











VOLUME 3: TECHNICAL SPECIFICATIONS

TENDER DOSSIER FOR-VOLUME 3 D2-SEK2 Works of Renovation of Nubar Health Center and Othman Health Center in Shubra El Kheima Area- Qalubeya Governorate



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Table of Contents

1. Specia 1.1. So 1.2. Ge 1.2.1. 1.2.2. 1.2.3.	I Conditions ope of Work neral Conditions for the Project Drawings and Documents for Implementation Site Preparation Implementation	4 4 4 4 4 5		
2 Techni 2.1 Intr 2.2 Spe 7.° The 2.4 2.4 7.° Imp 2.6 Ma	cal specifications for planting oduction coduction State Planting and Landscaping e Necessary Guarantees Delivery Storage and Handling of the Various Elements of Planting olementation and Sequence of Works	6 6 6 6 6 8		
3 Concre 3.1 Gener 3.2 Ma 3.2.1 3.2.2 3.2.3 3.3 Adr 3.4 Qu 3.5 De	te	8 9 9 9 .11 .11 .11 .12		
4. Joints i 4.2 Ge 4.3 Co 4.4 Mo 4.5 Joi	n Concrete neral nstruction Joints (End of Day Joints) vement Joints nting Materials	13 .13 .14 .14 .15		
5. Insulati 5.2 Bit 5.3 Sh 1.2.1. 5.3.1 5.3.2 5.3.3 5.3.4 5.3.5 5.3.6 5.3.7 5.3.8	on Works umen eet Membrane Scope of Work Submittals Quality Assurance Delivery and Handling Materials and Products Insulation Cleaning On Site Testing Production	15 16 16 16 16 16 16 17 17 18 18		
 Mortars Finishii 	 Mortars and Plasters			

















Qalyubeya Governorate

8. Floor, Wall, Roof and Ceiling Finishes	. 20
 9. Interlock for Walkways	. 21 21 22 22 22 22
9.7 Execution	24
10. Paint Work	. 24
10.2 General 10.3 Materials	24
1.2.1. Cement Paint	25
10.3.1 Acrylic Paint	25
11. Plumbing	. 25
11.2 General	25
11.3 Materials	25
12. Electrical Works	. 27
12.2 General	27
12.1.1 Outlet Boxes	21
12.1.2 Frates	.27
12.1.4 Socket Outlets	28
12.1.5 Fixtures	28
12.3 Installation	28
12.4 Inspection and Tests On Site	29













1. SPECIAL CONDITIONS

Special conditions contained in the following paragraphs complement the general conditions of the contract.

1.1. Scope of Work

The project consists of the renovation of Nubar and Othman Medical centers, Typical renovation measures include the refurbishing of bathrooms, repairing or increasing electricity outlets, repairing doors and windows, repair of structural cracks, painting works, interlock walkways and landscape

1.2. General Conditions for the Project

1.2.1. Drawings and Documents for Implementation

- The project is to be executed in accordance with shop drawings prepared by the contractor and approved by the supervising engineer. Any drawings, details or instructions issued by the supervising agency are considered to be within the scope of the original drawings attached to this contract.
- The contractor shall provide a time schedule for the execution of works provided that it does not exceed the total duration specified. The supervising engineer shall review and approve the time schedule and periodically review progress according to this schedule. The schedule is to include a detailed procurement program for all project components.
- 3. The contractor shall determine the activity durations based on the date of the contract award.
- 4. The contractor shall submit 3 copies of the standards referred to in the specifications
- 5. The contractor shall review the land survey works and make final shop drawings for review and approval.

1.2.2. Site Preparation

- 1. The contractor is responsible for providing a temporary source of water for construction and shall bear all related costs. The owner, however, is to identify the source for the contractor.
- 2. The contractor is responsible for providing a temporary source of electricity for construction and shall bear all related costs. The owner, however, is to identify the source for the contractor.
- 3. The contractor shall produce an on-site sign board using the template provided by the consultant which is in accordance to the European Union, German Cooperation and GIZ-Participatory Development Programme (PDP) guidelines. The contractor is requested to fill-in the template with the project's information







Comment [NS1]: Changed to supervising engineer

Comment [NS2]: Changed to supervising engineer













and submit the final design for approval before printing. Any signboard produced, must not be smaller than 200cm height x 300cm width.

- 4. The contractor shall facilitate the task of supervising engineer to monitor the progress of work and its execution and is to retain a full range of technical specifications and drawings for review and compliance of the work carried out.
- 5. The contractor's engineer must be present at the work site permanently and continuously. He must be an engineer registered with the Engineer's Syndicate or more, he must be competent, and familiar with the project planning, budgets and all works subject of this contract. He must be fully authorized to work on the contractor's behalf and to receive instructions and orders.

1.2.3. Implementation

- 1. The contractor shall provide all the tools, equipment, technicians and skilled workers needed to implement the works.
- 2. Interlocking blocks, tiles, pipes, wires, cables, lighting fixtures and all other items needed are to be supplied according to specifications and approved samples.
- 3. Waste, debris and excess dust is shall transferred to public dumps, Site housekeeping is to be performed as it accumulates with the progress of works.
- 4. The contractor shall take all needed technical precautions during implementation, shall adhere to width of excavation pits specified by the Egyptian code and which will be taken as the basis for payment, and shall adhere to approved base courses and backfill materials.
- 5. The contractor shall remove any works that the supervising engineer deems contrary to the specifications or the standard industry practice at his own expense without any delay. The contractor is to protect works from damage and climatic conditions and is to repair any damage incurred for any reason.
- 6. The contractor shall level the road or track needed for access to and from the site if needed and shall remove any obstacles by his own means and at his own expense.
- 7. Prices include work at night or during the day according to the instructions of the Traffic Department and the district, as well as coordination with the operations engineer according to working conditions
- 8. Prices include excavation in all types of soil excluding rock soil.
- 9. Quantities listed in the bill of quantities are estimated and payment will be based on the actual amounts implemented.
- 10. The contractor has to reinstate items damaged during excavation, such as pavements or otherwise, to their original condition including handing over of final pavement works to the district In accordance with industry practice and standard Egyptian specifications



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2 TECHNICAL SPECIFICATIONS FOR PLANTING

2.1 Introduction

All specifications are according to standard Egyptian specifications and the Egyptian Building Code.

