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MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

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**EL MINA REMAINING COASTAL SEWER
COLLECTORS**

VOLUME 5

BILL OF QUANTITIES

Part A – Preamble to Bill of Quantities
Part B – Bill of Quantities

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**MINISTRY OF ENERGY AND
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**COUNCIL FOR DEVELOPMENT
AND RECONSTRUCTION**

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PART A

**PREAMBLE TO BILL
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1.000 INTRODUCTION

1.010 GENERAL

The clauses contained in this preamble relate to the bill of quantities for the wastewater collection and conveyance systems including gravity sewers.

The Bill of Quantities (BOQ) is not and does not purport to be either exhaustive or explanatory of all the obligations and duties of the Contractor who shall be deemed to have satisfied himself as to the correctness and sufficiency of the rates and prices entered by him in the Bill of Quantities all of which shall cover all his obligations under the Contract (including those in respect of the supply of goods, materials, Plant or services) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein and which may reasonably be inferred to be necessary for the Works as described in the Contract whether expressly mentioned therein or not.

The Bill of Quantities is to be read in conjunction with other Contract Documents, which shall be taken as mutually explanatory.

The general directions and descriptions of work given in the specification and the drawings are not necessarily repeated in the bill of quantities. Reference must be made to the specification and the drawings for such information which shall be deemed to be included in the bill of quantities.

The unit price of any item in the Bill of Quantities shall include all costs for:

- Any temporary works necessary to maintain traffic.
- Mobilization, demobilization and reinstatement.
- Materials, wages, bonus and travel expenses.
- Transportation.
- Medical welfare, importation, repatriation, boarding and lodging payments for employees.
- Necessary tools, equipment and plant.
- Dewatering works of Trenches and conveying of water.
- Scaffolding and other temporary works for both civil engineering and electro-mechanical works.
- Safety measures.
- General cleaning and complementary works.
- Insurance, bonds and similar expenses.
- Supplying of water, drainage, electricity and telephone.
- Testing and third-party certificate.
- Contractor's general overheads and profit.
- Establishment of Contractor's and sub-Contractor's temporary site office complex, work yards, stores, project signboards, car-parks and hoarding.
- Repair of the works during the maintenance period.

- Civil works such as excavation, backfilling, supports, frames, making holes, openings ... etc.
- The prices of the valves include flange adaptors and all necessary fittings.
- The prices of the pipes include all fittings.
- etc.

The above listing of the Tenderer's overheads is only indicative and it shall not be deemed to be complete. Unit prices shall include for all hidden and unforeseen contractual expenses.

The quantities set out in the bill of quantities are estimated quantities of the work and not to be taken as the actual quantities of the works to be executed by the Contractor in fulfillment of his obligations under the contract.

The cost of any work, material...etc, that is required to ensure the satisfactory function of any item listed in the BOQ in accordance with the specifications shall be deemed to be included in the price of that item.

All information given for the guidance of the Tenderer whether on the drawings elsewhere in the Tender Documents or in this Bill of Quantities is to be considered as indicative only without guarantee of accuracy or compliance. Therefore, the inspection of the sites of the works is a must and the obtaining of all relevant information before tendering, especially regarding the positions, sizes, numbers and details of all obstacles where hidden or not, and also the nature of the terrain and ground conditions.

1.011 ITEM DESCRIPTIONS

A detailed description of the items and of the conditions under which and the manner in which the work is to be done and measured is not set out in each item of the Bill of Quantities. Reference should be made to this Preamble and all other documents forming the Contract.

1.012 DEFINITIONS OF BILL OF QUANTITIES CATEGORIES

The Bill of Quantities is divided into several categories, listed below, to group the price under the following:

C) Wastewater Networks

1.012.1 Wastewater Networks

1.012.1.1 Pipeworks

The Pipework category of the Bill of Quantities shall include the prices for supply and transport to site of pipes and fittings for gravity and pressure sewer lines, supply, transport and installation of supplementary equipment, trench excavation (in all kind of soil) including supports, sand bedding and surrounds, reinforced concrete and concrete bedding and surrounds, laying of pipes, backfilling of trenches below paved roads and in open areas including supply and laying of indicator tapes.

- 75% of item supply of pipes and fittings will be paid to the contractor when this material will be on site.

- The items: 2.1000 supply of pipes, 2.2000 trench excavation, 2.3000 Dewatering of Trenches, 2.4000 sand or gravel bedding and surrounds, 2.5000 laying of pipes, will be paid after the completion of item 2.6000 related to backfilling works.

1.012.1.2 Manholes

The Manholes category of the Bill of Quantities shall include construction of pre-cast or cast in situ concrete manholes, (works include excavation, supports, blinding, formwork, concrete, reinforcement, backfill, step iron or galvanized steel ladder inside manhole, benching, asphalt coating, pipes connection, all work described in general specifications, drawings and particular specifications and all other related works excluding cover and frame), extra over for external drop manholes, chambers for washout and air release valves, chambers for house connections if required, and manholes covers, and frames (supply, transport and installation).

1.012.1.3 Testing and Commissioning

The Testing (Hydrostatic and Infiltration tests) and Commissioning category of the Bill of Quantities shall include the prices for testing and commissioning of the sewer lines, and of manholes and chambers.

1.012.1.4 Miscellaneous Items

The Miscellaneous Items category of the Bill of Quantities shall include the prices for concrete works, road reinstatement, above ground pipe supports.

1.013 BREAKING OUT AND REINSTATEMENT

Breaking out of bitumen or concrete surfaced roads shall be measured per linear meter along the pipelines and shall include:

- before the excavation cutting of the two sides of the trench.
- after excavation and before reinstatement recutting of all damaged parts of the road during excavation.

Reinstatement of bitumen or concrete surfaced roads shall be measured per m² along the pipelines and shall include, but not by way of limitation for:

- Trench widening for chambers and other ancillary structures and fittings:
 - The removal and replacement of kerb stones, paving stones, street lamps, road signs, safety barriers and other street furniture and all other costs and charges in connection therewith;
 - Breaking out and of any form of foundation and subsequent restoration and reinstatement;
- Disposal of all surplus material.

