

STATE OF KUWAIT

**MINISTRY OF PLANNING
AND
MINISTRY OF PUBLIC WORKS**

SANITARY ENGINEERING SECTOR

AGREEMENT NO. EF/S/121

FOR

**STUDY AND PREPARE KUWAIT SANITARY MASTER PLAN
AND OTHER RELATED WORKS.**

TERMS OF REFERENCE

DOCUMENT III-1

AGREEMENT NO. EF/S/121

FOR

**STUDY AND PREPARE KUWAIT
SANITARY WATER PLAN AND
OTHER RELATED WORKS**

**DOCUMENT – I
DOCUMENT – II-1 & II-2
DOCUMENT – III-1**

**Part I : Study, Preparation of Kuwait Sanitary
Master Plan and Sewer System
Management Plan (SSM)**

Section 1 - Introduction

SECTION 1 - INTRODUCTION:

1.1 General:

The Ministry of Public Works proposed to undertake Engineering Consultancy services for the following :-

- Part I : Study, preparation of Kuwait Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.
- Part II : Study, preparation of Tender Documents for Installation of Flow Meters

The consultancy should be of an International Consultant with a Local Consultant (Joint Venture of 80% for International Consultant and 20% for Local Consultant) both from the approved list of participants in the invitation sent out by the Ministry of Planning.

Part I : Study and preparation of Kuwait Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.

1.2. Work Requirements:

The works under this “Terms of Reference” are :

Sanitary Master Plan and Other Works:

- a) New Sanitary Master Plan
- b) Sewer System Management Plan (SSMP) Development Guide
- c) Study & Improvement of Existing Telemetry System in Kuwait. and other works.

Works Requirement details are mentioned in Section 2 –“Scope of Work”.

1.3. Period of Agreement:

“Starting from the Date of Enterprise, the period of Agreement for (Part I : Kuwait Sanitary Master Plan shall be **24 Calendar months,**

Part II/ 2 Stages:

Stage I – Contract Period for consultant (**12 calendar months**).

Stage II (Optional) – 2 contracts: construction period for each contract (**24 calendar months**) & supervision period for consultant (**26 months calendar months** for each contract).”

1.4. Submittals :

- All submittals by the Consultant to MPW will be totally owned by MPW.
- MPW will have all printing rights effective the date of the relevant contract signing.

Section – 2 : Scope of Work

SECTION 2 - SCOPE OF WORK

The Scope of Work includes the Consultant providing all staff and services necessary to study the following :

2.1. Sanitary Master Plan :

The Consultant to review the previous Sanitary Master Plan (for guidance only) and develop a new Sanitary Master Plan.

(Separate Effluent Master Plan under preparation)

The Consultant to collect all necessary latest data from different Authorities/ other Ministry's Departments, required for the development of Master Plan including flows data (sewage and rain) etc.

The new Sanitary Master Plan will cater to the sanitary requirements of the State of Kuwait for a period not less than 35 years.

The major components to be addressed in the Master Plan are described below :-

- All Sanitary Engineering Departments.
- Adequacy of all existing mains, lifting & pumping stations and treatment plants for the present flows.
- Future plans for increase in population and commercial/light industrial activities and their related flows will be projected for a period not less than 35 years. The existing conveyance, pumping and treatment facilities will be evaluated to accommodate the projected flows and modifications, alterations and additions of facilities will be reviewed and proposed.
- The proposals in the existing Master Plan for making the deep tunnels, interceptors and new major pumping stations should be studied together with all other alternatives on the basis of current sewerage network taking into consideration of all completed and on-going sanitary projects in the new Sanitary Master Plan.
- The effects of upgrading and/or abandoning of the existing pumping stations and treatment plants which will be handling the new changes will be also studied and analyzed.
- Modifications to the existing facilities or new facilities as needed for future flows will be planned. Separate projects will be analyzed and listed according to their priority.
- Overall odor control system of existing sewerage system to be studied and recommendations made for the improvements of the system .
- System at each pumping station, old treatment plants including Sulaibiya WWTP (BOT) and other facilities to be included in the studies.
- Study suspected surcharge sewers to measure the flow and compare with expected flow to detect any illegal connections.
- Prepare a comparative study report for the type of material and equipment used in sanitary facilities with latest material and advanced equipment.

- Study mobile Sewage Package Unit requirement.
- Operating and Control system of pumping stations to be studied and recommendations made for improving the control system. Studies should also include the remote monitoring and telemetry & satellite control system for the overall sanitary network.
- Study Operating and Control System of Laboratories of Treatment Plant/s and recommendations for improving the Lab activities.
- Quality of effluent from the existing treatment plants to be studied in compliance to the regulatory agencies requirements.
- Assess type and quantity of industrial waste flowing into the sewage system.
- Emergency overflow and by-pass system of each pumping station and treatment plant will be separately addressed. Also more flexible and reliable standby facilities will be provided for sensitive areas in which emergency overflow can cause greater harm to the public health and environment and make suggestion to co-ordinate all these activities with EPA Sanitary Engineering.
- The storm water which may enter into the pumping stations and treatment plants directly or through sanitary sewers will be considered in the study and the recommendations be made for dealing with the situation.
- A detailed evaluation of CCTV Survey and Renovation projects. The renovation works which have been completed and which are in progress to be studied and future renovation works programs and schemes to be prepared.
- The Master Plan should incorporate all items as described in the preceding sections. The output from the Master Plan should clearly present the recommended projects, their time schedule for implementation and related costs. The Terms of Reference for the design of each of the proposed project to be prepared and submitted.
- Master Planning effort shall cover the entire sewerage area in the State of Kuwait. For areas in which flows and population projections have recently been completed or proposed, the Consultant shall review them with the Ministry before going into further details for redeveloping the values.
- Flow diversion scheme to be used in the Master Plan will consider the capacities of the treatment works along with the conveyance system. A technical feasibility and economic analysis will be conducted to accomplish the flow diversion scheme. The final product should clearly indicate the advantages (technical and economical) of diverting flows from each of the sub-areas to the selected treatment works. This analysis should be performed for the present and the future conditions. The feasibility of treatment works expansion will be an integral part of this analysis.

- Sludge Management Program to be carefully studied and evaluated, which should include :
 - sludge handling processes and distribution of sludge
 - Sludge treatment quality and process
 - sludge reuse and utilization

Other Objectives :

The following objectives to be read in conjunction with the articles of major components of the Master Plan.

1. Background and objectives.
2. Wastewater and treated effluent quality objectives.
3. Sewage Strategy approach.
4. Sewage sources (domestic & Industrial)
5. Sewage Interception and collection.
6. Sewage disposal (storm water overflows and all others).
7. Sewage treatment (all types of treatments biological, chemical and all other reliable and suitable treatments).
8. Sewage transfer.
9. Utilization of different quality of treated effluent in different applications.
10. Strategy formulation.
11. Marine water quality testing in Kuwait by satellite pictures and analyse (outfalls).
12. Central Urban areas.
13. Options for peripheral areas.
14. Early environmental benefit providing early treatment of industrial provide in greater level of treatment.
15. Recommendation strategy.
16. Implementation.

17. GIS & GPS Systems.

The Consultant to study and design a Software Control system to maintain the network. The software should be able to define the status of flow by proper sensors in the selected manholes. Transmitting to the Telemetry System and the control room with proper alarm devices with location and position through GPS system (including Tunnels, Main Sewage Treatment Plants, Pumping Stations, Forcemains, Overflows to the Sea etc.) to attend and deal with emergencies.

18. Maintenance of tunnels and its system.

19. O&M of sewage schemes with booklets/manuals for Pumping Stations and Treatment Plants.

20. Infiltration/inflow.

21. Training.

2.1.1. **Executive Summary :**

The Master Plan Report shall include an Executive Summary Section with high quality presentation covering a very brief description of the Master Plan approach and contents.

The Master Plan Executive Summary shall be of minimum 10 pages, both in Arabic and English, coloured and produced on high quality paper.

2.1.2. **Other Requirements :**

Master Plan shall include Aerial views of all Stations, Treatment Plants, Satellite Townships (present and future) etc.