2.2 Specific Conditions for Planting and Landscaping

The detailing and submittal of landscaping and green area works is to be guided by the attached illustrative drawings of the site and includes the following: -

The transport and planting of trees and shrubs fixed with appropriate supports and planting of green areas including spreading of planting soil - in addition to the maintenance until the final handing over.

Identify the type and area planted for each plant type including a time schedule for works.

2.3 The Necessary Guarantees

Remove and replace damaged plants with new plants of the same type and size on a continuous basis and patching barren areas in lawns until the total area is fully covered. Any damage incurred as a result of planting works or site improvement during planting, removal or replacement of plants will be repaired at the expense of the contractor.

2.4 Delivery Storage and Handling of the Various Elements of Planting

- 1. Make a list upon delivery to the site on an on-going basis indicating the type, quantity and size of plants, planting elements must be protected during storage from damage due to natural elements or otherwise.
- 2. Avoid causing any damage to the trunks of trees and shrubs delivered during transport such that plants do not lose their shape or aesthetic properties. Trees are to be appropriately covered during transportation.
- 3. Trees and shrubs are not to be moved from one container to another container until planting at the project site.

2.5 Implementation and Sequence of Works

The contractor is to verify ground levels and slopes in general, to adjust slopes according to drawings, to remove any waste materials from the planting areas and to inform the supervising engineer of any infected plants. The contractor is to avoid damage to any public utilities whether these are under or above ground If necessary, excavation is to be executed manually to avoid any damage to public utilities (network pipes etc.) buried under the surface. Advanced stages of implementation should only take place after obtaining the approval of the supervising authority on the implementation of the previous stage.

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- 1. Supply of planting soil is to be free of impurities and salts and approved by the supervising engineer. Temporary storage of soil is to be close to the work area and according to instructions of the supervising engineer.
- 2. PH for water saturated planting soil should not exceed 8
- 3. Supply of high quality organic fertilizer obtained from a reputable vendor, free from harmful bacteria, fungi, toxins and other harmful materials during the maintenance period. Manure is to be stored and used only after approval by the supervising engineer based on a test certificate for every batch supplied.
- 4. The contractor is to submit a pruning, fertilizing and irrigation schedule covering the period from planting to final handing over to the supervising engineer for approval.
- 5. The location of planting beds, tree and shrub pits is to be based on approved shop drawings.
- 6. Tree pits are to be 90 x 90 x90 cm with removal of excavation material from the site.
- 7. All tree and shrub pits are to be saturated with water and left to dry before planting.
- 8. The planting soil mix for green areas must be levelled according to specified levels and instructions of the supervising engineer including fine grading and smoothing the surface, saturating the soil with water and letting it dry then levelling and smoothing it again if needed.
- 9. Trees are to be supplied according to the types and sizes mentioned in the bill of quantities. Each type is to be consistent in size and appearance and is to be supplied in a 20-25 cm pot. Shrubs are to be supplied in 15 cm pots and must have a clear crown.
- 10. Trees, shrubs and plants supplied must be completely free of diseases, fungi and insects, and the root and shoot must be in good health.
- 11. In the case of transporting and planting deciduous trees in the winter care must be taken to protect the roots from climatic conditions.
- 12. Supporting stakes must be of thick fronds or wood and must be no less than 2.5 m long for trees and 1m long for shrubs. Supports can be attached to the plants using twine or wire and must not cause any damage to the plant.
- 13. Irrigation for green areas by manual spraying shall be carried out by skilled workers on a daily basis until achieving full coverage.
- 14. Daily maintenance operations are to be performed until full growth of the green area is achieved and after the first mowing. Damaged or dead trees, shrubs and decorative plants are to be replaced with new plants. Barren areas in green areas are to be replanted until full growth is achieved on the surface.
- 15. Once the landscaping has been completely finished and appropriate growth has been achieved, the planting areas can be delivered to the owner according to the terms of the contract.

TENDER DOSSIER FOR-VOLUME 3 D2-SEK2 Works of Renovation of Nubar Health Center and Othman Health Center in Shubra El Kheima Area- Qalubeya Governorate







16. The park must be suitably guarded such that the loss or damage of plants due to misuse is prevented.

2.6 Maintenance

Maintenance must be on the basis of the approved plan. It includes the presence of skilled gardeners and their assistants as well as materials and tools needed to perform care and maintenance activities.

The care and maintenance plan is to include the following: -

- 1. To identify the periods and quantities of water needed for irrigation of the various plants by planting type in each planting bed
- 2. The proposed method and schedule for cutting, pruning and clipping.
- 3. The type of fertilizer, method, amounts and times of application. by type of plant.
- 4. The proposed method and materials to be used for the prevention of plant disease including the concentration of materials in each case.
- 5. A schedule for hoeing and aeration of the soil around the plants.
- 6 A list of equipment and tools necessary for the implementation of the various care and maintenance processes.
- 7 For each fertilizer, herbicide or pesticide to be used in plant maintenance, the contractor must submit data sheets including manufacturer's recommendations for application and evidence that the product is EPA approved

3 CONCRETE

3.1 General

All specifications shall be according to Egyptian standards and the Egyptian Building code.

