THE HASHEMITE KINGDOM OF JORDAN

سلطة اقليم البتراء التنموي السياحي
مديرية الاشغال العامة والخدمات / قسم المشاريع

مشروع تنفيذ بوابة البتراء وجسر وطريق اقلاع اطوال

option 3 phase 1

Volume (II): Specifications

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DAR AL-OMRAN
Infrastructure and Environment

PART 1 GENERAL PROVISIONS

STANDARD SPECIFICATIONS

The following General Technical Specifications shall be approved for this project and govern this Contract together with the modifications and amendments as specified in this document:

1- The "Specifications for Highway and Bridge Construction", issued in 1991 by the Ministry of Public works and housing, Directorate of Planning Development, and shall hereinafter be referred to as Standard Specifications.

2- The General Technical Specifications for Building volumes I, II and III (GTSFB) published by the Ministry of public works 1996 Second Edition.

The Contractor shall provide at his own expense three original copies of the General Specifications; two for the Engineer’s use and one for his own use.

0. SPECIAL SPECIFICATIONS

0.1 General:

The Special Specifications shall be read in conjunction with the "Standard Specifications for Highway and Bridge Construction" of Ministry of Public Works and Housing of the Hashemite Kingdom of Jordan, 1991.

The MPWH "Standard Design for Reinforced Concrete Culverts No. 1-72" shall be implemented in the construction of culverts which are required but are not shown on the tender detailed drawings.

The Special Specifications shall amend, supplement, delete or modify the Standard Specifications and unless otherwise indicated, the provisions of these Special Specifications shall prevail over those of the Standard Specifications.

Section numbers in the Special Specifications refer to corresponding sections in the Standard Specifications and the sub-sections, clauses, and items contained in these sections constitute additions, modifications and revisions to corresponding clauses in the Standard Specifications.

The Special and Standard Specifications shall be read together in conjunction with the Bills of Quantities, Drawings and other Contract Documents, which shall be considered as mutually explanatory.

0.2 General Description of the Project:

0.2.1 The project includes the construction of 640 m Eqla'a Tiwal road as per typical cross sections in the Drawings, rehabilitation and widening of Amman- Wadi Mousa Road and reconnecting all roads intersect with Amman- Wadi Mousa road with 420 m Ring road , construct new ramps as shown in drawings, the works include but not limited to Earthworks, pavement layers, Asphalt works, sidewalks, road signing and markings, drainage structure and other related works as indicated in the Drawings and Bill of Quantities, in addition to Bridge and Underpass and Retaining Walls, Architectural works such as Petra Gate.

The work includes but not limited to the following:

I. Construction of 640 m Eqla'a Tiwal Road.
II. Constructing a Bridge and tunnel .
III. Constructing all landscape works.
IV. Construction of retaining walls, and drainage structures consisting of box and pipe culverts and soil protection works.
V. Demolishing, relocating and/or reconstructing utilities that obstruct construction.

0.2.2 The Contractor shall take all measure to keep the traffic flow safe and function during the contract period.

0.2.3 The principal items of work to be carried out under this Contract include, but are not limited to, the following:

a. Removal and disposal, at approved locations, of the existing asphalt at the totally reconstructed sections, and clearing and grubbing of area over which the new embankment and other works are to be constructed. No direct payment will be made for the clearing and grubbing.

b. Relocation of utility lines that interfere with construction, including electric and phone poles, utilities and structure.

c. Construction of temporary and permanent detours, according to Engineer's instructions, and including the cut and fill, topping , sub base coarse, base coarse, prime coat, hot mix, traffic safety measures, and all what shall needed.

d. All earthworks necessary for the completion of the work, including embankment, roadway excavation, borrow, ditches, subgrade preparation, backfilling, filling and compaction, watering, rolling, sheathing, and subgrade and slope finish.

e. The construction of road granular sub-base, aggregate base coarse, bituminous concrete binder and wearing coarses, prime coats, etc. all as shown on the Drawings.

f. The construction of all drainage facilities including extension and new pipe and box culverts together with culverts inlet and outlet protections works, lined and unlined ditches and protection works as shown on the drawings.

g. The construction of all miscellaneous related works such as New Jersey barriers, road signs, road painting and markings and any other work which may be ordered by the Engineer under the provisions of the Contract.

h. The Contractor shall survey the side roads connected to the main road, submit proposal for typical cross section, plan and profile for such roads, for the Engineer approval. No separate payment shall be made in respect of the preparation of the Design drawings, whose cost shall be considered subsidiary to the relevant pay items in the Bill of Quantities, while the construction of such roads will be paid for according to the related items in Bill of Quantities.

0.3 Drawings:

0.3.1 The Contract Drawings consist of General Drawings which show general features and such details as are necessary to give a comprehensive idea of the construction contemplated. Roadway alignment, profile grade, typical sections and pavement, locations and size of drainage structures, dimensions of all structural elements, reinforcement details, protection works and other ancillary items are all shown on the Drawings.

0.3.2 The Contractor shall be responsible for preparing, thoroughly checking and submitting to the Engineer, for his approval, sufficiently in advance, such working drawings as may be required or directed to show in detail all parts of the permanent works including detailed shop drawings, bar bending schedules, foundations of structures and other drawings if required.

The Contractor shall prepare working drawings and details for, but not limited to, the following:

1. All drainage provisions including culverts, ditches, spillways, gullies, channels, dikes, inlets, outlets, etc. according to site conditions.
2. All structures.
3. Cut and fill slope geometry according to the natural ground cross-sections to be taken by the Contractor, materials used, ground conditions and the results of testing and geotechnical investigations performed by the Contractor where required.
4. Protection and stabilization measures for cut and fill slopes.
5. Walls and protection measures.
6. Traffic control devices and barriers.
7. Facilities for the supervision staff.
8 Traffic detours.
9. Relocation and diversion of existing utilities.

These working drawings shall be based on the Contract Drawings, field surveys, investigations and testing as may be required or directed, and shall be coordinated with the Contract Documents including compliance with the Standard and Special Specifications.

The Contractor shall also prepare such working drawings as may be necessary to shown in detail the temporary works and methods of construction he proposes to use including formwork.

No separate payment shall be made in respect of the preparation of the working drawings whose cost shall be considered subsidiary to the relevant pay items in the Bill of Quantities.

0.3.3 The Contractor shall be responsible for preparing and submitting to the Engineer a CD, one reproducible set of A1 size and two sets of A3 size of As-Built Drawings and cross-sections as may be required to show in detail all parts of the permanent works as-built. No separate payment shall be made in

respect of the preparation of the As-Built drawings, whose cost shall be considered subsidiary to the relevant pay items in the Bill of Quantities

0.4 Archaeological Sites:

The Contractor shall take note of the fact that a representative from the Department of Antiquities will be appointed on site during construction operations at the potential archaeological sites.

Prior to any work on or around the potential archaeological locations, the Contractor shall coordinate with the Engineer and the representative of the Department of Antiquities on site to ensure that adequate measures specified by the said Department are taken to protect these sites, including prohibiting work within 100 m. from these sites.

The Contractor shall inform the Department of Antiquities of the planned commencement of work in new areas to allow the Department to carry out a survey before construction begins.

The Contractor shall consider in his programme of work the presence of any identified sites and the need for the Department to inspect these sites during construction.

If a new site is discovered by the Contractor, he shall inform the Department immediately. In this case, the Contractor may have to adjust and/or re-schedule his activities around such site, and/or use other sources of materials if the site falls within a borrow area or a quarry to allow the Department of Antiquities to carry out survey and emergency salvage excavation.

Measurement

Unless shown on Pay Items in the Bill of Quantities, the provisions prescribed in this Section shall not be measured for direct payment, but shall be considered subsidiary Works, the costs of which will be deemed to be included in the Contract prices for Pay Items.

0.5 Test Sampling:

The basis of taking samples and their repetitions for various construction items of the road projects are shown in the following tables:

Minimum Tests Required

Reference: The Specification for Road and Bridges, 1991

1. Earthworks

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
1-1 Embankment	1- Soil Classification (AASHTO) 2- Any other tests as required in the Specifications and Drawings 3- C.B.R	- Test for each borrow pit - Test for each cut area having suitable material - When materials quality Change	1- Maximum Dry Density (Mod. Proctor) 2- Soil Classification (AASHTO)	– Test for each 500 L.m. and for each layer. – When materials quality change
			3- Field Density 4- Any other test as required by the Specs. and Drawings	– Test for each 1500 m2 or 100 L. M whichever be less, and for each layer
1-2 Structural Backfill (at culverts)			1- Maximum Dry Density (Mod. Proctor) 2- Granular Gradation 3- Plasticity Index	– Test for each structure. – When materials quality change. – As requested
			4- Field Density 5- Any other test as required by the Specs. and Drawings	– 50% of the layers or to the satisfaction of the Engineer

Minimum Tests Required

1. Earthworks (Cont'd)

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
1-3 Structural Backfill at Bridges (piers)			1- Modified proctor 2- Granular gradation 3- Plasticity Index	- Test at each pier. - When materials quality Changes. - As required
			4- Field Density 5- Any other tests as required by specs and drawings	- 50% of the layers for each pier and to the satisfaction of the Engineer.
1-4 Structural Backfill at Bridges (abutments)			(same as above)	(same as above)

Minimum Tests Required

1. Earthworks (Cont'd)

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
1-5 Subgrade and shoulders	1- Granular Gradation 2- Plasticity Index 3- C.B.R. 4- Any other tests or required in specs and drawings.	- Test for each borrow pit - Test for each cut area having suitable material - Test for each 4000 m3 - When materials quality Change	1- Modified proctor 2- Granular gradation 3- Plasticity Index 4- Soil Classification (AASHTO) 5- C.B.R	- Test for each 1000 L.m and for each layer. - When materials quality Changes
			6- Field Design 7- Any other tests as required by technical specs and drawings	- Test for each 1500 m2 or 100 L.m for each layer
1-6 Selected subgrade	1- Granular Gradation 2- Plasticity Index 3- C.B.R. 4- Any other tests or required in specs and drawings.	- Test for each source - When materials quality Change	1- Modified proctor 2- Granular gradation 3- Plasticity Index 4- C.B.R	- Test for each 500 L.m and for each layer. - When materials quality Changes
			5- Field Density 6- Layer thickness 7- Any other tests as required by technical specs and drawings	- Test for each 1500 m2 or 100 L.m for each layer.

Minimum Tests Required

2. Base & Subbase

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
2-1 Base & Subbase	1- Granular Gradation 2- Plasticity Index 3- Abrasion 4- C.B.R. 5- Sand equivalent 6- Fractured faces (for bases) 7- Any other tests or required in technical specs and drawings	- Test for each source - Test for each 2000 m3 - When materials quality Change	1- Modified proctor 2- Granular gradation 3- Plasticity Index 4- C.B.R. 5- Abrasion 6- Sand equivalent	- Test for each 500 L.m and for each layer. - When materials quality Change
			7- Field Density 8- Layer thickness 9- Any other tests as required by technical specs and drawings 10- Clay lumps & friable particles	- Test for each 750 m2 and for each layer

Minimum Tests Required

3. Concrete

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
3-1 Fine aggregate for concrete	1- Gradation and fineness modulus 2- Specific gravity and water absorption. 3- sand equivalent 4- Organic and harmful material. 5- As requested in the special specs. And drawings 6- Sulphates & chlorides	- Test for each source - Test for each 2000 m3 - When materials quality Change	1- Gradation and fineness modulus 2- Specific gravity and water absorption. 3- sand equivalent 4- Organic and harmful material. 5- Any other tests and requested in the specs. And drawings 6- Sulphates & chlorides 7- Soundness test	- Test for each source - Test for each 300 m3 - When materials quality Changes.
3-2 Coarse aggregate for concrete	1- Gradation 2- Specific gravity and water absorption. 3- Abrasion 4- Organic and harmful materials 5- Clay lumps and friable materials. Elongated and flaky particles Index. 6- Any other tests as required in specs and drawings	- Test for each source - Test for each 2000 m3 - When materials quality Changes	(Same tests mentioned under A) in addition to: 1- Abrasion test 2- Percentage of clay lumps and friable particles 3- Flakiness index & Elongation index.	- Test for each source - Test for each 300 m3 - When materials quality Changes.

Minimum Tests Required

3. Concrete (Cont'd)

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
3-3 Combined aggregates for concrete	1- Must satisfy fine and coarse aggregate requirements. 2- Gradation.	- Test for each source - Test for each 4000 m3 - Test at change of material	- Must satisfy fine and coarse aggregate requirements - Gradation	- Test for each source - Test for each 500 m3 - Test at change of material.
3-4 Water for concrete	1- PH. 2- Sulphates & chlorides 3- Water effect in concrete strength and properties 4- Grease and oil.	- Test for each source - When source changes	Same tests mentioned under (A)	- Test for each source - When source change.
3-5 Concrete admixtures	1- Manufacturer's Certificate	- One for each type or manufacturer	- Trail mixes to check suitability and percentages to be used based on site conditions, materials and manufacturer's recommendations. - Any other tests as requested in the spec and drawing.	- One for each type or manufacture.

Minimum Tests Required

3. Concrete (Cont'd)

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
3-6 Concrete (fresh) 3-6-1 Trail Mix Design			1- Slump test 2- Cubes or cylinders for crushing strength as specified. 3- Workability	- Test for each class of concrete. - Test for change in any material.
3-6-2 Ready Mix	1- The concrete and all its constituents shall satisfy all concrete and materials00 requirements as specified. 2- Workability 3- Any other tests as required in technical specs and drawings	- For each source - When any material changes	1- Slump test	- For each transit mixer.
			2- Compression Tests (Take cubes) 3- Any other tests as required in specs and drawings	No. of Transit Mixers — No. of sample 1 — 6 2-5 — 12 6-10 — 18 11-20 — 24 - For each 10 additional transit mixes take 6 additional samples (Test half the samples after week and the next half after 28 days).

Minimum Tests Required

3. Concrete (Cont'd)

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
3-6-3 Concrete Tests			1- Compression tests	- 6 specimens for every less or equal 80 m3.
			2- Workability 3- Slump	- 6 specimens for each casting day. - Test for each transit mixer at casting location
3-7 Hardened Concrete			1- Core samples 2- any other tests as required in the technical specs and drawing	- 3 cores for each part of a structure that did not satisfy the compression test after 28 days. - If samples are not taken during casting. - 3 cores for each part of a structure.

Minimum Tests Required

4. Asphalt Mixes

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
4-1 Materials in Asphalt mix. (At Batching Plant)	1- Specific gravity and water absorption. 2- Abrasion test 3- Chert content 4- Clay lumps and friable particles. 5- Flaky and elongated particles 6- Soundness	- Test for each source - When material quality changes - As required		
4-2 Materials used in Asphalt mix (from hot pins)	1- Gradation 2- Specific gravity and water absorption. 3- Plasticity index 4- Sand Equivalent 5- Stripping with asphalt	- Test for each source - When materials quality change - As required.		

Minimum Tests Required

4. Asphalt Mixes

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
4-3 Asphalt mix design each layer (At Batching Plant)	1- Complete mix design in accordance with the American Asphalt Institute (MS2) 2- Loss of stability	- For each project - When materials quality changes. - When results are not consistent with the mix design results. - As required.		
4-4 Asphalt mix for each layer	**At Batching Plant** 1- Stability 2-Flow 3-Extraction (binder content and gradation) 4-Air voids 5-Voids in mineral aggregates. 6-Daily Marshall Density	- Test each 3 working days - Test for each batching plant - As requested	**Behind spreader** 1- Stability 2- Flow 3- Extraction (binder content and gradation) 4- Air voids 5- Voids in mineral aggregates. 6- Daily Marshall Density 7- Loss of Stability	- Test each working days - Test for each batching - As requested
	7-Loss of Stability	- As requested - Once per week	8- Road density and thickness (after final compaction)	- Test each 200 L.m. per lane and for each layer. - As requested.

