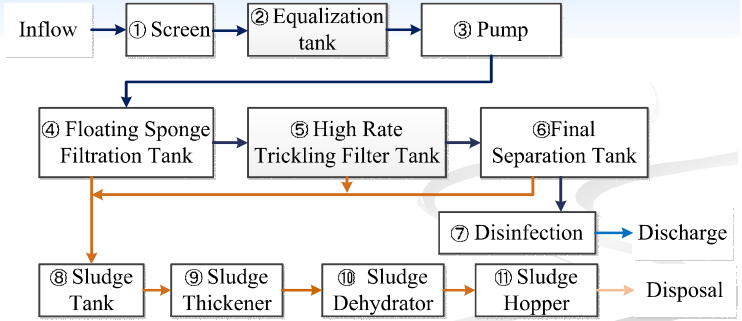
7. Construction of Sewage Treatment Plant (STP)

Treatment Flow



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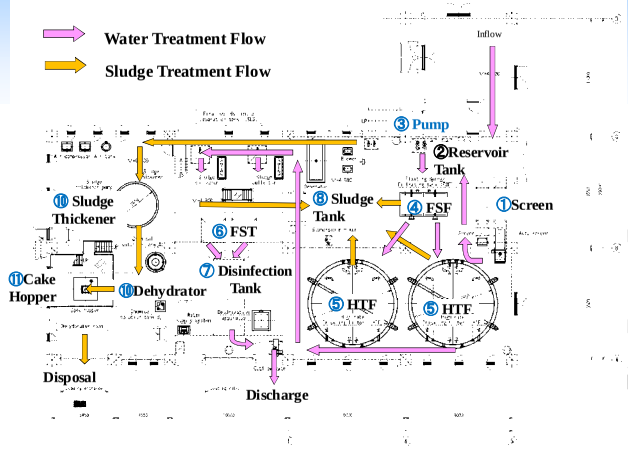
	Treatment Unit	Function
①	**Screen**	To remove small materials such as wood, fiber, and food waste for the protection of pump and floating sponge filtration unit.
②	**Equalization Tank**	To store wastewater which is overt than 2,000m^3/d(83.3 m^3/h) flow when wastewater increases due to rain and so on
③	**Pump**	To lift wastewater to Floating Sponge Filtration
④	**Floating Sponge Filtration Tank**	To remove SS such as debris in wastewater
⑤	**High Rate Trickling Filter Tank**	To remove BOD in wastewater
⑥	**Final Separation Tank**	To remove SS derived from the biofilm of trickling filter.
⑦	**Disinfection**	To inactivate pathogen in treated water.
⑧	**Sludge Tank**	To store sludge from Floating Sponge Filtration and Final Separation Tank.
⑨	**Sludge Thickener**	To increase the solids content of sludge by removing a portion of the liquid fractions.
⑩	**Sludge Dehydrator**	To dewater the sludge from sludge thickening Tank.
⑪	**Sludge Hopper**	To store dewatered sludge

7. Construction of Sewage Treatment Plant (STP)



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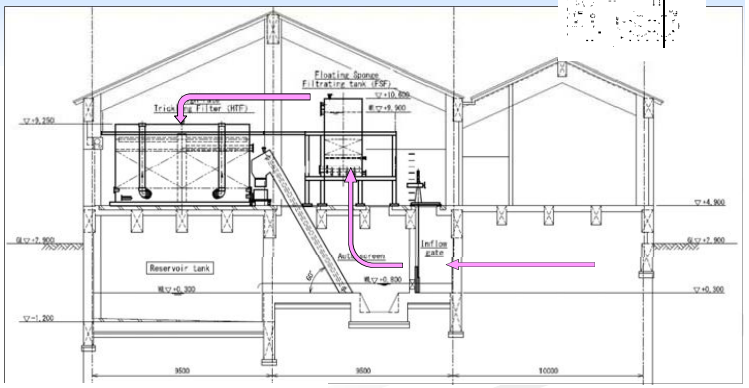
7. Construction of Sewage Treatment Plant (STP)
(Cross Section Drawing)

Section



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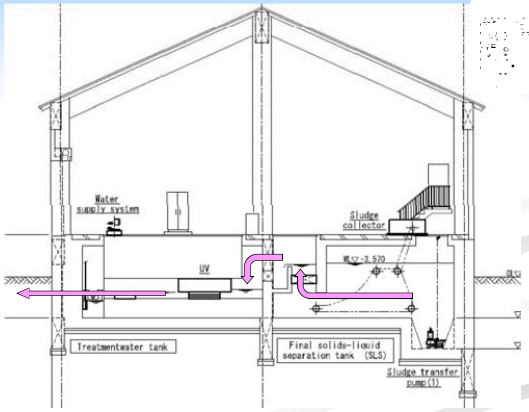

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Water and Environmental Consultants

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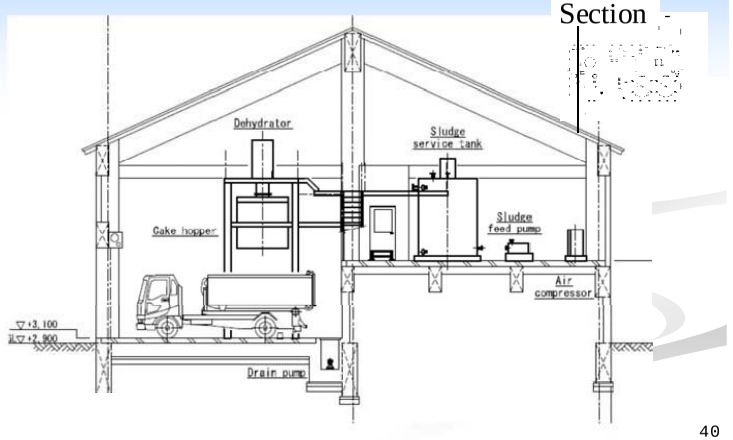

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