- (1) All concrete works shall comply with the following standards:
 - BS EN 206-1 Concrete. Specification, performance, production and conformity
 - BS EN 1990 Basis of structural design
 - BS EN 1992 Design of concrete structures
 - BS EN 12504 Testing concrete in structures
 - BS 1881 Testing concrete
 - BS 8110 Reinforced concrete structures design and construction
 - BS 8000 Workmanship on building sites. Code of practice for concrete work.
 - ACI 305 Hot weather concreting
- (2) The costs of all tests of concrete and / or its components shall be deemed to be









included in the rates.

All equipment used for concrete works requires the approval of the supervising (3)engineer prior to dispatching to the project.

(4) All sites have to be cleaned from remaining concrete and other materials within 24 hours after finishing the concrete work. Therefore it is recommended to use a mobile container with side and bottom steel sheets in an appropriate dimension for the temporary storage / preparation of concrete.

3.2 Materials

3.2.1 Cement

The cement to be used in the works shall be obtained from an approved (1)manufacturer, and shall comply with the requirements of BS EN 197.BS 12.

All cement to be used in works below ground level shall be sulphate resistant (2) Portland cement (SRPC) and shall comply with the requirements of BS 4027.

3.2.1.1 Certification for Cement

For each delivery of cement, the contractor shall furnish, free of cost, test certificates in accordance with BS EN 196 "Methods of Testing Cement". Details of test results must be shown on the certificate.

3.2.1.2 Storage of Cement

The Contractor shall provide a well- ventilated waterproof shed or sheds to store (1)the required amount of cement. Each shed shall have a suitable floor built at such a height that the cement is kept dry at all times. Delivery and stacking shall be arranged in such a way that the various consignments can be used in the order of their delivery. Cement shall not be taken from the shed until immediately before its use in the works.

Different types of cement shall be stored in separate compartments. If intermixing (2) of different types occurs, the tainted cement will be disposed of under the supervision of the supervising engineer and removed immediately from the site.

No cement which, in the opinion of the supervising engineer, has deteriorated or (3)hardened shall be used in the works and such cement shall be immediately removed from the site.

(4) Any cement which is stored on site for a period in excess of 28 days shall be tested in accordance with the relevant standard prior to use.

3.2.2 Natural Aggregate

All aggregates shall comply with the requirements of BS EN 12620.

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(2) Fine aggregate shall consist of siliceous natural sand, having hard, strong durable particles and shall come from an approved source. It shall be clean and free from salt or organic matter.

(3) Coarse aggregate shall consist of gravel, crushed gravel, or other approved inert materials of similar characteristics and shall be clean, hard and sound. No material of a shale or schistose nature shall be used.

(4) Aggregates shall not contain more than 0.5% by weight of clay. The sulphate content shall not exceed 1% by weight.

(5) Aggregates shall be screened or washed, if so directed by the supervising engineer.

(6) Each type and grade of aggregate shall be stored separately in bins of a type and size approved by the supervising engineer. They shall be provided with flooring of concrete or other approved material having sufficient slope to ensure adequate drainage of surplus water.

(7) The chloride and sulphate content of the aggregate shall be determined and in all cases be considered together with the content in the mixing water.

(8) The combined aggregate should be as coarse-grained and densely-graded as possible. The maximum particle size should be so chosen as to be compatible with mixing, handling, placing and working the concrete. Its normal size shall not exceed one third of the smallest dimension of the component to be concreted. With closely spaced reinforcement or small concrete cover, the greater part of the aggregate shall consist of particles smaller than the distance between adjacent bars and between the bars and formwork. Maximum size of coarse aggregates in all cases shall be 20 mm.

(9) The concrete shall contain a certain quantity of ultra fine particles to be properly workable and achieve a close texture. The ultra fine content comprises the cement, the aggregate particles of 0 - 0.25 mm size and such additional material of this particle size range as it may be necessary to introduce. Such additional material, if any, shall consist of natural or artificial mineral substances comprising, as far as possible, a mixture of differently sized particles which do not soften and do not impair the durability of the concrete. An adequate content of ultra fine material is especially important in concrete which has to be conveyed long distances or, in concrete for thin-walled densely reinforced components and, in waterproof concrete.

(10) After approval by the supervising engineer, the whole of the aggregate supplied for use on the works shall be obtained from the approved sources and the quality and grading shall be maintained consistent and equal in all respects to the samples submitted. Should it become necessary to change the source of supply for any of the



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materials, new tests shall be done to determine the proportions of the materials to be used and adequate steps shall be taken to maintain the required standard of the materials.

(11) Sieve and sedimentation tests shall be carried out when the first delivery is affected and thereafter at intervals as directed by the supervising engineer.

3.2.3 Water for Concreting

(1) The water used for mixing or curing of concrete and washing the aggregates shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. No salty water shall be used. BS EN 1008 shall apply.

(2) A thorough chemical water analysis shall be done before using a certain water source for concrete mixing and test certificates from an independent laboratory shall be approved by the supervising engineer.

(3) When comparative tests are done with distilled water of known quality, any indications of unsoundness, marked change in time of set, or reduction of more than 10% in mortar strength shall be sufficient cause for the rejection of the water under test.

(4) The Contractor shall not take water for use in concrete from shallow, muddy or marshy sources.

3.3 Admixtures and Additives

(1) Preliminary strength tests shall be carried out to ensure that admixtures and additives do not adversely affect the concrete to which they have been added.

(2) Additives may be added to the concrete if they do not adversely affect the strength and durability of the concrete and the corrosion protection of the reinforcement.

(3) In no case shall admixtures or additives be added to concrete, cement mortar or grout without the express permission of the supervising engineer in writing.

(4) Additives and admixtures, if approved by the supervising engineer, shall be used strictly in accordance with the manufacturers' instructions.