Minimum Tests Required

5. Miscellaneous

Work Item	A Tests at Source of Material	Frequency for all tests mentioned under (A)	(B) Tests at Road site	Frequency for all tests mentioned under (B)
5-1 Concrete pipes (Plain/ reinforced plant)	1- Abrasion 2- Proof & Ultimate loads 3- Materials used in pipes shall satisfy each individual material requirements as specified 4- Any other tests as required in the specs and drawings.	- Specimen for each pipe diameter	1- Absorption 2- Proof & Ultimate loads 3- Any other tests as required in the specs and drawings.	Pipes Diameter In (mm) — No. of specimens 100 – 500 — 2-3 501 – 1000 — 3-6 1001 – 1500 — 6-9
5-2 Reinforcing steel	1- Tensile strength 2- Yield point 3- Elongation 4- Bending 5- Dimensions 6- Any other tests as required in the specs and drawings	- For each source 3 specimens for each diameter (Specimens to be taken from different bars)	1- Tensile strength 2- Yield point 3- Elongation 4- Bending 5- Dimensions 6- Any other tests as required in the specs and drawings	Shipment Load (Tons) — No. of Specimens < 10 — 1 10-50 — 2 51-100 — 3 101-500 — 4 501-1000 — 6 Over 1000 tons – divide shipment into the above mentioned ranges in accordance with the Jordanian specifications.

PART 1 GENERAL PROVISIONS

The following sections, subsections, clauses, items of the Special Specifications shall amend, supplement, modify or delete the pertinent sections, subsections, clauses, items etc. of the Standard Specifications.

SECTION 1.03 SCOPES AND CONTROL OF WORKS

SUB-SECTION 1.03.4 WATER SUPPLY

Add the following clause at the end of sub-section:

The Contractor shall provide at his expense water for the works, temporary works, where mains supply is not available, the Contractor shall provide suitable water supply and storage facilities as agreed with the Engineer.

SUB-SECTION 1.03.6 EXISTING UTILITIES AND OTHER OBSTRUCTIONS

Clause No. 2 Existing Utilities

- Delete Item No. 2.3 and replace by:

  2.3 At the commencement of the Contract, the Contractor shall examine the Site and identify / verify all utilities within the right-of-way above or below ground, and shall record all such information on suitable Site Drawings which shall be submitted to the Engineer within one month of commencement of the Works. The Contractor shall for this purpose excavate trial pits on site or take any other measures needed as may be necessary for identification and verification of existing utilities.

- Add the following to Item No. 2.4

  The Department of Antiquities shall be considered the Utility Owner of all the sites having declared or suspected archaeological value whether they are found on private or on public property, inside or outside the right of way.

Clause No. 3 Obstacles

Add the following to Item No. 3.2:

The Site Drawings will clearly mark the presence of walls, monuments and ruins which are of declared or suspected archaeological value. The Engineer will forward the Site Drawings to the Department of Antiquities. No work shall be conducted at these sites without the written approval of the Department of Antiquities.

SUB-SECTION 1.03.9 SURVEYING EQUIPMENT

- Add the following to Item No. (1):

The Contractor shall provide the Engineer, to his satisfaction, with a complete set of survey equipment necessary for checking the Works as follows:

Item No.	Description	No.
1	Electronic total station for angles, distances, and coordinates measurements: - Angle Accuracy (1-2)". - Distance Accuracy Higher than (2) mm + 2ppm. - Equipped with two keyboard and display in both faces. - PCMCIA memory card compartment in one face build-in. - Integrated with surveying programs. - Facilities to load and erase programs. - Plug-in battery (rechargeable). - External battery (rechargeable) + battery cable. - Recharger for both batteries. - PCMCIA memory card MIN IMB. - Heavy – duty wooden tripod.	2 2 2 2 2 2
1.1	- Single Prism Holder - Reflector Pole. - Prism.	4 4 4
2	Automatic Level. Standard Deviation not more than 2mm/1km double runs levelling. Telescope Magnification not less than 30x.	2
2.1	Wooden Tripod.	2
2.2	Levelling Staff / CM. Graduation 4m	3
3	30 m Steel Tape with extra length before zero point.	4
4	Steel Pocket Tape with 2.5 m long.	4
5	Surveying umbrella	4
6	Ranging Roads 2.5 m long	5
7	Field Books	20
8	Level Books.	20

- Add the following to Clause No. 3:

  All surveying equipment shall be periodically maintained and calibrated by the contractor, as directed by the Engineer.

  All survey equipment shall meet the specifications above and the Engineer's satisfaction.

  On completion of the Contract, the survey equipment shall become the property of the Contractor and shall not be measured for direct payment, but shall be considered subsidiary Works, the costs of which will be deemed to be included in the Contract prices for Pay Items.

SUB-SECTION 1.03.17 MEASUREMENT

- Add this new Clause:

  4. All other works prescribed in this section shall not be measured for direct payment, but shall be considered as subsidiary work, the costs of which will be deemed to be included in the Contract prices for pay items in the BOQs.

  5. Permanent Realignment or Replacement of Utilities shall be measured and paid in accordance with the rates set in the Bill of Quantities of respective works. Where the Bills of Quantities contain a PROVISIONAL SUM for "Realignment or Replacement of Utilities", this SUM will be used by the Employer for approved realignment, replacement or permanent diversion Works carried out by the Contractor as directed by the Engineer and agreed with the Employer. This SUM shall only be expended against works which are not accounted for as Pay Items elsewhere in the Specification or the Bill of Quantities.

PAY ITEM	UNIT OF MEASUREMENT
1.03.6 Realignment & Replacement of Utilities	P.S
1.03.6(1) Overhead & Profit, Percentage of pay Item 1.03.6 above	%10

SECTION 1.06 SUPERVISION STAFF OFFICE, HOUSING AND FACILITIES:

- Delete this Section and Substitute by the following:

1.06 SUPERVISION STAFF OFFICES:

1.06.1 Scope:

The works shall consist of the provision of site offices for the Supervision staff by erection of a prefabricated building, including maintaining for the whole contract period (including any extension of time) plus two months. The works also consist of the provision, installation and maintenance of all services. Taking down, demolishing and removing of all facilities as directed by the engineer shall be the responsibility of the contractor.

1.06.2 General Requirements:

1. The offices facilities shall be suitably insulated from the heat and protected from direct Sun rays through windows. The walls shall be sound insulated to acceptable levels and the general Construction and fixtures shall be to the approval of the Engineer. All rooms shall be furnished with new curtains and venetian blinds and light fittings. All the above shall be subject to the approval of the Engineer.

2. The offices facilities, doors and windows shall have suitable fly screens. The doors shall be fitted with night latches and keys. Every room shall be adequately air conditioned (heated in winter and cooled in summer), to the satisfaction of the Engineer. The facilities shall be provided with the required services including a header tank, potable hot and cold water supply, air conditioning units in each room with the required connection for proper operation, water-born sewage disposal system, drainage, utilities, electric power and lighting, all to the approval of the Engineer.

3. The Contractor shall provide and maintain all necessary and required services to offices and facilities, including but not necessarily limited to the following new furniture and equipment:

    a. Heating and air-conditioning/split units.
    b. Electric lighting and power.
    c. Drainage and sewage systems.
    d. Fire fighting appliances.
    e. Cleaning facilities and services and general attendance.
    f. Telephone/communication services.
    g. All ducting, cabling and installation requirements to connect the office computer network.
    h. Construction of access roads with covered parking areas for (3) cars.

4. The Contractor shall coordinate with the Engineer and the Employer for the selection of the site for the Supervision staff offices.

5. The contractor shall submit to the Engineer's approval working drawings and details relating to the Supervision staff offices and facilities

SUPERVISION OFFICIES:

The Site Supervision Staff Office shall be of an area not less than 200 Sq.m, and shall cater for the following:

4 office rooms, 1 secretary's room, 1 conference room, a kitchen and 2 toilets; the Contractor shall furnish, equip service and maintain these offices.
Supervision Staff offices and facilities shall be arranged in a single block as per Engineer's approval

1.06.3 Furniture

1.1 Each of the office rooms shall be furnished as follows:

a. 2 desks (180 x 90 cm) with lockable drawers and swivel chairs.
b. 1 lockable steel filing cabinet.
c. 2 office chairs.
d. 1 lockable drawing hanger for 10 sets.
e. 1 shelf units.
f. 1 pin boards (2 m²)min.
g. 1 waste paper baskets.
h. 1 layout reference table.
i. Arm chairs and one coffee table.

1.2 1 Secretary's Office, shall be furnished approximately with:

a. 1 desk with lockable drawers 180 x 90 cm.
b. 1 secretary's desk and 1 swivel chair.
c. 1 large lockable steel filing cabinet.
d. 1 layout reference tables.
e. 2 office chairs.
f. 1 shelf units.
g. 1 pin boards (2 m²)min.
h. 1 waste paper baskets.

1.3 1 Conference Room, the conference room sized to accommodate meetings for 20 people; with:

a. 1 conference table to seat 10 people.
b. Arm chairs of the swivel types.
c. 2 shelf units.
i. 2 pin boards (2 m²).
d. 1 whiteboard with erasable ink pens supply.
e. 2 waste paper baskets.

1.4 Kitchen:

Gas stove with oven to cater for at least 8 people, refrigerator 16 cu.ft, tea and coffee cups, and a large wastebasket, exhaust fan, electric boiler.

1.5 Toilets:

Each shall have:
1 European toilet, 1 bidet, 1 Asian toilet, 1 Paper holders, toilet brush set, soap dish, 1 wash hand basins with mirrors, and 1 waste basket.

OFFICE EQUIPMENT FOR SUPERVISION OFFICIES:

(3) Computers, (2) printers, (1) fax machines, (1) scanner, (1) digital cameras, (1) photo copy machines, (3) electronic calculators satisfying the following requirements:

a. Three Computers

The computers shall be Core i7-2600 (3.40GHz, 8MB Cache), 8GB (4x 2GB) 1333MHz DDR3 Single Channel Up to 16GB, 500 GB hard disk, 2GB NVIDIA (DVI, VGA, HDMI) and shall be from Global Brands (HP, IBM, DELL) and have the following accessories:

a. Internet Keyboards English – Arabic.
b. Monitor 20''LED.
c. DVD/ CD read-write driver
d. Modem (56 K, V 92)
e. One parallel port.
f. Two serial ports.
g. Eight USB ports.
h. Sound card and speakers.
i. Microsoft Mouse.
j. Operating system: Windows 7, office 2010 with AutoCad 2012 and Norton Anti-virus latest edition. (Note AutoCAD will be installed on all PCs with facility to operate two stations concurrently. This will require that a network license; two concurrent licenses should be purchased and a local area network to be installed).
k. (2) USB flash disks 4 GB or higher
l. UPS Uninterruptible Power Supply for all above equipment with minimum 4 hours backup batteries.
m. Antistatic dust covers for all above equipment.
n. All necessary stationary and supplies throughout the Contract.

b. Two Printers

- (1) Laser printers A3/A4 paper size, 600 x 600 dpi resolution, 128 MB memory. Print speed A4: 20 ppm, A3: 11 ppm, similar to Minolta 2060 Print System or better.
- (1) Colour printers A3/A4 paper size, 1200 x 1200 dpi resolution, 384 MB memory.

c. One Fax Machine

- 1 Fax Machines similar to Canon C-70.

d. One Scanner

- 1 Scanners similar to EPSON 1640 XL-Pro for A3 size sheets.

e. One digital camera

- Digital camera to be equipped with lens 28-80, flash and accessories for downloading images to PC.

f. One Photo Copy Machine for A3 and A4

- Enlargement/reduction facility with automatic document feeder, RADF, ADU, electronic sorter, finisher, drawer base unit and printer kit, similar to KONICA 7030 digital input-output station.

g. Three Electronic Calculators

- (Three) Scientific Casio Fx-82MS or similar.

1.06.4 MEASUREMENT

Provision of the Site Offices for the Supervision Staff shall be measured in month.

The pay item in month for the provision of the Site Offices shall include the cost of providing the prefabricated buildings with air-conditioning, carpets, curtains, site grading and drainage, construction of access roads with covered parking areas for (3) cars, protection of the Site from flooding and any other foreseeable natural hazards. Payment shall also include for the provision land telephones in site office.

Pay items shall include all materials, labor, tools, equipment, and any other incidentals necessary to complete the Works according to the satisfaction of the Engineer.

	Pay Items	Unit of Measurements
1.06(1)	Supervision Site Office (minimum 200 Sq.m).	p.s

Pay item for provision of furniture for Site Office of and Supervision Staff shall be under the provisional sum allocated under pay Item 1.06 (3). Payment to the Contractor shall be according to the vouchers from the local market.

The profit shall be paid as percentage to the actual cost of furniture.

The Contractor shall collect from the market three alternative offers for each item and submit to the Engineer for the approval of the Employer.

	Pay Items	Unit of Measurements
1.06(2)	Furniture for Site Office (provisional)	Prime Cost
1.06(3)	Overhead and Profit on Item above	Percentage
1.06(4)	Provide and Maintain the computers & Printer	Prime Cost
1.06(5)	Overhead and Profit on Item above	Percentage

The Contractor shall provide the Engineer's Facilities mentioned above within 21 days from the Commencement Date of the Works. However, if the Contractor fails to complete the facilities within the time specified above, then he shall at his own expense rent, furnish, equip, service, and maintain, to the Engineer's satisfaction, offices for the supervision staff until the completion of the permanent facilities. The Contractor shall also pay to the Employer the sum of 300 JD/ per day delay for the Offices, as a compensation for the delay. The location and details of the rented facilities shall be subject to the approval of the Engineer.

Upon issuance of the Substantial Completion Certificate, the prefabricated site offices and the furniture shall become the property of the CONTRACTOR.

All other works prescribed in this Section shall not be measured for direct payment, but shall be considered as subsidiary work, the costs of which will be deemed to be included in the Contract prices for pay items.

SECTION 1.07 FIELD CONTROL LABORATORIES

1.07.2 MATERIALS

Add the following at the end of item 2.11:

(iii) British Standard and other relevant standards, materials manuals and codes of practice referred to in this Contract.

1.07.3 Delivery and Completion

- Delete Clause 1 from the specifications and replace by the following:

"The Contractor shall deliver the laboratory ready and complete for use of the Engineer and to his satisfaction within 21 days from the date of commencements and before any work requiring material control and laboratory testing is started. If the laboratory is not ready and complete, then the Contractor, at his expense, shall carry out all tests required by the Engineer at a material testing office approved by the Engineer."

SECTION 1.08 MAINTENANCE OF BUILDINGS AND UTILITY SERVICES

1.08.1 SCOPE

- Delete and substitute by the following:

The Works to be done under this section consist of maintaining of the Supervision Staff Site Offices and facilities as well as maintaining the operation of the internal and external utility system and providing all necessary services, including periodic cleaning of septic tank and shall be as per the headings of the Specifications and the following:

1. Water, electricity and Wastewater and solid disposal systems shall be provided for the compound of the Supervision Staff.
   The water supplied to the compound for whatever use shall be sweet, drinkable type of water fit for human consumption.
   One septic tank of suitable size located at least sixty (60) meters away from the compound.

2. Service and maintain office machines and equipment regularly including spare parts and provide all associated consumables, stationery, ink and paper supplies for printers, plotters, and photocopying machines as and when requested.

3. The Contractor shall maintain for the duration of the Contract Period the Site Offices as per the requirements and satisfaction of the Engineer.

4. Provide land telephone line in the site office, in additions to five (5) mobile telephones one for the use of the Client Staff, and four for the Engineer's staff. The cost of mobile telephone calls up to a maximum of 25 JD/month (including monthly prescription) for each, and the provision of telephone shall be at the Contractor's expense in addition to ADSL or Wireless Internet connection 2MB minimum with LAN router (wireless) covering all supervision offices.

5. One adequate generator shall be provided by the Contractor for continuous provision of electricity to the Offices and the compound. The maximum time for the shutdown of the power shall not be more than one hour per 24 hours.

6. The contractor shall carry out customary maintenance and janitorial services including the supply of coffee, tea, and sugar for the offices for the Supervision. The contractor shall provide on a continuing basis all supplies and utility services, which shall include, but not limited to, electricity supply, drinkable water supply, gas supply, office supplies, sewerage and waste disposal, all at the satisfaction of the engineer.

7. The services provided shall include the provision of cleaning materials and other necessary supplies. The contractor shall also responsible for the safety and security of the Supervision Staff Offices on site, including provision of watchmen and external lighting at night.

1.08.2 MEASUREMENT

The works prescribed in this section shall be measured as the number of months for which the services has been carried out, provided and maintained as specified and including the provision of any necessary materials. The pay items shall be as shown in the BOQ.

	Pay Items	**Unit of Measurements**
1.08	Provide Maintenance and Utility Services for Supervision Site Offices.	Month

SECTION 1.09 Provision of Workmen to Assist the Engineer's Representative

1.09.1 Scope

- Delete Clause 2 and substitute by the following:

The Contractor shall provide the Engineer with (1) semi-skilled workman (office boy) for cleaning and servicing the Supervision Staff Site Offices.

