

SPECIFICATION SECTION 01750

LABORATORY

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SPECIFICATION SECTION 01750

LABORATORY

1. DESCRIPTION

This Specification Section prescribes the requirements and procedures to establish, furnish, staff, and maintain the Contractor's Laboratory and the equipment that the Contractor shall make available to the Engineer under the Contract.

Maintenance includes the provision of all consumables by the Contractor for the operation and function of the Laboratory.

The following definitions shall be referred to for proper interpretation of this Specification Section:

Laboratory:	<p>The services of an Independent Testing Laboratory that the Contractor shall procure and provide for performing all the necessary testing for quality control.</p> <p>The Laboratory shall be provided with fully furnished and equipped facilities; installed and operated by the Contractor and shall consist of Laboratory for monitoring of quality control during the execution of the Works. All the equipment provided for the Laboratory shall remain the Contractor's property.</p>
Quality Control Plan (QCP):	As defined in Specification Section 01800 Contractor's Quality Control
Quality Control Manager (QC Manager):	As defined in Specification Section 01800 Contractor's Quality Control
Program and the Schedule:	As defined in Specification Section 01300 Program of Work
Certificate of Satisfactory Laboratory Operation:	The certificate that the Engineer shall issue to record his acceptance of the Contractor's compliance with the requirements of this Specification Section for each Interim Payment Certificate

2. REQUIREMENTS

2.1 Reference Standards

The current Vietnamese regulations for establishment and operation of the Laboratory shall supplement the latest edition of the following Standards, where applicable:

ASTM C1077-06 Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

ASTM D3666-05a Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Roads and Paving Materials.

ASTM D3740-04a Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

ASTM D4561-96 (2001) Standard Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.

ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

ASTM E542-01 Standard Practice for Calibration of Laboratory Volumetric Apparatus.

ASTM E543-06 Standard Specification for Agencies Performing Nondestructive Testing.

ASTM E617-97 (2003) Standard Specification for Laboratory Weights and Precision Mass.

Other international standards such as AASHTO, ASTM, JIS and others that may be recommended by the Engineer as applicable.

2.2 General

- a) The regulations stipulated by Vietnamese Law, Decision 11/2008/QĐ-BXD dated 03/07/2008 by the Ministry of Construction on the promulgation of Regulation for recognition and operation of laboratories for quality control of civil works shall govern the basic procedure for establishing and operating the Laboratory for the Works.

In the event of any discrepancy or ambiguity between the above referred regulations and this Specification Section the Contractor shall make a request to the Engineer, in good time, for an instruction after clarification with the pertinent Local Authorities.

- b) The provision of the Contractor's Laboratory and equipment for the Engineer's use shall be considered as a condition precedent for due compliance with the requirements of the following Specification Sections:

Section 01800 Contractor's Quality Control,

Section 01000 General Provisions (Mobilization),

Section 01300 Program of Work.

- c) The requirements established in this Specification Section are intended to be read in conjunction with and mutually explanatory with the requirements and provisions stated in the following subclauses of the Conditions of Contract:

Subclause 4.9, Quality Assurance,

Subclause 7.3, Inspection,

Subclause 7.4, Testing,

Subclause 7.5, Rejection,

Subclause 7.6, Remedial Work,

Subclause 9.2, Delayed Tests

Subclause 9.3, Retesting

Subclause 9.4, Failure to Pass Tests on Completion,

Subclause 10.1, Taking Over of the Works and Sections,

Subclause 10.2, Taking Over of Parts of the Works,

Subclause 10.3, Interference with Tests on Completion,

Subclause 11.1, Completion of Outstanding Work and Remedying Defects,

Subclause 11.2, Cost of Remedying Defects,

Subclause 11.3, Extension of Defects Notification Period,

Subclause 11.4, Failure to Remedy Defects,

Subclause 11.5, Removal of Defective Work and

Subclause 11.6, Further Tests.

- d) The requirements established in this Specification Section shall also supplement the requirements and provisions stated in the following Section of the Specification:

Section 01900 Control of Materials

and related Specification Sections dealing with the Laboratory and the Engineer's equipment in the Contract.

- e) Failure by the Contractor to comply with the requirements of this Specification Section shall be considered as a serious default of the Contractor in meeting his contractual obligations. In this case, the Engineer shall take note and record the default, and notify the Contractor to apply pertinent measures to secure compliance with the requirements of the Specification for the Laboratory.