(5) Chloride based admixtures will not be allowed.

3.4 Quality of Concrete

(1) The class of concrete required is specified in the following tables, on the drawings and / or in the Bills of Quantities for the particular position of the works to be constructed.

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(2) The quantity of water added shall only be sufficient to produce a dense concrete which can be fully compacted without undue difficulty, due allowance being made for the moisture content of the aggregates.

(3) The strength class of concrete shall be as designated in the following Tables: (extract of BS 8110 Concrete and Reinforced Concrete):

Concrete Strength Class	Minimal Nominal Compressive Strength of each test cylinder f _{ck,cvl} [N/mm ²]	Minimal Nominal Compressive Strength of each test cube f _{ck.cube} [N/mm ²]
C8/10	8	10
C12/15	12	15
C16/20	16	20
C20/25	20	25
C25/30	25	30
C30/37	30	37
C35/45	35	45

Reinforced Concrete Structures Design and Construction

3.5 Design of Concrete Mixes

(1) Before commencing any concrete work, the Contractor shall design the mixes for the concrete which he proposes to incorporate in the Permanent Works. Each mix shall be designed to produce the required class of concrete having a characteristic strength not less than the appropriate value specified above. Each design mix shall fulfil the following requirements:

- (a) The combined grading of coarse and fine aggregate shall be continuously available;
- (b) The proportions and properties of the mix shall be within the limits set out for the various classes and types of concrete described in this Specification;
- (c) The water/cement ratio shall be consistent with attaining the average strength but without the ratio exceeding the specified maximum. The aggregate/cement ratio shall be suitable to achieve the minimum workability consistent with proper compaction by the methods specified.







(2) When submitting his proposals for design mixes to the supervising engineer, the Contractor shall provide, in addition to details of his cement, aggregates and water as specified earlier, details of:

- (a) The proportions in which the dry materials are to be mixed, including the aggregate/cement ratio, cement per cubic metre of compacted concrete and the sieve analyses of the individual and combined aggregates;
- (b) The water/cement ratio to be adopted;
- (c) The workability of the mix and the range in which it is to be maintained;
- (d) The 28-day individual and average strengths for at least six previously obtained test cubes;
- (e) The individual and average densities of the six cubes;
- (f) The dates on which the cubes were made and tested;
- (g) Any other relevant information.

(3) Following the supervising engineer's approval of the design mixes, the Contractor shall prepare trial mixes of each class of concrete in the presence of the supervising engineer's representative. Each batch shall be not less than 0.5 m³ of concrete and shall be mixed in the same mixer which the Contractor proposes to use throughout the construction of the Works. Sieve analyses and moisture content determination shall be done on the aggregates. The batches of concrete shall be mixed as specified herein and tested.

(4) The Contractor shall allow sufficient time in his programme for designing and preparing trial mixes and testing test cubes obtained there from.

(5) If during the course of the works the concrete fails to comply with the specified requirements or the source of aggregate or cement should differ from those with which the preliminary design mixes were carried out, the supervising engineer will instruct the Contractor to prepare further design mixes, which will be tested in accordance with the above procedure.

4. JOINTS IN CONCRETE

4.2 General

(1) The Contractor is referred to the various types of joints required in the various structures and which are indicated in the drawings.

(2) Only those joints itemised in the Bill of Quantity or specifically ordered by the supersizing engineer will be measured and paid for as separate items otherwise they are deemed to be included in the rates for concrete.

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(3) The cost of the joints shall include for all labour and materials in forming the joint as shown on the drawings including, where required:

- (a) Shuttering, notching for passage of reinforcement if necessary and cutting for passage of waterstop;
- (b) Waterstop and jointing;
- (c) Expansion joint filler;
- (d) Formation of grooves and sealing with approved sealing compound;
- (e) 20 mm dowel bars, 1 m long, with sleeve and packing, where shown on the drawings;
- (f) Adequate crack checks and filling of such cracks with grout.

4.3 Construction Joints (End of Day Joints)

(1) The concrete bond across the joint shall be executed by removing the surface laitance and exposing the aggregate on the joint face as soon as the concrete has hardened. The surface shall be thoroughly washed with clean water prior to the resumption of concreting.

(2) The proposed position of the construction joints shall be submitted to the supervising engineer and approved by him before construction of each separate structure is commenced. A joint shall be made wherever concreting is finished for the day, or whenever concreting is stopped for any reason.

(3) All joints of water retaining structures shall be made water tight by introducing a 20 cm wide rubber waterstop bar placed and fixed in the middle of the section width. The rubber waterstop (or metallic if required) shall have the approval of the supervising engineer for its type and quality.

(4) The cost of construction joints shall be deemed to be included in the rates for concrete.

4.4 Movement Joints

(1) Movement joints, if required, shall be constructed in the positions as shown on the drawings or as directed or approved by the supervising engineer.

(2) Movement joints are measured separately and items are included in the Bill of Quantities for the various joints in each of the structures.

(3) Where indicated on the drawings, dowel bars shall be positioned across the joint. They shall have sawn ends and shall be provided with and secured to steel cradles on each side of the joint. They shall be placed with the midpoint of the longitudinal axes







intersecting the plane of the joint at right angles, half the length of the bars being suitably coated to prevent bonding. Fitted over the coated length shall be a loose cardboard or plastic sleeve, closed and packed with glass fibre for a depth of 75 mm at the end of the bar remote from the joint.

(4) Where shown on the drawings or as directed by the supervising engineer, joints shall be sealed on one or both faces as required. On the face or faces requiring sealing, a groove of the shape and dimensions shown on the standard joint details shall be formed. Not earlier than fourteen days after the placing of the concrete, or when otherwise directed by the supervising engineer, the groove shall be cleaned, dried if necessary, primed and filled with a suitable approved mastic sealing compound to the underside of the chamfers. The sealer shall be prepared and applied strictly in accordance with the manufacturer's instructions.

