



ARAB POTASH COMPANY
Projects and Expansions Directorate

TENDER DOCUMENT

FOR

Rehabilitation of the HLP Workshop Road Including Infrastructure Utilities

PR.#: (202203089)

“Volume 3”

Method of Measurement and Bill of Quantities (BOQs)

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DIVISION 1 – GENERAL RULES**1. INTRODUCTION**

- 1.1 The rules contained in this Method of Measurement apply equally to both proposed and executed works. The Method of Measurement forms part of the basis on which the unit rates are determined that are to be applied to the Bill of Quantities.
- 1.2 The Bills of Quantities are to be read and construed in association with the Drawings, the Specification, and this Method of Measurement.
- 1.3 In any case where there is any apparent contradiction in requirements as indicated in the drawings and the specifications the most stringent requirement shall apply. The Contractor shall also notify the Employer in writing in such case for confirmation so that a proper and consistent approach is used in assessing the requirements of any item listed in the Bill of Quantities.
- 1.4 The drawings accompanying this package are not checked construction issue drawings and not necessarily complete. They are provided to show the complexity of the work. Where items are not shown in the drawings and the quantities associated with these items not fully defined these quantities are the best estimates and will be indicated as “Provisional”.
- 1.5 Unless the term meter, used in this Method of Measurement, is preceded by the words square or cubic it is deemed to be linear.

2. QUANTITIES:

- 2.1 Quantities set out in the Bills of Quantities are the estimated quantities and they shall not be taken as the actual and correct quantities for ordering or purchasing of materials.
- 2.2 Works shall be measured net as fixed in position in accordance with the rules contained in this Method of Measurement or except where otherwise stated in a measurement rule applicable to the work.
- 2.3 Drawings provided in Volume 4 are generally provided for reference only and are not to be used for estimating quantities where quantities are already provided in the Bill of Quantities. However, these drawings will be used to assess the other requirements that will influence the unit rate for the work, such as the location of the work or other as reflected on the drawings.
- 2.4 Dimensions used in calculating quantities are taken to the nearest 10 mm (i.e., 5 mm and over is regarded as 10 mm; and less than 5 mm is disregarded).
- 2.5 Quantities measured in tons are given to two places of decimals. Other quantities are given to the nearest whole unit except that any quantity less than one unit is given as one unit.
- 2.6 Unless otherwise stated, where minimum deductions for voids are dealt with in this Method of Measurement, they refer only to openings which are within the boundaries of measured areas. Openings which are at the boundaries of measured areas are always deducted irrespective of size.

3. DESCRIPTION:

- 3.1 Headings to groups of items in the Bill of Quantities are to be read as part of the descriptions of the items to which the headings apply.
- 3.2 Dimensions are stated in descriptions generally in the sequence length, width, and height.
Where ambiguity could arise, the dimensions are identified.
- 3.3 Unless otherwise specifically stated in the Bill of Quantities or herein, the following are deemed to be included in the Rate:
 - 3.3.1-Labor and all costs in connection therewith.
 - 3.3.2 Materials, products, goods and all costs in connection therewith.
 - 3.3.3 Contractor's equipment, including but not limited to construction plant, scaffolding, tools, vehicles and the like, and all costs in connection therewith.
 - 3.3.4 Assembling, fitting and fixing materials, products and goods in position.
 - 3.3.5 Any method of fixing, fixing to any nature of base or background including preparation and providing fixing materials.
 - 3.3.6 Breaking down for transport and installation and subsequent re-assembly of composite items manufactured off site.
 - 3.3.7 Waste of materials.
 - 3.3.8 Square, raking and curved cutting.
 - 3.3.9 Work at any location or height.
 - 3.3.10 Work in small, isolated quantities.
 - 3.3.11 Protection of all work.
 - 3.3.12 Protection of all existing structures, utilities, site improvements, trees and vegetation, features, pavements, and other facilities on and adjacent to the site, which are to remain upon completion of the work.
 - 3.3.13 Quality assurance for all works, including all testing, inspection and reporting as called out in the specifications and bid documents.
 - 3.3.14 All other enabling tasks, associated and subsidiary components and items of work, which are indicated or reasonably inferred from the Drawings and/or Specification, and necessary to perform and complete the work described.
 - 3.3.15 Establishment and overhead charges and profit.
 - 3.3.16 Demobilization.

- 3.4 Except where items are included in the Bill of Quantities and are priced separately by the Contractor therein, provision of the following is deemed to be included in the Rate:
- 3.4.1 Site administration and security.
 - 3.4.2 Insurances.
 - 3.4.3 Bonds and guarantees.
 - 3.4.4 Water for the works.
 - 3.4.5 Lighting and power for the works.
 - 3.4.6 Temporary accommodation for the use of the Contractor.
 - 3.4.7 Temporary telephones for the use of the Contractor, and the cost of calls.
 - 3.4.8 Temporary roads, hard-standings, crossings, and the like.
 - 3.4.9 Temporary fencing, hoardings, screens, fans, foot- ways, guardrails, gantries, and the like.
 - 3.4.10 Giving notices and making applications, including the payment of fees and charges in connection therewith.
 - 3.4.11 Safety, health, and welfare of workpeople.
 - 3.4.12 Compliance with traffic regulations.
 - 3.4.13 Maintenance of public and private roads, services, and adjoining property.
 - 3.4.14 Control of noise and pollution, prevention of fire and compliance with all other statutory and general obligations.
 - 3.4.15 Removing rubbish, protective casings and coverings and cleaning the works on completion.
 - 3.4.16 Drying the works.
 - 3.4.17 Testing and commissioning of service installations including providing fuel.
 - 3.4.18 Samples of materials and testing of materials, including providing equipment for testing.
 - 3.4.19 Maintaining on-site project files and records for all documentation and test reports as requested in the specifications.
 - 3.4.20 Design, co-ordination, installation and as-built record drawings and the like.
 - 3.4.21 Preparation and submittal of reports, records, certificates, notices, proposals, designs, details, calculations and other information and data required by the Specification.
 - 3.4.22 Allow in unit rates for all other requirements services, provisions, liabilities and obligations contained in the General Requirements and Conditions of Contract.
- 3.5 Maintaining, adapting, clearing away and making good are deemed to be included with the items for temporary works.

