

SECTION 6 - SUB-SECTION I

WATER AND SANITARY SEWAGE

CONTENTS

- A - Water System Design Principles and Guidelines6I-2**
 - 1. Operational requirements6I-2
 - 2. Basic assumptions6I-2
 - 3. Work and site description6I-2
 - 4. Water supply system infrastructure specifications6I-3
 - 5. Drinking and sanitary water design data6I-4
 - 6. Irrigation and fire extinguishing water design data6I-4
 - 7. System design standards and specifications6I-5

- B - Sewage Infrastructure Design Principles and Guidelines6I-7**
 - 1. Operational requirements6I-7
 - 2. Basic assumptions6I-7
 - 3. Work and site description6I-8
 - 4. Sewage system infrastructure specifications6I-8
 - 5. Sanitary requirements design data6I-9
 - 6. System design standards and specifications6I-9

A - Water System Design Principles and Guidelines

1. Operational requirements

- 1.1 The water supply system to the site must supply water to the buildings for kitchens and sanitary uses, water for irrigation of garden areas and for fire extinguishing as well as cleaning the area of the site and the installations.
- 1.2 The designer must keep in mind the following points:
 - 1.2.1 The water supply system will be fully standalone.
 - 1.2.2 Complete dependency of the number of users, both people and installations, upon the external water supply.

2. Basic assumptions

- 2.1 External water supply system, temporary or permanent, will be supplied up to the border of the site by the Customer. The contractor will implement connection of water supply inside the Facility site.
- 2.2 The water system within the site and in the installations will be designed for maximum conservation and saving of water, without affecting operational requirements.

3. Work and site description

- 3.1 In principle, the installation's water system will be connected to the existing water system of Jordan River terminal. The Customer/ land owner will provide water infrastructure up to the plot's boundary.
- 3.2 The water distribution system in the installation is intended to serve four main objectives:
 - 3.2.1 Distribution of water to the buildings (for drinking and for sanitary use of the installation's workers)
 - 3.2.2 Washing water for installations;
 - 3.2.3 Ensure water supply, in the quantities and pressures needed, for fire protection.

3.2.4 Water for irrigation of garden areas;

4. Water supply system infrastructure specifications

4.1 The water supply system includes the following functions:

4.1.1 Connection of the water system to the existing water infrastructure outside the plot;

4.1.2 Main water supply system within the plot area up to the buildings and installations in the site;

4.1.3 Water supply system 8" diameter in size for fire extinguishing, up to the corners of the plot;

4.1.4 Water supply system for irrigation of the gardens;

4.1.5 Automatic fire-extinguishing sprinkler system in the buildings;

4.1.6 Emergency water storage tank for fire-extinguishing sprinklers and hydrants

4.1.7 Fire extinguishing booster pumps

4.1.8 Fire cabinets comprising hydrants and fire hose reels will be installed inside and outside the buildings according to the Fire-fighting Authority requirements.

4.2.1 Surveying or using existing surveys according to the master design of the water networks and the location of the water installations.

4.2.2 Surveys and examinations regarding the quantity of water necessary for drinking, for sanitary purposes and for fire extinguishing (by sprinklers and hydrants), and proposing several alternative solutions.

4.2.3 Detailed designing of the water networks, piping, trenches, etc. including cross-sections and details;

4.2.4 Detailed designing of the fire-extinguishing network and the water system pumps and fire booster pumps, including cross-sections and details.

4.2.5 Designing the connections to existing infrastructure and to buildings and installations, including details.

- 4.2.6 Technical specification and computerized bill of quantities to implement the work and to order the materials. The specification will include a list of drawings relevant to the specification and the bill of quantities.

5. Drinking and sanitary water design data

5.1 The details of the design data are as follows:

5.1.1 About 100 permanent employees will work in the installation (possibly in shifts), as well as about 250 visitors per day, whose presence in the installation will last a short time, and who will use water mainly for sanitary purposes.

5.1.2 All pipes will be underground and will be connected to the existing infrastructure outside the boundaries of the plot, by means of appropriate valves.

5.1.3 The layout of the pipes will be as marked in the plans and according to the cross-sections appearing in the plans.

5.1.4 Each pipe in the plans may have an alternative.

The designer must specify at the PDR the kind of pipes used in each alternative. The appropriate diameters will be given for each alternative.

5.1.5 The fire extinguishing, sprinkler and hydrant pipes will be marked with a different color from the drinking water pipes and from the water for sanitary purposes, and they will be drawn on a separate layer.

6. Irrigation and fire extinguishing water design data

6.1 The detailed design data for water for fire extinguishing is as follows:

6.1.1 The water supply to an individual 3" fire hydrant will be 500-900 liters per minute at a pressure of 4 atm.

6.1.2 The water supply will suffice to operate three 2" fire hydrants simultaneously with an amount of 425-750 liters per minute per faucet and at a pressure of 4 atm; on condition that the pressure at the aforementioned fire faucets will not be greater than 7 atm and not less than 2 atm.