(5) Partial contraction joints (for water retaining structures only) to be proposed by the contractor for the approval of the supervising engineer with a maximum span of 7.0 m.

4.5 Jointing Materials

(1) Expansion joints shall be filled with an approved jointing material, which shall be compressible and resistant to weathering and extrusion.

(2) The jointing material shall be kept back from the face as indicated in the joint detail drawings, formed recesses shall be primed and sealed with an approved sealing compound.

(3) The Contractor shall be held responsible for the quality of all materials, including the adhesion of the joint sealants. Joint sealants, which are too soft, too brittle or which lack the prescribed adhesion and resistance shall be replaced by the Contractor at no extra cost. The approval of material by the supervising engineer does not relieve the Contractor of his obligations under the Contract.

5. INSULATION WORKS

5.2 Bitumen

To protect surfaces of footings, tie walls, tie beams, and column necks against aggressive soil, all surfaces of concrete in contact with earth shall be protected by the use of cold bitumen solution type D complying with BS 743 applied in two coats to give a uniform and impervious finish

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5.3 Sheet Membrane

1.2.1. Scope of Work

This section covers the work of bituminous sheet membrane waterproofing as required by the Contract and includes the following type:

- Glass-fiber-Reinforced Bituminous Sheet Membrane Waterproofing.

Extent of bituminous sheet membrane waterproofing is indicated on Drawings.

It is the intention of the Specification and Drawings to indicate the entire work and all its component parts. The Contractor shall ascertain the precise nature and scope of the work and furnish, without additional cost to the Employer, all materials and components which may not be specifically mentioned or shown, but which are required for the proper installation and performance of the work.

The work shall include the coordination with actual site conditions and the work of other trades affecting the work of bituminous sheet membrane waterproofing

5.3.1 Submittals

The Contractor shall submit the following in accordance with Conditions of the Contract

A. Product Data:

Submit manufacturer's technical product data, installation instructions and recommendations for each waterproofing material required. Include data substantiating that material complies with requirements.

B. Samples:

Submit three samples of sheet waterproofing and sheet seams.

5.3.2 Quality Assurance

A. General: Obtain materials from a single manufacturer to the greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.

B. Sequence and Scheduling: The work in this section requires careful coordination with the work of other sections to prevent damage to sheet waterproofing material.

5.3.3 Delivery and Handling

A. Delivery:

Materials shall be delivered to Site in manufacturer's tightly–closed labeled packages. Labels shall indicate manufacturer's name or trade mark and method of application.

B. Storage:

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Sheet rolls shall be stored in a dry place. Rolls shall be placed on clean floors or platforms in such a way as to prevent damage to ends and soiling with foreign matters.

C. Handling:

Handle rolls with care. Do not roll on edges or ends

5.3.4 Materials and Products

Bituminous sheets shall meet the required following values:

- 1. Thickness: 4 mm.
- 2. Nominal Weight: 4kg/m2 to ASTM 792.
- 3. Reinforcing Glass Mat: 80 gm/m2, minimum.
- Bitumen Content: 840 gm/m2, minimum. 4
- 5. Softening Point: 110–115 Deg. C to ASTM D 36.
- 6. Penetration: 25 Deg. C 20-25 dmm to ASTM D 5.
- 7. Heat Resistance: 2 hours: 70 Deg. C to UEAtc.
- 8. Tensile Strength
 - a. Longitudinal: 350 N/50 mm to UEAtc
 - b. Transverse: 300 N/50 mm to ASTM D 146
- 9. Elongation
 - a. Longitudinal: 3.5% to UEAtc.
 - b. Transverse: 3% to ASTM D 146.
- 10. Tear Resistance
 - a. Longitudinal: 60 N minimum to UEAtc.
 - b. Transverse: 60 N minimum.

5.3.5 Insulation

A. System of Installation:

Fully bonded to substrates (sheet adhered to all of the areas covered).

B. Overlaps:

Use lap joints to seal membrane sheets together in the field. Overlaps shall be of a minimum width of 100 mm. Heat overlaps from the top and reseal with a trowel to ensure seam integrity.

C. Flashing:

Comply with manufacturer's printed instructions and details and provide and special pieces or fittings recommended by manufacture.

D. Expansion Joints:

Install joint filler as recommended by manufacturer, with protruding rounded surface. Apply 200 mm with strip of membrane on joint followed by membrane application.

E. Overlapping onto Vertical Surfaces:





Sheets shall be overlapped to the vertical surfaces of the structures (parapets, walls and the like) for a distance not less than 200 mm. Prime vertical surfaces to be overlapped onto, and fix sheets in the same way specified here before for horizontal surfaces

5.3.6 Cleaning

After completion of works, remove any materials, debris and empty cans caused by waterproofing from covered surfaces

5.3.7 On Site Testing

Before completed membranes on horizontal surfaces of roofs, bathrooms, toilets, fountains, flower boxes and the like are covered by protection course or other work, test for leaks with 50 mm depth of water maintained for 24 hours. Repair any leaks revealed by examination of substructures and repeat test until no leakage is observed

5.3.8 Production

Take sufficient precautions for protection of completed sheet waterproofing during performing other subsequent works over sheets and throughout remainder of construction period. Do not allow traffic of any type on unprotected membrane.

6. MORTARS AND PLASTERS

The mixes of mortars and plasters for blockwork, plastering and for external (1) rendering shall be as per the following table:

Cement Mortar	Mix Proportions			
	Cement [kg]	Lime	Sand [m³]	
Grade A	350		1.0	
Grade B	300		1.0	
Grade C	250		1.0	
Grade D	150		1.0	

The ingredients for cement mortars shall be measured in proper gauge boxes on (2) a boarded platform, the ingredients being turned over twice dry and twice whilst water is added through a sprinkler rose. Alternatively, mixing may be by means of an approved mechanical batch mixer.

