(5) Summary of the Sewerage Expansion project

1) Objective

In order to protect water environment of Mandovi River, "Project Outline on Environmental Upgrading of Panaji City, Phase-1" was prepared on December 2001. The project has already started and a new treatment plant was constructed and is in operation since April 2005. The project outline is as follows.

Project Scope:	Environmental upgrading of Panaji
Project Components:	Augmentation of the STP,
	Reconditioning of the existing plant,
	Extension of sewers and
	Pipeline for effluent disposal to the Mandovi estuary.

2) Project Components

a. Construction of Additional Treatment Plant

New treatment facility with capacity of 12,500m^3/day started operating in April 2005. It was constructed by turn-key and designed by Indian consultant company. The treatment process used is "SBR (Sequencing batch reactor) method", instead of originally proposed "Complete mixed activated sludge method". SBR method has advantage over the complete mixed system in land requirement, economical aspects. Process diagram, general plan of the new plant and specifications are shown in Figure 32.2 and 32.3, Volume IV Appendix M35.4 List of Existing STP Facilities, Panaji City , respectively.

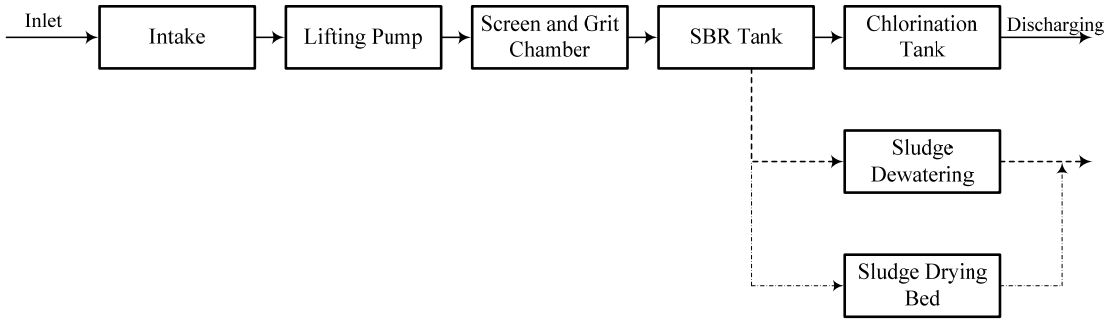

Figure 32.2 Process Diagram of Panaji STP（SBR）

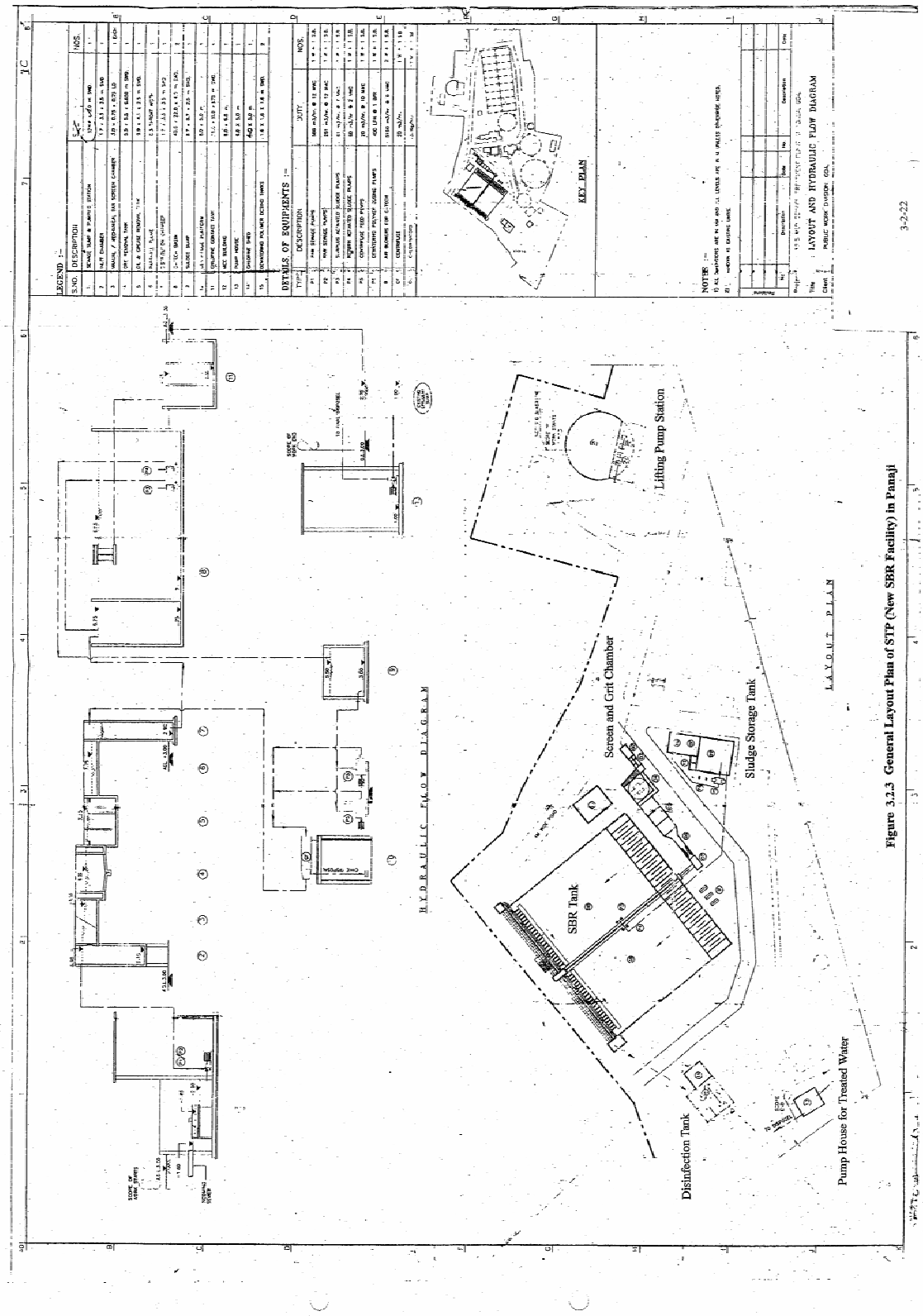

Figure 32.3 General Plan of Panaji STP (New Plant)

b. Renovation of the Existing STP

Renovation works for the existing STP are shown as below.

- Improvement of the existing bio-filter, including change of media and other rectification works