The Master Plan shall be produced on Digital High Density DVD, suitable for advanced information system of such standard that could be used for TV Stations. One copy in Arabic and English.

The Master Plan Documents shall be produced on high quality approved paper. Colour printing of Documents of latest advanced technology and bind with hard cover as approved by the Ministry.

2.1.3. **Flow Measurement :**

The Consultant shall identify the Domestic, Industrial and Commercial flow quantity for each drainage area separately. Flow measurement shall be carried out for a continuous period of 45 days (relevant to high demand period) and the flow measuring devices and equipment along with their catalogues and current calibration certificates and their location shall be approved by the Engineer,

2.2. Sewer System Management Plan (SSMP) Development Guide.

GENERAL INFORMATION.

Sewer System Management Plan

A Sewer System Management Plan, also called as SSMP, is a document that describes the activities, uses to manage wastewater collection system effectively.

Effective management of a wastewater collection system includes:

1. Maintaining or improving the condition of the collection system infrastructure in order to provide reliable service into the future.
2. Cost-effectively minimizing infiltration/inflow (I/I) and providing adequate sewer capacity to accommodate design storm flows.
3. Minimizing the number and impact of sanitary sewer overflows (SSOs) that occur.

In order to achieve the above goals it is expected that collection system department develop and implement an SSMP.

Required

This document contains a description of the required elements of an SSMP, as well as helpful information for you to consider in meeting the requirements. Each wastewater collection system is different, and some of the differences that affect the content of an SSMP including geographical terrain (hilly or flat), member and type of connections (residential, commercial, industrial), soil types, weather patterns, age of sewers, condition of sewers, materials of sewers, history of sewer management practices, number of SSOs, affordability of sewer rates.

The required information includes elements to effectively manage a wastewater collection system.

In summary, the required elements of an SSMP include:

1. Collection system management goals.
2. Organization of personnel, including the chain of command and communications.
3. Overflow emergency response plan.
4. Fats, oils, and grease (FOG) control program.
5. Legal authority for permitting flow into the system, inflow/infiltration control as well as enforcement of proper design, installation, and testing standards, and inspection requirements for new and rehabilitated sewers.
6. Measures and activities to maintain the wastewater collection system
7. Design and construction standards.
8. Capacity management.
9. Monitoring plan for SSMP program effectiveness.
10. Periodic SSMP Audits, periodic SSMP updates, and implementation of program improvement.

Data Management:

Wastewater collection system agencies are required to use computer-based maintenance management and GIS software to manage their wastewater collection systems. Regardless of the method selected for managing information, operations, maintenance and capital improvement procedures should be documented in writing and an SSMP is intended to fulfill that role.

Terms That Appear in This Guide:

Some terms and acronyms used in this document, along with their definitions, are as follows:

Geographical Information System (GIS) - A database linked with mapping, which includes various layers of information used by government officials. Examples of information found on a GIS can include a sewer map; sewer features such as pipe location, diameter, material, condition, last date cleaned or repaired. The GIS also typically contains base information such as streets and parcels.

Infiltration/Inflow (I/I) – Infiltration is generally considered to be extraneous water that enters the sewer system over longer periods of time, such as groundwater seepage through cracks in the sewer.

Inflow is generally considered to be extraneous water that enters the system as a direct result of a rain event, such as through improper connections to the sanitary sewer, through flooded manhole covers, or through improper connections to the sewer, or through defects in the sewers. While it is impossible to control all I/I, it is certainly desirable to reduce I/I when cost-effective.

Lateral – The portion of sewer that connects a home or business with the main line in the street. Sometimes sewer systems maintain a portion of the lateral.

Sanitary Sewer Overflow (SSO) – An SSO is defined as a spill, release, or unauthorized discharge of wastewater from a sanitary sewer system at any point upstream of a wastewater treatment facility that is caused by a problem in or with sewer system authorities' sewer lines including laterals. For reporting purposes, overflows greater than 100 gallons are to be reported electronically to the MPW.

MPW Sewer System: - The legal entity that owns and is ultimately responsible for the wastewater collection system.

Stoppage – A build up of debris in the sewer which stops the flow of wastewater and allows the water to back up behind the stoppage, sometimes causing an overflow. Also called a blockage.

Blockage – A build up of debris in the sewer, which stops the flow of wastewater and allows the water to back up behind the stoppage, sometimes causing an overflow. Also called a stoppage.

Wastewater Collection System - All pipelines, pump stations, and other facilities upstream of the headworks of the wastewater treatment plant that transport wastewater from its source to the wastewater treatment plant.

ELEMENTS OF AN SSMP

1. Goals:

Requirement: Wastewater collection system shall, at a minimum, develop goals for the sewer system management plan as follows:

- To properly manage operate, and maintain all parts of the wastewater collection system
- To provide adequate capacity to convey peak flows.
- To minimize the frequency of SSOs.
- To mitigate the impact of SSOs.

Helpful Information

Goals are an important aspect of an SSMP because they provide focus for agency staff to continue good work and/or to implement improvements in management of the wastewater collection system. Goals may also reflect performance, safety, levels of service, resource use, and other considerations. The goals section of the SSMP may also refer to the SSMP as a supplement to an existing wastewater collection system management program, if one already exists.

2. Organization

Requirement: Wastewater collection shall, at a minimum, provide information regarding organization.

- Identify agency staff responsible for implementing, managing, and updating the SSMP
- Identify chain of communication for responding to SSOs
- Indentify chain of communication for reporting SSOs.

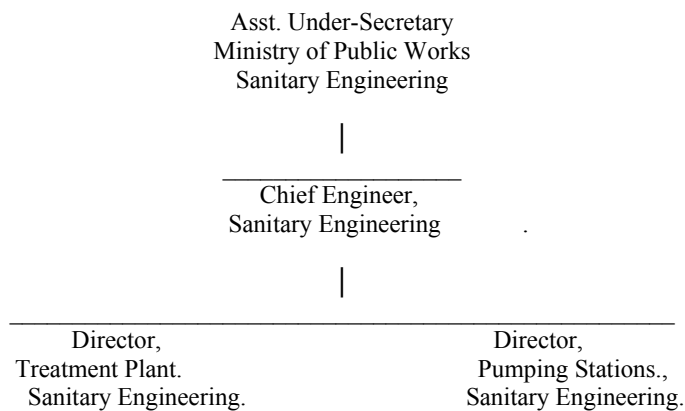
Key Point

The MPW organization of a wastewater collection system can be provided in either a tabular form or as an organization chart and should be used to identify administrative and maintenance positions responsible for implementing the SSMP, including the chain of communication for responsibilities, is shown in Figure 1.

Helpful Information.

The organization identifies those agency staff who are responsible for implementing, managing, and updating the SSMP. The communication plan identifies agency staff who are responsible for managing the SSO response, investigating the cause, and reporting the SSO to the appropriate parties. It also provides a consolidated list of contact information for key agency personnel. This portion of the SSMP should also describe lines of communication by which an SSO is reported to the MPW wastewater collection system (for example by members of the public) how management staff is notified; and how maintenance staff, contractors, and equipment are mobilized.

Figure I. Organization Chart for SSMP



Examples of SSMP Roles for wastewater collection system staff are:

Asst. Under-Secretary, MPW: – Establishes policy, plans, strategy, leads staff, allocates resources, delegates responsibility, authorizes outside contractors to perform services.

Chief Engineer, Sanitary Engineering – Prepares wastewater collection system planning documents; manages capital improvement delivery system; documents new and rehabilitated assets; and coordinates development and implementation of SSMP.

Permit Compliance Specialist – Works as needed on applicable permits, laws, and regulation; provides support to all parts of operation.

Directors for Collection System – Manages field operations and maintenance activities, provides relevant information to agency management, prepares and implements contingency plans, lead emergency response, investigates and reports SSOs, and trains field crews.

Field Crew – Staff preventive maintenance activities, mobilize and respond to notification of stoppages and SSOs (mobilize sewer cleaning equipment, by-pass pumping equipment, and portable generators).