1.09.2 MEASUREMENT AND PAYMENT

Measurement for provision of semi-skilled workmen shall be in number of man-months of attendance on Site and to satisfaction of the Engineer's Representative.

	Pay Items	Unit of Measurements
1.09	Provide (1) Semi-skilled workman	Man-Month

SECTION 1.10 Provision of Vehicles for Use by Supervision Staff

1.10.1 Scope

- Delete Clause 1 and substitute by the following:

1- These works shall consist of the purchase and delivery to the site of new motor vehicles with white plates of the types and in the number as specified hereunder, including payment of all clearance charges and fees, registration, comprehensively insured for the duration of the contract, and handed over in good condition and fully operational in all respects, for use by the Client Representatives, and the Supervision staff.

a) Two cars, minimum 2500 cc, 4 Wheel Drive, One diesel-operated double cabin pick-up, The other one could be SUV to the client approval , both cars **new** (not used) model (not more than three years back from the contract award), air-conditioned, equipped with all items required by the Jordan Traffic Department ,subject to Client Approval.

b) Cost of operation, fuel and maintenance of all vehicles for the whole duration of construction period.

c) One driver.

- Delete Clause 4 and substitute by the following:

4- The vehicles shall be maintained and served by the Contractor who shall bear all running costs (fuel, oil, washing, cleaning etc.), repair costs, annual licensing renewal fees and comprehensive insurance costs for the whole Contract Period etc., and shall be kept at all times in first class condition by the Contractor.

1.10.2 Purchase and Delivery of Vehicles

- Delete Clause 1 and substitute by the following:

1- Within two weeks from the Order to commence, the Contractor shall submit to the Employer, catalogues, brochures, specifications and prices, etc., relating to the various types of motor vehicles required. Details shall be supplied form at least three manufactures unless a particular make of vehicle is specified to be purchased.

- Delete Clause 3 and substitute by the following:

3- All vehicles shall be delivered new, clear, registered with white plates, mortgaged in favor of the Client and fully insured in the name of the Contractor within two weeks or as otherwise specified, after selection by the Employer of the types and makes of vehicles required. At the end of the project the vehicles will remain the Contractors property.

1.10.3 Measurement and Payment

Measurement and payment for provision of vehicles for use by the Supervision Staff shall be as stipulated in the Specifications and the following:

	PAY ITEM	UNIT OF MEASUREMENT
1.10(1)	Provide two cars, one Diesel pickups And the other could be SUV car, to the Client request.	Prime Cost
1.10(2)	Add 5% for overhead and profit on Item above. Including fuel.	%
1.10(3)	Operation and Maintenance of the Pickups, Item above	Vehicle-month
1.10(4)	Driver	Man-month

SECTION 1.11 First Aid Centers, Accident Procedures And Prevention

1.11.4 Measurement

Delete this Sub-Section and replace by:

The Works prescribed in this Section shall not be measured for direct payment, but shall be considered as subsidiary work, the costs of which will be deemed to be included in the Contract prices for pay items.

SECTION 1.14 Scope and Basis of Payment

Renumber Section 1.14 as 1.16 and add the new section 1.14 and 1.15 as follows:

SECTION 1.14 Topographic Survey

1.14.1 Scope

Immediately following the Notice to Commence, the Contractor shall carry out a topographic survey (by cross-sections) of the project road along the proposed centerline, check all the reference points benchmarks and jointly with Employer and/or Engineer's Representative take cross sections, to serve as the basis of earthwork volume measurements and envisaged revision of road profile.

The topographic survey shall be done in presence of the Engineer and the Employer.

The survey shall also cover side and service roads, as shown on the Drawings or directed.

1.14.2 General Requirements

1. The topographical survey shall be carried out by taking cross-sections along the proposed road centerline at a maximum interval of 20m. The cross-sections shall cover an area of at least 40 m each side of the mainline centerline. However, where required or directed, the Contractor shall increase the width of the area covered by the survey sufficiently to show the full extent of the proposed earthworks (cut and fill) and any other works to be executed under this Contract, and/or to establish the stability of the proposed earthwork slopes.

Each cross-section shall include the related topographic details, for the existing and proposed sections, but not limited to the following:

- Street furniture (electricity poles, lighting columns, traffic signals, road signs, gullies, manhole covers, etc.).
- Boundary features (fences, gates, walls, hedges, etc.).
- Survey data (National Grid survey points and PRMs).
- Slopes and earthworks (cuttings and embankments, quarries, refuse tips, cliffs, etc.).
- Water and drainage features (watercourses, wadis, wells, reservoirs, ditches, channels, etc.).
- All natural and manmade features.
- Buildings (outline threshold elevation).
- Structures (bridges, culverts, retaining walls, sign and signal gantries, etc.).

- Roads, tracks, footpaths (curb line or edge of surfacing to carriageways, steps, traffic islands, parking or amenity areas).

2. Each section shall be identified by its chainage, and coordinates (X, Y, Z) in the National Grid system and description shall be given for all the surveyed points.

3. The road shall be plotted in plan at an approved scale and the elevations of all the surveyed points shall be shown.

4. Cross-sections shall be plotted at an approved scale and delivered in AutoCAD (Version 2004 or later) files.

5. All the survey works shall be done by a Total Station.

1.14.3 Measurement and Payment

No separate payment shall be made in respect of the required topographic survey and production of maps and cross-section in hard reproducible copy or computer files. The cost of this work shall be considered subsidiary to the pay items related to earthworks.

SECTION 1.15 General and Management Obligations

1.15.1 Statutory and Other Obligations

1. Noise, pollution, and nuisance: The Contractor shall ascertain and comply with any regulations concerning noise, pollution and other nuisance in addition to the obligations imposed by the Conditions of Contract and by law.

2. Noise: Compressors, percussion tools and vehicles are to have effective silencers of a type recommended by the manufactures of the equipment. Pneumatic drills and other noisy appliances shall not be used during days of rest or after normal working hours without the consent of the Engineer's Representative.

3. Nuisance: The Contractor shall take necessary precautions to prevent nuisance from smoke, dust, rubbish, water, polluted effluent and other causes.

1.15.2 Protection of Property

1- Roads and Footpaths: The Contractor shall protect public and private roads, footpaths and the like from damage by site traffic or other causes arising from the execution of the Works and shall repair any damage to the satisfaction of the relevant public authority or private owner.

2- Existing Features: The Contractor shall prevent damage to existing buildings, fences, gates, walls, roads, paved areas and other features on the Site or adjacent thereto which are to remain in position during the execution of the Works.

3- Adjoining property: The Contractor shall:

(a) Take all reasonable precautions to prevent damage to adjoining property and, if any damage is caused as a result of the execution of the Works, make good to the satisfaction of the owner.

(b) Preserve trees, planted fields, fences and the like in areas adjoining the Site and shall replace or re-plant as necessary the trees, crops etc. which are damaged or removed, and shall re-erect or replace fences, etc. in their original condition.

(c) Advice owners of adjoining property of the dates on which work will be done which may affect them and obtain their consent for erection of scaffold or other temporary works on their land.

4- Water: The Contractor shall ensure that his operations do not cause damage to adjoining land by flooding; he shall provide temporary drains and ditches and shall pump away excess water if necessary.

5- Existing condition of roads, paths, fences and other features shall be recorded by photographs or surveys if necessary before work is carried out adjacent to them.

1.15.3 Contractor's Technical Staff (to be read in junction with special conditions clause)

1- The Contractor shall provide the minimum number of technical staff entire construction period as follows:

- A Project Manager (Contractor's Representative): A Civil Engineer with at least 15 years of experience on similar road projects.
- A Highway / Site Engineer : A Civil Engineer with minimum 10 years of experience on similar road projects
- Electrical Engineer: (part time) with minimum 10 years of experience on the same projects type.
- A Planning engineer: a civil engineer with at least 5 years of experience in construction planning, programming and scheduling.
- A Quantity Surveyor: has Diploma with at least 7 years of experience on road and infrastructure projects.
- Surveyor: each has Diploma with at least 10 years of experience on road and infrastructure projects.
- Materials Inspectors (Lab technician): each has Diploma with at least 10 years of experience on the quality control of road, bridges, and infrastructure projects.
- A Highway Site Inspector has Diploma with at least 10 years, or a road Engineer with 3 years, of experience on road projects.
- A Structural Site Inspector has Diploma with at least 10 years, or a structural engineer with 3 years, of experience on bridges projects.
- Assistant Surveyors with experience not less than 3 years.

2- The Contractor shall provide the minimum required number of technical staff within 30 days from the date of commencement of the work. However, should the Contractor fail to provide the minimum required staff on time or when any of these members is not attending the site , then the contractor shall be subject to the following deductions:

- 150 J.D/day for the Project Manager.
- 120 J.D/ day for each of the Highway / Site and electrical, Engineers.
- 70 J.D/ day for each of the Inspectors, Surveyors, Quantity Surveyor.
- 20 J.D/ day for each of the Assistant Surveyors.

1.15.4 Site Administration

1. Engineer's Site Meetings: The Engineer's Representative will hold site meeting as frequently as deemed necessary for the efficient management of the Works and he will distribute minutes. The Contractor shall attend all such meetings and secure the attendance of subcontractors and others if requested by the Engineer's Representative.

1.15.5 Records and Reports

1. Labour Record: provide each week a record showing the number and description of workmen employed each day on the works including those employed by subcontractors.
2. Materials and plant record: Provide each week a record showing the quantity and description of all materials and plant delivered to the site complete with copies of delivery notes.
3. Equipment Record: provide each day a record showing the number, type and capacity of all Contractor's equipment, excluding hand tools daily employed on the Works.
4. Daily work record: provide each day a record showing activities performed and locations in which work has been carried out and any other matter requested by the Engineer's Representative.
5. Monthly Report: provide monthly report, which summarize the daily and weekly reports and deliver to the Engineer's Representative not later than one week following the end of each month.
6. Climatic Conditions: Measure and keep an accurate daily record of and submit to the Engineer's Representative at the end of each week:

Air temperature	:	maximum and minimum
Humidity	:	maximum and minimum
Rainfall	:	total in mm and hours

7. Special Records: in the event of delays for which an extension of time for compilation is sought under Clause 20 or in the event of any claim for costs, the Contractor keep such special records of the circumstances as the Engineer's Representative may require, and submit copies regularly for his inspection.

1.15.6 Program

- Conditions of The Program of Work Using in Projects:

1. Work according Primavera program.
2. Integrated program covers all work in the projects and Bill of Quantities, from the Preparation of the offices in the site and Shop Drawings to the date of Completion work with its Early start and Finish.
3. Show the early start and finish for each activity
4. Show the Actual start and finish for each activity according to its percentage of complete.
5. Show the Total Float for each activity.
6. Show the Critical Path for the activities and the effect of the percentage of complete on it.
7. Show the Calendar Using in the Program with working days and formal holidays.
8. Show the percentage of complete for each activity in the updating for each Financial Claim.
9. Inclusion whole resources using the project from man powers, equipments, materials and other which required for each activity with its own cost and number.
10. Execrate the estimate S-Curve from P3 program and not from any other program.
11. Execrate the Actual S-Curve from P3 program and not from any other program in the updating for each Financial Claim.
12. In each financial claim it is required to provide updating schedule program shown on it the updating on the percentage of complete and Actual dates for starts and finish, and also provides the actual S-Curve for cost form updating the resources using for each activity.
13. Provide Graphic Reports with each Financial Claim shown on it the dates of using the equipment and with its numbers in whole duration of project, extract form the updating of the program according to the percentage of complete.

14. Shown the reasons of the accelerating in the activities and the reasons of the delay in it, on the program by regular and periodic way if its occur.
15. Divide the program by using WBS way, or Activity Codes, and shown the milestones for major activities shown the start and finish every stage in the project.
16. Provide hard copy form the original schedule program in the beginning of the project with CD, and updating with its whole requirements shown above with each financial claim with CD.

17. using other programs such as the excel to extract any of the reports of equipment, materials or manpower, or to extract the S- curve for estimated or actual cost is not allowed, and if provided tables extracted from any way unless the approved schedule program, so it will not be approved and not shown the actual work in the site or the actual using for the equipment or other resources and its actual costs.

1.15.8 Measurement and Payment

No separate payment will be made for the General and Management Obligations described in this section. The cost shall be considered as subsidiary to other items in the Bill of Quantities.

Part 2 Earthworks

Section 2.02 Removal of Obstructions and Utilities

2.02.3 MEASUREMENT

- Replace this Sub-Section by:

1. Removal and disposal of large rocks and boulders which exceed the requirement of Sub-Section 2.01.2 Clause 2 shall be measured by cu.m of "Unclassified Highway Excavation" as prescribed in Section 2.03 - "Highway Excavation".

2. Removal of roadways and existing bituminous and cement concrete pavement including cutting by saws shall be measured by cu.m of "Unclassified Highway Excavation" as prescribed in Section 2.03 - "Highway Excavation".

3. Removal and disposal of fences, walls, foundations, tin roof buildings, existing buildings, guard house, structures other than bridges, trees, plastic green houses, abandoned pipes and culverts, ducts, wells, ditches, sidewalks, curbs, light poles, traffic light, abandoned telephone and electrical poles, traffic and advertising signs, advertising billboards, poles and signs foundation, road furniture and any other obstructions 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.

4. Temporary Diversion and protection of Utilities that are to remain in place required during construction, , supporting and protecting realigned Utilities, including all necessary Temporary Works in this respect, 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.

5. Survey works investigation and mapping of existing utilities and obstructions, coordination costs, and fees requested by Utility Owners 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.

	Pay Items	**Unit of Measurements**
2.02	Removal of Obstruction and handing over to the concerned authorities and as directed by the engineer:	
	Traffic Signs of any size	No.
	Dismantling of existing Guardrail	L.M

Section 2.03 Highway Excavation

2.03.1 Scope

- Replace Clause No (1) by:

1. These works shall consist of excavating material in the cut sections of the highway, including channels, grading for bridges, watercourses, ditches and wadi relocations (but excluding borrow pits and structural excavation) all as and where shown on the Drawings, and hauling the excavated material either to locations for highway embankments or to stockpiles or to waste.

2.03.2 Construction

- Replace Item No (1.1) by:

1.1 All suitable soils, rock, boulders, existing pavement layers, and other materials complying with Tables 2.1 and 2.2 shall be excavated in such a manner that they can be utilized, if intended to be used, as embankment fill or in subgrade, shoulder or elsewhere as appropriate.

- Replace Item No. (1) of Table 2.1 by:

2.1 1- Maximum dry density not less than 1.9 (T-180)

- Replace Item No. (4) of Table 2.1 by:

2.1 4- Maximum size not more than 1/3 of the loose layer thickness.

- Replace Items No. (3) and No. (4) of Table 2.2 by:

3- Bulk specific gravity not less than 2.25 t/m3 (ASTM-C127).
4- Water absorption not more than 6% (ASTM-C127).

- Replace Item No. (1.3) by:

1.3 Materials such as existing concrete, bituminous, granular or other surfaces or other materials shall, if shown on the Drawings or directed, be stockpiled for a specific purpose or for future use. Such materials shall be excavated and handled in a manner that will exclude foreign or undesirable material. Stockpiles shall be neatly formed and maintained in an approved manner.

2.03.3 Measurement

- Replace this Sub-Section by:

1. All excavated material (to the top of subgrade) of whatever type (except for unauthorized undercut below top of subgrade) shall be measured as "unclassified" which shall be deemed to include all materials encountered of any nature, including silts, clays, sand, gravel and granular materials, fractured, jointed and solid rock, unsuitable material, and existing pavements.

2. Highway Excavation (including roadside ditches and unsuitable materials) shall be measured by cu.m. of material excavated, hauled away and either wasted, stockpiled, or deposited on or in vicinity of highway embankment areas, completed and accepted. Measurements shall be of volumes computed from the cross sections shown on the Drawings and the original ground elevations taken jointly by the Consultant and the Contractor before clearing and grubbing operations.

3. Ditch Excavation shall not be measured for direct payment but shall be considered as a part of unclassified excavation.

4. Excavation of Unstable Material (from areas outside the ROW) where indicated or directed shall be measured as Unclassified Highway Excavation. Measurements shall be of volumes computed from surveyed cross sections of original and final ground elevations. When cross sectioning is impractical in the opinion of the Engineer, approval may be given to measure volumes in the vehicles removing such excavated material, adjusted to reflect in situ volumes.