Cement and sand mortar mix shall be used within 2 hours after starting addition (3)of water; any amount of mix remaining should be collected and disposed of.



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(4) Mortar plasticizer shall be of an approved make and shall be used in the proportions and manner recommended by the manufacturer. The proportions of the mortar mix shall if necessary be adjusted in accordance with the manufacturer's recommendations.

(5) Where coloured mortar or rendering is specified the pigment shall be of an approved manufacture and shall not be injurious to other ingredients of the mortar. It shall be mixed with care to ensure even colouring throughout the mixture and a sufficient quantity shall be made to ensure completion of an area of rendering in one operation.

7. FINISHING

(1) The preparation of the surfaces for plastering includes raking out joints of concrete surfaces or blockwork to form key, dubbing out all uneven surfaces as required, temporary rules and boards, working around pipe clips and other similar obstructions, working behind pipes.

(2) All surfaces are to be finished true and smooth.

(3) External angles, where not protected by metal angle beads, shall be properly formed rounded angles to 10 mm radius unless otherwise directed.

(4) All joints between block walls and concrete members, all routes of electric or sanitary piping should be covered by 20 cm wide metal lath strip; this will be included in the rates.

(5) The prices shall include for 1 m x 1 m sample panels if so directed by the supervising engineer.

(6) Plasters and mortars shall be to the grades and mix proportions specified.

(7) Plastering to internal walls and surfaces shall be composed of the layers, as hereafter detailed, to make up the complete thickness of 15 mm.

(8) Backing coat shall consist of approximately 10 mm thick cement mortar Grade "C" and scratched to form key.

(9) Finishing coat shall consist of a 5 mm thick layer mortar Grade "C" and finished with a steel float.

(10) Cement rendering shall be cement mortar Grade "A" and shall be applied in two or three coats. Undercoats shall not exceed an average thickness of 10 mm and finishing coats an average thickness of 6 mm. Two coat rendering shall be to a total thickness of 16 mm and three coats rendering to a total thickness of 25 mm.

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(11) Where rendering is to be applied to concrete surfaces such faces shall be suitably treated to provide an adequate mechanical key for the rendering.

The surface of brickwork blockwork or masonry to be rendered shall be thoroughly prepared before the first undercoat is applied by raking out the joints to form an efficient key for rendering.

(12)Surfaces shall be thoroughly brushed down to clean off all dust and loose material. Particular attention shall be paid to the removal of mould, oil or other deleterious substances prior to rendering. Each undercoat shall be scored to form an adequate key for subsequent coats. The surface of blockwork shall be thoroughly wetted with fresh water before rendering is applied.

Each rendering coat shall be kept moist for at least 48 hours and then given (13)adequate time to dry out thoroughly before the application of any subsequent coats. The surface shall then be wetted immediately before the application of any further coat.

(14) The finishing coat shall have a steel float finish to true planes and regular curves and to an even and polished surface. Arises shall be rounded and in true alignment and a hollow fillet shall be run at internal angles.

The finished rendering shall be protected and cured as specified for concrete. (15)

8. FLOOR. WALL. ROOF AND CEILING FINISHES

All specifications shall be according to standard Egyptian specifications and the Egyptian Building code.

(1)Materials used in the mixing of mortars and plasters for finishing to internal surfaces shall be as specified for mortars and plasters.

(2) Glazed wall tiles shall be of a minimum thickness of 6 mm and to the colour and pattern as instructed by the supervising engineer.

Ceramic floor tiles (non slip) shall be of a minimum thickness of 8 mm and to the (3)colour and pattern as instructed by the supervising engineer.

(4) Mosaic floor tiles shall be 200 mm x 200 mm minimum thickness 20 mm. Colour and pattern shall be as indicated on the drawings, in the Bill of Quantities, or as instructed by the supervising engineer.

Fire brick (sornaga) floor tiles shall be 200 mm x 200 mm, minimum thickness (5) 8 mm, colour and pattern shall be as indicated on the drawings, in the Bill of Quantities,

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or as instructed by the supervising engineer.

(6) Cement floor tiles shall be 200 mm x 200 mm, minimum thickness 20 mm, colour and pattern shall be as indicated on the drawings, in the Bill of Quantities, or as instructed by the supervising engineer.

(7) Marble floor tiles shall be 400 mm x 400 mm, minimum thickness 40 mm, Colour and pattern shall be as indicated on the drawings, in the Bill of Quantities, or as instructed by the supervising engineer.

(8) Marble slabs for entrance steps shall have a minimum thickness of 40 mm for treads and 20 mm for risers. Colour and dimensions shall be as indicated on the drawings, in the Bill of Quantities, or as instructed by the supervising engineer.

(9) Stamped concrete floors shall have a minimum thickness of 100 mm and shall be reinforced with 5-ø10 reinforcement bars per m². Colour and pattern shall be as indicated on the drawings, in the Bill of Quantities, or as instructed by the supervising engineer.

(10) Lead cladding shall be 99.9 % lead and 1.5 mm thick and shall include the full height of the walls and doors of the xray rooms. A wood (mouski) frame shall be fixed to the wall using 7 cm threaded galvanized steel screws. The battens shall be 1' x 2" spaced at 10 cm less than the width of the lead sheet horizontally. The lead sheets are to be fixed to the frame using headed nails starting from the floor to the ceiling with a 10 cm overlap between sheets so as to cover the nails of the previous sheets. There must be a 2 cm overlap on the floor and ceiling and a 5 cm overlap on the corners. The nails on the top row of lead sheets must be covered with 10 x 10 cm lead plates. Cut outs for electrical outlets must also be insulated with lead.