4. SYMBOLS, ABBREVIATIONS AND DEFINITIONS

4.1 The following symbols and abbreviations are used in this Method of Measurement and in the Bills of Quantities:

m	=	linear meter
m ²	=	square meter
m ³	=	cubic meter
cm	=	centimeter
mm	=	millimeter
Nr	=	number
Kg	=	kilogram
T	=	tons
%	=	percentage.
dn	=	nominal diameter
Qty	=	quantity
Mpa	=	Mega Pascal

4.2 The following definitions apply to all work:

4.2.1 'Horizontal' means level or sloping work not exceeding 15 degrees from the horizontal,

4.2.2 'Sloping' means sloping work exceeding 15 degrees but not exceeding 80 degrees from the horizontal,

4.2.3 'Vertical' means work exceeding 80 degrees from the horizontal,

4.2.4 'Curved' means curved in any direction or in more than one direction and to any radius or radii, and includes curved work to domes, vaults and the like.

4.3 The term 'extra over' means that the work so described involves extra cost over the basic work in which it occurs. No deduction of the quantity of basic work is made for the extra over work.

4.4 “Provisional” or “Optional” quantities shall be subject to measurement upon their completion, in accordance with the Contract. “Optional” items are subject to the sole discretion of the Employer with respect to their usage wholly, partially or complete deletion from the scope of work. In case items denoted "Optional" or "Provisional" are not priced in the Bill of Quantities they shall be deemed included and covered by other priced items of the Bill of Quantities.

EARTHWORKS

1. SITE CLEARING

1.1 Clearing the site generally is given as an item

1.2 Work is deemed to include:

- removing site features (including fences, gates, walls, scrap, roads, paved areas and the like; but excluding demolition of structures, including breaking out foundations,
- removing trees and tree stumps, including grubbing up roots,
- clearing site vegetation (including hedges, bushes, scrub and undergrowth), including grubbing up roots,
- protecting site features, trees and site vegetation which are to remain,
- removing general debris and rubbish,
- filling voids,
- disposal of materials,
- temporarily diverting ditches, field drains and other waterways - - including reinstating on completion or cleaning and filling.

2 EARTH MOVING

2.1 Excavation

2.1.1 Excavation is applied below the existing ground levels of the site to reach the excavation levels, limits and side slopes as indicated in the relevant drawings.

2.1.2 Excavation of each of the following types is given separately for each zone:

- Excavation in any material to remove unsuitable material including transportation to dump areas as necessary from the existing ground level to a 0.5m depth above the ground water table if encountered.

Excavation in any material to remove unsuitable material including transportation to dump areas as necessary from a 0.5m depth above the ground water table if encountered to the bottom of excavation - -

level, including the dewatering system to remove surface water and lower the ground water during excavation and fill works.

2.1.3 Excavation is given in cubic meters. The quantities given are the bulk before excavating.

2.1.4 Excavation Work is deemed to include:

- any method of excavating and working,
- all survey work and shop drawings whether before earthworks are commenced, during or after completion and for submission of records
- excavating in any material whatsoever encountered including salt rock,
- carrying out exploratory test pits to investigate the depth and extent of unsuitable material (that should be excavated and replaced)
- clearing and cleaning the excavated surface when required by the engineer for inspection,
- variations to bulk,
- additional work arising from the bulking or consolidation of excavated material
- commencing excavating at any level, and excavating to any depth, any width of trench and any number of pits, curved excavation,
 - excavating below ground water level, if any (irrespective of any difference between the post-contract and pre-contract level),
 - inspection of the excavation level and removing all the unsuitable materials
- excavating next to existing services and around existing services crossing excavations including temporary support, temporarily re-routing, sealing and removing services as required,
- breaking out existing materials and hard paving including concrete, reinforced concrete, brickwork, blockwork, stonework, drains, and coated macadam or asphalt and the like,
- extra excavation for working space and to accommodate earthwork support including additional disposal, backfilling, work below ground water level, breaking out and earthwork support,

- earthwork support (including interlocking steel piling) including support below ground water level, to unstable ground, next to roadways, next to existing buildings and support left in,
- disposal of excavated material, on site or off site, including spreading and levelling or depositing in spoil heaps, providing tip and paying fees and multiple handling,
- in case of unauthorized over excavation, backfilling to excavation level with material arising from excavations or imported filling material including depositing and compacting in layers and multiple handling, or backfilling using low strength materials at narrow areas,
- surface treatments at the excavation level including compacting surface of ground and bottoms of excavations, levelling and grading to falls, trimming sloping surfaces and trimming vertical surfaces to sides of cuttings (including trimming in rock),
- Dewatering is deemed to include:
 - disposal of ground water and surface water,
 - design, furnish, install, operate, and eventually remove an appropriate dewatering system during excavation and till placement of fill,
- maintain the groundwater level at least 0.5 m below the final excavation levels,
- constructing, installing, building, and maintaining all necessary temporary water containment facilities, channels, and diversions; furnishing, installing, and operating all necessary pumps, piping, and other facilities and equipment,
- removing all temporary works and equipment after their intended function is no longer required
- preparation of detailed method statement, design calculations and drawings of the dewatering system,
- provision for emergency/standby equipment to maintain continuous operation of the dewatering system

2.2 Filling

2.2.1 Filling to make up levels using engineering fill material is given as one item

2.2.2 Filling is given in cubic meters measured as equal to the void between the bottom and sides of excavations and the finish grade levels.

2.2.3 Fill material (borrowing area) will be provided by The Owner free of charge if found suitable and compliant with Tender Specifications. The transportation, preparation, testing, compaction, filling etc.. shall be under the Contractor's scope

2.2.4 Work is deemed to include:

- All survey work and shop drawings whether before earthworks are commenced, during or after completion and for submission of records,
- preparing surfaces to receive filling,
- using material imported from borrow areas including inspection of borrow areas, selection and testing of material suitability and transportation,
- filling of any thickness,
- multiple handling,
- variations to bulk,
- filling and compacting in layers including levelling and grading to falls and slopes, and loss of material into ground during filling and compaction,
- trimming sloping and vertical sides of filling and embankments,
- excavating benching in sloping ground to receive filling and in sides of sloping filling, including disposal,
- providing protective filling and removing on -

completion, removing from site unsuitable

and surplus filling materials.