5. Rock blasting, backfilling of overbreakage, the trimming and grading of cut slopes, ditches and of other below-subgrade surfaces, drainage of excavation areas, obliteration of disused roadways, and other ancillary excavation Works 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.

6. Highway Excavation for Grading Under Bridges, including cleaning, grubbing, excavation, backfilling, compaction, haulage, disposal, completion and acceptance, 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.

7. Excavation for benching slopes in fill/embankment sections shall be measured in cubic meters and shall be considered as unclassified Highway Excavation.

	Pay Items	**Unit of Measurements**
2.03	Unclassified Highway Excavation	Cubic Meter

Section 2.06 Embankment Construction

2.06.3 Construction

- Add Sub Clause 1.15 to Clause 1 General, as follows:

1.15 The elevations of embankments layers can be checked out using a Total Station of 1-2 second standard deviation, instead of using the Level.

- In Clause 3 Foundation Preparation , Replace sub-clause 3.2 by :

3.2 Clearing and grubbing, and removal of trees stumps, shall be undertaken. The top 150 mm of the surface on which the embankment , of less than 1.5 m height is to be placed shall be scarified, brought to uniform moisture content within the specified range , and compacted to Engineer satisfaction, no compaction test is required .

- In Clause 3 Foundation Preparation , Replace sub-clause 3.5 by :

3.5 All surfaces to receive rockfill are to be cleared and all vegetation removed off site before filling is placed. All unsuitable soil shall be removed to a depth as required by the Engineer. Soil surfaces are to be scarified and compacted to Engineer Satisfaction, no compaction test is required. Compaction is to be to a depth of at least 200 mm below ground surface. Hard or smooth surfaces are to be roughened before filling is placed existing road surfaces and the like are to be broken up and removed.

2.06.5 Measurement

- Delete only the word "less" in Clause 2 line 4 and substitute by the word "excluding"

- Add clause 8 and 9 as follows:

8. Embankment for benching as required in section 2.06 item 3.3 shall be paid for as Embankment Construction. The compacted fill for Diversion Dykes will also be paid for as Embankment Construction.

9. The fill required to replace the excavated unsuitable material shall be paid for as “Embankment Construction”.

	Pay Items	Unit of Measurements
2.06	Embankment Construction	Cubic Meter

Section 2.07 Subgrade Construction and Topping

2.07.2 Materials

- Amend Clause No. (1) to read:

1. Topping shall consist of selected borrow material having a 4-day soaked CBR of not less than 25% when tested in accordance with AASHTO T193, when compacted at 100% modified proctor (AASHTO T-180) and having P.I. not exceeding 12% when tested according to AASHTO T89 and T99 and when the sample is prepared according to AASHTO T146. Topping gradation shall be reasonably smooth without gap grading. All topping material shall pass 75mm sieve and not more than 18% + 2% shall pass 0.075mm No. (200) sieve. A tolerance of 2% is allowed in upper limit for percentage of material passing No. 200 sieve if tested after compaction.

2.07.3 Construction

Add point (3.4) to Clause 3 as follows:

3.4 The elevations of Topping layer can be checked out using a Total Station of 1-2 second standard deviation, instead of using the Level.

2.07.4 Measurement

Delete Clause No. (2), and replace by:

2. Subgrade layer or layers in approved in situ material shall be scarified to a minimum depth of 200 mm including removal of undesirable matter compacted, completed, and accepted. This work shall not be measured for direct payment but shall be considered as subsidiary Works the cost of which shall be deemed to be included in the Unclassified Excavations.

- Delete The Pay Items and replace by:-

	Pay Items	Unit of Measurements
2.07	Subgrade Layer (Topping)	Cubic Meter

Section 2.09 Excavation and Structural Backfill

2.09.4 Measurement

- Modify Clause No. (4) to read as follows:

4. Structural Excavation shall be measured by cubic meter of material excavated for the major structures other than those specified in Clause 3 above, hauled away and disposed of as directed, or stockpiled on or in the vicinity of the Works, and the excavated areas backfilled, completed and accepted. De-watering of surface or underground water, if encountered, is included in the measurements.

- Amend Clause No. (6) to read as follows:

6. Authorized Sub excavation of unsuitable material, hauled away and disposed of as directed, and backfilling with approved material of the excavated areas shall be measured and paid for as Unclassified Structural Excavation, of whatever type.

- Delete the Pay Items and add the following Pay Item:

	Pay Items	Unit of Measurements
2.09	Unclassified Structural Excavation for all structures	Cubic Meter

Part 3. Subbase and Base Courses

Section 3.01 Materials

3.01.3 Granular Material for Sub-base

- In clause 3, second line, delete "or B"

- Add the following at the end of Clause No. 4:

  In The specified sand equivalent value corresponds to the value obtained in accordance with AASHTO T. 176 (Dry method), for the material in dry condition.

- Replace the Clause 5 as follows:

5. The loss in weight of granular material shall not exceed 40% after 500 revolutions, when tested in accordance with AASHTO T96 (Los Angeles Abrasion Test).

$$\text{The ratio of wear loss} = \frac{\text{Abrasion after 100 Rev.}}{\text{Abrasion after 500 Rev.}}$$

Should not be more than 0.20

- Add the following new clauses:

10. The fractions of material passing the No. 200 mesh sieve shall not be greater than 67% of the fractions passing the No. 40 mesh sieve.

11. Chert content (determined as percentage by weight insoluble in hydrochloric acid) for sub-base material shall be within reasonable limits which will not affect the formation of intact cohesive surface.

3.01.4 Aggregate for Base Courses

- Delete Table 3.2: Gradation of Base Course Aggregate by Class should be revised to read as follows:

Sieve Designation	Class A, % Passing
37.50 mm(1-1/2 in.)	100
25.00 mm (1 in.)	75-100
19.00 mm (3/4 in.)	60-90
12.50 mm (1/2 in.)	45-80
9.500 mm (3/8 in.)	40-70
4.750 mm (No. 4)	30-55
2.000 mm (No. 10)	20-40
0.425 mm (No. 40)	8-20
0.075 mm (No. 200)	5-10

- Add the following at the end of Clause No.5:

The specified sand equivalent value corresponds to the value obtained in accordance with AASHTO T. 176 (Dry method.

- In Clause (6), amend the following:

a. In the first line, delete “45%” and replace by “40%”

b. Delete the third and fourth lines and replace by the following:

$$\text{The ratio of wear loss} = \frac{\text{Abrasion after 100 Rev.}}{\text{Abrasion after 500 Rev.}}$$

Should not be more than 0.25, and the abrasion loss after 100 revolutions not to exceed 8%, and 40% after 500 revolutions.

- Replace the first sentence in Clause (9) by :

9. The portion of aggregate, including any blend material, passing the 0.425mm (No. 40) mesh sieve shall have a liquid limit (L.L) of not more than 25 and plasticity index (P.I) of not more than 6 when tested in accordance with AASHTO T90.

- Add the following new clauses:-

11. The fractions of material passing the No. 200 mesh sieve shall not be greater than 67% of the fractions passing the No. 40 mesh sieve.

12. Chert content (determined as percentage by weight insoluble in hydrochloric acid) for base course material shall be within reasonable limits which will not affect the formation of intact cohesive surface. Usually less than 5% and to the approval of the Engineer.

Section 3.02 Granular Sub base Courses

3.02.6 Construction

- Add item 4.6 to read as follows:

4.6 The elevations of sub base layer shall be checked out using a level instrument of 1 mm double run accuracy.

	Pay Items	Unit of Measurements
3.02(1)	Granular Sub-base Course C.B.R > 40% at 100% MD	Cubic Meter

Section 3.03 Aggregate Base Courses

3.03.6 Construction

- Revise the first sentence to read: "All components of base course material shall be mixed thoroughly and uniformly with water in a pugmill mixing plant or other method approved by the Engineer, and permit complete mixing of all the material.

- Add the following paragraph to the end of Clause 2.1;

  After mixing, the material shall be transferred to the trucks which will transfer the material to a self-propelled finisher, equipped with mechanical vibrator with rotary blades that will mix the base course material again to prevent any segregation and spread the material to the required width.

- Revise Clause 2.4 to read:

"The base course material shall be placed to the required width using a self-propelled spreader (finisher), and shall be delivered such that it is ready for compaction without further shaping.

The finisher shall be equipped with a sensor that runs on a string line or a 6.0 m skid to spread the base course evenly to the required elevation. Immediately upon completion of spreading to the required shape and elevation, the mix shall be compacted using approved rollers to achieve the required compaction density. Rolling should start immediately after spreading to avoid moisture loss.

The elevation of the sensor wire shall be established based on site trials that will be made to measure the difference between the loose thickness and compacted thickness in order to define the elevation of the sensor wire accordingly."

For transverse joints during construction, the end of constructed lane should be prepared and cleaned to form a vertical face to the required compacted thickness; the finisher screed should be placed on it but at the required thickness of the loose new materials to achieve continuity of surface elevation.

- Replace Items No 4.2 and 4.4 by:

4.2 The elevations of the finished base course shall be checked by the Contractor in the presence of the Engineer at intervals of 10 m and its intermediate points as directed.

4.4 When the finished surface is tested with a 4m long straightedge, placed parallel to, or at right to the centerline, the maximum deviation of the surface from the testing edge between any 2 contact points shall not exceed 10 mm.

	Pay Items	**Unit of Measurements**
3.03	Aggregate Base Course, including watering and spreading with finisher and compaction to CBR > 80% at 100 MD	Cubic Meter

PART 4 BITUMINOUS CONSTRUCTION

SECTION 4.01 MATERIALS

4.01.3 Aggregates for Bituminous Paving Mixes

- Amend Clause 1 to read as follows:

- Aggregate for use in bituminous base course, binder course, levelling course, and macadam and cold mix courses, shall consist of crushed stone.

The coarse fraction of aggregate for use in bituminous wearing course shall consist of crushed stone from high quality Basalt. Vesicular particles shall not exceed 5.0% by weight.

- Replace Clause 7 by

7. Aggregate particles shall be clean, hard, durable and sound. Crushing shall result in a product such that for particles retained on 4.75 mm (No. 4) sieve, at least 90% by weight shall have 2 or more newly fractured faces.

- Replace Clause 11 by

11. Combined coarse and fine aggregates for bituminous mixes, including mineral filler, when tested in accordance with AASHTO T 27 and T11, shall conform to the gradations shown in Table 4.1.

Table 4.1 Gradation of Aggregates for Bituminous Mixes

Sieve Designation		Heavy Traffic*		Light Traffic**	
		Binder Course	Wearing Course	Binder Course	Wearing Course
1 1/2”		-	-	-	-
1”	(25.0mm)	100	100	100	100
3/4”	(19.0mm)	70-100	90-100	70-100	90-100
1/2”	(12.5mm)	53-90	71-90	53-90	71-90
3/8”	(9.5mm)	40-80	56-80	40-80	56-80
No.4	(4.75mm)	30-56	35-56	30-56	35-65
No.8	(2.36mm)	23-38	23-38	23-49	23-49
No.20	(1.18mm)	13-27	13-27	14-34	14-34
No.50	(0.300mm)	5-17	5-17	5-19	5-19
No.80	(0.150mm)	4-14	4-14	4-15	4-15
No.200	(0.075mm)	2-8	2-8	2-8	2-8

* To be used for the main roads and parking areas.
** To be used for temporary roads and detours

- Amend Clause No. 12 to read as follows:-

12. The loss in weight of aggregate after 500 revolutions, when tested in accordance with AASHTO T 96, shall not exceed 25% for bituminous wearing course layer and 35% for bituminous binder course layer.

$$\text{Ratio of wear loss} = \frac{\text{Abrasion after 100 Rev.}}{\text{Abrasion after 500 Rev.}}$$

Less than or equal 0.25

- Add the following new Clauses

16. Polish Stone Value of coarse aggregate used in wearing course mix, when tested in accordance with BS 812, shall be at least 60%

17. The water absorption of the coarse basalt aggregate material shall not exceed 2%.

18. The aggregate material shall have chloride content of less than 0.8 percent and sulphate content of less than 0.30 percent when tested in accordance with BS-812.

SECTION 4.02 BITUMEN PRIME AND TACK COATS

4.02.2 Materials

- Clause 2 "Rapid – Curing (RC) Cutback Bitumen", replace 2.1 to the following:

2.1 RC cutback bitumen (for tack coat) shall be grade RC250 and as specified in section 4.01 "Material".

Add the following Pay Item:

	Pay Items	**Unit of Measurements**
4.02(1)	Bituminous prime coat	ton
4.02(2)	Bituminous tack coat	ton

SECTION 4.03 BITUMINOUS COURSES

4.03.5 Construction of Trial Sections

- Add Clause 6 as follows:

6. The trial section shall commence immediately after the completion of the design mix stage at least one month before actual production. If the initial trial section should prove to be unacceptable, the necessary adjustments to the Job Mix Formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second trial section shall then be placed. Additional trial sections, as required, shall be constructed and evaluated for conformance to the specifications. Full production shall not begin until an acceptable section has been constructed and accepted.

SECTION 4.05 BITUMINOUS BINDER AND WEARING COURSE

4.05.2 Materials

Add Clauses 4 and 5 as follows:

4. The bitumen for bituminous wearing course layer shall meet the requirements for performance graded bitumen Grade 60-70.

4.05.3 Job Mix and Project Mix

- Replace Clauses 2 to 4 and Table 4.15 by the below Clauses:

2. The job mix shall be composed of a mixture of aggregate, filler and bituminous material.

3. The several aggregate fractions shall be combined in such proportions that the resulting mixture meets the grading requirements of the Job Mix Formula (JMF)

4. Job Mix Formula:

4.1 No asphalt mixture for pavements shall be produced until a job mix formula has been approved by the Engineer. Details of JMF shall be submitted at least 15 days prior to first trials.

4.2 The Job Mix Formula shall be determined based on volumetric mix design according to the Asphalt Institute's Manual (MS-2).

4.3 The field laboratory to be used shall be capable of performing all the tests required by this Section.

4.4 The gradation given in Table 4.1 and 4.1A of Section 4.01 represents the limits that shall determine the suitability of aggregates for use in the course of supply.

4.5 Marshall design criteria:

Table 4.15 Marshall Design Criteria

Criterion	Requirement for Bituminous Binder Course Layer	Requirement for Bituminous Wearing Course Layer
Number of Blows at each end of the specimen	75	75
Stability, in Newton	>10,000	> 12,000
Flow, in mm	2 – 4	2 – 4
Air Voids, percent	4 – 7	3 – 6
Loss of Marshall Stability* in accordance with AASHTO T165	Max. 25%	Max. 25%
Marshall Quotient, /mm (-Stability / Flow)	4900	4900 min.
Percent Voids in Mineral Aggregate (VMA)	Min 13	Min 14
Filler/Bitumen Ratio, by weight	0.6 – 1.2	0.6 – 1.2
Air Voids at Refusal**, percent	2 minimum	2 minimum

* The loss of Stability shall not be more than 25 percent determined as follows:

Submerge samples in water at 60 deg. C for 30 minutes and determine Marshall Stability – result (a).
Submerge samples in water at 60 deg. C for 24 hours – result (b).
Loss of Stability is (a – b)/a x 100 percent.

** The refusal condition shall be achieved by compacting samples with increasing number of blows in the Marshall procedure until no further densification occurs. The sequence of blows recommended to determine the refusal condition is 75 blows, 200 blows, 300 blows, 400 blows, and 600 blows.

- Add the following Clauses to subsection 4.05.3:

5. Bitumen content shall be calculated by weight of total mixture excluding absorption.

The range of bitumen content by weight of total mix to be added to the mix is indicated below:

Pavement Course	Bitumen Content (percentage by weight of total mixture)
Binder	3.5 to 5.0
Wearing	3.5 to 5.0

These values are guidelines only. The minimum binder content shall be selected consistent with achieving the void content, durability and mechanical property requirements.

6. When tested for resistance to water damage in accordance with AASHTO T 283 "Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage", the bituminous wearing course mixture shall have a retained tensile strength greater than or at least equal to 80%. In case the anti-stripping agents are not successful in providing the specified Tensile Strength Ratio, then the Contractor shall consider alternative means, such as the use of hydrated lime to achieve this purpose.

7. Surface texture: An average surface texture depth in the asphalt course of 0.9mm shall be achieved when tested according to the sand patch test to ASTM E 965, with no values below the minimum limit of 0.72mm.Mix proportions shall be performed by the Contractor to optimize the asphalt wearing course mix design taking into consideration the surface texture requirements.