It is to be noted that the width of the trench will be taken as specified by the drawings and specifications to calculate the area of road reinstatement and any widening of the trench made

by the Contractor without the approval of the Engineer will be reinstated by the Contractor at his own expenses.

1.014 TRAFFIC REGULATION CONTROL AND SAFETY PROVISION

The provision of traffic control, safety equipment, signs, diversions, control systems including obtaining approvals and liaison with third parties for work in public roads and streets will not be measured separately but shall be included in pipes rates, and shall include but not by way of limitation:

- Preparing all necessary plans, details and schedules and submission to the Engineer, as necessary for the Employer to obtain all necessary approvals.
- Liaison with third parties.
- Erecting, maintaining, moving and removal of safety barriers, signs and traffic control equipment.
- Establishment and management of road diversions.
- Watching and lighting.
- Maintaining, Roads and Streets clean and free from construction debris.
- All safety provisions as described in Volume 1 – Appendix 1.

1.015 RATES AND PRICES

The Contractor shall be deemed to have inserted against each item in the Bill such rates and prices as he may deem necessary to cover the requirements of the Contract. Where neither price nor rate is entered against an item it shall be deemed to be “nil” and measured accordingly. The term “included” or any such similar term shall be deemed to be nil.

Rates and prices shall be inserted in the rate column of the Bill of Quantities. Each part of the Bill of Quantities shall be totaled and the totals carried to the Summary.

1.016 MEASUREMENT

The Bill of Quantities includes items as lump sum and others as measured quantities.

1.016.1 Lump sum

The lump sum items shall not be subject to remeasurement, and shall include all necessary equipment, construction, installation, testing and commissioning among others related to the pumping station. The lump sum entered in the Bill shall include for a complete installation as described in the specifications.

The prices shall include for all work necessary for the completion of the Works and shall include for all necessary building work such as forming box outs, support plinths, cable trenches, and the like and all necessary safety and access works including guards, handrails, fire fighting equipment and the like.

1.016.2 Measured quantities

All measurements in the Bill of Quantities are taken strictly net. The principle of net measurements shall apply to all Works executed. All quantities measured by the Engineer on the basis of actual net quantities of Work fixed in position. Item not used shall neither be measured nor included by the Contractor in his statements.

The quantities given in the Bill are the estimated quantities. In no sense shall such quantities be considered as limiting or extending the amount of the work to be done by the Contractor and of the materials to be supplied by him. The Contractor shall be responsible for checking quantities and for making any necessary surveys and investigations prior to placing any order for materials.

1.017 VALUATIONS

Subject to the provisions of the Conditions of Contract, the contractor shall value the Permanent Works executed at the rates in the Bill of Quantities.

1.018 COVERAGE

Where the Bill of Quantities does not include separate items for Contractor's Equipment, Temporary Works, labour and all associated costs, materials, goods and all associated goods, establishment charges, overheads and profit, all bonds and insurances, facilities for the Engineer and the like, the Contractor shall be deemed to have covered his obligations in these respects in the rates and prices for Permanent Works.

1.019 DEFINITIONS

The following definitions shall apply to items in the Bill of Quantities.

- **Extra-Over**
Any "Extra-Over" item shall be measured and paid for in addition to the measurement of the basic item to which it relates.
- **Included**
Where the term "included" is used in the Preamble or in the bills any items stated to be included within another item shall not be subject to measurement and their costs shall be deemed to be included within the rates of the billed item.

1.020 DEALING WITH WATER

Unit rates of items in the Bills of Quantities especially excavation items or excavation works shall be deemed to include the prices for dealing with water flows (especially for water courses crossing, or excavation along a water course) and keeping the Works free of water, and shall include prices for **supporting of trenches** and excavation limits for pipeline works and structure works. The above-mentioned works shall not be measured and shall not be paid for separately; only dewatering works shall be measured by linear meter of trenches and shall be paid separately.

1.021 WATER AND POWER

Unless otherwise explicitly stated in the Contract, water and power for the purpose of constructing, cleaning, testing and commissioning the Works shall be provided by the Contractor, and shall not be measured nor paid separately.

1.022 REFERENCES TO PREAMBLE IN THE BILL OF QUANTITIES

Item headings in the Bill of Quantities have been referenced to the appropriate section in the preamble. These references are only to facilitate pricing and in no way limits the obligations of the Contractor. Items should be priced fully inclusive of all the requirements mentioned in the preamble, drawings, specifications and elsewhere in the Contract.

1.023 RECORDS AND “AS-BUILT” DRAWINGS

After the work has been completed, the Contractor shall submit “as-built” drawings prepared whilst surveying during construction, showing the Works as constructed together with all other information that may either be required or be useful for the operation and maintenance of the Works in the future, such as type of soil, dimensions and location of structures, size of existing pipelines and cables encountered during excavation.

The cost of preparing the shop drawings, “as-built” Drawings and Records shall be deemed to be included by the Contractor in his unit rates for the various items in the Bill of Quantities and shall not be paid for separately. Therefore, the As-built Drawings shall be submitted, if required by the Engineer on computer CDs.

1.024 TRAFFIC REGULATION CONTROL AND SAFETY PROVISION

The traffic regulation control and safety provision and requirements shall be Referred to Volume 1 & 2 – Bidding Conditions Procedures-Conditions of Contract - Appendix 1: Safety, Health and Environment Regulation.

The provision of traffic control, safety equipment, signs, diversions, control systems including obtaining approvals and liaison with third parties for work in public roads and streets or in private sector will not be measured separately but shall be included in pipes rates, and shall include but not by way of limitation:

- Preparing all necessary plans, details and schedules and submission to the Employer/Engineer to obtain all necessary approvals.
- Liaison with third parties, to get all the needed permits from the concerned authorities.
- Erecting, maintaining, moving and removal of safety barriers, signs and traffic control equipment.
- Establishment and management of road diversions.
- Watching and lighting.
- Maintaining Roads and Streets clean and free from construction debris.

