

Technical Specifications/Scope of Work

Project Name: Provision of Secondary Education

TITLE OF WORK:

Enhancing Learning Spaces through the construction of additional classrooms, library building and solar operated WASH facilities

**FOR DEPARTMENT OF EDUCATION
KHOST PROVINCE**

30 May 2019

A - GENERAL

1. Introduction

1.1 Outline of Education in Khost

The construction of additional classrooms aimed at enhancing learning spaces inside Borikhail Secondary School, in Gurbuz district, Khost Province Afghanistan.

Borikhail Secondary School is located inside Gulan Refugee Camp, around 35 km south of Khost City.

The school has an eight room school building only, which densely accommodates around 1,000 students. Since 2014, UNHCR through its partner CoAR implemented Secondary Education Project for North Waziristani Refugee in Gulan Refugee Camp. During 2018, the partner with instruction from UNHCR FO Khost implemented Afghan curriculum along with Pakistan curriculum with the aim to accommodate refugee children in Afghan Schools. UNHCR through its Secondary Education Programme plans to construct additional classes, a library building and solar operated WASH facilities to boost learning environment in the school.

The main objective of upgrading of the school related facilities are:

- a) Enhancing overall learning spaces and environment
- b) Increasing learning spaces,
- c) Providing refugee children with access to school and learning opportunities,
- d) Assist provide child protection,
- e) Reforming present institutional set up for long term sustainability between host and refugee communities.

1.2 Site Description

The Location of the site is in Gulan Refugee Camp, close to Borikhail village.

The site is in a hilly terrain. The access is on an earth road beyond the Khost-Ghulam Khan border. The contractors are advised to visit the site prior to price the Bill of Quantities.

The site has to be first cut and level and compact using machines where necessary. Mobilizing of relevant machinery at the site has to be considered.

B- SPECIFICATIONS

SPECIFICATION FOR CIVIL WORKS

2.0 CONCRETE WORKS

2.1 General

Materials used in the Works shall be new, of the qualities and kinds specified herein and equal to approve samples. Delivery shall be made sufficiently in advance to enable further samples to be taken and tested if required. No materials shall be used until approved and materials not approved shall be immediately removed from the Works.

2.1.1 Materials shall be transported, handled and stored on the site in such a manner to prevent from weather, damage, deterioration or contamination.

2.1.2 Cement

Cement shall be Ordinary Portland cement of an approved brand. and shall conform to BS 12. Cement shall be of recent manufacture and used within 6 months of manufactured date.

Cube tests will be required by the Engineer. These tests shall be carried out at the Contractor's expense.

Any cement failing to meet the required standards will be rejected and replaced at the Contractor's expense.

Any cement not conforming to BS 12 shall not be used unless otherwise approved by the Consultant.

2.1.3 Aggregate

Fine aggregate shall be river sand conforming to BS 882.

Coarse aggregate shall be crushed granite stone excluding limestone or Aggregate shall not contain injurious amount of rubbish, dirt, organic impurities and other foreign matter

Strength of aggregate shall be more than that of hardened concrete paste.

Shape of coarse aggregate shall not be flat or slender.

The maximum size of coarse aggregate shall be 25 mm.

Sources of aggregate shall be to the approval of the Consultant and samples of aggregate from the proposed source shall be submitted to the Consultant at least 14 days before its intended use.

2.1.3 Water

Water shall not contain unacceptable amount of impurities, Salinity, which may adversely affect concrete and reinforcement.

Water shall be obtained from a public supply where possible, collected rain water or taken from any other sources approved by the Engineer.

Only water of approved quality shall be used for washing out formwork, mixing of concrete curing of concrete etc

3.0 HANDLING AND STORAGE OF MATERIAL

3.1 Cement

Cement shall be stored in a manner to prevent weathering.

Bagged cement shall be piled not more than 10 bags.

Cement caked even to the slightest extent shall not be used. Such cement and rejected cement shall be immediately separated from other bags .

3.2 Aggregate

Aggregate shall be stored in a manner effectively separating coarse and fine aggregate according to type and shall be prevented from inclusion of dirt, rubbish and other undesirable foreign matters.

Coarse aggregate shall be unloaded and piled in a manner not to cause segregation of small and large particles. Aggregate to be stored in piles of moderate height and at a location where good drainage is provided.

4.0 MIX PROPORTION AND STRENGTH

4.1 Mix ratio for reinforced concrete (Grade 20, M- 200) shall be in the proportion of 1:1 2:4 or as specified in the lab. Approximately (cement: fine aggregate: coarse aggregate) by dry volume. However the Characteristic Strength of Concrete must be of 20 N/mm^2

4.2 Mix ratio for lean concrete (Grade 15, M-200) shall be in the proportion 1:3: 6 approximately (cement: fine aggregate: coarse aggregate) by dry volume.