- f) Failure by the Contractor to comply with the requirements of this Specification Section shall be considered as a serious default in meeting his contractual obligations under clause 4.1 of the Conditions of Contract. Should this situation arise the Engineer will adjust the value of the work in the Interim Payment Certificate(s) as foreseen in subclause 14.6(b) of the Conditions of Contract.
- g) In the event the Contractor's failure to comply with the requirements of this Specification Section persist the Engineer, at the request of the Employer, will carry out such Works as he deems necessary and charge the Contractor with the full cost thereof plus respective incidental and administrative costs in accordance with the provisions of subclauses 2.5 and 3.5 of the Conditions of Contract. The Contractor shall remain fully responsible for the Works performed on his behalf and shall have no right of action against the Engineer or the Employer for any reason.
- h) Any delay to the Works arising from the Contractor's failure to comply with this Specification Section will be the subject of the Engineer's consideration at the issue of Taking-Over Certificate; should the Employer chose to exercise his rights under subclause 8.7, Delay Damages of the Conditions of Contract. In this situation the Contractor will be required to demonstrate that the aforementioned delay did not impact the critical path of the Works.
- i) The Engineer reserves the right to require the Contractor to provide additional laboratory testing materials or instruments to provide necessary technical support for quality control specified in the Contract.

2.3 Laboratory Requirements

2.3.1 Special Requirements for the Laboratory

- a) The Contractor shall procure, provide and maintain the services of an Independent Testing Laboratory (herein referred to as Laboratory) complete with all utility services, furniture, equipment, apparatuses and fittings for performing all the necessary testing for quality control for the Works .
- b) The Laboratory proposed by the Contractor shall be noted in the Quality Control Plan described in Specification Section 01800 Contractor's Quality Control, including all information and data necessary to evaluate its qualifications and adequacy.
- c) A list of the tests that the Contractor proposes to be accomplished off Site by the Laboratory, or by other laboratories, shall also be described.
- d) The Laboratory shall consist of fully furnished and equipped facilities, fittings and equipment installed and operated by the Contractor all the times throughout the Contract period until the issue of the Taking-Over Certificate.

- e) The provision of the Laboratory and the equipment for the Laboratory shall be incorporated in Specification Section 01300 Program of Work. The Contractor shall prepare and submit to the Engineer, for review the following:
 - i) Design drawings of the Laboratory facilities prepared by experienced professional staff and reviewed by the QC manager in accordance with the quality control plan,
 - ii) Detailed list of the Laboratory's equipment, instruments, materials and devices for testing that shall be mobilized, installed and maintained up to the issue of the Taking-Over Certificate.
 - iii) A detailed list of the Engineer's equipment for the use of the Engineer that shall be mobilized and maintained up to the issue of the Taking-Over Certificate .
- f) The requirements specified in Specification Section 01800 Contractor's Quality Control regarding the quality control plan shall also govern the Laboratory's operation, organization, management and administration, etc.
- g) The Laboratory shall be properly installed and shall operate to the Engineer's satisfaction, at least 56 calendar days from the commencement date of the Works, or before the start of any work requiring its use, whichever is the earlier.
- h) The Laboratory shall work independently but under the jurisdiction of the QC manager. The Laboratory shall be administrated by the Contractor.
- i) Materials, equipment and instruments in the Laboratory and those used for field testing shall be maintained by the Contractor and kept ready in good operating condition at all times.
- j) The Contractor shall provide all technicians, supporting staff, labor, etc. in the number deemed necessary to operate the Laboratory as required by the approved quality control plan, to work under the supervision of the QC manager.
- k) Personnel once assigned to the Laboratory shall not be removed without the prior written approval by the Engineer.
- l) The Laboratory shall be provided with a main and standby electric power supply system. Enough outlets with ground connections shall be provided to accommodate the required testing equipment. Adequate lighting shall be provided all to the satisfaction and approval of the Engineer.
- m) Adequate storage of water and pressure supply shall be maintained for normal testing together with necessary sinks including taps.
- n) The floor of the building shall be rigid and adequate to support operating test equipment without vibration and undue noise.
- o) In addition, the Laboratory shall be provided with the following:

- i) Sufficient large floor units with tops covered with approved plastic laminate or tin sheet complete with adjustable shelves and drawers constructed of 19 mm external quality plywood.
- ii) Sufficient adequately sized cupboards with doors constructed approximately 600 mm above the floor units.
- iii) Pools and wet rooms for curing of concrete samples, saturating of CBR's test samples, etc., sized to comply with the quality control plan .
- iv) Exhaust ceiling fans with adequate capacity, windows with blinds.
- v) Double entrance doors wide enough to unload materials from site vehicles into the Laboratory. A minimum clear opening of 2 meters shall be provided.
- vi) Other facilities reasonably required by the Engineer to make the Laboratory fit for purpose.
- p) Modifications to the Laboratory's organization structure and operation will not be allowed, unless requested by the Engineer based on the actual necessities for improvements of testing performance, or in the event of introducing new items due to the application of some variation orders in accordance with clause 13, Variations and Adjustments of the Conditions of Contract.
- q) At the completion of the Contract ownership of the Laboratory and all the furniture, equipment, apparatuses and fittings provided by the Contractor shall vest in the Contractor.

2.3.2 Equipment and Instruments for the Laboratory

- a) The Laboratory shall be furnished and maintained with all equipment, apparatuses and supplies necessary to permit the proper execution of all standard tests required by these Specifications under the Contract and relevant to the materials and construction methods to be used on the Works.
- b) The Contractor shall provide all the equipment needed for the correct execution of tests according to the Contract and the equipment shall be of an acceptable quality, new and of models and brands and approved by the Engineer and calibrated in accordance with the requirements of the manufacturer, international standards and testing specifications.
- c) The list of Laboratory equipment described hereto is intended as a guide for the Contractor and should neither be construed as; complete, a binding list nor as a recommendation to purchase from a specific manufacturer. The Contractor is responsible for providing and equipping a Laboratory which is fit for the purpose and compliant with this Specification Section. Many of the items are easily broken or otherwise rendered unusable, therefore their replacements shall be readily available so that the testing is not interrupted.

- d) The Contractor is solely and fully responsible for implementing and assuring the quality control for the Works, all the activities related to the implementation, furnishing, maintenance and operation of the Laboratory, as well as all the provision and administration of all testing results shall also be at the full responsibility of the Contractor. However, the respective analysis and application of the results obtained by the Laboratory shall be the sole responsibility of the Engineer.
- e) At the completion of the Contract ownership of, all furniture, equipment, apparatuses and supplies provided by the Contractor shall remain with the Contractor.

Engineer's Office in the Laboratory:

- i) The Laboratory shall include one private and lockable office of 25 m², fully furnished and equipped with one computer, software, one inkjet printer, all necessary office supplies and connected to the Laboratory's network, including all utilities and services, all for exclusive use by the Engineer.
- ii) The office for the Engineer at the Laboratory shall be equipped with furniture and fittings in accordance with the following indicative list:
 - 1) 2 Junior executive desks, 0.75 m x 1.5 m with 2 drawers on each side.
 - 2) 2 Junior executive chairs.
 - 3) 1 Filing cabinet, steel, 4-drawer.
 - 4) 1 White board, 1.0 m wide x 0.75 m high.
 - 5) 1 Cupboard, steel, lockable, 1.8 m high x 0.9 m wide x 0.45 m deep.
 - 6) 1 Bookcase, 4 shelves, 1.0 m wide x 1.5 m high.
 - 7) 1 Air-conditioner, 9000 BTU, split type.
 - 8) 1 Telephone (including the apparatus, the line and service).
 - 9) 1 Network extension including provision of internet with 100 Mbps in the ITU (International Telecommunication Unit) system approved in Vietnam.
 - 10) 1 Laptop computer, Pentium ® Dual Core CPU 3GHz, >2GB RAM.
 - 11) 1 computer table and chair
 - 12) 1 UPS unit.
 - 13) 1 Laser printer, A4 & A3 sizes.
 - 14) 1 Photocopier, A4 & A3 sizes.
 - 15) 1 Windows 7, Professional Version including license.

- 16) 1 Microsoft Office Latest Version, Professional Version including license.