2.000 BILL C – WASTEWATER NETWORKS

2.010 SITE TOPOGRAPHIC SURVEY

The price shall cover performing land surveying of the designed networks layout. The surveyor shall start from approved benchmarks and shall mark the stations shown on drawings, using steel pegs and high-quality paint. Distance between two pegs shall not exceed 30m.

Moreover, the Contractor is supposed to visit the site to check and be familiar with the present status of the survey.

EDM devices shall be used exclusively.

New longitudinal profiles shall be issued on transparent paper and AutoCAD files and shall be submitted to the Engineer's approval.

Vertical scale shall be 1/200 and horizontal scale 1/2000.

Measurement of topographic survey shall be in horizontal kilometres.

The topographic survey should show the boarder limit of the roads, the location and sizes of the manhole covers, the location of electrical and telephone poles, the houses facades, the width of the road pavements (sidewalks), etc...

2.011 TRIAL PIT

Trial pits shall be measured by number and shall include for excavation in any material to a depth not exceeding 3m, hand excavation as necessary, backfilling, reinstatement of the surface to its original condition and reinstatement of road surfaces.

Payment will only be made for trial pits ordered in writing by the Engineer. Any measures taken by the Contractor to locate existing services or determine ground condition shall be included within the respective excavation item, whether separately itemised or not, and shall not be measured for payment.

2.012 TRIAL TRENCH

Trial trenches shall be measured by linear meters and shall include for all requirements as stipulated in item "Trial pit" above.

2.013 AS-BUILT DRAWINGS

As-built drawings shall be measured by horizontal kms and shall consist of new profiles, plans and details on scale similar to the design drawings scale.

Pipes, manholes, and accessories shall be shown clearly as well as effective invert level and depth of pipe and distance between pipe axis and carriage edge or sidewalk, and between manhole cover center and electric pylons or buildings corners. Adequate number (minimum one for each road or 250 m which is less) of transversal sections showing all existing utilities should be also submitted.

Payment shall only be made for as-built drawings approved by the Engineer and submitted on transparent paper, and these records shall also be submitted on electronic media using Computer Aided Design (CAD) and Geographic Information System (GIS) Softwares, which is compatible with the systems used by the Employer and Engineer.

2.014 CCTV SURVEY

Rates for closed circuit television (CCTV) survey shall include for opening up and subsequent closing of manhole covers, all labour and equipment for pulling the camera through the sewer, and handover on completion of a video - cassette and a description report of the survey to the Engineer all in accordance with specifications. Quantities shall be measured in linear meters along the center line of pipes including manholes, but excluding lateral or branch connections.

2.015 CONNECTION OF EXISTING SEWER TO MANHOLE

Connection of existing sewer to new manhole shall be classified for payment by number of completed connection unit installed in place and the price shall include but not be limited to:

- Demolish and remove existing manhole including backfilling with sub-base material.
- The construction of new manhole type M6 as per standard drawings, on the top of the existing sewer line.
- Connection of existing wastewater line to manhole, all types, including dealing with flows (including excavation, bedding, compaction, supply, laying and backfilling, etc...).
- Keep the outlet of the existing sewer line to work as overflow for this new manhole (see sketch in standard drawings) and all necessary items to make a complete connection of existing sewer to new manhole.

2.016 CONNECTION OF NEW SEWER TO EXISTING MANHOLE

Connection of new sewer to existing manhole shall be classified for payment by number of completed connection unit installed in place and the price shall include the re-benching where needed and dealing with flows and all necessary items to make a complete connection of new sewer to existing manhole.

2.017 SUPPLY AND TRANSPORT OF PIPES INCLUDING ALL NECESSARY FITTINGS

Supply and transport of pipes (as specified in Volume 4) shall be classified for payment according to diameter and shall be measured in linear meters measured along the crown of the pipeline and shall include but not be limited to:

- Supply of pipes.
- Transport of pipes to site.
- All fitting bends, tees, reducers dismantling joints, flanges, bolts, nuts, as well as, hauling, transport, unloading, and staking of pipes, fittings, joints, and jointing material.
- Removal of any abandoned pipework within the excavation.
- Distributing pipes along the trench
- Checking and cleaning pipe from dirt, oil, grease etc...

- Supply of temporary or final supports.
- All necessary types of jointing.
- Checking pipe alignment and elevation using topographical instruments.

Only pipes actually laid, jointed and accepted by the Engineer shall be taken into account for payment.

The length measured for payment shall include the lengths of all fittings, valves and accessories installed in the line.

2.018 TRENCH EXCAVATION

The price shall be calculated in terms of linear meters of dug trench only for each trench type Ti-Hj. The minimum width of trench is shown on the corresponding Contract drawings (refer to standard drawings).

This price shall include but shall not be limited to:

- * Excavating in any type of soil, rock, structural fill, contaminated fill, clay or others.
- * Excavating by hand or machine.
- * Excavating in asphalted or non-asphalted roads, in fields, in valleys, in accessible or non-accessible areas, including the execution of temporary access roads if needed.
- * Extra excavation depth carried out as shown on the longitudinal profiles or as shown on the standard drawings for the installation of the concrete structures or under the direction of the Engineer.
- * Extra excavation width carried out as shown on the standard drawings for the installation of the concrete structures or under the direction of the Engineer.
- * Transport of unsuitable backfilling materials to environmentally disposal sites approved by the Engineer.
- * Levelling or grading and compacting the bottom of excavations.
- * **Supporting, protecting and maintaining** existing services and utilities.
- * **Temporary or permanent supports to sides of excavation**, roads or structures as required by the Engineer (soil supports, sheet piling, etc...) or other method proposed by the Contractor and approved by the Engineer (micro-tunnelling, concrete piles, etc...).
- * Traffic regulation and safety provisions.
- * Repairing of all damaged utilities caused by the execution of the works.

Any excavated quantity will not be paid by the Employer under this item, if it is dumped or accidentally falls in the valley or in the field.

2.019 DEWATERING OF TRENCHES

The price shall be calculated in terms of linear meters of each trench type Ti-Hj.