4.3 Water-cement ratio for concrete shall be 0.4% to 0.45%

4.4 The specified Characteristic strength of reinforced concrete shall be 25 N/mm^2

4.5 The required slump of concrete shall be 100 mm.

5.0 MIXING AND QUALITY CONTROLLING OF CONCRETE

5.1 Field-Mixed Concrete

The Contractor shall select the necessary facilities for storage, batching, mixing and transporting of each of the materials.

5.2 Mixing Control

Concrete mixture shall be constantly controlled to obtain required workability and mixed strength. Mixing time for each batch shall be not more than 3 minutes.

5.3 Quality Control

The Contractor shall conduct tests for quality control to ensure that concrete of the required quality is constantly produced.

The Contractor shall have all quality control tests reports ready for submission as required by the Engineer.

Quality Inspection of Concrete at the Point of Placement

The Contractor shall conduct tests on concrete at the point of placement. When test results meet the tolerances given below, the concrete shall be qualified to have passed the tests.

The tolerance between actual slump and required slump of the concrete shall be ± 2.0 mm

5.4 Cubes Test

Cube tests shall be carried out to determine the compressive strength of concrete. If the average value of compressive strength of concrete obtained in a test is not less than the specified design strength, it shall be qualified to have passed the test. In case of failure to the above requirements, the concrete shall be rejected and the Contractor shall take necessary measures to rectify whole of the concrete works carried out with rejected concrete mixture.

6.0 TRANSPORTING AND PLACING

6.1 General

The Contractor shall establish manner and schedule for transporting and placing of concrete and obtain approval of the Engineer.

Concrete shall be transported in a manner to minimize segregation, spill, age and other changes in quality thereof.

Concrete shall be placed and consolidated in a manner to ensure uniformity and optimum density.

In case of rain or other conditions that may affect the quality of concrete during concreting, the Contractor shall take necessary measures to cover the works and concrete to, the satisfaction of the Engineer.

6.2 Time Limit

The time limit from start of mixing to completion of placing of a batch shall be 30 minutes.

6.3 Construction Joint

Joint surfaces shall be cleaned, made free of laitance and other foreign matters, and wetted prior to concreting. Joint surface shall be roughened to the satisfaction of the Engineer. The locations and shapes of construction joints shall be consulted and approved by the Engineer.

6.4 Concrete Placing

Concrete placing shall be proceeded to keep the surface of placed concrete as horizontal as possible.

Concrete shall be continuously poured to compact around reinforcing bars and corners of formwork.

The maximum time interval between placement of adjacent concreting shall not exceed 30 minutes. However, when special measures are taken this time limit may be changed according to instruction or approval of the Engineer.

6.5 Consolidation

Mechanically operated (Poker) Vibrator shall be used for consolidating concrete to the best possible manner and to the satisfaction of the Engineer. However, vibrator shall not touch reinforcing bars and shall not be operated more than 30 seconds at same spot.

Concrete shall be horizontally placed and vibrating shall be carried out for each layer completely prior to placing any fresh layer. Vibrating shall not be continued until segregation or accumulating of water on top of the surface, takes place

6.6 Concrete Curing

After concrete has been placed, the concrete surface shall be kept moistened by spraying water or by other appropriate methods, and shall be protected from direct sunlight and rapid drying. The top surface of concrete shall be kept flooded with water at all times after concreting for the duration of specified curing period of not less than 14 days.

No foot traffic or loads shall be permitted on concrete for at least 03 days after placement.

7.0 TESTING OF CONCRETE

7.1 General

The contractor shall be required to conduct all tests according to BS method and procedure.

Tests, shall be conducted with samples randomly selected by the Engineer and, at the testing institutions approved by the Engineer.

In case of failure in tests, necessary measures shall be taken as instructed by the Engineer.

The Contractor shall keep test records during the work and until the completion of the defects liability period of the works.

7.2 Material

Cement Test

- (1) Setting test.
- (2) Soundness test.
- (3) Compressive strength test

Note: These tests shall be carried out for each batch of stock but, as directed by the Engineer

Aggregate test:

Grading and fineness modules.

7.3 Concrete

Fresh concrete

Slump test shall be conducted when concrete is placed, and more often at request of the Engineer.

Compressive strength test

In order to assess strength of concrete prior to 28 days after placing, compressive strength test shall be conducted for concrete test cubes in 7 days and 28 days after placing. The number of test pieces to be used in each test shall be not less than 3.

Test cubes shall be stored shall be cured in water after removed from moulds without being disturbed and shall be covered during the first 24 hours and shall be cured in water after removed from moulds , and carefully transported to the testing laboratory. The temperature of cubes shall be kept as close as possible to the temperature of the concrete in structure until the time of testing.