4.05.9 SAMPLING AND TESTING

1. Sampling and testing shall conform to the relevant requirements of section 1.05 "Control of Materials and Standards for sampling and Testing".

Table 4.13 Tests For Bituminous Pavements
Minimum Tests Required:
Table 4.13 should be replaced by Table 4 in Clause 0.5 of these particular specifications**.**

4.05.10 SURFACE TELORANCES

- Amend Clause 2 to read as follows:-

2. The Tolerances on elevations of the final bituminous wearing and binder course surfaces shall not be greater than 10mm.

- Amend Clause 3 to read as follows:-

3. When the finished wearing and binder course surfaces are tested with a 3 m long straightedge, placed parallel to, or at right angles to the centerline, the maximum deviation of the surface from the testing edge between any 2 contact points shall not exceed 3 mm and 4 mm, respectively.

- Add the following new clause:

Measurement

Bituminous Binder course and bituminous wearing course shall be measured by sq.m of mix furnished, Spread, Compacted, completed and accepted Measurements shall be of the areas and thickness as shown on the Drawings and BOQs.

Add the following Pay Item:

	Pay Items	**Unit of Measurements**
4.05(1)	Bituminous binder Course, 7 cm (Compacted Thickness), Dimensions measured from the top of layer.	Sq.M
4.05(1)	Bituminous Wearing Course, 5 cm (Compacted Thickness), Dimensions measured from the top of layer.	Sq.M

SECTION 4.11 BITUMINOUS OVERLAY

The bituminous overlay course(s) shall consist of wearing course and/or binder course conforming to part (4) "Bituminous Construction", of the Specifications.

1. Preparation of the existing surface

The following preparatory steps shall be taken before starting the laying of the bituminous overlay:-

1.1 Existing Asphalt shall be milled, (where required), as shown on the DWG). To depth of (50)mm using electronic sensor equipment (measured at both edges of the proposed new lanes). Milling width shall be as directed by the engineer.

1.2 Cracks repair:-
Medium cracks (width of 3mm-19mm) shall be cleaned with broom and air and filled with rubber or other approved electrometric modified asphalt sealants conforming with ASTM D190 or AASHTO M-173. The sealant material is then sprinkled with dry sand.

1.3 Pot holes shall be cleaned out and patched as directed by the Engineer.

1.4 The existing surface shall be hatched, cleaned of all foreign material and broomed free of dust. In addition any loose, broken or shattered bituminous material along the edges of the existing surface shall be removed.

1.5 Manhole covers, catch basins, drop inlets… etc. shall be adjusted to fit the new surface grade.

1.6 All existing non relocated manholes and inlets top levels shall be raised to suit new overlay levels.

1.7 After the existing surface has been cleaned and prepared, a tack coat shall be applied as specified.

2. Placing of overlay courses (Binder or Wearing):-

The bituminous overlay shall be spread and finished in layers as shown on drawings and specifications.

3. Measurement and Payment

1. Overlay of bituminous course shall be measured by square meters of mix furnished, spread, compacted, completed and accepted. Measurements shall be of the areas and thickness as shown on the drawings and indicated in the Bill of Quantities.

2. Items (1.2) to (1.7) inclusive as described in 4.11.1 shall not be measured for direct payment but all costs shall be deemed to be included in the bid price for bituminous overlays.

3. Asphalt milling (as described on item 4.11.1.1.1) shall be measured by square meter.

	Pay Item	**Unit of Measurement**
4.11 (1)	Overlay 3-5cm wearing Asphalt course	Square meters (sq.m)
4.11 (2)	Asphalt milling 3-5cm	Square meters (sq.m)

Part 5 Concrete, Steel and Structures

Section 5.01 concrete and Concrete Mixes and Testing

5.01.2 Material

- Item 4.2.5, Correct this item to read as follows:-

4.2.5 Aggregate abrasion value by the Los Angeles test in accordance with AASHTO T96-83, ASTM C131-81, and ASTM C535-81.

- Item 5.4, Correct this item to read as follows:-

5.4 Fine aggregate shall meet the requirements specified under this item of the Standard Specifications.

- Item 6.3, Correct this item to read as follows:-

6.3 Coarse aggregates shall meet the requirements specified under this item of the Standard Specifications.

- Item 6.4, Delete and replace by:

7.4 The grading of coarse aggregates shall comply with Table 1 of JSS/96/1987 or to AASHTO M43 or as per the Engineer's directions.

5.01.5 Requirements for design mixes

Table 5.5.A:

- Change the maximum free water/cement ratio in very severe exposure from 0.45 to 0.40.

5.01.8 Measurement

- Delete Items 2.3 and 2.4 and substitute by the following:

2.3 Measurement and payment shall be based upon different classes of concrete as stated in the BOQ irrespective of type of form and/or false work and irrespective of class of surface finish.

- Renumber Items 2.5 and 2.6 as 2.4 and 2.5 respectively.

4. Inclusion in the Rates

Add the following:

4.1.16 Backfill drains, shear key, induced contraction and expansion joints and any other items shown in the drawings.

4.1.17 Inspection holes with service pipes, deflection and contraction joints used for concrete parapets, all types of joints (except the joints stated in 5.18.5), shear bars, threaded inserts sleeves, expanded polystyrene fillings, joint filler, tar paper, voids formers and its fixing ancillaries, sealants, expoy (mortar, resin, or adhesive paint), water stops, utility dusks, weep holes, voids vents, base course and polyethylene under approach slab.

- Add the following new clause:

5. Payment

The Payment Items for the Bill of Quantities under which the works in this section and other related sections of the Specifications shall be paid for, are as listed hereinafter. Measurement for payment shall be made according to the units of measurement stated in the Bill of Quantities.
Prices and payment for the Pay Items shall be deemed to include all that is required to complete the work according to this section and other sections of the Specifications, including all incidentals and subsidiary work which have no separate items for payment in the Bill of Quantities.

Unless it is explicitly specified in the specification or the drawings and a separate Item is included in the BOQ, The rate for any concrete class shall deemed to include the following:

1. Fair Face surface finish,
2. Formwork,
3. Provision and installation of joint filler,
4. Weep holes for abutment, wing walls and retaining walls,
5. Permeable materials behind abutments and retaining walls,
6. UPVC conduits,
7. Deck drainage,
8. Construction Joints.
9. Expansion joints for retaining walls and culverts, and
10. Waterproofing
11. All other miscellaneous details shown on structural drawings.

No separate payment shall be made for any of above items. However, only for bridges, the deck expansion joints and bearings will be measured and paid for under separate items.

	Pay Items	Unit of Measurements
5.01	Concrete Class all class	Cubic Meter

Section 5.02 Concrete Handling, Placing and Curing

5.02.6 Hot Weather Concrete

- Clause 2, Delete item 2.2 and substitute by the following:

2.2 In the absence of an alternative procedure proposed by the Contractor and approved by the Engineer in order to control the concrete mix temperature, no concreting shall commence when the air temperature is 32° C and rising. However the Contractor may schedule his operations to commence pouring concrete during the hours that the air temperature is 34°C maximum but dropping at late hours of the day.

Section 5.03 Steel Reinforcement and Fixing

5.03.2 Materials

- Delete item 1.1 and substitute by the following:-

1.1 Hot rolled steel bars shall conform to JSS/441/1994 or to AASHTO M31M (ASTM A615M) or to B.S. 4449.

SUB-SECTION 5.03.4

MEASUREMENT

- Replace Clause No. (2) by:

2. Calculated weights, for both mild and high yield reinforcing bars, shall be based upon Table 5.11.

	Pay Items	Unit of Measurements
5.03	High tensile steel	Ton

SECTION 5.06 Plain and Reinforced Concrete Structures

5.06.3 Construction

6. Finishing

Add the following to 6.1.1**:**

Concrete Deck Slab, bridge curb, parapets, wall copings, bottom face of Deck Slab, vertical faces of cantilever deck slab and Walls etc. which form architectural features shall have F1 finish.

All other finishes as described in the General Specifications.

Section 5. 12 Reinforcement Concrete Box Culverts

5.12.1 Scope

- Replace Clause 1 by the following:-

1. These works shall consist of furnishing materials and the construction of reinforced concrete box culverts and headwalls. All monolithic reinforced concrete box culverts including headwalls and pipe culverts headwalls shall be constructed in conformity to the lines, grades and dimensions as shown on the Drawings and in accordance with section 2.09 "Excavation and Backfill for Structures", 5.06 "Reinforced Concrete Structures", 5.03 "Steel Reinforcement", 5.15 " Waterproofing for Structures", and other items which are to constitute the complete structure.

5.12.2 Materials

- Add the following item in Clause 1 :-

1.1.4 For waterproofing Section 5.15.

5.12.3 Construction

Add the following new clause:

7. Where existing box culverts are to be extended:

7.1 The Contractor shall break up the existing headwalls and wingwalls as required and with the utmost care and in such a way so as not to damage the

existing culverts. The Contractor shall break up the existing headwalls, deck and floor to expose the existing culverts for such a length as agreed with the Engineer to make the required connection.

7.2 The exposed surfaces shall be cleaned prior to placing concrete.

7.3 Any undue damage caused by the Contractor while breaking such headwalls, wingwalls or structure shall be repaired by the Contractor at his own expense.

8. **Regrade Works**:

8.1 The Contractor shall regrade the areas shown in the drawings to ensure the flow of the generated stormwater towards the inlets of the proposed culverts. The width of the areas to be regraded should not be less than 10.00m from the toe of the road embankment or as directed by the Engineer on site.

5.12.4 Measurement

- Delete Clauses 1,2 and replace by:

1. The Works shall be measured and paid for as prescribed in Section 5.01-"Concrete and Concrete Mixes and Testing", and Section 5.03 - " Steel Reinforcement and Fixing", and in accordance with the Pay Items entered in the Bill of Quantities.

2. Waterproofing for culverts shall not be measured for direct payment.

3. No separate measurement or payment shall be made for breaking existing culverts inlets, outlets, and barrels to extend existing culverts, or for cleaning existing barrels, inlets and outlets, clearing and training wadi courses upstream and downstream of culverts, and all other items necessary for the completion and acceptance of the Works, which shall considered subsidiary to the Pay Items.

4. No separate measurement or payment shall be made for the regrade works. The compensation for such works shall be deemed to be included in the rates for the prices of culverts.

Section 5.13 Pipe Culverts, Storm Drains, and Utility Ducts

5.13.4 Measurement

- Delete Clauses 1,2 and 3, and replace by:

1. Pipe Culverts, shall be measured by linear meter of each pipe size and type furnished, installed, or constructed, backfilled, completed, and accepted.

   Storm Drains and Utility Ducts shall be measured by linear meter of each size and type furnished, installed or constructed, backfilled, completed, and accepted.

2. Measurement of pipes for pipe culvert shall be made as per B.O.Q items. The length measured shall extend from end to end of pipe in the absence of headwall or end walls, or shall extend between inside (Highway) faces of headwall and end wall.

3. Reinforced Concrete for head walls and apron, and plain concrete for blinding shall be measured and paid for as prescribed in section 5.01.8 and as shown in drawings.

- Add the following new clause:

12. The quantities, measured as provided above, shall be paid for at the contract price per unit of measurement, for the pay items listed below which price and payment shall be full compensation for furnishing and placing all materials including all labor, tools, equipment and incidentals necessary to complete the work described in this section.

- Delete the Culverts Pay Items and replace by:-

	Pay Items	Unit of Measurements
5.13(1)	Single/Multiple Pipe Culvert according to pipe diameter and type, to include new and extensions.	Linear Meter
5.13 (2)	Storm Pipe according to pipe diameter and type	Linear Meter

SECTION 5.15 Waterproofing For Structures

5.15 Water Proofing For Structure

The following specification for Crystalline Water Proofing painting for bridge shall be used in the project:

10. Bridge Waterproofing Painting

8.1 GENERAL

1. THE REQUIREMENT

   A. Furnish all labor, materials, equipment and appliances required for the complete execution of the Work as shown on the Drawings and specified herein.

   B. Principal items of work include:

1. Waterproofing bridge concrete elements.

2. REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

   A. Without limiting the generality of these specifications, materials shall be tested to the following standards:

      1. US Army Corps of Engineers CRD C48: Permeability of Concrete
      2. ASTM C267: Chemical Resistance of Mortars
      3. NSF Standard 67

3. SUBMITTALS

   A. submit the following:

      1. Manufacturers product literature, specification data sheets and installation instructions.
      2. Method statement describing the preparation, procedures, equipment and the scope of the application.
      3. Provide certificates signed by manufacturer or manufacturer's representative certifying that the materials to be installed comply in all respects with the requirements of this specification, and that the applicator is qualified and approved to install the materials in accordance with manufacturer's product data.

   B. Provide a written report from the Manufacturer's representative stating that the waterproofing membrane and composite drainage system were installed correctly.

4. DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's unopened containers identified with name, brand, type, grade, class and all other qualifying information.

B. Store materials in dry location, in such manner as to prevent damage or intrusion of foreign matter. Conspicuously mark "Rejected" on materials which have been damaged and remove from the job site.

5. QUALITY CONTROL

A. Manufacturer shall have no less than 10 years' experience in manufacturing the cementitious crystalline waterproofing materials for the required work.

B. Waterproofing applicator shall be experienced in the installation of cementitious crystalline waterproofing materials as demonstrated by previous successful installations, and shall be approved by the manufacturer in writing.

C. Prior to installation of waterproofing, the manufacturer's representative shall conduct a site meeting with waterproofing applicator and the Contractor to verify and review the following:
   1. Project requirements for waterproofing as set out in the Contract Documents
   2. Manufacturer's product data including application instructions.
   3. Substrate conditions and procedures for substrate preparation and waterproofing installation.
   4. The waterproofing manufacturer's representative shall provide technical consultation on waterproofing application.

6. WARRANTY

A. Manufacturer shall provide a product warranty executed by an authorized company official. Term of warranty shall be three years from the Date of Issue of Taking over Certificate of the project.

B. Applicator shall warrant the waterproofing installation against defects caused by faulty or workmanship or materials for a period of three years from Date of Issue of Taking over Certificate. The warranty will cover the surfaces treated and will bind the applicator to repair, at his expense, any and all leaks through the treated surfaces which are not due to structural weaknesses.

The warranty shall read as follows:

Warranty: The applicator warrants that, upon completion of the work, surfaces treated with cementitious crystalline waterproofing will be and will remain free from water leakage resulting from defective workmanship or materials for a period of [specify term] years from Date

of Substantial Completion. In the event that water leakage occurs within the warranty period from such causes, the applicator shall, at his sole expense, repair, replace or otherwise correct such defective workmanship or materials. Applicator shall not be liable for consequential damages and applicator's liability shall be limited to repair, replacement or correcting of defective workmanship or materials.

8.2 PRODUCTS

1. CRYSTALLINE WATERPROOFING

A. Crystalline Waterproofing: Concrete waterproofing material shall be an integral crystalline waterproofing material which waterproofs and protects concrete. The material shall chemically and permanently fix non-soluble crystalline growth throughout the capillary voids of the concrete.

8.3 EXECUTION

1. EXAMINATION OF SURFACES

A. Prior to waterproofing installation, applicator shall arrange to visit the project site with water-proofing manufacturer's representative. Representative shall inspect and certify that concrete surfaces are in acceptable condition to receive waterproofing treatment.

B. The manufacturer's representative shall verify in writing that concrete surfaces are sound and clean, and that form release agents and materials used to cure the concrete are compatible with waterproofing treatment.

C. The applicator shall examine surfaces to be waterproofed for form tie holes and
Structural defects such as honeycombing, rock pockets, faulty construction joints and cracks. Such defects to be repaired in accordance to manufacturer's product
Data and 3.02 below.

2. PREPARATION

A. Concrete surfaces to receive waterproofing treatment shall have an open capillary system to provide tooth and suction, and shall be free from scale, excess form oil, laitance, curing compounds and foreign matter. Horizontal surfaces shall have a rough wood float or broom finish. Where a smooth trowel finish is required on horizontal surface, crystalline waterproofing material shall be applied by dry shake method at time of concrete finishing in accordance with manufacturer's product data.

B. Smooth surfaces (e.g. where steel forms are used) or surfaces covered with excess form oil or other contaminants shall be washed and lightly sand-blasted or water-blasted to provide a clean absorbent surface.