STRUCTURAL WORKS**DIVISION 031113 - STRUCTURAL CAST-IN-PLACE CONCRTE FORMING****1. FORMWORK (FAIRFACE)**

- 1.1 Temporary formwork to produce basic finish, is deemed to be included within the price of concreting.
- 1.2 Permanent formwork is that which is designed to remain in position. Type of permanent formwork is stated.
- 1.3 Basic Tamped Finish to surfaces of concrete is not measured, it is deemed to be included within the price of concreting.

2. FINISHING FORMED SURFACES:

- 2.1 Temporary formwork to produce formed finishes, is deemed to be included within price of concreting.

DIVISION 032100 - REINFORCING STEEL**1. BAR REINFORCEMENT**

- 1.1 High yield steel bar reinforcement of 420 MPa is provided and shall be process separately.
- 1.2 Bar reinforcement is given in tons.
- 1.3 Rate is deemed to include:
 - 1 Preparing schedules for bar bending
 - 2 Fixing bars in any position and in any member,
 - 3 Fixing bars horizontally, vertically and sloping,
 - 4 Any diameter, section, and length of bars,
 - 5 Any type of weldable bars,
 - 6 Forming straight, bent, and curved bars and links,
 - 7 Cutting, lapping, and jointing (including special joints),
 - 8 Hooks, tying wire, spacers, chairs, and the like,
 - 9 The weight of surface treatments and rolling margin,
 - 10 Tests and quality control procedures.
 - 11 Water stops as per design drawings and engineers' requirements.
 - 12 Mechanical splices at connection between existing and new structures and as shown on drawing.
 - 13 Dowel Bars at expansion joints.

DIVISION 033000 - CAST IN - PLACE CONCRETE**1. IN PLACE CONCRETE:****1.1 Material procurement, supply & Execution of concrete -only- is by Contractor.**

Each class of in situ concrete is given separately, stating the kind of cement and whether plain or reinforced.

1.2 Work of each of the following types is given separately:

- 1 Foundations (isolate, strip, raft, combined, etc.)
- 2 Ground beams
- 3 Machine Pads
- 4 Slab on grade (including trenches, pits, stairs on ground, ramps, etc.)
- 5 Suspended slabs (including flat beams and landings occurring at floor level)
- 6 Attached drop beams (drop parts below slab)
- 7 Walls
- 8 Columns (including column necks)
- 9 Pedestals
- 10 Staircase (including steps, landing occurring between floor levels and strings)
- 11 Upstand parapet
- 1.3 Wall and column kickers are included with the measurement of walls and columns respectively.

1.4 Columns and column casings which are attached to walls are included with the measurement of the member to which they are attached.**1.5 Projections, nibs, and the like are included with the measurement of the adjacent member.****1.6 Details of each type of composite or complex unit and feature are stated in description.****1.7 In situ concrete is given in cubic meters measured net except that deductions are not made for the following:****1.7.1 Reinforcement****1.7.2 Steel sections of area not exceeding 0.05 m^2 ,****1.7.3 Cast in accessories,****1.7.4 Voids not exceeding 0.20 m^3 in volume.****1.8 Rate is deemed to include:****1.8.1 Designing mixes, (including all tests and quality control procedures),****1.8.2 Any method of pouring, placing, compacting, and curing,**

- 1.8.3 Pouring on or against earth or unblended hardcore,
- 1.8.4 Any thickness, cross-sectional area or number of members,
- 1.8.5 Horizontal, sloping, vertical and curved work,
- 1.8.6 Placing or finishing to falls and cross falls,
- 1.8.7 all types of concrete finishes, including basic and plain finish as struck from formwork, and tamped and troweled worked finish,
- 1.8.8 Formwork or any other form of temporary support to produce formed finishes, (including basic and fair face finish),
- 1.8.9 Extra width of concrete or formwork to edges of blinding beds,
- 1.8.10 temporary formwork or other form of temporary support to all surfaces, including design, construction, supports, fixing, striking, removing, re-propping and all formwork requirements,
- 1.8.11 Reinforcement content of any percentage of the volume of concrete,
- 1.8.12 day joints (construction joints), contraction joints and joints required in the forming of bays including formwork and treatment of reinforcement crossing the joint, column and wall kickers and construction joints,
- 1.8.13 all labors on concrete including working around pipes or cables, cutting channels, chases, mortices, pockets, and holes and including subsequent grouting or filling and making good,
- 1.8.14 Chemical hardener on top of slab on grade.
- 1.9 Water stop
- 1.10 Rate is deemed to include:
 - .1 Horizontal, vertical, sloping, and curved work,
 - 1.10.2 Ends, angles and intersections, irrespective of whether standard, welded or purpose made.
- 1.11 Embedded steel parts, pipes, and sleeves
- 1.12 Tests and quality control procedures
- 1.13 Expansion Joints
- 1.14 Expansion joints, isolation joints, construction joints, contraction joints, etc.
- 1.15 Rate is deemed to include:
 - 1.15.1 sheet material filler,

- 1.15.2 formwork,
- 1.15.3 horizontal, sloping and vertical work,
- 1.15.4 any width or depth of joint,
- 1.15.5 Joint sealant.

2. VAPOR RETARDERS (POLYETHYLENE SHEETS)

- 2.1 Work is given under item:
 - 1 Polyethylene under slabs on grade.
- 2.2 Work is given in square meters.
- 2.3 Rate is deemed to include:
 - 2.3.1 Sloping and curved works,
 - 2.3.2 Work to any width, height, or girth,
 - 2.3.3 Work laid to falls and cross falls, and intersection on sloping work,
 - 2.3.4 Extra material for lapping membranes including adhesive tapes,
 - 2.3.5 Internal and external angles, fillets, and the like,
 - 2.3.6 Edges, arises, and turning into grooves or channels and ceilings,
 - 2.3.7 Cutting, notching and benching membranes,
 - 2.3.8 Holes for pipes and the like, forming collars and ceilings,
- 2.4 Sand/cement screed protection to polyethylene sheets is given in square meters stating the thickness.