This price shall include but shall not be limited to:

- * Design of the Dewatering System
- * Method Statement
- * Full compensation for obtaining any necessary permits.
- * Drilling of pits and/or wells
- * Installation of pumps
- * Supply of Electric Generators including sufficient number of stand-by and back-up Generators

- * Cables, control panels
- * Discharging pipes
- * Labors

And all necessary materials to operate, maintain, and remove the dewatering system in accordance with all applicable regulations.

No payment shall be made to the Contractor until copies of the permits are submitted to the Engineer.

2.020 SAND OR GRAVEL BEDDING AND SURROUNDS

Sand or Gravel bedding and surrounds shall include for supply of Sand/Gravel, filling and compaction where the pipelines are above water table and shall be measured by linear meter along the pipelines in function of pipe diameter. The same price will be used to release gravel bedding and surrounds for pipelines below water table.

The sand bedding and sand surrounds shall be classified for payment according to pipe diameter and shall comply with the corresponding contract drawings (refer to standard drawings), and shall be measured by linear meters of completed pipeline.

Price shall include supply of material, backfilling, testing and compaction.

2.021 LAYING OF PIPES

Laying of pipes shall be classified for payment according to pipe diameter and shall be measured by linear meter along the center line of the pipe and shall include but not be limited to:

- Removal of any abandoned pipework within the excavation.
- Distributing pipes along the trench
- Checking and cleaning pipe from dirt, oil, grease etc...
- Supply of temporary or final supports.
- All necessary types of jointing.
- Checking pipe alignment and elevation using topographical instruments.

Only pipes actually laid, jointed and accepted by the Engineer shall be taken into account for payment.

2.022 SAND BACKFILLING OF TRENCHES

1- Sand Backfilling of trenches shall be classified for payment by linear meter along the pipelines for each trench type Ti-Hj and shall include among others supply of suitable material, filling in layers and compaction up to the level of the base, sub-base and wearing courses, testing and compaction, etc... supply and laying of indicator (warning, Marker) tapes among the trenches. (refer to standard drawings).

Sand backfilling shall include for:

- Supply of imported materials.
- Backfilling in layers and compaction.
- Testing and compaction
- Supply and installation of the warning tape (Marker Tape).

2.023 CONSTRUCTION OF PRE-CAST OR CAST IN SITU, CONCRETE MANHOLES

The Manholes category of the Bill of Quantities shall include construction of pre-cast or cast in situ concrete manholes.

Manholes, where not included in another item, shall be measured by unit according to manhole type and shall include for excavation, blinding, formwork, concrete, reinforcement, rendering, external damp-proofing, coal tar epoxy internal coats, painting, backfilling, step irons access ladders, compacted gravel, etc. and all items necessary to make a complete manhole according to the contract drawings.

As stated in the BOQ, we have added two (2) separate items for the manholes. The first one is for the pre-cast manholes (C – manholes) while the second is for the cast in-situ manholes (M – Manholes). The contractor has to price both but shall execute one OR the other depending on the on-site conditions and as per the Engineer's recommendations.

The manhole cover and frame shall be measured by unit separately.

All related works as specified and shown on drawings and with full coordination with relevant authorities including but not limited to the following:

- Breaking out and reinstatement of existing paved surfaces
- All necessary excavation in any type of soil
- Testing the connecting pipe
- Reinforced concrete bedding and surrounds (encasement)
- Backfilling with selected excavated or imported fill materials
- And all other related works, all as specified, shown on drawings, and with full coordination with relevant authorities.

2.024 EXTRA OVER FOR EXTERNAL DROP MANHOLES

Supply, install and connect the following Backdrop Connections to manholes complete including all necessary pipes, pipe fittings, jointing materials accessories, reinforced concrete encasement additional excavation and backfilling and all other related works, all as specified shown on the drawings and to the satisfaction of the engineer. This item is classified by manhole type. It is paid for per unit completely installed.

2.025 SUPPLY AND INSTALLATION OF MANHOLE COVER AND FRAME

Manhole cover and frame shall be measured by unit and shall include all necessary materials and equipment including installation, labours, painting etc... in order to get an installed cover and frame according to the specifications.

2.026 TESTING AND COMMISSIONING

Testing and commissioning shall include all necessary equipment and water to carry hydrostatic test and infiltration test for the pipelines and manholes below water table and shall be measured by linear meter (resp. unit) of tested pipelines (resp. manholes and chambers) accepted by the Engineer and commissioned.

2.027 CONCRETE WORKS

2.027.1 MASS CONCRETE

Cast in situ concrete shall be measured by net volume shown on drawings and shall be paid by cubic meter (m³).

Concrete, whether included in another item or separately measured, shall include for:

- All material, equipment, labour, transport, admixtures (retarders, plasticizers, waterproofness...) batching, mixing, placing, vibrating, curing, testing.
- Formwork (Formwork shall be “sawn” finish to all buried external faces of concrete below a line 200mm below ground level and shall be “wrought” finish to all other faces).
- All needed excavation in all kinds of soils and rocks, use of all adequate equipment, transport of soil to disposal sites approved by the Engineer, labour, dewatering, temporary and/or final retaining structures for trenches or open digs, backfilling, compacting, cutting of asphalt.
- Forming of chamfers (25mm x 25mm) to all exposed external angles.
- Forming expansion, contraction, movement and construction joints and for all water stops, jointing materials, sealing compounds and formwork necessary for forming such joints;
- Building in of all pipes and fittings, bolts, frames, iron and steelwork and the like.
- Finishing of surfaces.
- All necessary items to have the concrete works according to the specifications.

2.027.2 REINFORCED CONCRETE

Cast in situ or Precast reinforced concrete shall be measured by net volume shown on drawings and shall be paid by cubic meter (m³).

