



**Cleaning and Rehabilitation of Storm Water and Waste Water
Drainages Projects in Maachouk, Sour**

Specifications

July 2017

Contractual Specifications

1 Objectives of the Project

The project consists of cleaning and rehabilitating waste water drainages in Maachouk neighborhood, in the Sour area.

2 Description of Works

The requested works include: Cleaning and rehabilitating networks, gullies, manholes, culverts of storm and waste water channels; leveling road surfaces, adding pipes were needed, adding storm water grates or waste water manholes covers were also needed, cast concrete, excavate and backfill, etc... (Works are developed in the Bill of Quantities section).

3 Terminologies

- Architect and Engineer: also referred to as Design Architect or Engineer means the individual or organization who furnished the design, which includes but not limited to the construction drawings and technical specifications.
- The “project implementer” means UN Habitat.
- The “Funding Agency” means the organization, entity, or persons who have entered a contract or agreement with UN Habitat to achieve a development objective. UN Habitat is responsible to manage the funding provided by the Funding Agency.
- The “Supervising engineer”, or Engineer’s representative, means the person whose services have been engaged by UN Habitat to technically monitor and administer the subcontract as provided therein, as will be notified in writing to the contractor or stated in the Contract Data of the subcontract.
- The “Owner” means the individual or organization that will own, use and be responsible for operations and maintenance of the completed work.
- The “contractor” means the person or corporate body who’s bid to carry out the work has been accepted by the project implementer who in this case is UN Habitat.

4 Contractors Minimum Requirements

All contractors submitting for the bid should:

- Minimum 3 similar projects during the past 5 years.
- Previous related work assignments and references including proofs of similar contracts completed in the past
- Company’s Legal Certificates and Business License
- VAT Registration Certificate
- Company’s Audit financial statements of the two preceding years

5 Insurance for workers and the Work

Contractor must insure his staff and materials against incident and theft, and must also insure his site against any incident that might occur to pedestrians and vehicles and against any third party claim with regard to his work on site.

Insurance must cover the whole period of works on site.

6 Time lines and duties

The Contractor shall provide in a reasonably timely manner a method statement to the Supervising engineer (Consultant) for any part of works upon request from the supervisor.

The Contractor shall also provide a detailed time table schedule on MS project or Primavera software, indicating all the phases of the project, starting and ending dates and specific key times for any particular job and major milestones to be achieved all along implementation period.

All schedules shall be in the English language and any system of dimensions (metric) shown shall be consistent with that used in the subcontract.

An update of the schedule shall be provided, schedule of deliverables, showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.

The contractor shall submit to the supervisor representative for approval an updated schedule.

The supervisor approval of the schedule shall not alter the contractor's obligation to perform within the period of performance. The contractor may revise the schedule and submit it to the engineer again at any time. A revised schedule shall show the effect of change orders, where applicable.

7 Site Safety, Environment and Health

It shall be the Contractor's responsibility to safeguard by means of temporary or permanent supports or otherwise all existing installations, pumps cables, panels or other things which would be liable to suffer damage on environment and health if such precautionary measures were not taken.

8 Contractor's Minimum Equipment

The contractor should have the following equipment:

- Skid Steer Loader (BoBCat or equivalent) – no. 1
- Hand Compactor for backfill compaction 2.5 Tons – no. 1
- Pick up – no. 2
- Water Truck (1000 Liters) – no. 1
- Excavator (Peklain or equivalent) – no. 1
- Jetting Trucks – no. 5
- CCTV Cameras for sewage – no. 1
- Ductile Iron Cover Detector – no. 1
- Asphalt Cutting Machine – no. 1
- Vibrator – no. 2
- Pump 3" for Water Suction – no. 1
- Pump 6" for Water Suction – no. 1

9 Supervising Works

Contractor in coordination with "Supervisor" will prepare and submit a detailed measurement of works that are completed within the month frame.

Measurements are according to BOQ items and any addition in works greater than what is mentioned within the BOQ must be within an approved work Comparison Table.