3 Overflow Emergency Response Plan

Requirement: Wastewater collection system shall develop an overflow emergency response plan with the following elements:

- Notification - Provide SSO notification procedures.
- Response - Develop and implement a plan to respond to SSOs.
- Reporting - Develop procedures to report and notify SSOs per SSO Monitoring and Reporting Program.
- Impact Mitigation - Develop steps to contain wastewater, to prevent overflows from reaching surface waters, and to minimize or correct any adverse impact from SSOs.

Key Point

The response plan should be developed as a stand-alone document and summarized in the SSMP, and updated as necessary to reflect any changes in staffing or notification requirements, including contact numbers.

Helpful Information

An overflow emergency response plan provides a standardized course of action for wastewater collection system personnel to follow in the event of an SSO, and ensures that the MPW sewer system is adequately prepared to respond to SSO events. The plan does not need to be organized specifically into sections corresponding to the required elements, but the plan should address each of the required elements.

Further information on each of the required elements of an emergency response plan is shown below:

- Notification – This element includes information on how the MPW could be notified of an SSO through a complaint or a report from outside or within the MPW, and also the internal agency chain of communication leading up to the response to the overflow. Internal communication responsibilities during and after the overflow should also be included.
- Response - The plan for responding to SSOs should describe the staff and expected response time for SSOs, and any details associated with mobilizing for the response.
- Reporting – This element includes a procedure for evaluating whether an overflow event triggers 24-hour reporting (such as in the case of an SSO that is 1,000 gallons or more; if the SSO may imminently and substantially endanger human health, or if the SSO causes a fish kill). This element would also include the individuals expected to do the reporting and identify the external agencies receiving the reports. The transmission media options should also be identified.

- Impact Mitigation – The plan should describe potential system failures in order to be prepared for potential overflow situations, and strategies and emergency operations for responding to these potential system failures.

This document is a step-by-step guide to developing a plan, including other departments coordination strategies, strategies for minimizing private property damage, public notification, and follow-up cleaning and reporting. Training of agency personnel on the emergency response plan is important. Conducting periodic exercises to ensure that both training and emergency equipment are relevant and functional is important.

4. Fats, Oils and Grease (FOG) Control Program.

Requirement - Wastewater collection system shall evaluate its service area to determine whether a FOG control program is needed. If so, a FOG control program shall be developed as part of the SSMP.

Key Point

A FOG control program should identify section of the sewer system subject to grease blockages and establish a cleaning maintenance schedule for each section. Identification of these blockage “hot spots” and their causes is usually based on blockage history, line investigation, and inspection of FOG dischargers (such as restaurants). Hot spots can then be addressed through more frequent cleaning, targeted outreach, and additional regulation on FOG discharges.

Helpful Information

Grease can be a significant source of sewer blockages in some communities, potentially leading to SSOs. If grease is a source of SSOs in sewers recommended elements of a FOG control program include the following:

- Identification & Sewer Cleaning – Identify areas or line segments of the wastewater collection system subject to grease stoppages and establish a prioritized preventive cleaning schedule for each area or line segment.
- Source Control – Develop and implement source control measures for each area of the wastewater collection system identified, for all sources of grease that may be discharged.
- Facility Inspection – Inspect grease-producing facilities, with priority given to previously identified problem areas.
- Legal Authority - Ensure legal authority to prohibit discharges to collection system, as appropriate.

A FOG control program in place, and in that case the SSMP can refer to the documentation that already exists. If a sewer system agency is developing a FOG control program for the first time, several resources exist, and neighboring agencies with existing programs can provide information for consideration in developing a program that meets the specific needs of sewer system.

If discharger-specific blockages or permit violations persist, additional source control or installation of grease removal devices may be warranted. Outreach to residences can also be helpful in reducing the total FOG load to the collection system.

5. Legal Authority

Requirement: Wastewater collection system shall, at a minimum, describe its legal authority, through sewer use ordinances, services agreements, or other legally binding procedures to:

- Control infiltration/Inflow (I/I) from satellite wastewater collection systems and laterals.
- Require proper design and construction of new and rehabilitated sewers and connections.
- Require proper installation, testing, and inspection of new and rehabilitated sewers.

Key Point

The specific legal mechanisms applicable to the sewer system agency should be described in this section of the SSMP, with citations of names and code numbers of ordinances.

Helpful Information.

Legal authority refers to powers granted to the wastewater collection system MPW to provide services to the public.

Using this legal authority, the wastewater collection system MPW can require system users to meet performance standards, maintain user-owned elements of the system and pay penalties for non-compliance. As with other sections of SSMP, if documentation of legal authority (such as ordinances or regulations) already exists for MPW the MPW can simply list the legal mechanisms already in place, in order to meet the requirements for the SSMP.

Points to remember when documenting legal authority:

- Legal agreements, discharge permits, and ordinances should include the proper authority to require system users to comply with standards of design, construction, use, and maintenance.

- The wastewater collection system agency should have the ability to ultimately disconnect the user if they fail to comply with the established conditions of use. Other civil or criminal recourse should be available to the wastewater collection system agency in cases where deliberate and significant violations of these conditions occur and there is a substantial impact to a receiving water or endangerment of human health.
- Illegal discharges should be subject to corrective response action using any existing laws prohibiting a type of discharge, regardless of the sewer class (for example, domestic, commercial, or industrial).
- Building codes normally provide legal authority for the proper construction of privately-owned sewer lines.

6. Measures and Activities.

a. Collection System Map

Requirement: Wastewater collection system shall maintain up-to-date maps of wastewater collection system facilities.

Key Point

The SSMP should describe the type of maps for sewer system along with procedures for updating the maps with new and rehabilitated facilities.

Helpful Information

Knowledge of the location of all wastewater collection system facilities is essential to effective management. This requires the maintenance of up-to-date collection system maps. The maps can be available in hard copy and electronic format. The benefit of an electronic format is that it provides a more sophisticated tool for prioritizing repair, replacement, or rehabilitation projects, and for producing work orders for sewer cleaning and other maintenance activities. Sewer maps should include at least the basic information shown in the table below. Additional attributes which may be useful to the MPW are shown in the column to the right of the basic attributes. Some of this basic information may be included as part of the GIS database linked to the map instead of on the map itself. Pump stations should also be indicated on the map, although their technical information can be too complex to display on a map sheet, and it may be more appropriate to place it in the GIS database. Service lateral data can optionally be included.

Facility Type	Basic Map Information	Additional Map Information
Manholes	-ID number or other unique identifier -Location, with reference to streets and property lines -Depth	-GPS coordinates -Date built -Rim elevation -Invert elevation -Size -Material Type -Worker safety information
Pipes	-ID number or other unique identifier -Location, with reference to streets and property lines -Size -Direction of flow -Length -Material type	-Date built -Slope -Pipe invert elevations -Plan or as-built ID number - Depth
Pump Station	-ID number -Location - Max. Intake/Capacity	-Additional information would normally be available on drawings, or a GIS if available

b. Resources and Budget

Requirement: Wastewater collection system shall allocate adequate resources for the operation, maintenance, and repair of its collection system.

Helpful Information

The resources required for effective wastewater collection system operates, maintenance, and repair include:

- A reliable, consistent, and sufficient funding source for both the operating budget and capital replacement plan.

The strongest funding mechanism is a user-supported rate-paying structure, commonly known as an enterprise fund, which is separate from general fund revenue sources.

- A formal operating budget and expenditure plan.

This is the annual cost of running the collection system, for example operations and maintenance including staff, equipment, tools, consumables, contract services, spare parts and support facilities such as corporation yards or utility service centers.

- A capital improvement plan (CIP) sufficient to ensure the continued longevity of the system.

This is the on-going funding for major rehabilitation or replacement of the collection system as the system wears out, or upgrading of the system because of expansion. Costs include planning, design, construction, and inspection of new or rehabilitated facilities.

In the event that operations and maintenance are provided through contract service, the scope of those services should be described.

c. Prioritized Preventive Maintenance

Requirement: Wastewater collection system shall prioritize its preventive maintenance activities.

Key Point

This section of the SSMP should describe the system currently in use for prioritized preventive maintenance, and any plans for improving the system, as needed, to maintain the integrity of the system and reduce the frequency of SSOs. The program should address criteria and results for short-term and long-term prioritization of corrective actions based on structural or other deficiencies identified during preventive maintenance activities.