3- CEMENT-BASE SCREED

1. Generally

- 1.1 Each kind of screed, topping and the like is given separately stating the surface finish. Reinforced work and monolithic work (i.e. work laid in one operation with the base) are each so described.
- 1.2 Thickness stated for screeds and toppings is the nominal thickness.
- 1.3 Sloping work is so described
- 1.4 Work to roofs, floors, channels, and the like is given separately in square meters measured overall the area in contact with the base. No deduction is made for voids not exceeding 0.50 m².
- 1.5 Work to skirtings, angle fillets and the like is given in meters, measured the length in contact with the base
- 1.6 Rates for measured work are deemed to include the costs of:
 - 1.6.1 work laid to falls and crossfalls, and intersections on sloping work,
 - 1.6.2 work laid in bays,
 - 1.6.3 forming shallow channels within the thickness of screeds or toppings,
 - 1.6.4 fabric reinforcement, metal mesh strips across dissimilar backgrounds, service chases, conduits, and the like,
 - 1.6.5 dividing strips, anti-crack strips, cover strips and movement joints except designed expansion joints,
 - 1.6.6 temporary support work to face of risers and the like,
 - 1.6.7 bonding agents,
 - 1.6.8 samples and tests,
 - 1.6.9 protection.

DIVISION 334000 – Mechanical work**1. EARTHWORKS****1.1 Excavations and Backfilling of Pipe Trenches**

1.1.1 Excavating trenches are not measured separately and are deemed to be included in measured items for pipe, manholes, chambers, etc., as applicable.

1.1.2 Rates for excavating trenches are deemed to include excavations to form the trench and backfilling to the trench as follows:

- Setting out as directed.
- Excavation in any material whatsoever encountered.
- Excavation at any level and any depth.
- Excavation to any width of trench and along curves.
- Allowance for working space and for variation to bulk.
- Excavation below water table and keeping excavations free from water.
- Levelling ramming trimming and grading bottoms and sides of excavation as required.
- Planking strutting and all temporary support as required.
- Excavating next to existing services and around existing services, crossing excavations including temporary support, temporarily re-routing, sealing and removing services as required.
- Breaking out existing materials and hard paving including concrete, reinforced concrete, brickwork, blockwork, stonework, drains, and coated macadam or asphalt and the like.
- Removing of obstructions.
- Hunching and concrete encasement as appropriate.
- Segregation of the various classes of excavated material and stock piling as may be directed by the Engineer.

- Returning, filling and ramming selected excavated material in trenches and around foundations, multiple handling of excavated material and excavation from borrows and transporting about the Site.
- Disposal of surplus excavated material including depositing and consolidating where directed on Site or removing from Site and depositing at a tip to be provided and paid for by the Contractor.
- Pipe bedding and backfilling to excavations with material arising from excavations or imported filling material including depositing and compacting in layers and multiple handling
- Filling over-excavation.
- Consolidation of primary backfill (initial backfill) material using water or hand tamping.
- Compaction of secondary backfill (main backfill) material.

- Reinstatement of surfaces at road crossings and wherever required.

1.1.3 No separate payment will be made for trench excavation and backfilling including pipe bedding. The cost shall be included with the rate of the respective item requiring such work.

2. PIPES, FITTINGS AND ACCESSORIES

2.1 Pipes, Fittings and Accessories

2.1.1 Each kind of pipe is given separately.

2.1.2 Each diameter of pipe is given separately. Diameters stated are nominal diameters.

2.1.3 Pipes and accessories shall include for the following as applicable for pressure and gravity pipes:

- Supply of pipes, couplings and all appropriate fittings, specials and jointing materials.
- Transportation and hauling about the site, loading unloading and laying in the trench or fixing to appropriate structure.
- Cutting machining, chamfering, etc... of standard-length pipes.
- Piping sleeves.
- Assembling the pipes and couplings and connecting to manholes and chambers as appropriate.
- Bolts, nuts, gaskets and other material for flanged fittings.
- Concrete encasement.
- Testing as per specification
- All ancillary works and materials.
- Flushing cleaning, lining and coating.

2.1.4 Rates for pipes are deemed to include all auxiliary fittings and accessories which are not classified /specified in the BOQ.

2.1.5 Pipelines shall be paid for per linear meter covering, supply of materials, earthwork, bedding, installation, manhole, bends, tees, all fittings, testing and commissioning and all items listed above. The pipe length shall be measured as a straight line between the centers of consecutive coupling section, valves or manholes. No allowance will be made for cut ends and waste.

3. MANHOLES AND GULLIES

3.1 Rate for manholes are include in GRP pipeline and shall include for the following:

- Setting out
- Excavation in any natural material in accordance with the preambles for “Earthwork”.
- Concrete, blinding, reinforcing steel, beds, surrounds, benching and flexible couplings including all items required for Concrete Works and Concrete Structures and all temporary works.
- Protective coating of exposed faces of concrete.
- Concrete or brick blockwork corbelling as required
- Covers, grates and frames with all ancillary work.
- Testing structures for water tightness and any subsequent re-testing.
- Rungs and puddle flanges built into walls.
- All other ancillary items.

4. CONNECTING WORKS TO EXISTING NETWORKS

4.1 The rates of such work are deemed to include in the GRP pipeline the following:

- Temporary diversion or stopping of flow in existing networks.
- All earthworks including excavation, bedding and backfilling.
- Preparing existing work to receive or discharge to new work including any hand excavation to expose pipe and subsequent backfilling.
- All cutting machining required to facilitate the connection.
- All pipe works as listed above, fittings, fixing and jointing materials.
- Making good all work disturbed and reinstating surfaces as per directions of the Engineer
- Disposal of materials arising.
- Testing and inspection.
- All co-ordination required with utility authorities, all ancillary items and all costs associated with authorities’ requirements and procedures for maintaining uninterrupted service
- reinstatement of surface wherever required.

4.2 No separate payment shall be made for connection to existing pipelines. The cost shall be included in the rates of other respective items of the Bill of Quantities.