Concrete, whether included in another item or separately measured, shall include for:

- All material, equipment, labour, transport, admixtures (retarders, plasticizers, waterproofness...) batching, mixing, placing, vibrating, curing, testing.
- Formwork (Formwork shall be “sawn” finish to all buried external faces of concrete below a line 200mm below ground level and shall be “wrought” finish to all other faces).
- All needed excavation in all kinds of soils and rocks, use of all adequate equipment, transport of soil to disposal sites approved by the Engineer, labour, dewatering, temporary and/or final retaining structures for trenches or open digs, backfilling, compacting, cutting of asphalt.
- Forming of chamfers (25mm x 25mm) to all exposed external angles.
- Forming expansion, contraction, movement and construction joints and for all water stops, jointing materials, sealing compounds and formwork necessary for forming such joints;
- Building in of all pipes and fittings, bolts, frames, iron and steelwork and the like.
- Finishing of surfaces.

- Reinforcement
- All necessary items to have the concrete works according to the specifications.

2.027.3 REINFORCED CONCRETE – CONCRETE STRUCTURE

Precast reinforced concrete for Concrete structure shall be measured by linear meter of installed structure inside trenches and shall be paid by linear meter (Lin.m) along the pipelines for each Concrete Structure Height (H) (Refer to Standard Drawings)

Concrete structure, measured by linear meter, shall include for:

- All material, equipment, labour, transport, admixtures (retarders, plasticizers, waterproofness...) batching, mixing, placing, vibrating, curing, testing.
- Formwork (Formwork shall be “sawn” finish to all buried external faces of concrete below a line 200mm below ground level and shall be “wrought” finish to all other faces).
- All needed excavation in all kinds of soils and rocks, use of all adequate equipment, transport of soil to disposal sites approved by the Engineer, labour, dewatering, temporary and/or final retaining structures for trenches or open digs, backfilling, compacting, cutting of asphalt.
- Forming of chamfers (25mm x 25mm) to all exposed external angles.
- Forming expansion, contraction, movement and construction joints and for all water stops, jointing materials, sealing compounds and formwork necessary for forming such joints;
- Swelling bars between each installed section to prevent the water infiltration from outside to the inner part of the section.
- Transportation from yard to site
- Installation at the required level
- Installation of the required 4” pipe above the sewer pipe as shown on standard drawings
- Finishing of surfaces.
- All necessary items to have the concrete works according to the specifications.

2.028 ROAD REINSTATEMENT

2.028.1 Cutting

Cutting of paved roads shall be measured by linear meters along the pipe crown. It shall include for asphalt cutting at both sides of the trench, and removal of excavated material to disposal sites.

Cutting and breaking of concrete pavements shall be measured by squared meters, it shall include for cutting and breaking out of concrete pavement (the width of the cut trenches will be as shown on standard drawings) and removal of excavated material to disposal sites.

The price shall include cutting works and removal of material of widening of trench for chambers or other ancillary structures and fittings.

2.028.2 Reinstatement

Reinstatement of asphalt pavement shall be classified for payment according to type of roads, as for main roads two layers of asphalt shall be applied, and one layer for the other roads, and shall be measured by square meters of completed asphalted and reinstated trench, according to the quantity actually executed but not to exceed the quantities shown on standard drawings for trench reinstatement, the price shall include for:

- Transport of material.
- Recutting works.
- Base and sub-base courses, material.
- Compaction.
- Laying and application of material.
- Tests.
- Repairing of all defects, asphalt or concrete collapse.
- Etc..

The width of asphalt layers shall be in accordance with the standard drawings.

Reinstatement shall also include for any re-cutting works of asphalt or concrete required by collapse of trench edges and for base and sub-base courses and compaction according to drawings and complying with the specifications.