The test results shall be expressed in the average value by calculating the average compressive strength of all test cubes. The average value must be equal to or greater than the specified strength.

7.3 Cube Strength of Concrete:

Grade M	Cube strength at age of (N/mm ²)	
	7 days	28 days
20	16.5	25

7.5 Defective Concrete and Finishes

Honeycombed surfaces shall be made good on the instruction of the Engineer by the consulting the Engineer.

8.0 CONCRETE FORMWORK

8.1 Structure and Material

Formwork shall be fabricated to obtain accurate concrete in accordance with the drawings.

Formwork shall be made firm to bear the force of concreting and to avoid cement paste seeping.

Sheathing for formwork shall be waterproof plywood of not less than 12 mm thick. Joint of sheathing shall be butt joint and firmly assembled. In case of using wood board for sheathing, boards shall be 15 mm thick and applied planer. Joint shall be tongued and grooved unless otherwise approved by the Engineer.

Form lines shall be sound and suitable materials to accurately and safely cast the in-situ concrete structure as shown on the Drawings.

Timber form boards for sheathing where used for fair-faced concrete shall be of new materials as not to cause any defects to the surface of the concrete. Special care shall be taken in fabrication, storage and protection of these boards.

Form oil shall not have injurious effects on quality of concrete nor to bonding of surface finishing materials and shall be subject to approval of the Engineer.

8.2 Design of formwork

Formwork shall be designed to withstand construction loads during concreting, lateral pressure of fresh concrete, shock and vibrators due to concrete placing.

Formwork shall be free of injurious leakage of water, easy to remove, and shall not damage concrete at removal.

Supports shall be provided with the adequate horizontal and diagonal bracing and/or stays to prevent collapsing, heaving and twisting of formwork due to horizontal loads working during concrete placing.

8.3 Fabrication and Erection

Erection of formwork, shall be started only after previously placed concrete has reached age, so that no adverse effect on the concrete.

Sheathing shall be fabricated and installed accurately to match the locations, shapes and dimensions of members called for in the Drawings.

Sheathing shall be installed tightly so as not to permit cement paste or mortar to escape from joints.

Pipes, boxes and other embedded hardware shall be properly secured to sheathing or others so that they will not move during concrete placing.

Shoring shall be erected paying special attention to safety. If sheathing is reused, the surface in contact with the concrete shall be thoroughly cleaned off and sufficiently repaired before reuse. In case of using for fair-faced concrete, the same sheathings could be used twice only after approval of the Engineer.

8.4 Inspection

Formwork shall be inspected by the Engineer prior to placing of concrete.

8.5 Striking of form work

The minimum period for keeping the forms in position and for watering after laying the concrete shall be as stated below, except otherwise specified. Forms shall be removed in such a manner as to ensure the complete safety of the structure, so that there is no shock or vibration that would damage the reinforced concrete. The responsibility for the safety of the concrete shall rest entirely with the Contractor and the Contractor shall be held liable for any damage done and shall have to make good the same at his own expenses. The Contractor shall inform the Engineer when he intends to remove and shall obtain his consent, but the consent of the Engineer shall not relieve the Contractor of his responsibility.

37.6 Removal of formwork

Formwork shall be removed gently, after its removal has been approved by the Engineer.

Inspection by the Engineer shall be carried out immediately after the removal of sheathing and defects shall be immediately remedied according to instruction of the Engineer.

The minimum time for formwork to remain in place

Vertical sides of beams, slabs and columns	3 days
Soffits of slab	14 days
Soffits of beams	21 days
Cantilevers	28 days

9.0 STEEL REINFORCEMENT

9.1 Material

Reinforcing bars shall comply with the requirement of B.S.4449. and welded wire fabric, square bar fabric and expanded metal shall comply with appropriate part of B.S.4483. Dia 6mm reinforcing steel shall be round mild steel bars, and 10mm, 12mm shall be deformed high tensile bars.

Characteristic Strength of deformed bars shall not be less than 410 N/mm².

Any other non-specified reinforcing steel shall not be used.

All reinforcing steel and binding wire shall be stored under cover and shall be at least 250mm above the ground.

9.2 Cleaning

Reinforcing bars shall be cleaned before use so that it is free from rust, oil, dirt or other coatings that reduce bond.

9.3 Bending and Laps

The reinforcement shall be bent cold in an approved bar bending machine.

Preferably bars of full length shall be used. Lapping of bars where necessary shall conform to BS1487 'Bending Dimensions of Bars of Concrete reinforcement.

9.4 Concrete Cover to Reinforcement

FOR UNDER GROUND OR
WATER RETAINING STRUCTURES 20 MM

Reinforcement shall be inspected by the Engineer and approved before concrete is placed.