5. RELOCATION/PROTECTION OF EXISTING UTILITIES

5.1.1 The rates of such work are deemed to include in GRP pipeline the following all subject to the Engineer approval:

- Investigation works of exiting utilities including coordination with relevant authorities, survey of all existing piped utilities (water, wastewater, fire, irrigation, stormwater networks) in the vicinity and within the project boundaries.
 - Identification of the existence and location of underground utilities and other construction affecting the works need to be removed / diverted/ protected.
 - Diversion / relocation of pipes and related valves/manholes/chambers/gullies, et..., as necessary.
 - Protection and encasement of pipes as needed.
 - Reinforcement of manholes/chambers as needed
 - Level adjustment of valves, manholes, chambers, and all exposed network elements to match the finished grade levels
 - Re-alignment of utility lines, as needed, complete in coordination with other existing utilities running within the project site.
 - All preparation works including identification of utilities corridors for the relocation of utilities, the coordination between all utilities
 - All cutting machining required to facilitate the connection.
 - All earthworks including excavation, bedding, and backfilling.
 - Preparing existing work to receive or discharge to new work including any hand excavation to expose pipe and subsequent backfilling.
 - All necessary pipe works, valves, chambers, manholes, etc... as listed above, fittings, fixing and jointing materials.
 - All necessary concrete works, protection works,
 - Making good all work disturbed and reinstating surfaces as per directions of the Engineer.
 - Disposal of materials arising.
 - Testing and inspection.
 - All co-ordination required with utility authorities, all ancillary items and all costs associated with authorities' requirements and procedures for maintaining uninterrupted service.

5.1.2 No separate payment shall be made for relocation of existing pipelines. The cost shall be included in the rates of other respective items of the Bill of Quantities.

6. PROTECTIVE COATINGS

6.1 The item for protective coatings shall include for applying the necessary coatings to surfaces of metalwork as detailed in the Specification and shall include for:

- i preparation of surface,
- ii supplying all necessary tools and equipment, adhesives, bonding agents, etc.,
- iii work in any location,
- iv any area or width,
- v rubbing down between coats,
- vi cutting in edges,
- vii making good to damaged areas,
- viii protection,
- ix testing when required by the Engineer,

6.2 No separate payment will be made for protective coating. The cost shall be included with the rate of the respective item requiring such work.

TRANSPORTATION WORKS

1. PLACING OF FILL

1.1 Placing of Fill is given separately: Fill

1.2 Fill is given in cubic meter.

2. Work is deemed to include:

Using suitable material imported from borrow areas including handling, sampling, testing, hauled and used in the proper formation of embankments, including trimming of slopes, preparation and completion of the roadway subgrade and sidewalks.

3. Subgrade

3.1 Subgrade is given separately: Subgrade layer.

3.2 Subgrade layer is given in cubic meter.

3.3 Work is deemed to include:

Supply of material, handling, sampling, and testing

Deposition, measuring, grading watering and mixing of materials.

All type of works required, as specified

EXTERIOR IMPROVEMENTS

1. AGGREGATE BASE & SUBBASE COURSE

1.1 Aggregate Base& SUBBASE Course shall be measured by cubic meters (m³) of aggregate materials of the indicated layer thickness, furnished, crushed and screened, mixed with water, placed, spread, compacted and finished, completed, and accepted.

Measurements shall be based on volumes computed from the cross sections shown on the For Construction Drawings and of the field measurements of area and compacted depths / thicknesses. No measurement shall be made for direct payment of over-depth construction, regardless of the Engineer's permission for it to remain in place.

Rates for aggregate base course shall include:

- Provision of aggregate from approved sources.
- Laying, spreading and raking to correct levels, falls and cambers
- Rolling and compacting.
- Testing of materials as specified.

2. ASPHALT PAVING

- 2.1.1 Bituminous Wearing Course and Bituminous Base Course shall be measured in cubic meters (m^3) of mix of the indicated thickness, furnished spread, compacted, completed and accepted. Measurements shall be based on the areas and compacted thickness as shown on the Drawings or otherwise directed by the Engineer.
- 2.1.2 Deficiencies in thickness of the surface course shall, unless an overlay is constructed at the Contractor's expense
- 2.1.3 Bituminous prime and tack coats shall be measured by the square meter (m^2) of the areas coated at the appropriate rate approved by the Engineer.
- 2.1.4 Surface preparation, protective measures to avoid staining or damage to appurtenances, blotting of prime coats when required, and cleaning stains and repairing damage caused by equipment, etc shall not be measured for direct payment, but shall be considered as subsidiary works the costs of which will be deemed to be included in the contract prices for the Pay Items.
- 2.1.5 Bituminous Layers constructed by order of the Engineer to correct deficiencies in total thickness of bituminous courses or to compensate for major deficiencies in the thickness of any underlying bituminous course, shall not be measured for direct payment, but shall be considered as subsidiary works the costs of which will be deemed to be included in the contract prices for Pay Items.
- 2.1.6 Establishment of the Job Mix Formula, surface preparation, construction of joints, hand painting of contact surfaces, remedial treatment of surface irregularities, cutting of cores and slabs for testing or measurement purposes, reinstatement of core and slab areas of pavement, rolled down longitudinal bituminous edge strips, additional thickness of bituminous course in excess of the specified thickness, and other ancillary items shall not be measured for direct payment, but shall be considered as subsidiary works the costs of which will be deemed to be included in the contract prices for Pay Items.

3. AGGREGATE SURFACING

- 3.1 Gravel for sidewalk is given separately:
- 3.2 Gravel is given in cubic meter.

- 3.3 Work is deemed to include:
- Supply of material and preliminary trials
 - Deposition, measuring, grading watering and mixing of materials
 - All type of works, required, as specified.

4. CURBS and GUTTERS

- 4.1 Curb is given separately for each type:

- Non-mountable curb
- Edge curb

- 4.2 Non-mountable curb and edge curb are given in linear meter.

- 4.3 Work is deemed to include:

- Curb type furnished, constructed, or installed, completed and accepted. Measurements shall be of the front face of concrete curb.
- Excavation, backfilling, bedding, concrete backing, construction in and around obstacles shall not be measured for direct payment, but shall be considered as subsidiary works, the costs of which will be deemed to be included in the contract prices for the pay items.