2.029 CHANGES IN COST AND LEGISLATION - WASTEWATER NETWORKS

ITEM Nb	DESCRIPTION	PRICE ADJUSTMENT FORMULA
1.0000	General	
1.0001	Site Topographic Survey	NOT APPLICABLE
1.0002	Trial pit not exceeding 3m depth	$P_1 = 60\% * P_0 * \{0.15 * L_1 / L_0 + 0.25 * F_1 / F_0 + 0.10 * Eqp_1 / Eqp_0 * E_1 / E_0 + 0.50\}$ + 40%*P ₀ * {0.15 + 0.15 * L ₁ / L ₀ + 0.45 * [(1.12 * B ₁ + 66) / (1.12 * B ₀ + 66)] + 0.25 * F ₁ / F ₀ }
1.0003	Trial Trench not exceeding 3m depth	$P_1 = 60\% * P_0 * \{0.15 * L_1 / L_0 + 0.25 * F_1 / F_0 + 0.10 * Eqp_1 / Eqp_0 * E_1 / E_0 + 0.50\}$ + 40%*P ₀ * {0.15 + 0.15 * L ₁ / L ₀ + 0.45 * [(1.12 * B ₁ + 66) / (1.12 * B ₀ + 66)] + 0.25 * F ₁ / F ₀ }
1.0004	As Built Drawings	NOT APPLICABLE
1.0005	CCTV survey on completion	NOT APPLICABLE
1.0006	Connection of existing sewer to manhole, all types,including dealing with flows	NOT APPLICABLE
1.0007	Connection of new sewer to existing manhole/chamber all types,including rebenching and dealing with flows	NOT APPLICABLE
2.0000	Pipeworks	
2.1000	Supply of Pipes and fittings for gravity main and lateral sewers Material	● FOR CORRUGATED HDPE PIPES: $P_1 = P_0 * \{0.15 * L_1 / L_0 + 0.70 * Et_1 / Et_0 * Y_{n1} / Y_{n0} + 0.15\}$ ● FOR CONCRETE PIPES: $P_1 = P_0 * \{0.45 * C_1 / C_0 + 0.15 * L_1 / L_0 + 0.10 * F_1 / F_0 + 0.30\}$
2.2000	Trench excavation	$P_1 = P_0 * \{0.15 * L_1 / L_0 + 0.25 * F_1 / F_0 + 0.10 * Eqp_1 / Eqp_0 * E_1 / E_0 + 0.50\}$
2.3000	Dewatering of Trenches	$P_1 = P_0 * \{0.15 * L_1 / L_0 + 0.25 * F_1 / F_0 + 0.10 * Eqp_1 / Eqp_0 * E_1 / E_0 + 0.50\}$
2.4000	Sand or gravel bedding and surrounds	$P_1 = P_0 * \{0.15 * L_1 / L_0 + 0.25 * F_1 / F_0 + 0.10 * Eqp_1 / Eqp_0 * E_1 / E_0 + 0.50\}$
2.5000	Laying of pipes	NOT APPLICABLE
2.6000	Sand backfilling of trenches below main paved roads	$P_1 = P_0 * \{0.15 * L_1 / L_0 + 0.25 * F_1 / F_0 + 0.10 * Eqp_1 / Eqp_0 * E_1 / E_0 + 0.50\}$
3.0000	Manholes	
3.1000	Construction of pre-cast or cast in situ concrete manholes works include excavation, formwork, concrete, reinforcement, backfill, step iron or ladder inside manhole and all other related works (excluding cover)	$P_1 = 45\% * P_0 * \{0.15 * L_1 / L_0 + 0.70 * Lmc_1 / Lmc_0 * E_1 / E_0 + 0.15\}$ + 4%*P ₀ * {0.15 * L ₁ / L ₀ + 0.25 * F ₁ / F ₀ + 0.10 * Eqp ₁ / Eqp ₀ * E ₁ / E ₀ + 0.50} + 40%*P ₀ * {0.45 * C ₁ / C ₀ + 0.15 * L ₁ / L ₀ + 0.10 * F ₁ / F ₀ + 0.30} + 11%*P ₀
3.2000	Extra over for external drop manholes :	NOT APPLICABLE
3.3000	Manhole Cover & Frame	$P_1 = P_0 * \{0.15 * L_1 / L_0 + 0.70 * Tf_1 / Tf_0 * E_1 / E_0 + 0.15\}$
4.0000	Testing and Commissioning	NOT APPLICABLE
5.0000	Miscellaneous Items	
5.2000	Concrete works	
5.2001	Mass concrete - Class C25 for pipe supports, thrust blocks, anchors, pipe surround at river crossing	$P_1 = P_0 * \{0.45 * C_1 / C_0 + 0.15 * L_1 / L_0 + 0.10 * F_1 / F_0 + 0.30\}$
5.2002	Reinforced concrete - Class C25 for pipe anchors, supports and thrust blocks including formwork, excavation, reinforcement, removal and backfill	$P_1 = 50\% * P_0 * \{0.15 * L_1 / L_0 + 0.70 * Lmc_1 / Lmc_0 * E_1 / E_0 + 0.15\}$ + 5%*P ₀ * {0.15 * L ₁ / L ₀ + 0.25 * F ₁ / F ₀ + 0.10 * Eqp ₁ / Eqp ₀ * E ₁ / E ₀ + 0.50} + 45%*P ₀ * {0.45 * C ₁ / C ₀ + 0.15 * L ₁ / L ₀ + 0.10 * F ₁ / F ₀ + 0.30}
5.2003	Reinforced concrete - Class C30 for concrete structure H = 3m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	$P_1 = 46\% * P_0 * \{0.15 * L_1 / L_0 + 0.70 * Lmc_1 / Lmc_0 * E_1 / E_0 + 0.15\}$ + 4%*P ₀ * {0.15 * L ₁ / L ₀ + 0.25 * F ₁ / F ₀ + 0.10 * Eqp ₁ / Eqp ₀ * E ₁ / E ₀ + 0.50} + 50%*P ₀ * {0.45 * C ₁ / C ₀ + 0.15 * L ₁ / L ₀ + 0.10 * F ₁ / F ₀ + 0.30}
5.2004	Reinforced concrete - Class C30 for concrete structure H = 4m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	$P_1 = 46\% * P_0 * \{0.15 * L_1 / L_0 + 0.70 * Lmc_1 / Lmc_0 * E_1 / E_0 + 0.15\}$ + 4%*P ₀ * {0.15 * L ₁ / L ₀ + 0.25 * F ₁ / F ₀ + 0.10 * Eqp ₁ / Eqp ₀ * E ₁ / E ₀ + 0.50} + 50%*P ₀ * {0.45 * C ₁ / C ₀ + 0.15 * L ₁ / L ₀ + 0.10 * F ₁ / F ₀ + 0.30}
5.2005	Reinforced concrete - Class C30 for concrete structure H = 5m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	$P_1 = 46\% * P_0 * \{0.15 * L_1 / L_0 + 0.70 * Lmc_1 / Lmc_0 * E_1 / E_0 + 0.15\}$ + 4%*P ₀ * {0.15 * L ₁ / L ₀ + 0.25 * F ₁ / F ₀ + 0.10 * Eqp ₁ / Eqp ₀ * E ₁ / E ₀ + 0.50} + 50%*P ₀ * {0.45 * C ₁ / C ₀ + 0.15 * L ₁ / L ₀ + 0.10 * F ₁ / F ₀ + 0.30}
5.3000	Road Reinstatement	
5.3001	Cutting of paved roads for sewers	NOT APPLICABLE
5.3003	Reinstatement of paved main roads including base, sub-base and wearing courses	$P_1 = 50\% * P_0 * \{0.15 + 0.15 * L_1 / L_0 + 0.45 * [(1.12 * B_1 + 66) / (1.12 * B_0 + 66)] + 0.25 * F_1 / F_0\} + 50\% * P_0$
8.0000	Provisional Sum	
8.0001	Provisional Sum for unforeseen works	NOT APPLICABLE

For all the parameters figuring in the price adjustments formulas, refer to Volume 1, Conditions of Contract, Clause 70.1.