Helpful Information

A good preventive maintenance program is one component in keeping a system in good repair and preventing excessive infiltration/inflow (I/I), service interruptions, and system failures, which can result in SSOs. A preventive maintenance program can also help in protecting the capital investment in the collection system.

Preventive maintenance activities can include some or all of the following activities:

- Scheduled cleaning of gravity sewers, with a higher frequency in those areas with a history of stoppages due to debris and fats, oils, and grease in order to minimize SSOs. (see also section 4 above for FOG control information)
- Root control in areas that are known to have recurring SSOs or premature structural damage due to root intrusion.
- Investigation and resolution of customer complaints.
- Odor control including the maintenance of chemical injection systems, carbon filters, etc.
- Scheduled cleaning of force mains – although at a longer interval than gravity sewers – to increase pump station efficiency and prevent backups.
- Maintenance activity records to support appropriate analysis and reporting.

Prioritization of preventive maintenance activities can occur through the use of verbal communication (especially for smaller agencies), the use of work orders to track progress, and/or routine operations such as sewer cleaning based on experience with known problem areas. Data on stoppages or other operational problems can be collected in field logs or computer-based information systems and reviewed regularly by system managers for prioritization.

Larger sewer system agencies will likely use a formal condition assessment process that relies on television inspection of sewers as part of its prioritization process. For more sophisticated systems, the prioritization of preventive maintenance activities can be coupled with the prioritization of connecting structural deficiencies, as described in Section 6.d. below. If this is the case, Section 6.c and 6d. can be described in the SSMP together.

d. Scheduled Inspections and Condition Assessment

Requirement: Wastewater collection shall identify and prioritize structural deficiencies and implement a program of prioritized short-term and long-term actions to address them.

Key Point

This section of the SSMP should describe the approach currently used for scheduled inspections and condition assessment of the sewer collection system. The approach should address criteria and results for short-term and long-term prioritization of corrective actions based on identified structural or other deficiencies. This should be consistent with the overall goal of maintaining the integrity of the system and reducing the frequency of SSOs.

Helpful Information

A good inspection program is one component for keeping a system in good repair and preventing excessive inflow/infiltration (I/I), service interruptions, and system failures, which can result in SSOs. When combined with an adequate condition assessment plan, inspection can also help protect the capital investment in the collection system.

There are at least two methods to manage structural deficiencies in a wastewater collection system reactive and proactive.

In the reactive method structural deficiencies are identified by waiting for system failures (e.g. stoppage, SSO, equipment failure) to appear. Corrective actions are then taken in response to the failure. This may be adequate for a wastewater collection system that is somewhat new and/or has relatively few SSOs. This is a short-term strategy, however, and may not be cost-effective in the long term. It is likely that as the wastewater collection system ages, however, a “proactive” approach to system management would be more appropriate.

Using a “proactive” method, collection system performance and physical integrity can be substantially improved by actively seeking out and correcting structural deficiencies prior to system failure. Under the “proactive” mode, periodic condition assessments are performed for each sewer facility (manhole, main line, service lateral, etc.) to determine the location and extent of problem areas.

There are many methods for conducting inspections, evaluating results, and establishing condition assessments. Sophisticated computer models that combine large quantities of data to form capital management plans can be used.

Inspection activities can include some or all of the following activities:-

- Routine inspections of the collection system facilities, including pump stations, with a process to address defects, damage, or other identified problems.
- Flow monitoring for capacity analysis.
- Smoke testing, dye testing and exfiltration testing to monitor/reduce inflow and infiltration (I/I).
- Uniform condition assessment based on inspection data.
- Implementation of short-term and long term rehabilitation actions to address each deficiency.
- Maintenance of records to support appropriate analysis and reporting.

Sewer system agencies will likely use a formal condition assessment process that relies on television inspection of sewers as part of its condition assessment process. For more sophisticated systems, the prioritization of preventive maintenance activities can be coupled with the prioritization of correcting structural deficiencies, as described above. If this is the case, Sections 6c and 6d can be described in the SSMP together.

e. **Contingency Equipment and Replacement Inventories**

Requirement: Wastewater collection system agency shall provide contingency equipment to handle emergencies, and spare/replacement parts intended to minimize equipment/facility downtime.

Key Point

For this section of the SSMP, wastewater collection system agencies should summarize their critical spare parts inventory and list major equipment used for sewer system operation and maintenance. Specific aspects of the replacement parts inventories can also be described (e.g. use of the same model pumps at multiple locations to reduce needed replacements).

Helpful Information

Contingency equipment (e.g. portable pumps, generators) supports an effective response to emergency conditions. Spare/replacement parts can be kept in inventory to minimize equipment/facility downtime in the event of an unplanned failure. Replacement parts for pumps, motors, and vehicles and appropriately maintained emergency response equipment and accessories allow field crews to effectively respond to incidents and efficiently perform routine maintenance. Without an adequate inventory of replacement parts, the collection system may experience high volume and/or extended overflow events in the event of a breakdown or malfunction.

Providing adequate maintenance facilities and equipment typically includes a process for identifying critical parts needed for system operation and maintenance and establishing an adequate inventory of replacement parts. The process for identifying critical parts can be based on a review of equipment and manufacturer's recommendations, supplemented by the experience of the maintenance staff and local availability.

f. Training

Requirement: Wastewater collection system shall provide training (Local and Abroad) on a regular basis for its staff in collection system operations, maintenance, and monitoring. Assess and Recommend the number of Trainees.

Key Point

The SSMP should include a description of the MPW training program and whether any changes or improvements are anticipated in the near future.

Helpful Information

An ongoing training program should address the skills necessary to perform proper operations and maintenance, to provide timely and effective emergency response, and to incorporate recognized safety practices.

Training can take on many forms. It can include special classes or seminars, certification programs, on-the job training, and informal training through mentoring of experienced personnel with those new to collection systems.

7. Design and Construction Standards

a. Standards for Installation, Rehabilitation and Repair.

Requirement: Wastewater collection system shall identify minimum design and construction standards and specifications for the installation of new sewer systems and for the rehabilitation and repair of existing sewer systems.

Key Point.

Wastewater collection system should evaluate if the existing design standards are appropriate and up to date. If its current standards are appropriate, can refer to the documentation that already exists, and provide a discussion in the SSMP.

Helpful Information

SSOs and operating problems are, in some cases, attributable to poor design and/or improper construction for both newly constructed and rehabilitated sewers. An effective program that ensures that new sewers are properly designed and installed can minimize system deficiencies that could create or contribute to future overflows or operations and maintenance problems.

Using the legal authorities outlined in Section 5 above, specific design and construction standards should be required for new construction and for rehabilitation. Design criteria include specifications such as pipe materials, minimum sizes, minimum cover, strength, minimum slope, trench and backfill, structure standards, and other factors.

Additional resources are listed in the references to this document.

b. Standards for Inspection and Testing of New and Rehabilitated Facilities.

Requirement: Wastewater collection system shall identify procedures and standards for inspecting and testing the installation of new sewers, pump stations, and other appurtenances; and for rehabilitation and repair projects.

Key Point

As with design and construction standards, the SSMP should refer to the documentation that already exists.

Helpful Information

Inspection and testing of new facilities is important, to ensure that the standards established as described in Section 7a. above are actually implemented in the field. It's important that completed construction not be accepted by the wastewater collection system agency until inspection and testing have been completed. This approach helps ensure proper operation and maximum life expectancy.

Using the legal authority set up as outlined in Section 5 above, specific inspection and testing should be required. Installation and testing of facilities is sometimes conducted by the contractor while an inspector representing the wastewater collection system makes sure the installation and testing meets the standards. Inspections are usually performed during and at the completion of construction. Acceptance testing for gravity sewers can include: low pressure air test or water test to identify leakage, mandrel test to identify deflection in flexible pipe, water or vacuum test of manholes to identify leakage, television inspection to identify grade variations or other construction defects.

If inspection and testing standards need to be developed for the MPW can be valuable meets the specific needs of sewer system.

