SCOPE OF WORKS

Design and Construction including Fit-out of the National Library of Timor-Leste

Autoridade Nacional do Petróleo e Minerais

CONTENTS

1 EXECUTIVE SUMMARY

This Scope of work describes the requirements for the Detailed Engineering Design, Construction and Fit-Out Works of the National Library of Timor-Leste. The scope also includes testing, inspection and commissioning.

The Design & Construct Contractor (Contractor) is to compose of a team with the relevant competencies required for a single design and construct activity for the duration of the project, providing one point of contact from contract execution through the design, build and fit-out phases. Furthermore, the Contractor is required to conduct all testing, inspection and commissioning. .

The Scope of Work is divided into 3 Stages:

I. Stage A – Detailed Engineering Design

II. Stage B – Construction

III. Stage C – Fit Out

This Scope of Work shall be read in conjunction with the Drawings, Specifications, Bill of Quantities, and the Conceptual Design Report and its annexes as listed in Clause 4 - Reference Documents of this Scope of Work.

The Contractor shall ensure a smooth interface between the detailed engineering design & construction of National Library and the post-construction Site Works.

2 PROJECT LOCATION

The Site designated for the National Library of Timor-Leste is located at Hudi-Laran Sub-village, Bairro Pite Village, Sub District of Dom Aleixo, District of Dili, Timor-Leste.

Figure 1a: Project Location

Figure 1b: Project Site (Before Sitework Pre-construction)

Figure 1c: Actual Project Site

3 PROJECT STAKEHOLDERS AND STRUCTURE

The Contractor shall consider that certain efforts of coordination and communication will be required to ensure smooth interfaces between the execution of this Scope of Works and the post construction Works.

The Contractor is required to co-operate with the stakeholders who may be employed in the carrying out any work on or near the Site, or the personnel of any legally constituted public authorities.

The stakeholders are:

(a) The Principal is the Autoridade Nacional do Petróleo e Minerais (ANPM).

(b) Secretary of State for Art and Culture (SEAC) is the End User of the Project and the owner of the Site. SEAC will be responsible for issuing a letter to allow Contractor access the Site, dealing with community surrounding Project area.

(c) Project Management Unit (PMU) of ANPM is responsible for contract management and will act as Project Engineer ("Engineer") on behalf of the Principal and working in close collaboration with the WG to check and review the request for payments and the works carried out by the Supervision Consultant.

(d) Working Group (WG) and Steering Committee (SC):

Working Group is responsible for reporting to the Steering Committee, developing the proposals for each phase, implementing the approved proposals and work plans for each phase, endorse the payment to the SC, broader stakeholder consultation, and generally managing the day-to-day implementation of the National Library Project.

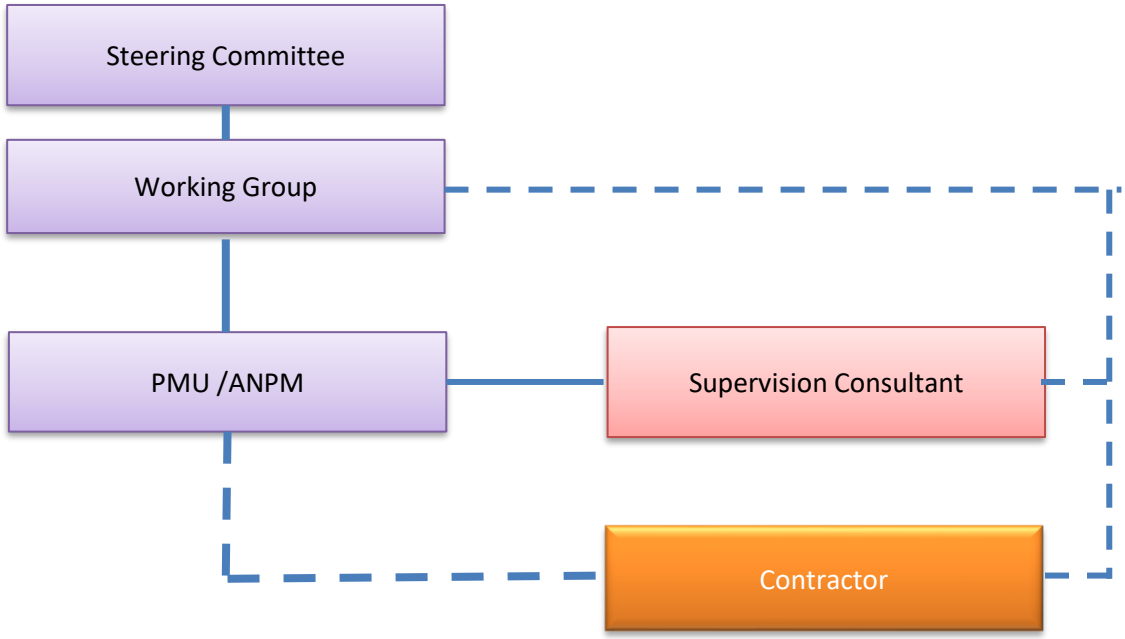
Steering Committee is comprised of senior level managers from each of the primary stakeholders receiving proposals, assessing the work of, providing final approval and direction to the Working Group.