All materials that must be brought on site must be supplied in suitable containers and in appropriate batch sizes for the work to be undertaken.

Any warnings or precautions concerning the contents and their safe use;

Add to this that Contractor shall supply with each consignment of proprietary material delivered to the site, certificate furnished by the manufacturer including:

The manufacturer's name and address;

Material identification;

Batch reference numbers, size of each batch and the number of containers in the consignment;

Date of manufacture.

10 Quality Assurance and Quality Control

Contractor is responsible for his own quality control and shall provide competent personal for supervising his works, taking and preparing samples and for carrying out all necessary required tasks including concrete and civil works, tiling, plastering, painting, wood works, insulation and partitions, and furniture.

11 Preservation of Public and Private Properties

Any damage occurring in the course or progress of work that is adjacent to telephone and power agencies or companies or even adjacent to neighboring property, shall be rearranged on Contractor's expenses in cooperation with the owners of any underground or overhead utility lines.

The damage resulting in terms of considerable expense or inconvenience shall be managed before the continuation of work.

12 Handing Over

Site should be cleaned before handing over the project. No materials or debris should be left on the site, and everything should be returned as it was before, except if some manholes covers or grates were requested to be changed directly, during the project.

Technical Specifications

SECTION 1
CLEANING AND REPAIR
OF EXISTING SEWERAGE AND STORM PIPE SYSTEMS

1 General

- 1.1 Cleaning and repair of existing sewerage and storm systems in the project area shall be done where directed by the Engineer and shall include but not limited to:
- a. Cleaning of sewer, manholes, inlets, outlets, catch basins, gullies and inspection chambers and survey of condition status
 - b. Upgrade defective sewer and house connections by replacement in the area marked in the drawings.
 - c. Repair of manholes, inspection chambers, catch basins and gullies, if applicable.
 - d. Replacement of deteriorated existing manholes, inspection chambers, catch basins and gullies.
 - e. All ancillary works related to cleaning and repair of existing sewerage and storm systems such as flow diversion, over pumping, maintaining house connection flows, restoration of surfaces, traffic diversion, etc...
- 1.2 Construction and repair works of sewerage and storm systems shall be in accordance with "Special Conditions and Technical Specifications for Sewers Construction" of Ministry of Housing and Cooperatives, or according to the direction of the Engineer.

2 Products

Products to be used for construction and repair works shall be compatible with materials and in accordance with reference 1.2 above or according to the direction of the Engineer.

3 Execution

- 3.1 Cleaning of existing sewer, manholes, inlets, outlets, catch basins, gullies and inspection chambers:
- a. Cleaning work shall be done by water using water jet equipment suction pumps and water trucks for supply for fresh water and for disposal of waste-water, sludge and debris.
 - b. Cleaning shall be done between two manholes at any one time by blocking incoming pipes at upstream manhole, blocking outgoing pipes at downstream manhole, flushing water by water jet in the upstream manhole and pumping out waste water from downstream manhole
 - c. Prior to operation (b.) the Contractor shall direct the flow by over pumping from the previous manhole at upstream end to the manhole after the downstream end, which is in operation of cleaning.
 - d. The Contractor shall ensure during cleaning are not blocked house operations that connections connected to sewer pipe by T or Y are not blocked
 - e. Cleaning works program and procedures shall be as directed and approved by the Engineer.
 - f. After cleaning by water the Contractor shall pass a mandrill through sewer pipe of diameter smaller than the sewer pipe, in order to detect any obstacle or defective pipe.
 - g. During the cleaning operations, the Contractor shall record on "record drawings" the condition status of manholes, benching, pipes, house connections, catch basins and gullies.
 - h. All inspection chambers, benching be cleaned also by water and condition status shall be recorded
 - i. Contractor shall use fresh water free of salt
 - j. Contractor shall arrange for traffic diversions, place traffic barricades flashing lights, and other safety measures during the cleaning operation
- 3.2 Repair of defective sewer and storm pipes and house connections:
- a. Break-up existing surfaces remove and dispose of all debris to an approved dumping area.