8. Capacity Management

a. Capacity Assessment

Requirement: Wastewater collection system shall establish a process to assess the current and future capacity requirements for the collection system facilities.

Key Point

The SSMP should describe whether a current capacity assessment of the wastewater collection system has been prepared, and if not, provide a schedule of activities for completing such an assessment.

Helpful Information

A critical function of a wastewater collection system is to provide adequate capacity to handle peak, typically wet weather, flows. The purpose of a capacity assessment is to ensure that adequate capacity exists in all portions of the collection system and that the downstream portions that will receive wastewater from new connections can handle the additional flow.

A sewer system master plan normally serves the purpose of determining whether there are any capacity-related issues that need to be addressed, but other evaluations may also be used. A master plan would generally include an evaluation of the sewer system capacity through sewer mapping, flow monitoring of major trunk sewers, and modeling to identify hydraulic bottlenecks.

For the purposes of the capacity assessment, it is appropriate to establish the design storm under which various components of the collection system are expected to perform.

b. System Evaluation and Capacity Assurance Plan.

Requirement: Wastewater collection system shall prepare and implement a capital improvement plan to provide hydraulic capacity of key sewer system elements under peak flow conditions.

Key Point.

Once the capacity assessment (as described in Section 8.a.aboved) has been completed and capacity needs have been identified, a capital improvement program must be implemented to address capacity needs, if there are any. The SSMP should briefly describe the capital improvements anticipated in the next 1-5 years, 5-10 years and 10-20 years, and be updated as implementation occurs and priorities change.

Helpful Information

The recommended elements of a capital improvement plan are as follows:

- Evaluation Steps – Evaluate portions of the collection system experiencing SSOs due to hydraulic deficiency.
- Capacity Enhancement Measures - Establish a short and long term capital improvement program to address identified hydraulic deficiencies.
- Plan updates – Update the plan on a regular basis as specified in the SSMP.

The capital improvement activities outlined in this section should be coordinated with the identification and prioritization of structural deficiencies identified in Section 6.d. above, because structural and hydraulic problems can be closely related.

Short-term capital improvement programs should replace or repair critical elements of the system that are near failure as soon as possible. An optimized replacement schedule prioritizes specific elements of the collection system to provide the most benefit.

9. Monitoring, Measurement, and Program Modifications.

Requirement: Wastewater collection system shall monitor the effectiveness of each SSMP element and update and modify SSMP elements to keep them current, accurate and available for audit as appropriate.

Key Point

This section of the SSMP should discuss how your agency monitors implementation of the SSMP elements, and measures the effectiveness of SSMP elements in reducing SSOs. Effectiveness should be measured by developing and tracking performance indicators on a regular basis. Performance indicators should be selected to meet the goals of the MPW wastewater collection system.

Helpful Information

Some examples of performance indicators include:

- Number of SSOs over the past 12 months distinguishing between dry weather overflows and wet weather overflows.
- Volume distribution of SSOs.
- Volume of SSOs that was contained in relation to total volume of SSOs.
- SSOs by cause (e.g. roots, grease, debris, pipe failure, pump station failure, capacity, other)

- Number of stoppages over the past 12 months.
- Stoppage by cause.
- Average time to respond to an SSO.
- Relationship of capacity related SSOs to storm event return frequency.
- Ratio of planned sewer cleaning to unplanned sewer cleaning
- Backlog of repair, rehabilitation and replacement projects.
- Plans developed for, or implementation of, activities to target specific problems identified, such as roots, structural deficiencies or fats oil, and grease (FOG).

This section of the SSMP should also contain a description of what the wastewater collection system plans to do to make sure the SSMP remains current and useful over time. Examples of changes that could occur include new or modified infrastructure, increased system demand, new or modified operations and maintenance protocols, or changed organizational structure.

There are several ways the SSMP can be kept up to date. Examples of actions, which could be used to meet this requirement, include:

- Obtain specific funding to carry out periodic reviews and to participate in any related coordinating meetings.
- Assign a staff person to review the SSMP periodically to check effectiveness and timelines. Check in with collection systems staff at periodic intervals to review the effectiveness and identify potential areas for improvement, either individually or through meetings.
- Prepare progress reports documenting effectiveness, potential changes, and/or a summary of program activities on a periodic basis.
- Obtain internal approval to update the SSMP with specific revisions.
- Solicit per review by another collection system agency.

If major changes are proposed for the sewer system management program, they may need to be approved by the MPW. In addition, if changes are identified for implementation in the SSMP, other related documentation may also be affected and need to be revised as well.

10 SSMP Audits

Requirement: Wastewater collection system shall conduct an annual audit of their SSMP which includes any deficiencies and steps to correct them (if applicable) appropriate to the size of the system and the number of overflows, and submit a report of such audit.

Key Point.

The audit should cover the most recent calendar year and be submitted to MPW.

Helpful Information

The audit can contain information about successes in implementing the most recent version of the SSMP, and identify revisions that may be needed for a more effective program. Information collected as part of Section 9 above can be used in preparing the audit. Tables and figures or charts can be used to summarize information about these indicators. An explanation of the SSMP development, and accomplishments in improving the sewer system, should be included in the audit, including:

- Progress made on development of SSMP elements, and if the sewer system agency is on schedule in development of the SSMP. Provide justification on the delay if the sewer system agency is behind schedule on development of the SSMP.
- How the sewer system agency implemented SSMP elements in the past year;
- The effectiveness of implementing SSMP elements;
- A description of the additions and improvements made to the sanitary sewer collection system in the past reporting year; and
- A description of the additions and improvements planned for the upcoming report year with an estimated schedule for implementation.

Resources:

Publications

Include resources and publications for SSMP development guide.

- 2.3. **Existing Telemetry Centers:**
The Consultant to study and assess the existing Telemetry Centers in the State of Kuwait and prepare Study Report for the improvement of the system.
Drawing attached showing the locations of the Telemetry Control Centers.
- 2.4. **Manuals for Operations and Maintenance of Sewerage System :**
The manuals required for Pumping Stations, Wastewater Treatment Plants, Sewerage Networks for tunnels and Interceptors, Forcemains.
- 2.5. **Specifications Revision :**
Review Specifications of Sanitary Engineering and upgrade.
- 2.6. **Standard Numbering System :**
Develop a Standard Numbering system for Sanitary Engineering (MPW) for approved material, equipment (M&E, Telemetry and Instrumentation)
- 2.7. **Internet Web Site :**
The Consultant shall develop an “Internet Web Site” by engaging a specialized software office approved by MPW.

The web site shall include summary of Sanitary Engineering facilities for Pumping Stations, Wastewater Treatment Plants, Sewer Networks, Effluent Networks, Sewers & Effluent Reservoirs and Headworks etc.

All details of Sanitary Engineering Agreements, executed during last 5 years, present and under preparation. Similarly Sanitary Engineering Contracts executed during last 5 years, presently under execution and their details of completion and also the Contracts under preparation.

House Connections :

On line application and approval for house-connections for Consultant offices for projects under designing by them.

Drawings :

All drawings pertaining to Civil, Mechanical & Electrical, Telemetry and Wastewater Treatment Plants, Sewage and Effluent Networks, Irrigation Pumping Stations, Reservoirs and Overheads tanks etc.

Access and Security :

This website access to selected information to authorized persons only except general information available to the interested persons.

Training :

The Consultant to provide training to MPW staff to update the Internet site form time to time as required.

Control :

This site to be connected to main control room in the Pumping Stations, Wastewater Treatment Plant and Data Monitoring center.

Facility to access to other Internet websites without closing Sanitary Engineering Website.

The Consultant to perform the following :

2.8. **Monthly Report.**

The Consultant shall submit to the Engineer 10 copies of the monthly report of the works carried out under this Agreement. The report shall be prepared so that a quantitative estimate of the work done can be assessed and it shall be in a form approved by the Engineer. The Consultant shall also submit documents to support the report if required by the Engineer.

2.9. **Periodic Progress Review Meetings:**

The Consultant will establish the requirement for regular meetings with MPW Representatives. These meetings will be scheduled at a time convenient to the Engineer to review the work progress and discuss the relevant issues as per a prepared agenda.