جدول كميات					
أعمال صيانة خطوط الفايرجلاس / البنية التحتية وتزفيت شارع المشاغل - مصنع البلورة الساخنة					
رقم البند	الوصف	الوحدة	الكمية	السعر الإفرادي	
				فلس	دينار
1	أعمال تصميم ال Trench حسب المسار المحدد بالرسم التوضيحي المرفق، شاملا الأعمال المساحية، ويشمل السعر اصدار المخططات التصميمية والتنفيذية، على ان توضح الحدود والابعاد والاقطار والمناسيب وتفاصيل حديد التسليح. كما يجب أن توضح احداثيات المناهل القائمة والمستحدثة والمسافات فيما بينها وميولها، بالإضافة الى تسليم مقاطع طويلة لمسار خطوط ال GRP وال Trench مع توضيح طرق الربط مع خطوط ال GRP الموجودة وتفاصيل حديد تسليح المناهل، بالإضافة الى طرق التنفيذ، على ان لا يقل ميول خطوط ال GRP وال Trench عن 1%.	بالمقطوع	1		
2	تنفيذ أعمال حفریات أرضية على طول خط مسار أنبوب التصريف GRP وال Trench، حسب المخطط الاستدلالي المرفق ، وأبعاد حفر كما يلي:	بالمتر الطولي	380		
	<ul style="list-style-type: none"> • <u>الترنش:</u> يتدرج من عمق 40 سم الى 120 سم، بعرض 70سم وبطول 60 متر، على ان يتم تأكيد المناسيب اثناء التصميم وتطبيق ذلك في المخططات التصميمية والتنفيذية (الصادرة من المقاول)، وحسب المواصفات الفنية المذكورة في وثائق العطاء . • <u>الحفر لأنابيب GRP قطر 18 انش</u> ما بين المناهل الجديدة، بجوار ال Decomposition Tanks بطول مسار الخط 70 متر وبعمق يتدرج من 1.2 متر الى 1.7 متر وبعرض 1.5 متر، على ان يتم تأكيد المناسيب اثناء التصميم وتطبيق ذلك في المخططات التصميمية والتنفيذية (الصادرة من المقاول)، وحسب المواصفات الفنية المذكورة في وثائق العطاء . • <u>الحفر لأنابيب GRP قطر 10 انش</u> ما بين المنهل الجديد المستحدث بجوار تنك الماء 				

					<p>العذب, مقابل المحطة الحرارية, بطول 60 متر, عرض 1.5م وعمق يبدأ من 1متر تقريبا, على ان يتم تأكيد المناسيب اثناء التصميم وتطبيق ذلك في المخططات التصميمية والتنفيذية (الصادرة من المقاول), وحسب المواصفات الفنية المذكورة في وثائق العطاء .</p> <ul style="list-style-type: none"> • <u>الحفر لأنابيب GRP قطر 24 انش</u> ما بين ال تقاطع شارع B والزاوية الغربية لمبنى Switchroom-1, بطول 190 متر, عرض 1.5م وعمق يبدأ من 2.0متر تقريبا, على ان يتم تأكيد المناسيب اثناء التصميم وتطبيق ذلك في المخططات التصميمية والتنفيذية (الصادرة من المقاول), وحسب المواصفات الفنية المذكورة في وثائق العطاء . كما ويجب استخدام مقص ميكانيكي مناسب لقص المناطق التي يتطلب العمل عليها (سواء أن كان الوجه العلوي من الخرسانة أو الاسفلت) وتكال أعمال الحفر بالمتر الطولي لمسار الخط ويشمل السعر: • كافة أعمال الحفر و إزالة مخلفاته, بما يتناسب مع الموقع, سواء حفر يدوي أو الي. • كافة الأعمال المساحية و تحري المرافق في الموقع مكان الحفريات. • نقل ناتج الحفر أول بأول الى المناطق التي سيتم تحديدها من قبل المهندس المشرف. • تأمين جميع متطلبات السلامة بموقع العمل باستصدار التصاريح اللازمة ووضع حواجز تحذيرية وشريط تحذيري وشواخص تحذيرية تدل على وجود أعمال حفريات وضرورة تأمين جسور معدنية للمشاة بحواف دربزين أمانة في أي منطقة تتطلب ذلك . • تأمين متطلبات السلامة بتدعيم جوانب الحفر أو أية أعمال طوبار مطلوبة أول بأول لمنع حصول انهيارات. • تأمين مسار الحفر وعلى الجانبين, بعمل حواجز من الطوب أو الرمل أو ما يوافق عليه المهندس المشرف) لمنع دخول المياه والمحاليل الملحية نتيجة عمليات التشغيل
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					<p>الموجودة والمستمرة في المصانع, علما بأن الأولوية للعمليات الانتاجية, ولا يجب تعطيلها.</p> <ul style="list-style-type: none"> • لا تحسب أية أعمال أو كيل كميات إضافية لنواتج الحفر وإنما يعتمد الكيل على طول مسار الحفرية بالمتر, بغض النظر عن العرض والعمق. 	
				6	<p>اعمال توريد وتنفيذ وانشاء مناهل التصريف حسب الرسومات و المخططات التصميمية (الصادرة من المفاضل) وحسب المخطط الاستدلالي المرفق:</p> <ul style="list-style-type: none"> • (5) مناهل بأبعاد داخلية لا تقل عن 1.5X1.5X1.5 • (1) مناهل بأبعاد داخلية لا تقل عن 1X1X1 <p>ويشمل السعر للمنهل الواحد بالمقطوع:-</p> <ul style="list-style-type: none"> • كافة أعمال الحفر و إزالة مخلفاته, بما يتناسب مع الموقع, سواء حفر يدوي أو الي. • كافة الأعمال المساحية و تحري المرافق في الموقع مكان الحفريات. • نقل ناتج الحفر أول بأول الى المناطق التي سيتم تحديدها من قبل المهندس المشرف. • تأمين جميع متطلبات السلامة بموقع العمل باستصدار التصاريح اللازمة ووضع حواجز تحذيرية وشريط تحذيري وشواخص تحذيرية تدل على وجود أعمال حفريات وضرورة تأمين جسور معدنية للمشاة بحواف دريزين أمانة في أي منطقة تتطلب ذلك . • تأمين متطلبات السلامة بتدعيم جوانب الحفر أو أية أعمال طوبار مطلوبة أول بأول لمنع حصول انهيارات. • تأمين مسار الحفر وعلى الجانبين, بعمل حواجز من الطوب أو الرمل أو ما يوافق عليه المهندس المشرف) لمنع دخول المياه والمحاليل الملحية نتيجة عمليات التشغيل 	3