- Rectifications and replacement of the rake arms of the existing primary settling tank
- Replacement of 5 centrifugal pumps, bar-screens distribution chamber, flume channel, etc.

c. Pipeline of Treated Effluent Disposal to the Mandovi Estuary

A 500mm dia. D.I. pipe upto the river bank and a 630mm dia. HDPE pipe in the river bed are planned to discharge the treated water to the Mandovi estuary. The diffuser is also designed for the requirement of quick diffusion and dilution of the treated effluent.

d. Treatment Plant for Re-use for Irrigation and Gardening

The partial flow (75 m^3/hour) of the final effluent is proposed to be treated with pre-treatment and R.O. plant for reuse for public gardens, local plantations, etc.

e. Extension of Sewers to Left Out Area

It is proposed to take up the work of extension of sewers to left out areas as shown below;

- Tambdi Mati, Santa Inez, Panaji
- Patto Colony, near Patto bridge
- Some areas on Altinho Hill slopes etc.

3) Project Cost (see Table 32.11)

Table 32.11 Costs for Sewerage Expansion Project of Panaji City

Works		Project Cost (lakhs)
a.	Construction of Additional Treatment Plant	646.95
b.	Renovation of the Existing STP	84.00
c.	Pipeline of Treated Effluent Disposal to the Mandovi Estuary	69.00
d.	Treatment Plant for Re-use for Irrigation and Gardening	193.00
e.	Extension of Sewers to Left Out Area	194.50
f.	Construction of 5 seats community toilet complex	8.39
g.	Construction of staff quarters and acquisition of additional land	47.80
Sub-total		1,243.64
Price escalation, contingencies, etc.		259.24
Total		1,502.88