The agenda and the summary of sequence of discussions in every meeting will be prepared by the Consultant and approved by the Engineer.

2.10. **Services to MPW Design Office:**

The Consultant shall provide all office stationary and consumables needed for the Engineer's office in-charge of the Design works (Design Administration, Sanitary Engineering). This office shall specify the monthly needs the cost of which is limited to KD.200/- per month. This shall be provided for the whole duration of the Agreement. The Financial proposal shall be inclusive of the this cost.

Section – 3 : Instruction for the Performance of Works

SECTION-3 – INSTRUCTION FOR PERFORMANCE OF WORK

3.1 General:

The Consultant shall prepare an Agenda prior to each Monthly Progress Meeting and Minutes for each meeting. The Minutes for the prior months meeting shall be delivered to and approved by the Ministry and included in the following months Monthly Report.

The Consultant shall develop, implement and maintain an electronic document control system for the program of work. The records management system shall identify, store, retrieve, and archive project documents such as correspondence, communications, contract documents, schedule data, and cost and financial data.

3.2 Reports and Presentations

The Consultant shall perform the works under Part (I) Study and Preparation of Sanitary Master Plan & Sewer System Management Plan (SSMP) Documents in different stages as outlined below :-

- Stage I : The Report – Preliminary and final
- Stage II : Preparation of Draft Documents for Kuwait Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.
- Stage III : Submission of Final Documents of Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.

3.2.1. Stage I : The Report Preliminary & Final :

This shall include all necessary studies as specified in Scope of Work but not limited to the following :-

- i) Flow measurement analysis for domestic, commercial and industrial areas.
- ii) Identify density of buildings and population at present time and growth projection till saturation
- iii) Identify contribution of sewage at the present time and its projection till saturation according to different areas
- iv) Review the “As Built” Sanitary Drawings to identify locations of gravity mains, lifting stations, pumping stations, pressure mains etc.
- v) Prepare a general plan and schematic design outlining the different categories of works for sewerage improvements
- vi) Prepare an approximate cost estimate for all categories of works
- vii) Prepare an outline of the Sewer Improvement Program
- viii) Submit 10 copies of Preliminary Report to the MPW for review and comment
- ix) Submit 10 copies of final Report to MPW after all the MPW comments have been incorporated.

Reports shall be to the international system of paper size A2, A3 or A4 as considered appropriate. All required reports shall have printed on the cover, or under the cover title page the following:

- Name of the Project
- Date of Publication
- MPW Agreement Number

All reports shall have a table of contents and page numbers corresponding to the report content divisions. All report pages shall be consecutively numbered. Reports submitted without these requirements shall be rejected.

All reduced drawings used in the reports shall be clearly legible. The Consultant shall take this requirement into consideration in properly preparing original drawing for reduction and inclusion in reports.

All reports to include copy in electronic media with submittals.

All technical support data shall be published in either an appendix or a separate supplement to the main reports.

3.3. Stage II : Preparation of Master Plan & Sewer System Management Plan (SSMP) Draft Documents

The Consultant shall prepare Master Plan Draft Documents and submit 10 copies to the MPW for Review and Comments .

Documents shall be to the international system of paper size A2, A3 or A4 as considered appropriate. All required Documents shall have printed on the cover, or under the cover title page the following:

- Name of the Project
- Date of Publication
- MPW Agreement Number

All documents shall have a table of contents and page numbers corresponding to the document content divisions. All document pages shall be consecutively numbered. Documents submitted without these requirements shall be rejected.

All reduced drawings used in the Documents shall be clearly legible. The Consultant shall take this requirement into consideration in properly preparing original drawing for reduction and inclusion in Documents.

The Consultant shall assure that all services are properly and effectively carried out.

The Consultant shall prepare meeting minutes and shall respond to all review comments in writing to MPW, documenting the Consultant's disposition to each comment.

If requested by the Ministry, the Consultant shall prepare a Ministry Level Presentation, using high quality graphics. The presentation shall be in Arabic and shall be developed in Microsoft PowerPoint and provided on a CD and on color overheads. The presentation shall also be printed in a report format on high quality glossy paper and bound.

3.4. Stage III : Preparation of Master Plan & Sewer System Management Plan (SSMP) Final Documents

The Consultant shall prepare Final Documents of Sanitary Master Plan, after incorporating all MPW comments and submit Master Plan Documents as mentioned in Section 4 "Schedule of Requirements".

Section – 4 : Schedule of Requirements

SECTION 4 – SCHEDULE OF REQUIREMENTS

Kuwait Sanitary Master Plan & Sewer System Management Plan (SSMP) Development Guide and other works :

Preliminary and Final Reports :

The Consultant shall submit 10 sets of Preliminary Master Plan, SSMP and other works Approach Reports to the Ministry for review and approval.

After approval of preliminary reports, the Consultant shall submit 10 sets of Final Reports.

Printing of Documents :

Upon approval of final documents and instruction from the Ministry to print for the following :

New Kuwait Sanitary Master Plan : 200 copies with CDs (2 Nos)

Sewer System Management Plan
(SSMP) Development Guide : 200 copies with CDs (2 Nos)

Telemetry Study Reports : 20 copies with CD

Executive Summary : 100 copies with CD

Manuals for O&M of Sewerage
System : 200 copies with CDs (2 Nos)

Specifications : 100 copies with CDs (2 Nos)

Section – 5 : Schedule of Time

SECTION 5 – SCHEDULE OF TIME:

Below is a suggested time program for the project. It is indicative only and the Consultant is encouraged to propose an Alternative Schedule to accelerate the project delivery if it is considered appropriate, in the Technical Proposal.

Part I : Study and preparation of Kuwait Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.

Project Management Plan :

Preliminary Plan 15 days after Date of Enterprise

Final Plan 30 days after Date of Enterprise

5.1. The Reports – Preliminary & Final

(1) Data Collection & Preliminary Report	: 190 days (From the Date of Enterprise)
(2) MPW Review (15 days overlap as shown on the attached shedule) (Presentation date as agreed with MPW)	: 45 days
(3) Final Report	: 30 days
Total	: 265 days

5.2. Preparation of Documents

(4) Preparation of Draft Documents	: 360 days
(5) MPW Review (15 days overlap as shown on the attached shedule) (Presentation date as agreed with MPW)	: 45 days
(4) Preparation of Final Documents & Submit	: 60 days
Total	: 465 days

Total Period for Part -I : 730 days

Section – 6 : Fees and Terms of Payment

SECTION 6 – FEES AND TERMS OF PAYMENT:

In the final agreement with the successful Consultant, the overall maximum amount payable under the terms of the executed agreements will be the total lump sum of each individual part shown in the Consultant's Financial Proposal. The Consultant will be expected to complete the proposed work within this maximum amount unless scope changes have been approved by MPW, in advance, that may increase or decrease this maximum payable amount. All payments will be made in Kuwaiti Dinars.

The amount payable under the terms of the final signed Agreement will be as follows:-

Part I : Study and preparation of Kuwait Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.

- 6.1. The Reports – Preliminary & Final and existing Telemetry system.
- 30 % after Submission of Preliminary Report
 - 30 % after approval of Preliminary Report
 - 40 % after Submission of Final Report
- 6.2. Preparation of Documents :
- * 50 % after Submission of Master Plan, SSMP Draft Document
 - * 30 % after approval of Master Plan, SSMP Draft Document
 - * 20 % after Submission of Final Document
- 6.2.1. * 100% after submission of manuals of O&M of sewerage system
- 6.2.2.* 80% after approval of Preliminary Draft Specificaiton and Standard Numbering system.
- * 20% after completion of Final Revised Specifications and Standard Numbering Systeme.
- 6.2.3. * 100% after satisfactory installation of web site plus training the MPW staff.
- 10% Recovery of Advance Payment (if Consultant received Advance Payment)
- 6.3. Performance Bond.
- The Consultant shall be required to submit to the MPW a performance bond from an approved Kuwaiti Bank equal to 10% of the agreed upon fees and in accordance with Article 19 in Document –1 (General Conditons) of Agreement.
- The bond will remain valid from the Date of Enterprise till the Date of Final Acceptance of Master Plan Documents.
- 6.4 Visits.
- The Consultant shall indicate in the proposal if there will be visits from outside of Kuwait by specialists staff and if so indicate the number of visits. Visits will only reimburse by Ministry.
- Payment for the specialists staff visits, shall be made for each visit after receiving the original receipt of expenses.