- 6.1.3 The emergency water storage tank for fire-extinguishing sprinklers and hydrants will be adequate for 5 hours of use.
- 6.1.4 Pipes will be made of steel, buried in the ground with all necessary protection against corrosion according to the accepted standards.
- 6.1.5 The water network will be based on a ring configuration (feeding from at least two directions) and it will have valves at each branch and at each predetermined length, as per the instructions of the nearest fire-fighting authority.
- 6.1.6 Water stockpiling: In order to ensure the flow of water to fight fires, an adequate reserve stockpile of water must be ensured in addition to the reserve of water needed for the normal water supply.
- 6.1.7 The fire-extinguishing system may be connected to the normal water supply system on condition that the normal water equipment will withstand the pressure of the fire-fighting system.
- 6.1.8 At the side of every entrance to a building in the installation, a 3" diameter hydrant will be installed.
- 6.1.9 Around all the sides of every building, 2" diameter hydrants will be installed. The distance between fire-fighting hydrants will not be greater than 60 m.
- 6.2 There will be large spaces of gardens and trees in the plot area.

The contractor is responsible for designing a water supply system for the gardens, according to the quantities needed by the garden designer, using an automatic irrigation system.

7. System design standards and specifications

- 7.1 Updated Instructions for Sanitary Installations (H.L.T.).
- 7.2 General specification for building works (Chapter 07 - General Specification for Sanitary Installations).
- 7.3 General specification for building works (Chapter 57 - General Specification for Water, Sewage and Channeling works).

- 7.4 Guidelines from the local fire-fighting authorities.
- 7.5 The sprinkler system will be automatic and computerized.

B - Sewage Infrastructure Design Principles and Guidelines

1. Operational requirements

- 1.1 The infrastructure for sanitary sewage in the plot area is required to evacuate all ordinary waste water from the building (flushing water) and from the other buildings and areas that receive a supply of water.
- 1.2 The designer must take into consideration the following points:
 - 1.2.1 Complete consideration for any number of users of the sanitary needs of the system (without compromise).
 - 1.2.2 The designed system must evacuate the sewage to the existing sewage system outside the plot area, or collect it within the plot and evacuate it mechanically to the municipal sewage system.

2. Basic assumptions

- 2.1 The sanitary sewage infrastructure will be based on two alternatives regarding elimination of waste water.
 - 2.1.1 Connection to the municipal main sewage pipe, in a place as close as possible to the plot area (the distance or location of the line has not yet been defined).
 - 2.1.2 Central collecting tank, following the updated regulations of the relevant authorities, and pumping from the tanks in the plot area, to be designed and implemented by the contractor.
- 2.2 Should the sewage system be based on tanks and pumping from the tanks within the plot area, this will be designed so that the pumping will not interfere with the normal work of the installation and that it will enable evacuation of the sewage from the system in an orderly manner and without nuisances such as odors, flooding, etc.

3. Work and site description

- 3.1 The sewage infrastructures will include the sanitary sewage and the flushing water collected from the building and the other installations in the site.
- 3.2 Design of the sewage infrastructure and the location of the collecting installations will be based on the existing topography of the grounds within the plot and outside, while preserving the quality of the environment.

4. Sewage system infrastructure specifications

- 4.1 Infrastructure for the system will include the following functions:
 - 4.1.1 Collecting network for sewage from the sanitary drains of the building and from washing installations.
 - 4.1.2 Local collection installations or, alternatively, connection of the network to an existing sewage mains outside the boundaries of the plot.
- 4.2 Design of the sewage system infrastructure will include:
 - 4.2.1 Geodesic measurements or using existing surveys and plans in the master plan of the sanitary sewage network (piping), placement of settling pits/ tanks and collecting installations.
 - 4.2.2 Presentation of surveys and examinations regarding the amount of sewage and proposals for several alternative solutions by the Contractor at the PDR;
 - 4.2.3 Detailed design of the sanitary sewage network, pipes, trenches, etc., including cross-sections and details.
 - 4.2.4 Connection plans with the sewage and drainage pipes designed or implemented by others, with full coordination.
 - 4.2.5 Detailed design of local collection installations, including cross-sections and details.

- 4.2.6 Technical specification and computerized bill of quantities for work implementation and materials order (see general guidelines). The specifications will include a list of drawings relevant to the specification and the bill of quantities.
- 4.3 Design of the sewage system will comply with the regulations and requirements of quality of the environment.

5. Sanitary requirements design data

- 5.1 Details of the design data are as follows:
 - 5.1.1 About 50 permanent employees will work daily in the installation. About 70% of employees are men and 30% women.
 - 5.1.2 The installation will be visited daily by about 250 visitors (truck drivers, guests and escorts) whose presence in the installation will last short periods of time, 90% of them men and 10% women.
 - 5.1.3 All pipes will be underground and connected to the central infrastructure outside the area of the plot.
 - 5.1.4 The layout of the pipes will be designed with adequate gradients.

6. System design standards and specifications

- 6.1 Updated Instructions for Sanitary Installations (“H.L.T.”).
- 6.2 General specification for building works (Chapter 07 - General Specification for Sanitary Installations).
- 6.3 General specification for building works (Chapter 57 - General Specification for Water, Sewage and Channeling works).
- 6.4 Israeli Standard IS 884 for underground sewage and channeling.