10.0 WATER PROOFING OF CONCRETE

Install crystalline type water proofing to all the internal and external surfaces of concrete structures in strict accordance with the approved manufacture's printed instructions.

10.1 Materials

Crystalline Type Water Proofing Material shall be used. It shall be a cementitious slurry coating containing catalytic chemicals which migrate in to the concrete using moisture present in the concrete as the migrating medium, and which cause the moisture and the unhydrated cement in the concrete to react causing the growth of non soluble crystals which fill the voids and capillary tracks of the concrete, thereby rendering the concrete it self water proof.

Acceptable products: Xypex concentrate, quick set, manufactured by Xypex chemicals (Canada) Limited or equivalent as approved by the Engineer.

10.2 Storage of materials

All materials shall be stored in original undamaged containers with manufactures seals and labels intact. Material shall be stored off the ground in a dry enclosed area.

10.3 Surface preparation

All surfaces shall be examined for defects such as honeycombing, pockets, cracks, etc. These areas shall be repaired in accordance with the manufactures printed instructions.

Concrete surfaces must be clean and free from scale, oil, laitance, dirt films, paint, or any other foreign matter.

If surfaces are smooth, the concrete should be lightly sandblasted, water blasted, or acid -etched with muriatic acid, as required to, provide a clean absorbent surfaces.

Prior to the application of water proofing slurry, concrete surfaces must be thoroughly wetted with clean water making concrete saturated to control surface suction. This shall ensure the growth of crystalline formation deep within the pores of the concrete. Excess surface water on the concrete surface, if any, shall be removed prior to application.

10.4 Application

Apply according to the manufacturer's specifications and instructions. Treatment of constructions joints and surface defects shall Comply with waterproofing material manufacturer's printed directions in the preparation. Apply second coat while first coat is still 'green' but after it has reached an initial set, as recommended by the water proofing material manufacturer.

10.5 Curing

Curing, shall be carried out as soon as the waterproofing material has set up sufficiently by a fine misty spray so as not to be damaged,. Treated surface shall be sprayed three times a day for a period of 3 days. Allow material to set 12 days before filling the structure with liquid

Protect treated surfaces from damage due to wind, sun, rain and temperatures below 35 degrees F. For a period of 48 hours after application, arrange protections to permit proper curing conditions for waterproofing material.

In the case of temporary protections remove all such items carefully to avoid damage to treated surfaces

11.0 PLUMBING

11.1 Pipes

Piping and fitting material shall be uP.V.C High Pressure type or Ductile iron as approved by the Engineer.

Piping material shall comply with requirements of water supply and sewerage and other relevant authorities.

Materials for the piping and service requirements shall basically conform to the service pressures encountered.

The recommend position of the fittings, fixtures, control valves, tanks etc. as shown on the drawings will be adhered to as far as practicable.

Should there be any discrepancy due to incomplete description ambiguity or omission in the drawings and other documents, whether original or supplementary, forming the contract, either found on completion or during the currency of the installations work, the Contractor shall immediately, on discovering the same, draw the attention of the Engineer and the Engineers decision is final and binding the Contract.

11.2 Existing Works

The site shall be examined for field drains and those, when found, shall be either entirely removed or diverted, trenches filled with dry earth in 200mm to 300mm layers and consolidated as directed by the Engineer.

11.3 Earth Work

Excavation

Excavations liable for sliding shall be timber shored to the satisfaction of the Engineer and the type of timber shall be suitable to the kind of earth encountered. Fixing of timber shoring and removal after completion of work shall be done as directed by the Engineer.

Should any water accumulated in the trenches, headings or other excavations, the Contractor shall do such work as may be necessary to drain away the accumulated water and shall install pumps as may be required to keep the excavation and trenches dry. The Contractor shall ensure that the flow water in trenches or excavation does not injure or remove cement or aggregate of any concrete that has not set. No subsoil water shall be discharged into open drains or sewer at the site.

Filling:

In refilling trenches or forming the surfaces after excavation, shall be done in layers After consolidating each layers of 250 mm to a thickness of 150 mm. Special care shall be taken to see that the earth is packed uniformly and no injury to the pipe shall occur.

12.0 MISCELLANEOUS

Throughout the construction period, open ends of all installed pipelines shall be kept closed by temporary plugs.

A temporary fire protection system at site office and stores shall be provided by the Contractor during the construction period. This shall be of sufficient capacity to put out any fire that may break out at the sites.

A temporary potable water supply shall be available to construction workers, site office staff of the contractor and the Engineer

A temporary human Excreta Disposal System shall be provided by the Contractor to serve the workers during the construction period, site office staff of the contractor and the Engineer.