The lead cladding is to be covered with 14 mm MDF boards laminated with 1 mm matt white PVC leaving 1 cm space from the floor. Minimum 6 cm high vinyl skirting with a lip on the floor is to be supplied and installed on the PVC laminated boards.

Prior to supply and installation of the lead boards, the contractor is to prepare working drawings and a method statement to be approved by the Center for Protection from Radiation. After installation and before handing over, the contractor is to obtain a certificate of approval from the same center.

9. INTERLOCK FOR WALKWAYS

9.2 Description of Work

This section covers interlocking concrete paving blocks

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9.3 Reference Standard

Works shall be performed in strict accordance with the stipulations of the Egyptian Standard Specifications (ES) latest edition

9.4 Submittals

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations. Provide certifications stating that materials comply with requirements.
- B. Verification Samples: Submit representative samples of each element that is to be used in the finished work, showing the full range of colour and finish variations expected. Provide at least three unmounted units to locations agreed with the supervising engineer for comment.
- C. Provide large scale shop drawings for installation to include plans and details showing exact size, shape, finish, installation pattern and colours and submit to the supervising engineer for comments.

9.5 Quality Control

Tests: Use standard test with manufacturer to determine if mortar and grout materials will obtain optimum adhesion, and shall be non-staining to installed paver and other materials constituting the paver installation. Schedule for sufficient time for testing and analysis of results to prevent delaying the work.

Two blocks shall be drawn from each group of 2000 blocks for sampling. These blocks shall be tested for dimensional accuracy, compressive strength, abrasion and water absorption.

The results of the abroad mentioned tests should comply with the following results:

- Compressive strength not less than 300 kg/cm2 for 60 mm thick interlocking pavers
- Water absorption should be:
 - o 2% absorbed after 10 minutes.
 - o 5% absorbed after 24 hours.
- Loss in thickness after abrasion test on specimens prepared from the delivered tiles should be not more than 0.8 mm for the specimens (using Quartz as an abrasion material to a rotation distance of 500 m, with a compression strength on specimen 500 gm/cm2).
- Tolerances in length and width is (+ 1.5 mm) and for height is (+ 3 mm).

Should any of the test blocks not comply with the required tests for dimensional accuracy, it shall be left to the discretion of the supervising engineer whether the whole

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consignment from which these blocks are selected shall be deemed not to comply with the specifications.

Delivery, Storage and Handling:

- Deliver pavers on protective, shrink wrapped pallets with metal strapping (vertically and horizontally) and nylon wrapped so movement by fork lift is permitted without disrupting original package.
- Unload pavers at job site in such a manner that no damage occurs to product.
- Pallets shall be stored complete and unopened until time of use so that the company label indicating the style and color within the pallet can be clearly viewed

9.6 Description of Unit Pavers

Inter Locking Concrete Paving Blocks: Shall be precast 60 mm thick for sidewalks. Solid interlocking paving units made from normal weight aggregates in sizes and shapes as indicated on Drawings. Concrete shall be a well compacted mixture at a ratio of 1:2:4 by weight cement: sand: gravel respectively.

Characteristic strength of concrete after 28 days shall not be less than 300 kg/cm2 for sidewalks

Edges and surfaces of all blocks shall be at right angles to one another.

Dimension of the interlocking concrete pavers as shown on drawings.

Adequate measure shall be taken to ensure that the concrete paving blocks are properly cured in a manner satisfactory to the supervising engineer

The surface of all paving-blocks shall be plane, free from projections, depressions, crazing, and from damages to edges and corners. When a cut is examined, paving block shall show a reasonable uniform texture.

The block must include side spacers of 15 mm thickness in order to option uniform spacing in laying of blocks and to enable the fine sand to fill the gaps between blocks to start the interlocking action.

Pattern and colors of blocks according to drawings.

















9.7 Execution

A. Examine surfaces receiving pavers, in the presence of the "installer", for compliance with requirements for installation tolerances and other conditions affecting performance of the unit pavers.

Do not proceed with installation until unsatisfactory conditions have been corrected.

Verify that sub-grade preparation, compacted density and elevations conform to plans and specifications.

Verify that the base materials, thickness, compaction density, surface tolerances and elevations conform to the plans and specifications.

B. Accuracy:

On completion, the finished surface level shall be within 10mm of the design level and the maximum deviation within the compacted surface, measured by a 3m straight edge, shall not exceed 10mm. The level of any two adjacent blocks/slabs shall not differ by more than 2mm. Any areas of paving which do not comply with these tolerances shall be removed, and sand-laying course lifted and relaid and the paving blocks/slabs relaid to the correct levels.

10. PAINT WORK

10.2 General

All specifications should be according to standard Egyptian specifications and the Egyptian Building code.

(1) All paints shall be obtained from an approved manufacturer. Where paint is to be used on the site samples shall be provided for the supervising engineer's approval prior to delivery. Details of the type and manufacture of the paint shall be provided for all items, which are painted prior to delivery to site.

(2) All material shall be delivered in sealed containers bearing the manufacturer's name and description of contents.

(3) All paints shall be applied strictly in accordance with the manufacturer's instructions.

(4) The colour of the paints shall be to the approval of the supervising engineer and where possible alternative coats shall be of different shades.

(5) All preparation and painting is to be carried out under dry conditions.







(6) The supervising engineer may take samples from painter's pails for analysis and testing. No thinners or other materials shall be added to the paint without the consent of the supervising engineer.

10.3 Materials

1.2.1. Cement Paint

(1) For outdoor use, surfaces exposed to erosion or fair- faced concrete.

(2) Cement paint shall be white or coloured Portland cement adjusted for use as a paint with the necessary additives for outdoor use.