					<p>الموجودة والمستمرة في المصانع, علما بأن الأولوية للعمليات الانتاجية, ولا يجب تعطيلها.</p> <ul style="list-style-type: none"> • تقديم و توريد و صب خرسانة مسلحة بقوة كسر لا تقل عن 45 نيوتن/ملم² بعد 28 يوم للمكعبات قياس 150×150 ملم وذلك بعد دمك الأرضية حسب المخططات التصميمية (الصادرة من المقاول) بدرجة رك لا تقل عن 95 % • مع توريد و تقديم وتركيب حديد عالي المقاومة للشد إجهاد خضوع 420 نيوتن/ملم المربع " grade High tensile steel Grade 60 لتسليح الخرسانة حسب متطلبات المواصفات واللوحات التصميمية وشمولية السعر, وذلك من كافة الأقطار والأطوال, والسعر يشمل القص والثني والضياع وكراسي رفع الحديد وأسلاك التثبيت والدسر والمباعدات البلاستيكية مع ملاحظة تأمين أي طول حسب المخططات التصميمية ولا تحسب الأطوال الزائدة ولا يدفع لذلك أي علاوات. والسعر يشمل جميع ما يلزم لإنجاز العمل على أكمل وجه حسب المخططات والمواصفات . • تسليح و طوبار و صب قواعد و جدران و سقف المناهل حسب الرسومات و المخططات و حسب المواصفات الواردة في وثائق العطاء و حسب الأعماق المطلوبة مع جميع ما يلزم للتوصيل و تثبيت من sulphate resisting Portland cement (SRPC) مع جميع ما يلزم (fair face) بأسطح ناعمة من دمك التربة أسفل قواعد المناهل وعزلها بطبقة بلاستيكية (polyethylene sheet 250 micron) • عزل جميع الأسطح الخارجية للمناهل بطبقة من 4mm Bitumen Roll . • توريد و تنصيب و تثبيت أغطية المناهل (مفتوحة), وحسب المواصفات التالية, وبالرجوع لـ (BS EN 1561 : 1997):
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					<p>1- Heavy Duty Manhole Grate & Frame/ Two Pieces Grate. 2-Cast Iron. 3-Clear Opening: 915 mm.sq & 100mm Total Depth 4- Over Base: 1065 X 1065 mm 5-Design Load Capacity: 40 Ton</p>  <ul style="list-style-type: none"> • كافة أعمال الردم حول المناهل مع الدمك المستمر أول بأول لطبقات الردم و ذلك حسب المخططات التصميمية الصادرة من المقاول. • تكون كافة كلف الأعمال المذكورة من توريد و تركيب و حفر و ردم و صب الخرسانة أو أي أعمال أخرى تلزم لإنجاز أعمال المناهل بشكلها محملة على سعر المنهل بالمقطوع مهما بلغ عمق المنهل أو عدد نقاط الشبك مع الأنابيب. • اجراء الفحوصات اللازمة لأغطية المناهل الموردة مع تقديم عينات للمراجعة والموافقة عليها من المهندس المشرف قبل المباشرة في أعمال التوريد. • شاملا جميع قطع التثبيت مع الخرسانة من براغي التثبيت والزوايا والحواضن المصنعة من نفس معدن الأغطية وبنفس قدرة التحمل <p><u>ملاحظة : على المقاول صب المناهل خارج الموقع, ومن ثم نقلها جاهزة مع أغطيتها الى مكانها وحسب اللوحات التصميمية.</u></p>	
			60	بالمتر الطولي	<ul style="list-style-type: none"> • تقديم و توريد و صب ال Trench على شكل حرف U, من الخرسانة المسلحة بقوة كسر لا تقل عن 45 نيوتن/ملم² بعد 	4

					<p>28 يوم للمكعبات قياس 150×150 ملم وذلك بعد دمك الأرضية حسب المخططات التصميمية (الصادرة من المقاول والمعمدة من المهندس المشرف) بدرجة رك لا تقل عن 95 % • مع توريد و تقديم وتركيب حديد عالي المقاومة للشد إجهاد خضوع 420 نيوتن/ملم المربع " grade High tensile steel Grade 60، لتسليح الخرسانة حسب متطلبات المواصفات واللوحات التصميمية وشمولية السعر، وذلك من كافة الأقطار والأطوال، والسعر يشمل القص والثني والضياع وكراسي رفع الحديد وأسلاك التبريط والدرس والمباعدات البلاستيكية مع ملاحظة تأمين أي طول حسب المخططات التصميمية ولا تحسب الأطوال الزائدة ولا يدفع لذلك أي علاوات، والسعر يشمل جميع ما يلزم لإنجاز العمل على أكمل وجه حسب المخططات والمواصفات.</p> <ul style="list-style-type: none"> • تسليح و طوبار وصب قواعد و جدران ال Trench حسب الرسومات و المخططات التصميمية (الصادرة من المقاول والمعمدة من المهندس المشرف) وحسب المواصفات الواردة في وثائق العطاء و حسب الأعماق المطلوبة , بأسطح ناعمة (fair face) مع جميع ما يلزم من دمك التربة أسفل قواعد ال Trench وعزلها بطبقة بلاستيكية (polyethylene sheet 250 micron) • عزل الأسطح الخارجية بطبقة من 4mm Bitumen Roll . • توريد و تنصيب و تثبيت زوايا وأغطية ال Trench بما يتوافق مع توصيات الشركة المصنعة، وحسب المواصفات التالية،وبالرجوع لـ (BS EN 1561 : 1997): <p>1- Heavy Duty Grating & Frame 2-Cast Iron.</p>	
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					<p>3-Clear Opening: 450 mm & 75mm Total Depth 4- Over Base: 620 mm 5-Design Load Capacity: 40 Ton</p>  <p>شاملا جميع قطع التثبيت مع الخرسانة من براغي التثبيت والزوايا والحواضن المصنعة من نفس معدن الجرلات وبنفس قدرة التحمل.</p>	
			10"= 60m	<p>بالمتري الطولي</p>	<p>تنفيذ أعمال تركيب وتشغيل و فحص خط ال GRP الجديد (حسب المخطط الاستدلالي المرفق)، والتأكد من المناسيب و القياسات و الميلانات الواردة في المخططات التصميمية (الصادرة من المقاول والمعتمدة من المهندس المشرف) ، ويشمل السعر ما يلي:</p> <ul style="list-style-type: none"> • مد خطوط الأنابيب الجديدة و توصيلها و لحامها حسب توصيات الشركات الصانعة (GRP Resin , 6 طبقات على الأقل) مع جميع ما يلزم من مواد و كذلك مع توريد وفرد طبقات من الرمل الناعم اسفل الخط بسماكة لا تقل عن 20 سم مع رشه بالمياه ودخله على مراحل لتثبيت المواد والوصول لمناسيب ال Invert Level . • ربط وشبك الخط الجديد مع نقاط الربط القائمة حاليا و حسب المخططات التصميمية (الصادرة من المقاول والمعتمدة من المهندس المشرف)، 	5
			18"= 70m			
			24" = 190m			