PART B

BILL OF QUANTITIES

LOT 1 - COMPULSORY

BILL C - WASTEWATER NETWORKS (LINE A & LINE B1)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
1.0000	General				
1.0001	Site Topographic Survey	km	1.87		
1.0002	Trial pit not exceeding 3m depth	nb	27		
1.0003	Trial Trench not exceeding 3m depth	Lin.m	111		
1.0004	As Built Drawings	km	1.87		
1.0005	CCTV survey on completion	Lin.m	1,868		
1.0006	Connection of existing sewer to manhole, all types,including dealing with flows	Unit	2		
1.0007	Connection of new sewer to existing manhole/chamber all types,including rebenching and dealing with flows	Unit	2		
	Sub-Total 1.0000				
2.0000	Pipeworks				
2.1000	Supply of Pipes and fittings for gravity main and lateral sewers Material:				
2.1001	Supply of 500 mm dia Pipes	Lin.m	810		
2.1002	Supply of 600 mm dia Pipes	Lin.m	72		
2.1003	Supply of 800 mm dia Pipes	Lin.m	168		
2.1004	Supply of 1000 mm dia Pipes	Lin.m	822		
	Sub-Total 2.1000				
2.2000	Trench excavation				
2.2001	Excavation of Trench Type T3-H3	Lin.m	180		
2.2002	Excavation of Trench Type T3-H4	Lin.m	424		
2.2003	Excavation of Trench Type T3-H5	Lin.m	230		
2.2004	Excavation of Trench Type T3-H6	Lin.m	40		
2.2005	Excavation of Trench Type T4-H6	Lin.m	53		
2.2006	Excavation of Trench Type T4-H7	Lin.m	116		
2.2007	Excavation of Trench Type T5-H6	Lin.m	285		
2.2008	Excavation of Trench Type T5-H7	Lin.m	537		
	Sub-Total 2.2000				
2.3000	Dewatering of Trenches				
2.3001	Dewatering of Trench Type T3-H3	Lin.m	180		
2.3002	Dewatering of Trench Type T3-H4	Lin.m	424		
2.3003	Dewatering of Trench Type T3-H5	Lin.m	230		
2.3004	Dewatering of Trench Type T3-H6	Lin.m	40		
2.3005	Dewatering of Trench Type T4-H6	Lin.m	53		
2.3006	Dewatering of Trench Type T4-H7	Lin.m	116		
2.3007	Dewatering of Trench Type T5-H6	Lin.m	285		
2.3008	Dewatering of Trench Type T5-H7	Lin.m	537		
	Sub-Total 2.3000				
2.4000	Sand or gravel bedding and surrounds				
2.4001	for 500 mm pipes	Lin.m	810		
2.4002	for 600 mm pipes	Lin.m	72		
2.4003	for 800 mm pipes	Lin.m	168		
2.4004	for 1000 mm pipes	Lin.m	822		
	Sub-Total 2.4000				

BILL C - WASTEWATER NETWORKS (LINE A & LINE B1)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
2.5000	Laying of pipes				
2.5001	Laying of 500 mm Dia pipes	Lin.m	810		
2.5002	Laying of 600 mm Dia pipes	Lin.m	72		
2.4003	Laying of 800 mm Dia pipes	Lin.m	168		
2.5004	Laying of 1000 mm Dia pipes	Lin.m	822		
	Sub-Total 2.5000				
2.6000	Sand Backfilling of trenches below main paved roads				
2.6001	Backfilling of Trench Type T3-H3	Lin.m	180		
2.6002	Backfilling of Trench Type T3-H4	Lin.m	424		
2.6003	Backfilling of Trench Type T3-H5	Lin.m	230		
2.6004	Backfilling of Trench Type T3-H6	Lin.m	40		
2.6005	Backfilling of Trench Type T4-H6	Lin.m	53		
2.6006	Backfilling of Trench Type T4-H7	Lin.m	116		
2.6007	Backfilling of Trench Type T5-H6	Lin.m	285		
2.6008	Backfilling of Trench Type T5-H7	Lin.m	537		
	Sub-Total 2.6000				
	Sub-Total 2.0000				
3.0000	Manholes				
3.1000	Construction of pre-cast or cast in situ concrete manholes				
	works include excavation, formwork, concrete, reinforcement, backfill, step iron or ladder inside manhole and all other related works (excluding cover)				
3.1001	Manhole Type M3-H3 or C3-H3	Unit	4		
3.1002	Manhole Type M3-H4 or C3-H4	Unit	12		
3.1003	Manhole Type M3-H5 or C3-H5	Unit	6		
3.1005	Manhole Type M4-H6 or C4-H6	Unit	2		
3.1006	Manhole Type M4-H7 or C4-H7	Unit	1		
3.1007	Manhole Type M5-H6 or C5-H6	Unit	9		
3.1008	Manhole Type M5-H7 or C5-H7	Unit	14		
	Sub-Total 3.1000				
3.2000	Extra over for external drop manholes :				
3.2001	Manhole Type M3-H3	Unit	1		
3.2002	Manhole Type M3-H4	Unit	1		
3.2003	Manhole Type M3-H5	Unit	1		
3.2004	Manhole Type M4-H6	Unit	1		
3.2005	Manhole Type M5-H6	Unit	7		
3.2006	Manhole Type M5-H7	Unit	11		
	Sub-Total 3.2000				
3.3000	Manhole Cover & Frame				
3.3001	Manhole cover & frame Grade A (heavy duty)	Unit	48		
	Sub-Total 3.3000				
	Sub-Total 3.0000				

BILL C - WASTEWATER NETWORKS (LINE A & LINE B1)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
4.0000	Testing and Commissioning				
4.1000	Sewer Lines				
4.1001	Testing & commissioning of 500 mm dia sewer lines	Lin.m	810		
4.1002	Testing & commissioning of 600 mm dia sewer lines	Lin.m	72		
4.1003	Testing & commissioning of 800 mm dia sewer lines	Lin.m	168		
4.1004	Testing & commissioning of 1000 mm dia sewer lines	Lin.m	822		
	Sub-Total 4.1000				
4.2000	Testing & Commissioning of Manholes and Chambers				
4.2001	Testing & Commissioning of manholes& chambers all types	Unit	48		
	Sub-Total 4.2000				
	Sub-Total 4.0000				
5.0000	Miscellaneous Items				
5.2000	Concrete works				
5.2001	Mass concrete - Class C25 for pipe supports, thrust blocks, anchors, pipe surround at river crossing, filling between excavation limit and manhole	m ³	620		
5.2002	Reinforced concrete - Class C25 for pipe anchors,supports and thrust blocks including formwork, excavation, reinforcement, removal and backfill	m ³	14.5		
5.2003	Reinforced concrete - Class C30 for concrete structure H = 3m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	Lin.m	740		
5.2004	Reinforced concrete - Class C30 for concrete structure H = 4m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	Lin.m	273		
5.2005	Reinforced concrete - Class C30 for concrete structure H = 5m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	Lin.m	909		
	Sub-Total 5.2000				
5.3000	Road Reinstatement				
5.3001	Cutting of paved roads for sewers	Lin.m	1,932		
5.3002	Reinstatement of main paved roads including base, sub-base and wearing courses	sq.m	7,270		
	Sub-Total 5.3000				
	Sub-Total 5.0000				
	Summary				
1.0000	General				
2.0000	Pipeworks				
3.0000	Manholes				
4.0000	Testing and Commissioning				
5.0000	Miscellaneous Items				
	Grand Total				