C. Surface defects shall be repaired in accordance with manufacturer's instructions as follows:

1. Form Tie Holes, Construction Joints, Cracks: Chip out defective areas in a "U" shaped slot one inch (25 mm) wide and a minimum of one inch (25 mm) deep. Clean slot of debris and dust. Soak area with water and remove excess surface water. Apply a slurry coat of waterproofing material at the rate of 0.8 kg/m2 to the slot. Allow slurry to reach an initial set, then fill cavity with a patching material manufactured by the waterproofing material manufacturer. Compress tightly into cavity using pneumatic packer or block and hammer.

2. Rock Pockets, Honeycombing or Other Defective Concrete: Rout out defective areas to sound concrete. Remove loose materials and saturate with water. Remove excess surface water and apply a slurry coat of waterproofing material to area. After slurry has set, but while still "green", fill cavity to surface level with non-shrink cement grout.

D. Prior to application of waterproofing treatment, thoroughly saturate concrete surfaces with clean water as required to ensure migration of crystalline chemicals into voids and capillary tracts of the concrete. Remove free surface water before application.

3. APPLICATION

A. After repairs, surface preparation, treatment of construction joints and sealing strip placement have been completed in accordance with manufacturer's product data and as specified herein, apply waterproofing material uniformly to concrete surfaces with semi-stiff bristle brush or broom, or suitable spray equipment. Application rates and locations shall be in accordance with manufacturer's product data, subject to minimum specified requirements herein. When brushing, work slurry well into surface of the concrete, filling surface pores and hairline cracks. When spraying, hold nozzle close enough to ensure that slurry is forced into pores and hairline cracks.

B. Apply with brushes or spray at a rate of I kg/Sq.m.. Apply a second coat at 1 kg/sq m while first coat is still green.

4. CURING

A. Begin curing as soon as coating has hardened sufficiently so as not to be damaged by a fine spray. Cure waterproofing treatment with a mist fog

spray of clean water three times a day for 3 days, or cover treated surfaces with damp burlap for the prescribed period; rewetting burlaps at least three times per day.

B. Do not lay plastic sheeting directly on the waterproofing coating as air contact is required for proper curing. Air cure for 12 days before filling structure with liquid. Blow air into reservoir during the 12 days.

D. During the curing period, protect treated surfaces from damage by wind, sun, rain and temperatures below 2oC. If plastic sheeting is used for protect- ion, it must be raised off of waterproofing coating to allow sufficient air circulation.

5. FIELD QUALITY CONTROL

A. The installation of the materials shall be performed in the presence of the Engineer. The hydraulic test of the reservoir shall be done after the installation and curing of the waterproofing material.

6. CLEANING AND PROTECTION

A. Clean spillage and soiling from adjacent surfaces using appropriate cleaning agents and procedures.

C. Take measures to protect completed coating from damage after application. Do not permit traffic on unprotected coating.

5.15.6 Measurement

The pay items shall be as the following

	Pay Items	Unit of Measurements
5.15(1)	(4 mm) torched applied bituminous membrane	Sq.m

SECTION 5.18 Bridge Expansion Joints

5.18.5 Measurement

- Add the following:

3. Joints and parapet, expansion joints shown on the drawings or required for construction, other than those mentioned in clause (1) under this subsection, shall not be measured for direct payment, but shall be considered as subsidiary to the concrete, the cost of which shall be deemed to be included in the Contract prices for pay items.

Delete pay items and substitute by the following:-

Pay Item	Unit of Measurement
5.18 Bridge Expansion Joint	Linear meter (L.m)

SECTION 5.19 Bridge Bearings

5.19.4 Construction

- Add the following new item in Clause (1):

1.13 The gap between the underside of bearing and sub-structure shall be filled epoxy mortar as specified by the Engineer which shall have minimum 28 day cube strength of 50 MPa and the resulting voids filled with an approved epoxy mortar. Construction of the bridge superstructure may then proceed. The supporting false work and formwork of the bridge superstructure shall not be removed nor permit the transfer of load to the bearings prior to removal of the temporary supporting wedges.

5.19.8 Measurement

- Add the following :

Payment shall be for the bearings completed as detailed on the drawings including installation, epoxy, steel Plates, anchors, cover plate, ring angles, and all details as per drawing and manufacturer's installation instructions.

Amend pay items and substitute by the following:

Pay Item	Unit of Measurement
5.18 Bearing (Each type)	Number (No.)

SECTION 5.20 Bridge Parapets and Railings

5.20.1 SCOPE

Concrete barrier on bridges deck shown in the drawings shall be used in this project as bridge parapet

5.20.4 Measurement

- Add and amend as follows:

Sealing compound joints, barrier expansion joint and reinforcement above construction joint of barrier shall not be measured for direct payment.

Amend pay items to read as follows:-

Pay Item	Unit of Measurement
5.20 Concrete bridge barrier	Linear meter (L.m)

- Add these two new section (5.25 and 5.26) at the end of part 5

SECTION 5.25 Grouting Under Footings

5.25.1 Scope

Injecting grout under footings for more stability of the foundation since the foundation layer is fractured and fissured.

5.25.1 Construction: the grouting works shall be done as follows:

- Grouting shall cover as a minimum the area of (1.5B x 1.5B) where B is the width of the foundation.
- Grouting shall cover a depth not less than 5.0 meters below the bottom of the foundation. The grouting mix shall be one of the following alternates:

Alternate 1

Water	Cement	Additives
21L + 2L	50Kg	227gm flow add one

Alternate 2

Water	Cement	Additives	Sand

21L + 2L	50kg	227gm flow add one	50kg

- The grouting works shall be done under the supervision of a Geotechnical Engineer.

5.25.3 Measurement

1- The grouting under footing shall be measured in Lump sum as stated in the BOQs, grouted, completed, and accepted including all materials, additives, labour, machinery, equipment, tests required by the Engineer, overheads and profit, supervision of a Geotechnical Engineer, and any other works to meet the Engineer satisfaction..

2- All other items necessary for the proper completion of the work and all other works prescribed in this section shall not be measured for direct payment, but shall be considered as subsidiary work, the costs of which will be deemed to be included in the Contract prices for pay items in the BOQs.

Pay Item	Unit of Measurement
5.25 Grouting	Lump Sum (L.S)

SECTION 5.26 protective / decorative Coating

5.26.1 Description

A protective coat of acrylic co-polymer based protective and decorative finish for exterior use formulated to prolong the durability of concrete by protecting it from carbonation affects and to inhibit organic growth.

5.26.2 Primary uses

The protective / decorative shall be applied in areas of application on to the following surfaces:

- Underpasses.
- Bridge, soffits, wing walls.
- Concrete repairs.

5.26.3 Main Characteristics

The protective / decorative coat shall have the following characteristics.

- Easily applied by roller, brush or airless spray.
- Economical to use

- Contains a powerful biocide to inhibit organic growth
- Good adhesion properties
- No priming is required for newly plastered walls

5.26.4 Application procedure

The protective coat shall be applied by brush, roller or airless spray equipment.

Application:

- All concrete surfaces shall be sound, clean and tree of any loose material, non-compatible curing compounds, dirt and dust

- Apply in one or more coats ensuring a continuous even film.

- In hot dry climates, application should be assisted by dampening brushes and substrate if necessary.

- The protective / decorative coating shall be strictly in accordance with the manufacturer's recommendations.

5.26.5 Weather conditions

- The protective / decorative coat should not be applied in rain or if rain is forecast, and should not be applied to frozen substrates or when the temperature is below 5°C or likely to fall during application.

- The protective / decorative coating shall be strictly in accordance with the manufacturer's recommendations.

5.26.6 Typical Properties

Typical Properties*

Colour	Grey
Density at 25C	1.31 - 1 .33kg/i..
Solid Content	54-56%
Touch Dy at 25°C	30 minutes
Recoating Time at 25°C	1 hour

5.26.6 Measurement

1- The protective / decorative coat shall be measured in square meters as stated in the BOQs, supplied, furnished, installed or completed, and accepted including all materials, primer if necessary, labour, machinery, equipment, tests required by the Engineer, overheads and profit, supervision of supplier, and any other works to meet the Engineer satisfaction..

2- All other items necessary for the proper completion of the work and all other works prescribed in this section shall not be measured for direct payment, but shall be considered as subsidiary work, the costs of which will be deemed to be included in the Contract prices for pay items in the BOQs.

Pay Item	Unit of Measurement
5.26 protective / decorative coating	square meters (Sq.m)

Part 8 Incidental Construction

Section 8.01 Concrete Curbs, Gutters, Sidewalks and Paved Medians

8.01.2 Materials and Precast Manufacturer

- Add the following to sub-Clause 4.7:

  The Precast concrete curbs shall be tested in accordance to Jordan Standard Specification (JSS) No. 479/94.

- Clause 8 – Bedding, replace item 8.1 by the following:

8.1 Bedding Material shall conform with the relevant requirements of Section 2.07 “Sub-grade construction and topping, Section 3.02 “Granular Sub-base Courses” and Section 3.03 “Aggregate Base Courses”, and as shown on drawings.

8.01.3 Construction and Installation

- Add the following to the end of this Subsection:

  Mountable curb stone concrete class 30 in the median should be constructed in the locations shown on the drawings, also use concrete class 30 for raised curb stone.

8.01.4 Measurement

- Amend clause (4) to read as follows:

"Excavation, backfilling, bedding concrete, concrete backing, construction…etc" to the end of clause.

- Add the following to end of clause (4):

"Concrete Class (15) for blinding and bedding for Concrete Curbs Gutters, Sidewalks and Paved Medians shall not be measured for direct payment, but shall be deemed to be included in the Contract prices for Pay Items below".

- Add the following new Item:

5. Reinforcement steel mesh under tiles as shown in details drawings 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 in BOQs.

- Amend Pay Items as follows:-

	Pay Items	**Unit of Measurements**
8.01(1)	Class 30 Precast Concrete Raised and Mountable Curb as per details	Linear Meter
8.01(2)	Class 25 Pre cast Concrete Tiling as per details.	Square Meter

Section 8.03 Ditch Linings, Energy Dissipaters and Slope Drains

8.03.4 Measurement

- Delete this sub-section and replace by:

1. Ditch Lining, Energy Dissipaters, Embankment Drains, and Cut Slope Drains shall be measured as prescribed in Section 8.05 - "Slope Protection and Stabilization" for Grouted Riprap and Loose Riprap, Section 5.01 "Concrete and Concrete Mixes and Testing" for Concrete, Section 5.03 "Steel Reinforcement and Fixing" for reinforcing steel, as applicable and in accordance with the Pay Items entered in the Bill of Quantities.

   Measurement shall be made of the areas and thicknesses specified or directed for the above specified materials, furnished, constructed, completed and accepted.

2. Loose Riprap or Mortared Riprap required at the ends of drainage culverts and pipes and at the outlet ends of ditches and slope drains shall be measured as specified in Section 8.05 - "Slope Protection and Stabilization".

3. Excavation for road-side ditches and cut-off ditches shall be measured and paid for as specified in Section 2.03 - "Highway Excavation".

4. Excavation (except for ditches as indicated in Clause 3 above), backfilling, preparation, forming, compacting, bedding and other incidentals, 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.

Section 8.05 Slope Protection and Stabilization

8.05.2 Materials

Clause 1: Stone for Riprap

- Amend Item No. 1.1 to read as follows:

1.1 Stone for loose and grouted riprap shall consist of fieldstones furnished in broad flat shapes to the maximum extent practicable. All stone shall be hard, sound, durable, and highly resistant to weathering and shall be suitable as protection material for the intended purpose. The foundation surface of the slope shall be furnished with 7.5 cm layer of mortar or concrete Class (20). No direct payment shall be made for the material used in the foundation and the cost shall be included in the price of this item.

- Amend Item 1.4 to make the table of riprap classes read as follows:

Weight of Stones (Kg)				**% of Total Weight Smaller than size shown**
Class (A)	**Class (B)**	**Class (C)**	**Class (D)**	
50	200	1000	5000	95 – 100
20	100	500	2000	50 – 100
5	20	100	500	0 – 50
1	5	20	100	0 – 10

8.05.3 Construction

Clause 3: Mortared Stone Riprap

- Delete this clause and replace by:

3. Grouted Riprap

1.1 The surfaces (formation) upon which grouted riprap is to be placed shall be excavated, formed, and compacted to the required lines, grades, and sections as shown on the drawings or as directed.

1.2 Excavation and preparing for paved ditches shall be performed in a manner so as to anchor the structure into the sides of the ditches and protect the slopes to prevent seepage and scour. Unless otherwise specified, each anchor shall extend about 60 cm into the natural ground and shall be backfilled and tamped after completion. Surplus excavation shall be disposed.

1.3 Stones shall be class B as specified in sub section – "8.05.2 Materials", and shall be cleaned of all adhering dirt and clay before being placed. Stones shall first be laid into a layer of soft moist concrete composition of class "20". Unless otherwise indicated, the concrete layer thickness shall not be less than 75 mm.

1.4 The successive layers of stone masonry shall be laid in cement mortar. Stone shall be placed by hand, laid with close, broken joints, and the stones so selected that they are firmly bedded against adjoining stones.

1.5 The larger stone shall be placed in the lower courses. Interstices between stones may be chinked with spalls or selected small stones firmly rammed into place, but voids between large and small stones or spalls shall be filled with mortar as the work progress. The mortar shall be vibrated, spaded, and rodded into place until the voids are completely filled. Excess material and spillage shall be cleaned from the front face of the riprap before hardening. The finished work shall present uniform tight surfaces.

1.6 The exposed mortar shall, immediately after completion of each section of riprap, be cured using clear compound in accordance with the relevant requirements of section 5.02 – "Concrete Handling, Placing and Curing". Alternatively, if approved, the mortared riprap shall be protected from the sun and kept moist for at least 3 days after completion of mortar placement.

8.05.4 Measurement

- Amend Clause No. 8 read as follows:

Excavation, backfilling, slope surface preparation, mortar, concrete bedding Class (20) for grouted riprap, reinforcement and joints of concrete, 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.

	Pay Items	Unit of Measurements
8.05	Grouted Stone Rip Rap Protection	Cubic Meter

- delete Section 8.07 from and replace by:

8.07: Geogrid Reinforced Systems with Modular Block Facing

The contractor shall submit the required engineering studies for MSE system , and all required designs to construct the reinforced soil system, and all geotechnical calculations , also all laboratory tests .
The item price shall include also all technical studies to the (Mechanically Stabilized Earth Wall) construction, which shall be submitted by (specialized approved vender by the client).
The system shall be supplied with Modular Block Facing .

8.07.1 General

This work shall consist of constructing retaining walls using a proprietary reinforced soil wall system, constructed in accordance with the suppliers' drawings and specifications and in conformity with the alignment, grades and dimensions shown on the contract documents or as established by the engineer. The contractor shall provide complete set of drawings issued for construction and complete specifications of the proposed wall system for the approval of the engineer prior to ordering materials to construct these walls. Any particular requirements of approved detailed specifications for the approved proprietary system shall override any conflicting or incomplete requirement contained within this section.

The proposed system shall consist of Geogrid reinforced soil wall with dry cast modular block units as the exterior facing in accordance with project requirements as detailed in the contract drawings. The modular block units are connected to the Geogrid reinforcement by full width friction between Geogrids and blocks.

The design shall address the climatic and soil conditions existing in Jordan and provide a minimum design life of 100 years. The design must be performed by the supplier of the wall system (system proprietor), who shall have an office in Jordan and shall submit proof of professional indemnity (PI) insurance coverage of not less than 2.5 million JD per occurrence and shall provide adequate supervision and full technical backup throughout the project duration. The design shall consider continuous geosynthetic reinforcement material with full width coverage in the areas where reinforcement is placed. Reinforcement at horizontal intervals shall not be

accepted. The specifications as presented to the engineer shall state any requirements for the limitations on backfill used in the structure to ensure the design life. The system submission shall be accompanied by:

A. Detailed design calculations for the proposed walls in compliance with din 4084. Other design standards such as the FHWA- ASD or another allowable stress design method are also accepted.
B. Method statement for installation/construction.
C. Confirmation of the professional indemnity insurance cover provided by an international third party specialized design bureau.

8.07.2 Specification for Reinforced (Infill) Soil

The Geogrids reinforced soil wall shall be able to accommodate soil material present on site as the reinforced and retained fill. These can be one of the following:

1- Alluvial or Colluvial soils- reworked and compacted. For such soil, the angle of friction (Ø´) is 35 degrees. This type of fill is placed at maximum compacted lift thickness of approximately 20 to 25-cm. 30-cm compacted lifts are acceptable provided that in-situ compaction tests show at least 95% relative compaction based on standard compaction effort. Quality control of this fill type is accomplished by running nuclear or sand cone in-situ density.