- b. Excavate by hand or machine down to the defective pipe and protect sides of trench, existing utilities and other properties and keep excavations dry during
- c. Divert flow, cut and remove defective pipe and dispose of all debris to an approved dumping area
- d. Replace and joint new pipe to existing pipe and provide bedding and compact as specified in reference 1.2 above or according to the direction of the Engineer.
- e. Backfill and compact as specified in reference 1.2 above or according to the direction of the Engineer.
- f. Restore surfaces to the satisfaction of the Engineer

3.3 Replacement of deteriorated manholes, inspection chambers ca basins and gullies:

replace deteriorated manholes, inspection chambers, catch basins and gullies where directed by the Engineer to include but not limited to breaking up existing surfaces and existing manholes, inspection chambers, catch basins and gullies and removal and disposal of all debris to an approved dumping area, installation of new manholes, inspection chambers and gullies as specified in reference 1.2 above or according to the direction of the Engineer, reconnection to existing sewer pipes and restoration of surfaces to the satisfaction of the Engineer

3.4 Repair of manholes, inspection chambers catch basins and gullies:

Repair of manholes, inspection chambers, catch basins and gullies shall be done as directed by the Engineer and shall include but not limited to:

- a. Cleaning and coating of covers including removal and reinstallation
- b. Raising or lowering covers level to match pavement level in paved areas and to be 10 cm higher in unpaved areas
- c. Repair of shaft including breaking and reinstating to the satisfaction of the Engineer
- d. Replacement of broken or deteriorated covers and frame or grating
- e. Repair of deteriorated wall surfaces by using bond Concrete and concrete class 350 kgslm3.
- f. Repair of benching by breaking, forming new benching of plain concrete and coating with coal tar epoxy resin
- g. Placing and forming new benching of plain concrete and coating with coal tar epoxy resin by over pumping or any other approved

3.5 Contractor shall divert flow method, maintain house connection flow restore all surfaces required, providing traffic diversions and any other safety measures etc... to perform cleaning and repair works to the satisfaction of the Engineer.

3.6 Contractor shall take into consideration that existing sewers are receiving wastewater from adjacent areas

SECTION 2
TOPOGRAPHICAL SURVEY

1 General

- 1.1 The Topographical Survey works shall done where directed by the Engineer
- 1.2 Survey shall be linked to the National Grid System
- 1.3 Survey shall be done using appropriate equipment including Total Survey Station, data processing by computer and printing by plotters or laser jet printers
- 1.4 The Contractor shall submit 2 copies for the Engineers approval
- 1.5 Final survey data for approval of the Engineer, shall be submitted in computer diskettes, and two prints.

2 Survey Plans

The survey works shall include and submitted as follows:

- 2.1 Setting triangulation points throughout the required site.
- 2.2 General plans (scale 1/2000 and 1/500) of the required site indicating names of all streets. For streets that do not have Contractor shall provide a numbering system.
- 2.3 Plan for each street showing edge of pavement, sidewalks, any structure, spot levels, light poles, electric poles, telephone poles, boxes and edge of right of way (scale length 1/500).
- 2.4 Plan for each street showing all underground and overhead utilities routing, ground and invert elevations and associated structures. Additional plans shall be made for all utilities where utilities are located off the streets (in other areas (scale length 1/500).
- 2.5 Plans/profiles for gravity sewer/drainage systems showing locations, sizes, depths, invert levels at manholes, road crossings and nature of surfaces above the gravity lines/culverts. (Scale H: 1/500 V: 1/100).
- 2.6 Sections every 50 meters for each street showing level of the center line, level of edges and at least 3 other levels where necessary. (Scale 1/100). These sections may be replaced by a three-dimensional survey as in item 2-3.
- 2.7 Elevation of services at structures or appurtenances is to be determined and shown on drawings as well as ground and invert elevations of manholes, chambers and the like.
- 2.8 Plans/profiles for potable water lines of 200 mm diameter and above (scale H: 1/500 V: 100).
- 2.9 Plans for every proposed corridor of roads and utilities as directed by the Engineer (scale length 11500).