6.5. Delay Penalty.

The Consultant shall acknowledge in the proposal that they understand Article 24 for the MPW Standard Agreement. For this project, the penalty for each day of delay will be as follows:

The penalty value is KD.500/- per day with maximum value equal 10% of the Contract Value.

6.6. Advance Payment and Bank Guarantee and Method of Recovery :

According to Article (20) of Document –I (General Conditions) the Advance Payment shall be 10% of the value of Part-I. Recovery method will be 10% from each payment due to the Consultant.

The Ministry has the right to adjust this percentage in order to guarantee the full recovery of the advance payment at least one month before the completion date of Agreement.

Section – 7 : Staffing

SECTION 7 -STAFFING:

7.1 Organizational Chart:

The Consultant shall submit with their Technical Proposal an organizational chart of the team(s) proposed. The chart shall provide the name of the person proposed and his or her assignment on the team. The chart shall indicate the team member to be resident in Kuwait and those located internationally. A detailed CV of each nominated team member shall be included in the Technical Proposal presented in the form and with the content as illustrated in Table T2.

7.2 Staff Qualifications:

The Consultant shall determine the number of staff necessary to complete the scope of work as stated herein. The Consultant shall submit in the Technical Proposal, full details of the staffing proposed. The Financial Proposal shall reflect the cost of the staffing proposed in the Technical Proposal. Prior to assignment to the project or performing services for the project, the Consultant shall submit the proposed staff name and qualifications to MPW for approval. The majority of the engineers and other staff assigned to the project must have been employed by the Consultant at least one year prior to being assigned to this project.

The following positions are the core staff needed for execution of this contract:

7.2.1 Technical Advisor:

- Twenty years experience in water and sanitary engineering design and construction and preparation of Master Plans.
- 10 years Project Management Experience;
- Experience with major multi-contract, multi-facility Water or Waste Water Master Plan.
- Graduate plus Master in Civil/Sanitary Engineering, Chartered or Registered Engineer from an internationally recognized institute;
- Resident Middle East Experience.

7.2.2 Lead Engineer:

- * Fifteen years experience in design, project management and construction works and preparation of Master Plan;
- * Previous Design, Construction and Project Management experience
- * Experience with major multi-contract, multi facility Projects and master Plans
- * Graduate plus Master in Civil/Sanitary Engineering, Chartered or Registered Engineer from an internationally recognized institute with international experience
- * Resident Middle East Experience.

7.2.3 Mechanical Senior Engineer

- Twelve years experience in design and construction of major sanitary or water supply pumping stations distribution system.
- Graduate plus Master in Mechanical/Sanitary Engineering Chartered or Registered Engineer from an internationally recognized institute
- Resident Middle East Experience.

7.2.4 Electrical Senior Engineer.

- 15 years experience in design and construction of major Electrical facilities.
- Graduate plus Master in Electrical Engineering from an internationally recognized institute with multi-national experience.
- Resident Middle East Experience.

7.2.5 Instrumentation Senior Engineer.

- 12 years experience in design and construction of state of the instrumentation for major sanitary and/or water engineering facilities.
- Graduate plus Master Engineering with multi-national instrumentation experience.
- Resident Middle East Experience.

7.2.6 Telecommunication Engineer.

- 15 years varied experience in Telecommunication system.
- Graduate plus Master in Telecom.Engineering, Chartered or Registered Engineer from an internationally recognized institute
- Resident Middle East Experience.

7.2.7 Structural Engineer.

- 10 years experience in civil design of major engineering facilities.
- Graduate plus Master in structural/civil Engineering chartered or registered engineer from an internationally recognized institute.
- Resident Middle East Experience.

7.2.8 Civil Engineers (Hydraulic)

- * 10 years experience in civil design of major engineering facilities.
- * Graduate plus Master in civil engineering chartered or registered engineer from an internationally recognized institute.
- * Resident Middle East Experience.

7.2.9. Senior Micro Biologist and Chemist

- 15 years experience in the Laboratory activities.
- Graduate plus Master in micro-biology from an. internationally recognized institute.
- Resident Middle East Experience.

7.2.9 Penalties.

Ministry has the right to control minimum staffing and penalize the consultant with the ability to deduct the salary of staff missing. The Consultant shall provide a certified time sheet to be monitored by MPW.

Section – 8 : General Matters

SECTION 8 – GENERAL MATTERS:

8.1 Office Facilities:

The Consultant shall maintain an office in Kuwait that is adequately equipped and staffed with engineering personnel and support staff throughout the Agreement Period. The Consultants staff shall have word processing, and other computer equipment and all tools and equipment to fulfill the requirements of this agreement.

8.2. Training of Ministry Staff :

The MPW may select to assign one or more qualified Ministry staff personnel (engineers, architects and others) to the Consultant for training purposes at any time during the agreement. All Ministry staff personnel assigned to the Consultant shall carry out the Consultant's orders and instructions. If such assignment is made, the Consultant shall accomplish the following:-

- Provide the trainee with appropriate work facilities, such as office space, office furniture, tools, equipment and office supplies, etc. that are required for training purposes.
- Assign a fully qualified professional staff of the Consultant as a Technical Orientation Supervisor, in addition to his normal duties to provide the trainee with effective guidance and instructions during the orientation period.
- The Technical Orientation Supervisor shall develop and effectively implement a well defined On-The-Job Orientation programme to guide the learning process of the trainee. The Tech. Orientation Supervisor shall allow the trainee to progressively practice what he or she has learned to the greatest possible extent and the Consultant shall assume full responsibility for all work produced by the trainee.
- The Tech. Orientation Supervisor shall provide the Ministry with continuous feed back and submit a quarterly progress report on the trainee. The Ministry shall be immediately advised if the trainee does not report or frequently arrives late, or shows negligence, lack of interest, unwillingness to acquire and learn new skills.
- All Administration affairs of the trainees, such as annual leave, sick leave, salary costs, etc. will be processed directly by the Ministry and the costs will not be charged to the Consultant. The manpower assessment by the Consultant to perform the work under this Agreement will not be adjusted to reflect the trainees assigned to the Project.

The Consultant's rate for the same to be shown in detail through the direct cost schedule.

8.3 Co-Ordination :

It is necessary and obligatory that a close cooperation concerning various planning, design and construction works must be done during the period of this Agreement with, but not limited to, the following:

- Municipality.
- Ministry of Public Works.
- Ministry of Planning.
- Ministry of Defense.
- Ministry of Communication.
- Ministry of Electricity and Water (MEW)
- Ministry of Interior.
- Environmental Protection Authority
- Housing Authority.
- Traffic Department.
- Public Authority for Agriculture and Fish Resources
- All concerned Consultant's Offices and/or other offices.

The Consultant should bear in mind that all existing and proposed planning is an on-going process and that Consultant should keep the situation under review and shall incorporate the latest data and information into the project.

The Consultant should cooperate closely with the Sub-Service Committee and other concerned ministries to define the service reservations such as brackish water, sweet water, telephone, electrical cables...etc. along the sidewalk of roads.

The Consultant should keep all correspondence with all other concerned offices directly or indirectly in the study, design and construction of the Project. All of these correspondence or part of it should be presented at any time to MPW, when requested.

8.4 Transportation:

The Consultant shall comply with Cabinet of Ministers Decision No.21 dated 28 April, 1985 and use Kuwait Airways Corporation (KAC) for all airfreight of goods and equipment and all air travel of staff and labor required on this project. Alternatively, the Consultant may use the national air carrier of the country of origin of the goods, equipment, staff or labor. In the case of areas not served by KAC or by the national air carrier, the transportation shall be arranged through KAC.