2- Embankment fill (rock soil/rock fill) with maximum boulder size not exceeding 2/3rd the compacted lift thickness. For such fill, the angle of friction (Ø´) is 38 degrees. Quality control for compaction of this fill type is accomplished by performing plate bearing test at selected levels utilizing the modulus ratio (ER2/ER1) for approval of compaction.

   Typically, both materials do not contain more than 20% of fines and are classified as inorganic.

8.07.3 Modular Block Facing

The modular block facing shall be of reasonable size/weight for ease of handling produced locally by dry cast placement method. The modular blocks shall have a minimum 28-day compressive strength of 21 MPA and maximum absorption of 7%.
The modular blocks shall be connected to the Geogrids by direct friction.

8.07.4 Specification for Geogrid

The Geogrid shall be flexible reinforcing Geogrid or similar in accordance with the design calculations provided by the supplier and in accordance with a British board of agreement certificate for reinforcement in slopes. The Geogrid has to be approved by the engineer and the installation has to follow the manufacturer's instructions.

The flexible Geogrid shall be manufactured from polyvinyl alcohol (PVA) in the main reinforcement direction yarns with low creep and an environmentally inert coating, resistant to UV light and all micro-organisms and chemicals naturally present in the soil and temperature resistance up to 40° c (no deviations in mechanical properties of more than 5 %).

The strain at nominal strength in longitudinal direction shall not exceed a maximum of 6% when tested in accordance with EN DIN ISO 10319.

The total post construction strain for the design life of the structure at the allowable design load shall not exceed 1% (in accordance with BS 8006).

The PH resistance of the grid shall be >2 and <13.

The allowable design load under working conditions for a design life of 120 years shall be justified by partial (material) reduction factors on creep, mechanical damage, chemical and environmental effects, and an overall factor of safety for extrapolation of data, design assumptions and calculations. All reduction factors applied have to be certified and based on independent product-specific research by authorised research or testing institutes.

The roll width shall be at least 5.0 m. the mesh size shall not exceed 30 mm x 30 mm.

The mechanical properties of the grid should be verified by both internal quality assurance and external quality control and assurance by accredited laboratories (DIN EN ISO 17025:2000).

The production of the Geogrid shall been ISO 9001:2000 certified.

8.07.5 Installation:

The installation shall be done in accordance with the proprietor instructions and under the full supervision of an experienced representative from the proprietor.

8.07.6 Measurement:

The measurement for Geogrid reinforced soil (GRS) retaining walls shall be made per square meter of wall face measured as the vertical projection of the face of the reinforced soil wall or slope from bottom of facing foundation to top of barrier, depending on wall height range as described in the bill of quantities, furnished, erected, completed, and accepted including design, all materials and works required by this section and the requirements of the approved design performed by the supplier of the wall system (system proprietor) such as but not limited to:

- Suppliers' drawings and specifications and in conformity with the alignment, grades and dimensions shown on the contract documents or as established by the engineer.
- Detailed design calculations for the proposed walls
- Method statement for installation/construction.
- Confirmation of the professional indemnity insurance cover provided by an international third party specialized design bureau.
- The flexible Geogrid shall be manufactured from polyvinyl alcohol (PVA).
- Modular block units as the exterior facing in accordance with project requirements as detailed in the contract drawings.

1. Geogrid reinforced soil (GRS) retaining walls shall be measured by the square meter furnished, erected, completed, and accepted including geogrids with all necessary fastening, completed and accepted. Measurement shall be of the front face area.

2. polymer grids and ties shall not be measured for direct payment and shall be included in the price of Geogrid reinforced soil.

3. Excavation shall be measured by cu.m. of material excavated, carted away and, disposed of, as specified in Section 2.09 - "Excavation and Backfill For Structures". Measurements shall be of dimensions shown on The Drawings.

4. Backfilling shall be measured, by cu.m. of approved selected materials furnished, placed, backfilled, compacted, completed and accepted. Measurements shall be of dimensions shown on the Drawings.

5. Furnishing and installation of concrete levelling pads, capping units, joint filler, drainage materials within the earth structure, and 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, Reinforced fill retaining wall seat, coping plinth, geogrid and geosynthatic fabrics, facing material (cladding), anchorage system, steel mesh, concrete foundation and riprap protection, drainage pipes, material and installations and the required compressible material shown on the drawings shall not also be measured for direct payment.

	Pay Item	**Unit of Measurement**
8.07 (1)	Geogrid reinforced soil (GRS) retaining walls depending on wall height range as described in the bill of quantities	Square Meter (Sq.m)

Section 8.11 Highway Signing

8.11.2 Materials

- Amend Item 8 (Reflective sheeting), Para 8.1 to read that Reflective Sheeting shall be of the "High Intensity Grade".

8.11.4 MEASUREMENT

- Delete Sub-Section 8.11.4 and substitute by the following:

a. Signs shall be measured per number for each type and size of signs installed in place and accepted.

b. Payment shall be made according to the different classes of signs per number at the Contract unit rate including, but be not limited to, erection, excavation, backfilling, compaction, concrete and reinforcement steel, materials, painting, frames, posts, and all other items necessary for the proper completion of the work.

	Pay Items	Unit of Measurements
8.11(1)	Triangular Shape, Circular shape signs, and Rectangular shape signs (Area $\leq$ 1 sq.m)	No.
8.11(2)	Large Ground Mounted Signs (Area $\geq$ 1 sq.m)	Square Meter
8.11(3)	Overhead sign support structures - cantilever type	No.
8.11(4)	Rectangular signs for overhead Mounting	Square Meter
8.11(5)	Rectangular signs for overhead mounting on bridges and Tunnels.	Square Meter

8.12 Pavement Markings for Traffic

8.12.1 Scope

- Add the following items to be used in the project:

1.3 Sprayed Thermoplastic Reflectorized Paint (TRP) for painted markings and paint lines.
1.4 Reflective, Aluminum Marker with flat reflective strip shall be used for raised pavement markers.

8.12.3 Application and Installation

- Delete item 5.4 and substitute by the following:

5.4 The completed lines shall be a continuous and uniform cross section, and shall have clean, sharp dimensions. The width of paint line specified shall be applied in one application. The lines shall be laid to the following thickness unless otherwise agreed between the Engineer and the Supplier:

Sprayed Lines: 2.0 mm minimum

8.12.5 Measurement

- Delete this Sub-Section and substitute by the following:

1. Painted Pavement Lines and Painted Pavement Markings shall be measured net by linear meters and square meters or numbers respectively as itemized in the Bill of Quantities of completed and accepted work.

2. Payment shall be made for the amount of completed and accepted work as measured by linear meters, square meters and number at the relevant Contract unit price, which shall be full compensation for furnishing all materials, for all labor, equipment and tools, supplies and all other items necessary for the proper completion of the work.

3. Pavement studs shall be measured by the number, furnished, installed, completed and accepted.

	Pay Items	Unit of Measurements
8.12(1)	Sprayed Thermoplastic Reflectorized Paint (TRP) for Pavement Lines, white and yellow (gaps not Measured)	Square Meter
8.12(2)	Painted Pavement Markings	Square Meter
8.12(3)	Direction Arrows	No.
8.12(4)	Reflective Aluminum Pavement Markers (15X15cm) with flat reflective strip.	No.
8.12(5)	Ceramic Non-Reflective Raised Pavement Markers (15 cm diameter).	No.

Section 8.16 Steel Guardrail and Concrete Safety Barrier

8.16.2 Materials

- Item 8. Concrete, amend Item 8.3 to read that :

  8.3. "Concrete for New Jersey concrete Barriers (NJCB) and terminal section shall be of Class 25" unless otherwise mentioned in Drawings or Bill of Quantities.

8.16.5 Measurement

- Amend the second sentence of Clause No. 1 to read as follows:

  Measurements shall be based on the dimensions as shown on Drawings or as directed by the Engineer, and shall include terminal sections and transition sections which shall be measured by the linear meter furnished, Installed, completed and accepted and paid for at the relevant rate for Guardrail and New Jersey Concrete Barrier, as appropriate.

- Delete Clause No. (2)

- Renumber Clauses 3 and 4 as (2) and (3).

- Delete Pay Items (3), (4), (5), (6), (7) and (8).

- Delete part 7 from general specification and substitute by new parts 9 and 10:

Part 9 Special Requirements for Irrigation System

9.01 General

9.01.1 System Description:

The system is designed to irrigate, grass ground covers, shrubs, trees and palms
The system consists of an irrigation pumping station consisting of two pumps, one on duty and one stand – by, the suction line is connected to the water reservoir

The system is automatically controlled by one programmable control unit, from which electric field wires will connect to the remote control valves, located on different locations on the site.

9.01.2 Work included:

A. Supply, install, test and maintain all the irrigation system components as detailed later in this document, together with any related equipment and material needed to put the system into successful operation.

B. Setting in operation and commissioning the irrigation system.

C. Demonstrating and instruction the system operation to owner and / or his representative.

9.02 System components and specifications

All materials and equipment incorporated in the system shall be new, free of any flaws or defects, and of quality and performance as specified to meet the system's requirement.

9.02.1 Water reservoir:

As shown on Drawings .

A pump suction outlet of 40 mm minimum size should extend out of the reservoir to the pump room, with its end of the reservoir .

9.02.2 Pumping station:

A. The pumping station set consists of two electrical motor driven centrifugal pumps, Single-stage, vertical installation
, Closed radial impeller ,close-coupled.
The motor is totally enclosed to not less than class IP50, fan cooled and to class F insulation.

Each pump has the following specifications:
Q= 36 GPM and total dynamic head 50 m H2O

B. Isolating valves shall be fitted to suction delivery connections on each suction pipe.

C. The pumping station shall include the following equipment, as well:
Pressure switches
Pressure gauges.
Low level sensor, to prevent dry run.

D . the suction line include foot strainer (in reservoir)

9.02.3 Control panel:

Automatic control panel shall be mounted on the tank in a dust-tight splash proof enclosure and shall contain the following:

Duty selector switches.
Control circuit and line fuses.
Motor starters.
Variable speed control.
Thermal overload protection
Ammeter and voltmeter .
Power – ON pilot light
All Proper circuit breakers and contactors and other equipment deemed as required to enable the system to function properly and safely .

9.02.4 PE100 network:

A. Pipes:

Pipes shall be of polyethylene PN 10 PE100 pipes, and as shown on drgs. For inner diameter.

All Pipes crossing driveways shall be well protected in 10 Bars UPVC sleeves.
All pipes crossing walkway shall be through 10 Bars UPVC sleeves.

B. P.V.C fittings:

All P.V.C fittings are high pressure joints having a rating a rating of 16 bar working pressure, and conforming to solvent welding ISO 727 DIN standards 9063

9.02.5 Isolating valves and accessories:

A. Isolating valves shall be PVC ball valves

Shall be of class PN 10.
Shall be the same size of the main line.
Shall be installed in a suitable valve box, to ease the maintenance access.

B. Dual acting air vents shall be installed on the submains at the high points and siphons.

9.02.6 Electric remote control solenoid valve:

Shall be of heavy-duty P.V.C construction.
Shall be provided for globe configuration .
Shall be equipped with pressure regulating assembly.
Shall have slow closing design, to prevent water hammer.'
Shall have electric and manual operation
Shall have a flow control for downstream flow adjustment.
Shall be powered by 24 VAC operated solenoid/ 0.41 A inrush/0.23 holding.
Shall have a working pressure of 1-10 bars and flow as shown on drgs.
An isolating valve should be installed upstream of the electric valve, together with an in-line screen filter.
The electric valve and all related accessories shall be housed in a suitable valve box.

9.02.7 Programmable controller:

Make of rainbird or equal model ESP – TM Serices controllers 8 stations or equal.

Features

- ESP Extra-sample programming
- Two independent programs (A and B)
- "Flip Strip" terminal strip permits valve wire hook-up without screws
- Wiring skirt for clean looking, professional installation
- System water budgeting makes seasonal adjustments quick and easy
- Precise station timing in 1-minute increments
- Programmable day-of-week watering schedule
- Independent dual programming

- Easy-to-understand AM\PM clock
- Self-prompting alphanumeric liquid crystal display (LCD)
- 65A external plug-in style transformer
- Slim, indoor cabinet
- Manual start/advance capability for semiautomatic operation
- Mounting screws provided
- Large, high contrast LCD

Operating Specifications

- Station timing: 0-99 minutes (in 1-minute increments); 0-198 minutes with water budgeting
- Automatic start: 3 per day for each program (6 per day when using dual program capability)
- Programming schedule: 2-, 3- or 5-day fixed or 7-day variable cycle
- Water budgeting: 10-200% in 10% increments

Electrical Specifications

- Input required: 120 VAC, 50 Hz
- Output 24 VAC, 65A
- Surge protection: primary input side has built-in MOV (metal oxide varistro) to protect microcircuitry. Output side has 1 built-in MOV fro each valve station
- Battery backup: A 3V lithium coin cell battery maintains program memory up to several months and keeps timing accuracy during a power outage (battery included with controller)
- Default program: After prolonged power interruption, each station waters 10 minutes beginning 8 hours after power resumes-once per day for the 7-day custom cycle or on the first day of the 2-,3- or 5-day fixed cycle.
- Single-valve station capacity: One 24 VAC, 7VA solenoid valve per station, plus a master valve.

9.03 Execution

9.03.1 General:

A. Storage on site:

Pipes shall be stored protected from sun. All other equipment and materials shall be stored in a secure place and being capable of maintaining the temperature below the manufacturer recommended temperature limitation.

B. Cover or plug openings in pipes, fittings and all other equipment daily during construction to prevent any foreign materials form entry.

Construct all piping of full-length sections of pipe where ever possible . join all pipes with approved joints only.

9.03.2 Installation:

A. All pipes shall be installed in trenches at 50 - 60cm below surface.

B. Pipes running in agricultural soil shall be directly buried in soil.

C. Pipes crossing the streets shall be well protected and embedded in sand.

D. Contractor shall install all items in strict accordance with the printed recommendations of the manufacturer , installing each item firmly in position, level, plump and properly connected.

E. Special foundations, holding down anchors or other fixing devices shall be provided as required.

9.03.3 Cleaning of the system:

As the installation of the various system components are completed, they shall be adequately cleaned before final closing. All foreign matter shall be removed from equipment and surrounding areas . preliminary or final tests should not be permitted until the cleaning is certified by the supervising engineer .

9.03.4 Inline emitter:

Inline emitter tubing system, consisting of inlind emitters welded to the inner circumference of the polyethylene tubing. Emitters shall be spaced 12". Rat shall include all required fittings, relief valves, drain points and all necessary works as recommended by manufacturer. Ø 16.1 mm, 3.5 l/h @ 30.5 cm 11.47 l/h/MSQ

9.03.5 Plan Bubblers:

Palm Bubblers, 0.3 GPM (68 L/H), Distance 1 Ft (0.3 m) at 30 PSI

9.03.6 Grace Spray Heads:

Grace Spray Heads, 5° Trajectory Radius 4 Ft, Flow 0.3 GPM (68 L/H) at 20 PSI, covered Area 6.76 m2

9.03.7 Tree Bubblers:

Tree Bubblers, 0.2 GPM (45 L/H), Distance 1 FT (0.3 m) at 30 PSI

END OF SECTION

Part 10 Landscape Works Specifications

This part refer to The General Technical Specifications for Building (GTSFB) published by the Ministry of public works 1996 Second Edition

10.01 Concrete Works

This section shall be read in conjunction with the Bills of Quantities, Drawings, General Specifications and other Contract Documents; reverences with related General Specifications item numbers are made.

10.01.1 Cement
(Item reference 302/1.A)

Portland cement to JS 30 or BS12 shall be used for all structural elements.

10.01.2 Additives:
Additives to the concrete mix should be added in the concrete mix of all liquid retaining structures:

a- To increase workability.
b- To reduce permeability.

10.01.3 Reinforcing Materials
(Item reference 302/6)

Reinforcing bars for main Reinforcement shall be deformed mild steel bars conforming to JS/441/96 with a yield strength not less than 420N/mm^2, plain bars shall be conforming to JS/442 with a yield strength not less than 300N/mm^2. Plain bars shall be used for secondary reinforcement as shown on drawings.