Equipment and Instruments for Testing of Concrete and Soils:

The Laboratory shall be equipped in accordance with the following indicative list of minimum equipment required for testing of concrete and soils (the quantities shall be verified and provided by the Contractor in accordance with his quality control plan):

Description of Equipment for Testing of Concrete and Soils	Quantity
Mechanical loading press, suitable for determining laboratory CBR with all fittings necessary, including two ranges of proving rings (0-10 kN and 0-50 kN)	1
CBR moulds fitted with collars and base plates, for compaction and soaking and tripods fitted with dial gauges (25 mm travel, 0.01 mm division)	25
Surcharge weights, 2 kg, ring type	20
Surcharge weights, 1 kg, ring type	20
Sets slotted surcharge weights, 2 kg	20
Soaking tank for at least 20 CBR moulds	1
Complete field density kits, sand displacement type, large pouring cylinder suitable for fine and coarse grained soils	4
Standard steel cube moulds for concrete testing (150 mm sides)	30
Standard compaction hammer	1
Modified compaction hammer	1
Standard compaction moulds	2
Modified compaction moulds	2
Compaction mould extruder	1
Rubber mallet	1
Steel scoop	1
Measuring flasks, 1,000 cc	3
Vernier caliper, 150 mm	1
Steel ruler, 300 mm	1
Aluminum moisture content cans, 75 x 25 mm with lid	50
Sample splitters, 50 mm	2
Sample splitter, 12 mm	1
Aluminum trays, 24 x 40 cm	10
Electric force draught oven, capacity 0.15 m ³	1

Description of Equipment for Testing of Concrete and Soils	Quantity
Rotap type sieve shaker for 200 mm sieves	1
Set 200 mm BS sieves, 10, 5.75, 2.36, 1.18mm, 600, 425, 300, 150, 90 and 75 microns	2
Set 450 mm BS sieves, 50, 37.5, 28, 25, 20, 12.5, 10, 5.75 and 2.36 mm size with lid and pan	2
Lid pan for 200 mm BS sieves	1
Wash sieves, 90 microns	2
Field scale cap, 35 lbs	1
Desiccators 300 mm diameter	2
Solution balance, capacity 20 kg	1
Triple beam balance, capacity 2,610 grams	1
Triple beam balance, capacity 311 grams	1
Electronic balance, capacity 1,000 gm, accurate to 0.1 gram with a tare correction of not less than 100 gram	1
Atterberg limit machine, calibrated, with a grooving device	1
Glass plate, 400 x 600 x 6 mm	2
Linear shrinkage mould, 250 mm	5
Spatulas, 150 mm	2
Concrete compression testing machine, capacity 200 tonnes, and with 3 scales 0-50 tonnes, 0-100 tonnes and 0-200 tonnes	1
Full set of apparatus for concrete E-modulus testing	1
Hydrometers	2
Sand equipment test set, complete with graduated plastic cylinder, manual or mechanical shaker and stock solution	1
Set hand auger for sampling to depths of 3 m, 100 mm diameter heads suitable for boring in no-cohesive and cohesive soils	1
Set crowbar, pick and spade	2
Drying pan, 400 x 400 x 75 mm deep	6
Set Mackintosh Probe equipment	1
Set Dynamic Cone Penetrometer equipment	2
175 mm diameter porcelain with a rubber headed pestle	1
Set equipment for specific gravity determination of both coarse and fine graded soils, including ancillary glass ware	1
Set organic test apparatus for soils	1
Curing tanks for test cubes (enough size for daily work)	2
Slump cone and associated equipment	2

Description of Equipment for Testing of Concrete and Soils	Quantity
Los Angeles Abrasion testing machine with sound-proof cover	1
Aggregate Impact Value test apparatus	2
Flakiness Index gauge	2
Laboratory concrete mixer, 0.25 m3 capacity	1
Compatibility Test for Aggregate	2
Sets for specific gravity and absorption of coarse aggregate tests	2
Hot plate	1
Set accessories for all apparatuses, trays, hand gloves, consumables, chemicals, sampling tools all complete	1
Complete sets for field density measurement	3
Nuclear Densimeter Troxler Type or similar with necessary spears and tools for calibration	1

Equipment and Instruments for Testing of Asphalt Concrete and Bitumen:

The Laboratory shall be equipped in accordance with the following indicative list of minimum equipment required for testing of asphalt concrete and bitumen (the quantities shall be verified and provided by the Contractor in accordance with his quality control plan):