(3) Applied in under coat and finished coat.

10.3.1 Acrylic Paint

Acrylic paint finish for interior use shall be 100% pure acrylic base not less than 20% of total weight:

- (a) Lusterless (flat) acrylic finish, 2 coats over filler coat with total dry film thickness not less than 65 μ, excluding filler coat;
- (b) Filler coat: solvent thinned filler for porous surfaces;
- (c) First and second finish coats: acrylic emulsion.

11. PLUMBING

11.2 General

All specifications shall be according to standard Egyptian specifications and the Egyptian Building code.

(1) The contractor shall make all arrangements with the supervising to ensure that any connection is laid and metered according to the Water Authority's standards.

(2) Catalogue cuts and specifications for all plumbing items shall be submitted to the supervising engineer for approval. Any item shipped without prior approval may be subject to rejection and replaced at the contractor's expense.

(3) Provide all fittings / piping of one type produced by one manufacturer.

11.3 Materials

(1) Pipes and fittings for water supply shall be PPR and pipes for waste water shall

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be PVC, all to the gauge, type welding material and method approved by the supervising engineer

(2) Holder bats, where required, shall be brass school board pattern with tails for building into wall or brass brackets for plugging and screwing to wall.

(3) Stop cocks shall be made of brass.

(4) Bib and pillar taps shall be hot pressed brass, chromium plated with easy clean shield, crutch or capstan head.

(5) The sanitary fittings required as shown on the drawings and/or in the Bill of Quantities shall be obtained from an approved manufacturer.

(6) Lavatory basins, unless otherwise described, shall be white vitreous sanitary china, minimum dimension 55 x 40 cm, complete with chromium plated 15 mm diameter pillar tap, gap overflow, white plastic coated support brackets, 35 mm diameter chrome plated waste outlet, chrome plated chain and plug, 35 mm diameter chrome plated bottle trap.

(7) Toilet systems of the oriental (squat) type shall be white vitreous china enamelled cast iron suitable for floor installation and be planned with water flushing. The flush tank shall have a float valve, be installed at a height of approximately 2 m and have a capacity of at least 6 litres. The flushing pipe shall have an internal diameter of 32 mm, be led in a straight line to the toilet basin and shall have a water distributor at the end which shall distribute the water in a radial fashion throughout the basin. An odour trap shall be installed at the outflow of the basin.

(8) Each WC room should have a 13 mm water tap on adjacent wall 40 cm high from floor level.

(9) Each WC room should have a toilet roll holder, chrome plated, fixed on wall at 50 cm height from floor level.

(10) Toilet systems of the western type shall be white vitreous china consisting of:

- Ceramic wash down pan;
- Solid plastic seat and cover;
- Flushing cisterns;
- 13 mm hose pipe;
- Paper roll holder;

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 All necessary valves, fittings, materials, connection to water supply and wastewater system.

12. ELECTRICAL WORKS

12.2 General

All works are to be in accordance with drawings and specifications unless otherwise directed by the supervising engineer.

Scope of work: wiring, lighting switches, socket outlets, outlet boxes and plates,

Standards: components are to be standard manufactured items, uniform and modular, complying with one set of approved samples.

Submittals: samples, catalogues, data sheets, manufacturer's name, catalogue number

Shop drawings: contractor is to submit shop drawings for approval including, but not limited to, the following:

- exact indication of position of each item and outlet box
- installation details of special items including fans and airconditioners
- wiring diagrams of special items.

12.1.1 Outlet Boxes

Boxes are to be recessed boxes suitable for the type of conduit and wiring installed.

Unused openings in outlet boxes are to remain closed with knock out closures as provided by the manufacturer

12.1.2 Plates

The plate shall be rectangular or square similar to other plates in the same room, designed to cover outlet box, and with recessed head rust-resistant fixing screws.

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12.1.3 Switches

Type: single, two-way as shown on the drawings.

12.1.4 Socket Outlets

Types: general purpose socket outlets are to conform with the Egyptian Code. Duplex sockets are to be mounted in parallel under one common plate.

12.1.5 Fixtures

All fixtures to be supplied based on approved catalogues and manufacturers specifications.

Damaged starters, lamps, lamp holders, transformers and ballasts of lighting fixtures are to be replaced. If the body of the lighting fixture is damaged or if the louvers are blackened, then the fixture shall be replaced.

New lighting fixtures are to be similar to the type already installed in the same room

12.3 Installation

The drawings generally show approximate locations of outlets and equipment. Exact locations are to be determined from shop drawings prepared by the contractor. Any condition that would place an outlet in an unsuitable location is to be referred to the Supervising engineer. Locate switches at strike sides of doors, whether shown on the drawings or not. In locating outlets allow for overhead pipes, ducts, thickness of finishings, window and door trim, paneling and other architectural features.

Mounting heights for outlet boxes are to be uniform within the same or similar areas. Mounting is to be as shown on the shop drawings or as approved by the supervising engineer. Unless otherwise shown or instructed, mount lighting switches and socket outlets generally at 120 cm and 30 cm from finished floor level respectively.

Install boxes and plates plumb, square and parallel to finished wall surface. Exposed plates covering recessed boxes are to rest neatly on wall surface without gaps, and fully covering the box.

Grouped outlets are to be arranged neatly so that use of fittings is convenient and clear.



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Damaged fittings: replace damaged fittings or plates with damaged finish. Protect fittings and plates against damage after installation and until handed over.

12.4 Inspection and Tests On Site

Visual inspection: fittings and equipment are to be inspected for proper fixing and workmanship.

Operation: devices are to be tested for operation at full load without any signs of heating.

Lighting fixtures, fans and air conditioners are to be tested and observed while operating, under full-load for not less than 8 hours on two separate days, with respect to undue heating and performance in general.