LOT 2 - OPTIONAL

BILL C - WASTEWATER NETWORKS (Line B2)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
1.0000	General				
1.0001	Site Topographic Survey	km	0.82		
1.0002	Trial pit not exceeding 3m depth	nb	9		
1.0003	Trial Trench not exceeding 3m depth	Lin.m	50		
1.0004	As Built Drawings	km	0.82		
1.0005	CCTV survey on completion	Lin.m	818		
1.0007	Connection of new sewer to existing manhole/chamber all types,including rebenching and dealing with flows	Unit	1		
	Sub-Total 1.0000				
2.0000	Pipeworks				
2.1000	Supply of Pipes and fittings for gravity main and lateral sewers Material:				
2.1001	Supply of 500 mm dia Pipes	Lin.m	680		
2.1003	Supply of 800 mm dia Pipes	Lin.m	138		
	Sub-Total 2.1000				
2.2000	Trench excavation				
2.2003	Excavation of Trench Type T3-H5	Lin.m	450		
2.2004	Excavation of Trench Type T3-H6	Lin.m	240		
2.2005	Excavation of Trench Type T4-H6	Lin.m	138		
	Sub-Total 2.2000				
2.3000	Dewatering of Trenches				
2.3003	Dewatering of Trench Type T3-H5	Lin.m	450		
2.3004	Dewatering of Trench Type T3-H6	Lin.m	240		
2.3005	Dewatering of Trench Type T4-H6	Lin.m	138		
	Sub-Total 2.3000				
2.4000	Sand or gravel bedding and surrounds				
2.4001	for 500 mm pipes	Lin.m	680		
2.4003	for 800 mm pipes	Lin.m	138		
	Sub-Total 2.4000				

BILL C - WASTEWATER NETWORKS (Line B2)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
2.5000	Laying of pipes				
2.5001	Laying of 500 mm Dia pipes	Lin.m	680		
2.5003	Laying of 800 mm Dia pipes	Lin.m	138		
	Sub-Total 2.5000				
2.6000	Sand Backfilling of trenches below main paved roads				
2.6003	Backfilling of Trench Type T3-H5	Lin.m	450		
2.6004	Backfilling of Trench Type T3-H6	Lin.m	240		
2.6005	Backfilling of Trench Type T4-H6	Lin.m	138		
	Sub-Total 2.6000				
	Sub-Total 2.0000				
3.0000	Manholes				
3.1000	Construction of pre-cast or cast in situ concrete manholes				
	works include excavation, formwork, concrete, reinforcement, backfill, step iron or ladder inside manhole and all other related works (excluding cover)				
3.1003	Manhole Type M3-H5 or C3-H5	Unit	8		
3.1004	Manhole Type M3-H6 or C3-H6	Unit	7		
3.1005	Manhole Type M4-H6 or C4-H6	Unit	4		
	Sub-Total 3.1000				
3.2000	Extra over for external drop manholes :				
3.2003	Manhole Type M3-H5	Unit	1		
3.2004	Manhole Type M4-H6	Unit	1		
	Sub-Total 3.2000				
3.3000	Manhole Cover & Frame				
3.3001	Manhole cover & frame Grade A (heavy duty)	Unit	19		
	Sub-Total 3.3000				
	Sub-Total 3.0000				

BILL C - WASTEWATER NETWORKS (Line B2)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
4.0000	Testing and Commissioning				
4.1000	Sewer Lines				
4.1001	Testing & commissioning of 500 mm dia sewer lines	Lin.m	680		
4.1003	Testing & commissioning of 800 mm dia sewer lines	Lin.m	138		
	Sub-Total 4.1000				
4.2000	Testing & Commissioning of Manholes and Chambers				
4.2001	Testing & Commissioning of manholes& chambers all types	Unit	19		
	Sub-Total 4.2000				
	Sub-Total 4.0000				
5.0000	Miscellaneous Items				
5.2000	Concrete works				
5.2001	Mass concrete - Class C25 for pipe supports, thrust blocks, anchors, pipe surround at river crossing, filling between excavation limit and manhole	m ³	165		
5.2002	Reinforced concrete - Class C25 for pipe anchors,supports and thrust blocks including formwork, excavation, reinforcement, removal and backfill	m ³	7		
5.2004	Reinforced concrete - Class C30 for concrete structure H = 4m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	Lin.m	727		
5.2005	Reinforced concrete - Class C30 for concrete structure H = 5m including formwork, swelling bar, reinforcement, transportation, installation, levelling, etc...	Lin.m	41		
	Sub-Total 5.2000				
5.3000	Road Reinstatement				
5.3001	Cutting of paved roads for sewers	Lin.m	818		
5.3002	Reinstatement of main paved roads including base, sub-base and wearing courses	sq.m	2,790		
	Sub-Total 5.3000				
	Sub-Total 5.0000				
	Summary				
1.0000	General				
2.0000	Pipeworks				
3.0000	Manholes				
4.0000	Testing and Commissioning				
5.0000	Miscellaneous Items				
	Grand Total				

SUMMARY

SUMMARY OF EL MINA REMAINING COASTAL SEWER COLLECTORS

BILL No.	DESCRIPTION	TOTAL AMOUNT in USD
BILL C	COMPULSORY PART	
BILL C	OPTIONAL PART	
	Discount (%)	
	Total after Discount	
	Provisional Sum	500,000.00
	Grand Total	500,000.00