					<p>على ان يتم قص خط الفايبر الموجود في نهاية الخط.</p> <p>Note - 1:</p> <p><i>This Item Includes the Supply and Installation of a new 24" sewer branch near Sylvinite thickener</i></p> <p>ملاحظة - 2 : يوجد لتوريد خط الأنابيب بند منفصل.</p>	
				380	بالمتر الطولي	<p>6</p> <p>تنفيذ أعمال الردم للخندق مع توريد وفرد طبقات من الرمل الناعم (Pure Sand) أسفل الخط لتغليفه كاملا بمواد من الرمل الناعم (Pure Sand) مع رشه بالمياه ودخله على مراحل لتثبيت المواد وصولا لمناسيب طبقة ال Base Course وحسب المخططات التصميمية (الصادرة من المقاول والمعتمدة من المهندس المشرف) , على طول خط مسار الأنبوب .</p>
				4500	بالمتر المربع	<p>7</p> <p>بند اختياري (يسر ولا يجمع)</p> <p>تنفيذ أعمال الخلطة الأسفلتية الساخنة ولكامل الشارع الثاني (بما يحدده المهندس المشرف) مع المحافظة على الميول التصميمية للشوارع للمحافظة على تصريف كامل المحاليل الملحية أو مياه الأمطار والفيضانات .</p> <p>و تكال أعمال الخلطة الأسفلتية الساخنة بالمتر المربع محملا عليها كافة الأعمال التالية :</p> <ul style="list-style-type: none"> • ازالة الطبقة الاسفلتية الحالية وجزء من ال Base Course بسماكة لا تقل عن 15 سم, وتهيأة الشارع لاستقبال طبقة ال Base Course الجديدة وطبقات الاسفلت النهائية, مع تحقيق الميولات باتجاه المناهل. • تقديم وتوريد وفرش ودحل طبقة فرشيات الوجه الاول Base course ناتج تكسير كسارات بسماكة 15سم بعد الدحل حسب المواصفات المرفقة بدرجة رك لا تقل عن 95% .

					<p>• تقديم وتوريد ورش وجه تأسيس MC70 من الأسفلت السائل بمعدل 2.1 كغ/م² ويكون الرش بواسطة رشاش ميكانيكي.</p> <p>• تقديم وتوريد وفرش ودحل خلطة اسفلتية ساخنة WEARING COURSE بسماكة 7+5 سم بعد الدحل حسب المواصفات المرفقة والوصول إلى درجة رك مارشال 96%, على ان تكون مناسب الخلطة الاسفلتية متناسقة مع مناسب المناهل والقرلات, وحسب المخططات التصميمية (الصادرة من المقاول), وما يحدده المهندس المشرف.</p> <p>• قص أطراف الشارع ومداخل المستودعات لتحقيق وصل الاسفلت القديم مع الجديد بمنسوب متوافق, وحسب المخططات التصميمية (الصادرة من المقاول).</p> <p>• السعر يشمل فحوصات الدمك وأي فحوصات أخرى, بما يحدده المهندس المشرف.</p>	
				750 بالمتر الطولي	<p><u>بند اختياري (يسعر ولا يجمع)</u></p> <p>تقديم وتوريد وبناء أطاريق الشوارع/الكندرين ,جرانيت طبيعي بازلتي, Class A قياس 10/15X35X50 سم بارتفاع ظاهر لا يقل عن 20 سم, ويشمل السعر الحفريات اللازمة, مع دك التربة ودحليها ورشها بالماء, وتسوية الأرض باستخدام طمم من مواد جديدة حيثما ظهرت الحاجة لذلك.</p> <p>يشمل العمل كذلك ازالة الكندرين القديم ان وجد, ونقل ناتج الانقاض الى مكب النميرة أو حيثما يشير المهندس المشرف.</p> <p>يشمل العمل كذلك توريد وصب خرسانة النظافة من الخرسانة العادية بسماكة لا تقل عن 20 سم أسفل الكندرين (بقوة كسر لا تقل عن 150 كغم/سم² بعد 28 يوما) مع تدعيم الاطاريق من الخلف بخرسانة عادية (قياس 20 سم بارتفاع لا يقل عن 20 سم) والسعر يشمل الكحلة بالاسمنت بنسبة 4:1 والتنظيف والسقاية بالماء مع جميع ما يلزم لانجاز العمل على أكمل وجه.</p>	8

				10" =60m	توريد وتسليم خطوط فيبرجلاس GRP بأقطار مختلفة حسب المخططات الاستدلالية المرفقة والمواصفات التالية: Glass fiber Reinforce Polyester pipe, PN 10 bar, SN (Stiffness) 5000 N/M ² , using resin type "Epoxy Vinyl Ester/ or equivalent" for chemical resistant, suitable for operation temperature of 70 °C, min length of pipe: 6m Length	9
				18" = 70m		
				24" = 190m		
		المجموع (ينقل الى صفحة خلاصة الأعمال)				

BOQs Summary For PR No.: 202203089		
Item	Description	Amount (J.D)
1	Design Works	
2	Excavation Works	
3	Civil Works	
4	Asphalt Works	
5	Curb Stone	
6	GRP, Trenches & Manholes Material	
Total Contract Price		
Total Contract Price after discount or add		
Final Total Contract Price including Taxes		
Final Total Contract Price Written in words:		