3 Time schedule

The Contractor shall arrange for sufficient number of survey crews and equipment in order to complete survey parallel with the work. Data shall be provided progressively to the Engineer as the work proceeds.

SECTION 3

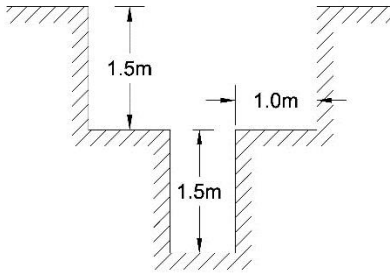
INSTALLATION OF SANITARY PIPELINE AND MANHOLES

1 General

- 1.1 Before starting the works, Contractor shall make sure that all working permits are available and he shall be accountable for all irregularities.
- 1.2 The contractor shall provide execution drawings and detailed timetable before any site activity.
- 1.3 The contractor shall abide by the protection of public facilities.
- 1.4 The contractor is responsible for all damages or losses that might occur to individuals or private/public utilities as a result of his work, and responsible for all claims arising from such losses.
- 1.5 The contractor must maintain the cleanliness of the site and remove all the debris or excavated material and transport it to allocated dumping sites and following the instructions of the municipalities.

2 Execution

- 2.1 All as dug material to appropriately placed in safe places.
- 2.2 Secure proper lighting during night works (in case it was allowed), also provide warning blinkers and phosphor signs in the beginning and the end of works.
- 2.3 Sprinkle as dug material with water to avoid dust and blinding fog caused by dust.
- 2.4 Use special barriers (New Jersey) painted with appropriate colors.
- 2.5 The contractor shall remove all as dug material and transport them to an appropriate discharging site. He shall handle a site clean and approved by the Engineer.
- 2.6 Contractor shall place Pedestrian Access (Bridges) each 100m maximum.
- 2.7 The items listed below shall be applied by the contractor while some of these items might not be applied:
 - A. Gravity Sewer Pipes with Diameter less than $\phi 300$ shall be POLYVINYL CHLORIDE (PVC), Contractor Shall Present a Technical Data Sheet from Manufacturer to the approval of UN Habitat's Engineer.
 - B. PVC pipes shall have a TRY AXIAL Strength not less than 2.5 Tons/m for $\phi 300$ Pipes and 1.6 Tons/m for $\phi 150$ pipes. PVC pipes should be connected with a proper joint and sealed to prevent any leakage.
 - C. Concrete pipes shall have a TRY AXIAL Strength not less than 0.75 Tons/m for $\phi 400$ pipes and 0.60 Tons/m $\phi 300$ pipes. Concrete Pipes should be connected by a rubber joint with Sealant to prevent any possible leakage- SN4 is required for the project.
 - D. All pipe Laying, Type of Bedding, etc... Shall be as specified and as shown on the detail drawings. UN Habitat engineer shall approve all such types of beddings in accordance with the prevailing soil condition where the pipe is to be laid. In fact, excavation should be sharp and if any soil erosion happens, it is the Contractor responsibility to apply soil consolidation. Also if excavation depth exceeds 1.5m, Contractor shall dig in "Stairs", for every 1.5m depth 1m horizontally should apply (as shown in the figure below).