Description of Equipment for Testing of A/C and Bitumen	Quantity
Balance, capacity 2 kg, sensitive to 0.1 gm	1
Oven with thermostatic controls and fan-assisted air circulation, suitable for use at 80-200°C	1
Mechanical mixer, capacity 3 kg and a mixing bowl surrounded by a heating element with a suitable control	1
Steel mould cylinders with mould bases, extension and extraction collars and extraction plate for Marshall Test, AASHTO T-245	6
Mild steel compaction hammer or automatic compactor	1
Thermostatically controlled hot plate for heating the base of the hammer	1
Mould assembly holder rigidly fixed to the compaction pedestal	1
Compaction pedestal	1
Water bath, thermostatically controlled	1
Jack or other compression device for extracting compacted specimens from moulds	1
Dial gauge for measuring the height of specimens	1
Balance, capacity 2 kg, sensitive to 0.1 gm	1
Marshall testing head	1

Description of Equipment for Testing of A/C and Bitumen	Quantity
Testing machine of strain type, 50 kg \pm 5% per minute, capacity up to 300 kg	1
Dial gauge	1
Power coring machine, 100 mm diameter	1
Sieving extractor	2
Extractor head, 3.35 mm mesh	1
Extractor head 2.36 mm mesh	1
Sealing ring gasket	a/n(*)
Push-on caps	a/n(*)
Set of Sieves of 2.36 mm, 1.18 mm, 0.75 mm, 0.6 mm, 0.3 mm, 0.212 mm, and 0.15 mm mesh	2
Silica gel, 500 gm	2
Dichloromethane, 275 kg, strengthened drum	1
Steel bottle, 250 ml	1
MSE minor centrifuge	1
Binder recovery apparatus	1
Set of Volumetric Flask, 250 ml, 500 ml, 1,000 ml, and 2,000 ml	1
General laboratory equipment as detailed below with any sundry items not particularly mentioned: Set of AASHTO or equivalent sieves Specific gravity bottles and pycnometer. Penetrometer. Riffle box. Containers and cans. Thermometers. Scoops and spatulas. Asbestos heat-resistant gloves. Filter papers, 95 mm diameter.	

(*) a/n: as might be necessary.

Equipment and Instruments for Testing of Pavement Surfaces for Acceptance:

The Laboratory shall necessarily be equipped with the following equipment for testing of surface pavements for acceptance tests: (one set for the Works, administrated by the Central Laboratory).

(i) Equipments and Apparatus:

Description of Equipment for Testing of Surface Pavements for Acceptance	Code or Standards	Quantity
Benkelman Beam Deflection test apparatus with	AASHTO T256-01	1

calibration gauges and six spare dial gauges	ASTM D4695-96 22 TCN 251-98	
Set of portable Roughness meter (type SSI model CS9500 Multiple Purpose Profiler, or similar that can be towed behind a truck or car), including full set of devices and calculation software for determining the IRI (International Roughness Index) of pavement courses.	AASHTO PP51-02 22 TCN 277-2001	1
Longitudinal and Transversal Profilometer for inspection of pavement courses' undulations.	ASTM E 950-98 22 TCN 16-1979	1
Nuclear Densimeter Troxler Type or similar with necessary spears and tools for calibration	AASHTO T238-86 (1996) ASTM E2922-96 ^{e1}	1

(ii) Templates and Straightedges:

Sufficient metal templates shall be supplied by the Contractor for use by the Contractor or the Engineer to check the finished surface of the pavement structure. These templates shall be submitted to the Engineer for his approval. The templates used to control the work shall be maintained at all times in a condition to produce the correct cross sectional profile, and shall be checked at intervals and, if necessary, repaired or adjusted as directed by the Engineer.

The Contractor shall make available sufficient straightedges, including one rolling straight edge, to check the surface of the pavement and other surfaces, for use by the Engineer.

2.3.3 Laboratory Check by the Engineer

- a) **Right to Check Testing Laboratory:** The Engineer shall at all times have full right and power to check Laboratory equipment for verifying their due compliance with the Specifications and to confirm the adequacy of the Laboratory technicians' testing procedures and techniques.
- b) **Engineer's Access and Use of Laboratory Facilities:** The Engineer shall at all times have full right and power to access to the Laboratory and respective Laboratory records related to the Works. The Engineer may at any time use the Laboratory facilities to conduct independent testing or require the Laboratory personnel employed to conduct such testing.