10.01.4 Classes of Concrete
(Item reference 306/1)

a- Classes of concrete are defined on Drawings (general notes drawing) and in BOQ, strength minimum cement content and maximum w/c ratio shall be in accordance with table show on general notes drawing.
b- Concrete used shall be to BS 5328.

10.01.5 Fair-face Concrete
(Item reference 317/2)

Fair-face concrete surfaces shall be class **1**, using ordinary Portland cement.

10.01.6 Cellular Concrete Type
(Item reference 318/1/D/2)

Cellular concrete type shall be foam concrete.

10.01.7 Precast Concrete Curbs
(Item reference 326)

Concrete curbs shall be to JS 479 class B of characteristic strength 25n/mm^2, the size for each piece shall be as defined on drawings and B.O.Q.

Pointing for curbs shall be with Portland cement.

Measurement (Precast Concrete Curbs)
(Item reference 328/5)

Add the following:

Concrete class (15) for bed and haunch for curbs shall be deemed to be included in the precast concrete item prices and shall be not measured.

10.02 Stone Work

This section shall be read in conjunction with the Bills of Quantities, Drawings, General Specifications and other Contract Documents; reverences with related General Specifications item numbers are made.

Classification source and finish of stone
(Item reference 502/1)

Stone shall be conforming to JS/851 class A and the following:

1. Quality of stone

   a To be first quality, each type obtained from one strata, from one quarry and delivered in one shipment. Slabs are to be hard and free from cracks, vents, sand and clay holes, Shelly bars, shakes, mottle and other defects to surfaces and edges which may impair structural integrity, function or appearance and are to be cut square and true with clean edges.

   b Submit supplier's test results for each type of stone for the following tests, which must meet the following when tested in accordance of ASTM-C97, ASTM-C99 and ASTM - C 241:

Test	Unit	Limit	Standard
Specific Gravity	ton/m^3	not less 2.5	ASTM - C 97
Absorption	wt%	not moor 3	ASTM - C 97
Modules of Rupture	N/mm^2	not less 6.9	ASTM - C 99
Abrasion Resistance	%	not less 10%	ASTM - C 241

c. Masonry classification for this project shall be first class building unless otherwise indicated below

2. Stone Source

A To be first quality **Ajlon Stone**, and obtained from quarries having sufficient quantities to complete the works as indicated on the drawings. The color variation shall be within the limits established on the mock-up and approved by the Engineer. Minor natural markings which are characteristic of the material which do not impair strength or appearance will be permitted.

B For natural finish stone: to be first quality **Ajlon Stone** natural finish stone (Wejh al sakher), 5 ~ 7 cm semis flat thick and 70 to 250mm course high distributed as follow:

1- 20% of stone shall be 5~7cm thick and 7~ 12cm high

2- 40% of stone shall be 7cm thick and 13~ 18cm high

3- 40% of stone shall be 7cm thick and 19~ 25cm high

This type of stone shall be fully backed with cement mortar, including formwork, cement mortar, 8~10cm thick concrete background, open joint (without joint grout), cleaning at completion, adding small stone pieces to back of stone fixed by special adhesive (stock) for more shrinkage and fixing about 2~ 3 pieces for each stone unit depending on stone size, all special stone pieces and special cutting for lintels unless otherwise stated in B.O.Q and all necessary required accessories.

Stone Finish
(Item reference 504/2)

A Finishes for exposed surfaces shall be as stated on the drawings and as follow:

1- **Ajlon Stone:** Bush hammered finish (fine Mofajjer) for wall finish type W1b of 24cm course high and W1d of 49cm course high.

2- **Ajlon Stone**: Natural finish stone for wall type WL17, WL21 and WL22 and the lick type in external walls.

B No visible saw marks shall be evident.

Stone Sizes
(Item reference 504 and 508)

A Generally all stone work shall be cut to size, finished and prepared for installation in the shop.

B Minimum tolerance in stone sizes shall be as defined in table 5/1 – first grade building of section 5 (stone work) of GTSFB.

C Minimum internal size shall be as defined in table 5/2 – first class building paragraph 5-4/1-D, Section 5 (Stone Work) of General Specification except stone depth at jambs, corner…etc. which shall be 140mm and / or as shown on drawings.

D Special stone pieces, like Corners, Lintels, Sills, Jambs..... etc shall be as defined in item 508 and tables 5/7, 5/8, 5/9 and 5/10 of General Specification; first class building except stone depth at jambs and corners (tables 5/7 and 5/8) which shall be 140mm and/or as shown on drawings.

E Height and thickness shall be as indicated in the drawings and B.O.Q.

Masonry type
(Item reference 505)

Shall be as Item 505/1/A

Mortar
(Item reference 506/2)

Mortar shall be cement type with plasticizer comprising 1 part ordinary Portland cement and 4 part sand with plasticizer.

Stone Cladding Type
(Item reference 511/1)

Stone cladding type shall be type (C) or type (A), using galvanize steel fixing as defined in paragraph 511/5 and 511/3 of section 5 of GTSFB.

Jointing
(Item reference 512/1)

Jointing shall be flush with stone surfaces in accordance with paragraph 512/1/A of section 5 of GTSFB.

Stone Tiles
(Item reference 513)

a- Stone tiles shall be conforming to JS/851 class A as indicated in item 502/1 above.

b- Stone tiles source shall be first quality stone.

c- Stone tile type, size and finishes shall be as shown on drawings and indicated in BOQ

d- Stone thick shall be 4cm.

e- Stone finish shall be as indicated in drawings and B.O.Q.

Rate Prevalence and Measurement Rules
(Item reference 517/1 and 517/2)

Add the following:

- Rate for stone walls items shall include for the all allowances for special stone fittings as mentioned in paragraph 517/3 and 517/4 except arch stone lentils which shall be measured and paid for as per items in the bills of quantities.

- Rate for stone wall masonry shall include for formwork and concrete backing.

10.03 Floor finishing

This section shall be read in conjunction with the Bills of Quantities, Drawings, General Specifications and other Contract Documents; reverences with related General Specifications item numbers are made.

10.03.1 Cement Tiles

(Item reference 804)

Cement tiles shall be to JS 45, square shaped as shown on Drawings with fairface finish as indicated in B.O.Q, and normal Portland cement shall be used.

10.03.2 Concrete Flooring

Classification
(Item reference 807/2)

a. Cement concrete screeds shall be grade 25 (compressive strength of 25 MPa at 28 days), using Ordinary Portland cement, steel troweled fair face finish.

Joints
(Item reference 807/4)

Cement screeds shall provide with shrinkage and construction joints as specified in GTSFB.

10.03.3 Stamped Concrete

Stamped concrete materials

A. Portland Cement: BS 12 or ASTM C150, Type I, non-staining or KSS 36. Use only one brand of cement from one mill throughout the work, unless otherwise approved by the Engineer.

B. Coarse Aggregate: BS 882 or ASTM C33, evenly graded gravel, crushed gravel or stone, or a combination thereof passing a 9.5mm sieve and retained on a 4.5mm sieve.

C. Fine Aggregate: BS 882 or ASTM C33, natural sand.

D. Blended Hydraulic Cement (for Stamped Concrete)

E. Joint Dowel bars: Plain steel bars, ASTM A 6l5/A 6l5M, Grade 420, Cut bars true to length with ends square and free of burrs. (for Stamped Concrete)

F. Colored Dry-Shake Hardener: Factory-packaged dry combination of Portland cement, graded quartz aggregate, coloring pigments, and other chemicals. Use coloring pigments that are finely ground, nonfading minerals oxides or chromates or cobalt interground with cement. (for Stamped Concrete)

Admixtures

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

E. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

10.03.4 Stone Flooring
(Item reference 815)

Stone for flooring shall be as mentioned in BOQ and specified in section 5 of this document, size and thickness shall be as stated in drawings and bills of quantities.

Rate Prevalence
(Item reference 817/4)

Add the following:

- Unit rates for floor ceramic tile shall include also for cement screed background as defined in paragraph 705/7/C.

- Unit rates for all types of floor tiles shall include also for control joints.

- Unit rates for all types of floor tiles shall include also for background fill material.

10.04 Metal Work

This section shall be read in conjunction with the Bills of Quantities, Drawings, General Specifications and other Contract Documents; reverences with related General Specifications item numbers are made.

10.04. 1 Steel Structure
(Item reference 1002/3e)

Steel structure shall be paint by two coats of red lead and two coat of zinc rich not less 90% paint.

10.04. 2 Steel Works
(Item reference 1003)

Material shall be mild steel to comply with BS 4360, hollow steel sections are to comply with (BS 4848; part 2). Steel sheet is to comply with (BS 149: part 1).

Steel works are to be formed according to the general arrangement shown on the Drawings for the structure, their general setting out, as well as sizes of members. Statements of Specifications and BOQ shall be considered also.

The contractor is to be solely and entirely responsible for the preparation of Shop Drawings required for the true and proper execution of the work to enable him to provide structures complete, structurally sound, able to be erect, and delivered up in good working order.

Cover plates shall be made of extruded aluminium alloy handles of cast aluminium alloy. Both cover plated and hands shall be anodized silver finished. Rubber door stops shall be 38mm diam. with iron lug. 32mm deep, overall size 59 mm deep fixed to floor.

10.04.3 Handrails & Balusters

Handrails and guardrails shall be designed to withstand a simultaneous horizontally and vertical force of not less than 75 kg/m, and a single concentrated load of 100 kg, these loads not imposed simultaneously.

External handrails exposed to wind load shall be designed to permanently resist Design Wind Velocity (wind resistance) as defined in British Standard CP3, Chapter V (1972) of 160 kph and shall be calculated based on the wind speed, height of the buildings, etc., acting inward and outward, normal to the plane of the wall.

The Contractor shall use all precautions necessary to protect the finish from scratches, nicks, gouges, dents etc., during storage, assembly and installation.

All surfaces components in contact with other materials and permanently exposed to moisture shall be painted with a coating of Zinc Chromate Primer to prevent contact between the two surfaces. All shall be installed so that no drainage over them has previously been contaminated from copper, caustics or alkalis.

10.04. 4 Stair nosing guard and aluminum alloy framing:

1. Type: Retrofit stair nosing with mill finish aluminum frame.

2. Color: as selected by the Supervising Engineer\Owner's Representative.

4. Size: overall section size shall be 2" (50mm) wide.

10.04. 5 Measurement
(Item reference 1009)

Add the following: -

Metal works shall be measured as indicated in bills of quantities.

10.05 Wood Work

This section shall be read in conjunction with the Bills of Quantities, Drawings, General Specifications and other Contract Documents; reverences with related General Specifications item numbers are made.

Natural Wood
(Item reference 1102/1)

a- Softwood shall be Pine wood, Hardwood for flush door shall be beech and for solid door shall be oak wood.

b- In general wood type shall be as stated in B.O.Q.

c- Timber shall be grade one (according sub items 1102/1.b, c, d and e).

Plywood
(Item reference 1102/2)

a- Shall be made of hard tropical wood veneers, 3 ply of a total thickness 5mm.

b- Plywood that is to be clear finished is to be grade 1. Adhesive shall be grade WBP.

c- Plywood that is to be covered by veneer or painted is to be grade 2.

Blockboard
(Item reference 1102/3)

a- Blockboard shall conform to BS 3444 and shall be of thickness and sizes shown on Drawings.

b- Blockboard shall be grade 2 and adhesive grad to BS 3444.

c- Blockboard is to be clear finished is to be grade 1.

Nails and screws
(Item reference 1102/9)

The use of nails for fixing items of joinery will not be permitted. Screws shall be counter sunk and puttied.

Wood Fixed Furniture
(Item reference 1110)

Fixed furniture shall be supplied and fixed according to Drawings. Blockboard in all joinery elements is to have hardwood lipping edges.

10.06 Coloured Premix Render

A. Coloured render shall be high quality pre-mixed totally waterproof and resistant cement based double up plaster intended for block wall, ceilings and other rendering in thick layers.

B. Material shall be suitable for dry and wet areas, interiors as well as exteriors.

C. Material shall be free of salts like sulphides, chlorides … etc.

D. Material technical data

1. Filler : Precisely graded crushed limestone fractions, maximum grain Φ1.60mm, silica sand
2. Type of binder : White Portland cement ASTM C 150.
3. Additives : Contains additives to improve consistency, adhesion and workability.
4. Density : About 1.7 kg/liter in dry powder form, about 1.75 kg/liter when mixed with water.
5. Standard : Conforms to and surpass ASTM C 587-681 Clause 5 and ASTM C 472-73 Clause 10.
6. Colour : As selected by Owner.
7. Thickness : Not less than 10mm (after scrapeding), applied in one layer.

E. Metal Lath: to ASTM C847; flat diamond self furring mesh, of weight to suit application, backed with treated paper; galvanized.

F. Wire Mesh Reinforcement: 38 x 38 mm galvanized steel 24 gage 0.6 mm wire, woven mesh.

G. Casing Bead: Formed sheet steel, depth governed by plaster thickness, maximum possible lengths, expanded metal flanges, with square edges; galvanized.

H. Corner Bead: Formed sheet steel, depth governed by plaster thickness, maximum possible lengths, expanded metal flanges with radiused edge; galvanized.

I. Base Screed: Formed sheet steel , depth governed by plaster thickness, maximum possible lengths, expanded metal flanges, with bevelled edge; galvanized.

J. Corner Mesh: Formed sheet steel, minimum 0.5 mm thick, expanded flanges shaped to permit complete embedding in plaster, minimum 50 mm size; galvanized.

K. Strip Mesh: Expanded metal lath, minimum 0.5 mm thick, 100 mm wide galvanized.

L. Control and Expansion Joint Accessories: Formed sheet steel accordion profile, 50 mm expanded metal flanges each side, galvanized .

M. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.

N. Fasteners: ASTM C1002, self drilling, self tapping screws.

10.07 Painting and Decorating

This section shall be read in conjunction with the Bills of Quantities, Drawings, General Specifications and other Contract Documents; reverences with related General Specifications item numbers are made.

Stopping
(Item reference 1302)

Add the following:

Stopping for joinery and metal works shall puttied complying with BS544 and shall be tinted to match the color of the undercoat.

Putty Coat Material
(Item reference 1303/1C)

Putty coat for all surfaces shall be manufactory ready mixed putty as recommended by painting material manufacturers.

Steel and Iron Primer
(Item reference 1304/1a (1))

Shall be synthetic, oil modified alkyd base, and has high resistance to rust, water and oil.

Nonferrous Metal Primer
(Item reference 1304/1.a(2))

Shall be vinyl butyral–phosphoric acid primer for conditioning. Primer shall be supplied in two components to be mixed according to manufacturer's recommendations and instructions.

Wood Primer
(Item reference 1304/1.b)

Shall be oil modified alkyd base primer pigmented with titanium dioxide and lead base pigments and strengthened with special extender pigments.

Cement Surface Primer
(Item reference 1304/1.c)

Shall be formulated with alkali resistant vinyl chloride, vinyl acetate ethylene grafted terpolymer, and pigmented with chalk resistant titanium dioxide and strengthened with silicate type extender pigments. Primer shall be have excellent sealing properties, alkali resistance, excellent hold out for all types of latex, oil and synthetic base paints.

Metal and Wood Finishing Paints
(Item reference 1304/3.a and b)

Shall be semi gloss, long oil type alkyd base enamel, designed for interior and exterior use.

Exterior Finishing Paints
(Item reference 1304/3c-1)

Shall be of two layers resin base water proofing acrylic textured decorative coating (The binder shall be pure acrylic) pigments and binders are resistant to weather pollution, …etc. to be applied in accordance to manufacturers instruction for the best results. All surfaces should be dry, clean and free from oil, grease, dirt and other foreign substances.

Interior Finishing Paints
(Item reference 1304/3c-2)

a- Emulsion paints shall be based on the stable copolymer of 100% pure vinyl and acrylic monomers, and pigmented with chalk resistant titanium dioxide and fade resistant colored pigments.

b- Oil paints shall be semi gloss, long oil type alkyd base enamel designed

for interior and exterior use. Type of interior paints to be applied to the surfaces as indicated on drawings and as instructed by the Engineer.

Application
(Item reference 1306)

After priming, one-putty coat and minimum three coats shall be applied (without prime coat and putty coat). The Contractor will be required to repaint at his own expense any work on which the paint is found to be incorrectly applied, or the applied coats do not result in complete coverage.

Paint Colors
(Item reference 1307/12)

Colors shall be according to the written instruction of the Engineer.

END OF SECTION