Trenches Deeper than 1.5m

- E. Compaction should be made to each 20cm layer over pipe line.
- F. Base Coarse should be a layer of not less than 25cm and should be compacted at 95% MDR.
- G. UN Habitat's engineers has the full right to ask the Contractor to take a PROCTOR Test to one or more backfill samples, if sample is not satisfying the specifications, the whole line can be rejected and re-instated again by the Contractor.
- H. Concrete encasement of Pipes should be at least an offset of 15cm around the pipe $f'c=25\text{Mpa}$. Reinforcement to be used as 1% and agreed by UN Habitat engineer.
- I. In some cases, concrete encased pipe will be pending without any support, Contractor should find the correct soil to implement the pipe over it or create concrete stands to support it otherwise.
- J. The top of Manholes shall be flush with the pavement in paved areas as directed by UN habitat Engineer.
- K. 45 degrees Slopes are to be applied from the top of the trench using a Backhoe loader bucket. Contractor should hand over an acceptable shape to the approval of UN Habitat Engineer.
- L. Asphaltting should be applied on top of the Base Coarse layer. Primary sealant asphalt should be layed all over the trench to cover all Base Coarse. Second a minimum 5cm layer of asphalt should fill the gap. If any deteriorated asphalt pavement in the outer side of the trench, Contractor should cover the deterioration properly. The asphalted part should be done after cutting the old asphalt edges from its sides (in case it exists).
- M. In Principle, Sewer Pipes are located as shown on the detailed drawings for location of utilities under roads. Final locations shall be modified to suit other existing utilities in the street as directed by UN Habitat engineer. Contractor shall detect all passing utilities and avoid crossings. Contractor shall seek to obtain all available utilities drawings from proper sources. And if somehow utilities were subjected to deterioration, it is the Contractor's responsibilities to fix it.
- N. The drawings provided shall not be scaled. Exact dimensions for locations of Manholes, levels, distances, etc... For the purpose of this contract shall be as indicated on the approved construction drawings and as specified.
- O. All manholes shall be fitted with heavy duty manhole frame and cover with a rubber ring installed at the inner face of the frame and cover section to ensure a NON-ROCKING setting. Covers shall be hinged to Frame. Manholes shafts and frames are to be tested.
- P. Unless indicated otherwise, manhole covers and frames shall be capable of withstanding a test load of 40 tons- Class A.
- Q. The contractor shall provide suitable opening in the inspection chamber to accommodate future house connections.
- R. Details may be modified by UN habitat engineer if site conditions warrant.

- S. All connections shall be completed and terminated as directed by UN Habitat engineer.
- T. The Following Abbreviations are used:
- | | |
|------------|--|
| Dia. (mm) | Pipe Diameter in Millimeters |
| GRD. ELEV | Ground elevation in Meters |
| PART. DIST | Partial Distance in Meters |
| CUM. DIST | Cumulative Distance in Meters |
| I.L. | Invert Level in Meters (unless otherwise indicated) |
| PVC | Polyvinyl Chloride Pipe. |
| MDD | Maximum Dry Density as determined by AASHTO standards in Labs. |
- U. Contractor shall provide concrete encasement for sewer pipes passing under water pipes with a clearance of less than 400mm, as specified and approved by UN habitat engineer.
- V. Support for existing utilities to be done where specified and as directed by UN Habitat engineer.
- W. Benching details are shown for guidance purposes. Applicable benching shall be determined to suit each condition as directed by the engineer.
- X. Dimensions and construction of manholes shall be similar to the provided drawings and details. If contractor has any other suggestion he should have UN habitat engineer approval.
- Y. Double flexible joint shall be used whenever pipe is connected to a sub-structure such as manhole wall, concrete encasement, or even another pipe...
- Z. Whenever the drawings show a sewer line connecting to an existing manhole fitted with a stub, the contractor shall remove the plug and make the connection to the approval of the engineer.
- AA. Prior to any construction, the contractor shall establish a new bench mark system, within the project area for setting out of all works, and obtain UN habitat engineer's approval.
- BB. Markings of Pipes and Fittings

Each pipe shall be clearly marked at the place of manufacture with the following:

- Name or distinctive mark of the manufacturer.
- Date of manufacture.
- Pressure Rating.
- Nominal Diameter and laying length.
- Strength Class.