2.3.4 Survey and Testing Equipment and Personnel Supplied to the Engineer

Equipment and Supporting Staff for Staking and Survey Work:

- a) The Contractor shall, as a requirement of the Contract and without extra charge, furnish for the exclusive use of the Engineer all necessary instruments, appliances, surveyor personnel and labor and any material that the Engineer may at any times require for checking the setting out, survey or for any other relevant work to be done.
- b) Unless otherwise dispensed by the Engineer in writing, the Contractor shall keep the Engineer's staff equipped in accordance with the following indicative list of minimum equipment required for survey:
 - 1) 2 no Levels - WILD NAK or equivalent,
 - 2) 2 no Level rods - metric calibration 4m min. length,
 - 3) 1 no Theodolite - WILD T16 or equivalent (mounting with Distomat),
 - 4) 1 no Distomat - WILD D1 1600 or equivalent (mounting with Theodolite),
 - 5) 3 no Wild (or equivalent) Reflector prisms with aluminum tripods and holders,
 - 6) 1 no Cover meter/rebar locator - Profometer 4, Model SCANLOG or equivalent with accessories including depth probe for measuring concrete cover and diameter probe for measuring rebar diameters,
 - 7) 10 no Range poles,
 - 8) 5 no 5-meter pocket tapes,
 - 9) 3 no 30 meter tapes,
 - 10) 1 no 60 meter tape,
 - 11) 1 no crack width gauge (for measuring concrete crack width),
 - 12) 2 no 1 meter carpenter (spirit) levels,
 - 13) 2 no hand held spirit (adjustable angle) levels,
 - 14) Wooden survey stakes as required and miscellaneous tools required for surveying,
 - 15) 1 no digital camera including all necessary devices for downloading and editing photos in a computer.
- c) All survey and testing equipment shall be supplied with miscellaneous tools, necessary tripods, extra batteries and battery chargers (for electrically operated equipment), mountings, carrying and storage cases and all necessary accessories.
- d) Survey and testing equipment will be utilized by the Engineer and will be repaired or replaced by the Contractor as required by the Engineer; however, the equipment will remain property of the Contractor at the completion of the Contract.

- e) Any marks or survey staking made by the Engineer or by the Contractor if so required by the Engineer shall be carefully preserved and if disturbed or destroyed shall be immediately replaced by the Contractor at his own expense and to the satisfaction of the Engineer. No work shall be carried out in any section until the Engineer has approved the necessary setting out.

2.4 Certificate of Satisfactory Laboratory Operation

This certificate will be issued by the Engineer, on a monthly basis, upon due compliance by the Contractor with the following conditions:

- a) More than 95% of the tests required by the Specifications have been satisfactorily performed by the Laboratory,
- b) The operation and maintenance of Laboratory's offices for Engineers has been fully provided as specified in this Specification Section.

3. MEASUREMENT AND PAYMENT

3.1 Method of Measurement

The establishment, staffing, provision of equipment and maintenance of the Laboratory shall be measured for payment as a lump sum.

The Laboratory provisions and requirements identified in this Specification Section shall be measured for payment in pay item 01750-01.

Any Laboratory Works not specifically identified in this Specification Section but which are necessary for the performance of the Works shall be deemed to be included in pay item 01750-01.

3.2 Basis of Payment

The work under this Specification Section shall be paid for in accordance with the applicable unit prices as indicated in the Bill of Quantities and given below. Payment shall constitute full compensation for performing the requirements of the Contract for the item of work specified including furnishing all necessary labor, materials, consumables equipment and incidentals.

Payments shall be made in the following three installments:

- ◆ **40%** (forty percent) on completion of construction of the Laboratory; which includes the provision of equipment, fixtures, fittings, consumables and acceptance by the Engineer of the laboratory;
- ◆ **50%** (fifty percent) over the duration of the Contract construction period prorated to the progress of the Works expressed in financial terms through the Interim Payment Certificates, upon the Engineer's certification of the Contractor's compliance with the requirements of this Specification Section and

- ◆ **10%** (thirty percent) upon the demobilization of the Laboratory or the issue of the Taking-Over Certificate; whichever is later.

<u>Pay Item</u>	<u>Description</u>	<u>Unit</u>
01750	Laboratory	
01750-01	Set Up and Maintenance of Laboratory	LS