8.5 Reviews and Approvals:

Following the scheduled review periods , the Consultant shall prepare written responses to the comments of the various review agencies, and shall meet with these agencies, as necessary, to resolve any problems or concerns which surface during the reviews.

The Consultant shall be responsible for obtaining all the necessary approvals from the concerned authorities including but not limited to the following:-

- Ministry of Public Works.
- Ministry of Defense.
- Ministry of Communication.
- Ministry of Electricity and Water (MEW)
- Ministry of Interior.
- Environmental Protection Authority
- Kuwait Fire Brigade
- Public Authority for Agriculture and Fish Resources
- All concerned Consultant's Offices and/or other offices.

The Consultant shall not proceed with project work without the written authorization of MPW.

**Section – 9 : Consultant’s Proposals
Technical & Financial**

SECTION 9 – CONSULTANTS PROPOSAL:

The Consultant's proposal shall be prepared according to the requirements of this Terms of Reference and with due consideration to the Articles of the MPW Standard Agreement. The proposal shall consist of two parts: a TECHNICAL PROPOSAL and a FINANCIAL PROPOSAL.

The Technical Proposal shall comprise the Consultant's discussion of project comprehension, work program, man-month input schedule, curriculum vitae and Consultant's experience. The Financial Proposal shall comprise the Consultant's fee proposal and any other financial matters.

Ten (10) copies of each proposal shall be submitted in sealed envelope and identified as Technical or Financial Proposal, in separate volumes, each organized in accordance with the three project stages and their respective phases. These are:

Part I : Study, preparation of Kuwait Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.

The proposals (Technical and Financial) shall be to the international system of paper size A4 and A3, if required. All required proposals shall be submitted in 3 hole or 4 hole binder format, and must have a table of contents and page numbers corresponding to the appropriate divisions. All pages shall be consecutively numbered.

Associations and/or joint-venture agreements between consulting firms for this project shall be submitted with the proposal, in which the relationship between the consultant and his sub-consultants shall be clearly identified.

The submittal requirements for each of the required proposals are outlined below:

9.1. Technical Proposal:

The Consultant is required to submit 10 copies of his technical proposal based on the Scope of Work presented herein. The Consultant is encouraged to use the Scope of Work presented herein as a general guide and is required to present his selected technical approach describing plans for accomplishing the works. The Consultant is encouraged to review all reports and documents available with Ministry of Public Works concerning the past and ongoing works for related projects and evaluate the existing facility and local conditions carefully before submitting his proposal.

In case of any discrepancy between the hard copy and the soft copy, the hard copy prevail.

Field trips and visits to assist the Consultants in preparing his proposal will be arranged at Consultant's request and at his own cost. As a minimum the Technical Proposal should include:

- Purpose of the Project
- Project Delivery
- Understanding of Scope
- Methodology.
- Typical Staff Training Plan
- Detail Mobilization Plan
- Consultant's Experience, highlighting work of a similar nature done in the Middle East, as per Table T1.
- Detailed Experience of the Professionals & Technical Staff proposed in Table T2.
- Bar-chart showing the work programme in Table T3.
- Man-month schedule in the Format Table T4.
- List of three references for whom similar projects have been completed by the Consultant.

In describing the Master Plan preparation program, the Consultant shall provide a description of the qualifications and experience for each key position as per Format Table T2 and shall indicate the plans, if any, for recruitment of international and local manpower outside his own organization. A substantial number of the engineers and other staff assigned to the project supervisory staff must have been employed by the Consultant at least one year prior to being assigned to this projects and shall have past experience on Water or Sewerage Master Plan. A statement as to when the Consultant should be mobilized to begin work should also be included.

The Consultant shall produce a work program that realistically fulfils the requirements of this Terms of Reference. The program must be logically sequenced, adequately detailed to convey a clear understanding of the proposed approach, and be consistent with current professional practices and design methods.

In setting out the work program, the Consultant shall allow sufficient time for the MPW to review each phase of the work.

9.2 FINANCIAL PROPOSAL:

The Consultant shall separately submit 10 copies of Financial Proposal as described below :-

Part I : Study, preparation of Kuwait Sanitary Master Plan and Sewer System Management Plan (SSMP) and Other Works.

The Financial Proposal shall be prepared to show the Consultant's Staff cost with breakdown of man-months with indication of salary, overheads and profit and direct costs with items in sufficient details so that the individual costs can be clearly understood and evaluated. Copies of Forms F-1 & F-2 included in this document shall be used in preparing the Financial Proposal. Separate fee estimate summaries shall be provided for each Stage.

In case of any discrepancy between the hard copy and the soft copy, the hard copy prevail.

The Consultant's fee shall be stated as a total, fixed lump sum fee broken down into direct staff salaries, head office overheads, profits and direct expenses. Other items, where applicable, should be specified along with cost estimates such as special surveys computer cost, models, etc.

Financial Proposal

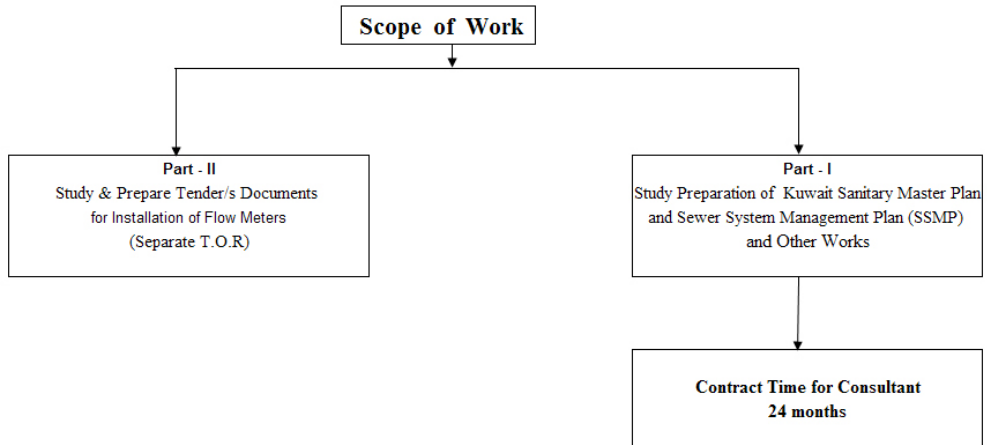
Description	Staff Costs	Direct Costs	Total - KD
- The Report – Preliminary & Final KD.			
- The Report –Existing Telemetry System KD.			
- Kuwait Sanitary Master Plan KD.			
- Sewer System Management Plan KD.			
- Manuals for O&M Sewerage System KD.			
- Revised Specifications & Standard Numbering System KD.			
- Internet website plus Training for MPW Staff KD.			
- Direct Cost for above works KD.			
Total KD			
Total cost carried to Summary (Part-I & Part-II) KD.			

SECTION 10 - ATTACHMENTS:

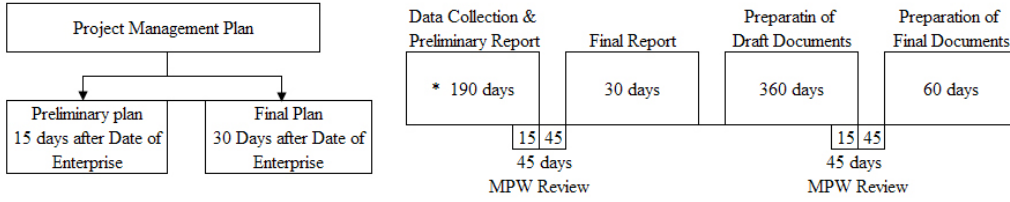
- Table T1 Technical Proposal – Firm Description (For Part-I & Part –II)
- Table T2 Technical Proposal – Curriculum Vitae (For Part-I & Part –II)
- Table T3 Technical Proposal – Work Program. (For Part-I & Part –II)
- Table T4 Technical Proposal – Man Month Schedule (For Part-I & Part –II)

- Table F1 Financial Proposal – Man Month Costs
- Table F-1-1- Production/Printing Costs
- Table F2 Financial Proposal – Direct Costs

SECTION 11 – DRAWINGS



**Section (5) - Schedule of Time
Document III-1**



Total Contract Period for the Consultant - 24 months