Annex

DAILY PROGRESS REPORT

DRAINAGE AREA : _____ CREW No : _____
SUB AREA : _____ DATE : _____
TIME : _____

FROM MH NO:	TO: MH NO:	DIAM (MM)	DISTANCE (M)	MANHOLES	DEPTH OF FLOW	REMARKS
TOTAL						

EQUIPMENT	No:	
JETTING + VACCUM TRUCK		
CCTV. VAN		
SAFETY EQUIPMENT		
WATER TANKER		
LABORS		
DRIVERS		

REMARKS

SITE ENGINEER
(CONSULTANT)

SITE ENGINEER
(CONTRACTOR)

SANITARY MANHOLE INSPECTION REPORT

LOCATION : _____

DATE : _____

MH No. : _____

TIME : _____

Prepared by : _____

I. LINITAL INSPECTION		II. STRUCTURAL INSPECTION		III. HYDRAULIC INSPECTION	
A. LOCATION:		A. STEPS:		A. INFLOW INDICATIONS:	
1. ROADWAY	<input type="checkbox"/>	1. SERVICEABLE	<input type="checkbox"/>	1. DEBRIS ON SIDES/SHELF <input type="checkbox"/>	
2. GUTTER	<input type="checkbox"/>	2. UNSAFE	<input type="checkbox"/>		
3. PAVED ALLEY	<input type="checkbox"/>	3. MISSING (No.)	<input type="checkbox"/>		
4. UNPAVED ALLEY	<input type="checkbox"/>	4. CORRODED	<input type="checkbox"/>		
5. OTHER	<input type="checkbox"/>				
B. MANHOLE COVER:				B. SURCHARGE INDICATION:	
1. SERVICEABLE	<input type="checkbox"/>			1. GREASE/DEBRIS ON SIDE AND SHELF <input type="checkbox"/>	
2. DAMAGED	<input type="checkbox"/>				
3. MISSING	<input type="checkbox"/>				
4. NEEDS RAISING	<input type="checkbox"/>				
5. NEEDS LOWERING	<input type="checkbox"/>				
6. HIDDEN UNDER ASPH.	<input type="checkbox"/>				
C. RING AND FRAME:		C. RISER:		C. CLARITY OF FLOW:	
1. SERVICEABLE	<input type="checkbox"/>	1. SERVICEABLE	<input type="checkbox"/>	1. TURBID APPEARANCE <input type="checkbox"/>	
2. LOOSE	<input type="checkbox"/>	2. BROKEN	<input type="checkbox"/>	2. CLEAR APPEARANCE <input type="checkbox"/>	
3. MISSING GROUT	<input type="checkbox"/>	3. SULFIDED	<input type="checkbox"/>		
4. NEEDS RAISING	<input type="checkbox"/>	4. MISALIGNED	<input type="checkbox"/>		
5. NEEDS LOWERING	<input type="checkbox"/>	5. LEAKING/BAD JOINTS	<input type="checkbox"/>		
D. MANHOLE MATERAIL:				D. FLOW	
1. BRICK	<input type="checkbox"/>			1. STEADY <input type="checkbox"/>	
2. R.C. CONCRETE	<input type="checkbox"/>			2. PULSATING <input type="checkbox"/>	
3. PRECAST CONCRETE	<input type="checkbox"/>			3. TURBULENT <input type="checkbox"/>	
				4. SURCHARGING <input type="checkbox"/>	
				5. SLUGGISH <input type="checkbox"/>	
		E. CHANNEL (BENCHING)		E. FLOW DEPTH COMPARED TO ADJACENT MANHOLE	
		1. SERVICEABLE	<input type="checkbox"/>	1. SAME <input type="checkbox"/>	
		2. OBSTRUCTED	<input type="checkbox"/>	2. LOWER <input type="checkbox"/>	
		3. SULFIDED	<input type="checkbox"/>	3. HIGHER <input type="checkbox"/>	
		4. BAD PIPE JOINT	<input type="checkbox"/>		
		5. SILTED	<input type="checkbox"/>		
		6. POOR STRUCT.COND.	<input type="checkbox"/>		