(e) Building Department of the Ministry of Public Works (MoPW) as WG member will also act as building design verification and approver during DED Works and building permit issuance.

(f) Supervision Consultant is responsible for the supervising the Works defined in the Clause 6 - Scope of Work and report to the WG and/or PMU.

(g) Sitework Post-Construction Contractor is responsible for executing the post construction Works which will be under management of the ANPM.

Project Structure



4 REFERENCE DOCUMENTS

The reference documents as listed below form part of the Contract:

No.	Document Title	Document Number
1.	National Library_ Conceptual Design Drawings, BoQ & Specification	
	a) National Library of Timor-Leste_Drawings	Volume 1 - Library Building Volume 2 - Utility Building
	b) National Library of Timor-Leste_Bill of Quantity	2533-BQ National Library of Timor Leste revG 20180806
	c) National Library of Timor-Leste_ Project Specification	Doc. No.: 2533-D2-PS-001 Rev. A December, 2016
2.	National Library of Timor-Leste_ STAGE–F: Conceptual Design Report_Final Report	Doc. No.: 2533-CDRF-001 Rev. Final November, 2017
3.	Sitework Pre-Construction Drawings and Reports	To be provided by ANPM

The Contractor shall be responsible for interpreting all data provided herein.

The Contractor shall note that:

- The Drawings, Project Specifications, and Bill of Quantities are the product of the Concept Design stage.
- The Drawings and Project Specifications are subject to further detailing in the DED phase before starting construction and fit-out.
- The Drawings are considered final. Design changes after Contract award will be subject to Principal approval, including the impact on the approved project cost.
- The Specifications provided in the ITT Document shall derive specific requirements and construction standards for various elements of a project, including materials specification for fit-out.
- The Conceptual Design Report provides a detailed report on conceptual design development of the National Library of Timor-Leste which is based on the Site surveys report, the selected design concept alternative and room requirements program, the conceptual design drawings, the functional and technical requirements (specification).
- Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, access to the Site, its surroundings, the above data and other available information, and to have been satisfied as to all matters relevant to the execution of the Works, including:
  (a) the form and nature of the Site, including sub-surface conditions;
  (b) the hydrological and climatic conditions, and the effects of climatic conditions at the Site;
  (c) the Laws, procedures, and labour practices of the Country; and
  (d) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and any other utilities or services.
- Principal makes no representation, warranty, promise or undertaking as to the accuracy of the information made available regarding the existing Site conditions.

5 ABBREVIATIONS & DEFINITION

ACDR	Architectural Conceptual Design Report
ACI	American Concrete Institute
AISC/SEI	American Institute of Steel Construction/ Structural Engineering Institute
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
AS/NZS	Australian/New Zealand Standard

ASCE	American Society of Civil Engineering
ASCE/ANSI	American National Standards Institute/A35 American Society of Civil Engineering
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BS	British Standard
D&C	Design and Construct
DED	Detailed Engineering Design
HVAC	Heating, Ventilation, and Air Conditioning
IBC	International Building Code
IBS	International Building Standard
IEC	International Electronic Commission
IES	Illuminating Engineering Society
JIS	Japanese Industrial Standard
NEC	National Electrical Code
NFPA	National Fire Protection Association
PMU	Project Management Unit
SC	Supervision Consultant
SEAC	Secretary of State for Art and Culture
SJI	Steel Joist Institute
SMACNA	Sheet Metal & Air Conditioning National Association
SNI	Indonesia National Standard
SoW	Scope of Work
SSR	Site Survey Report
UBC	Uniform Building Code

6 SCOPE OF WORKS

The Scope of Work details the Principal's requirements as herein described for the Detailed Engineering Design, Construction and Fit-Out of the National Library of Timor-Leste. The scope also includes testing, inspection and commissioning.

6.1 Scope Inclusion

The Scope of Work is divided into 3 Stages:

I. Stage A – Detailed Engineering Design

II. Stage B – Construction

III. Stage C – Fit Out

The Contractor shall provide a complete service including management and coordination; complete detailed design; procurement, supply and delivery to the construction Site of the required Project resources (construction materials, labour, Contractor's Equipment, and tools); manufacture and fabrication; installation, construction and completion; testing / commissioning and final acceptance of the following buildings:

1. Library Building Works
   Scope: Architectural, Structural, Electricals & Electronic, Mechanical & Plumbing, including Fit-out.
2. Utility Building Works
   Scope: Architectural, Structural, Electricals & Electronic, Mechanical & Plumbing

The scope also includes General Requirements and Site Construction Works.

General Requirements include execution of Works related to mobilization and demobilization, surveying and setting up temporary facilities and control systems. Site Construction Work is related to supply and installation, testing and commissioning of water distribution system, reservoir and tank, sewerage system, firefighting system, power, Site lighting, CCTV system, sound and alarm system, lighting protection.

6.2 Scope Exclusion

The following Site work packages related to the National Library are excluded from the Design & Construct Scope of Work:

1. Sitework pre-Construction; earthworks, temporary access road, fencing and drainage (completed).

2. Sitework post-Construction; road-pedestrian pavement, permanent fence, gates and landscaping as shown in figure 2 and figure 3 below.

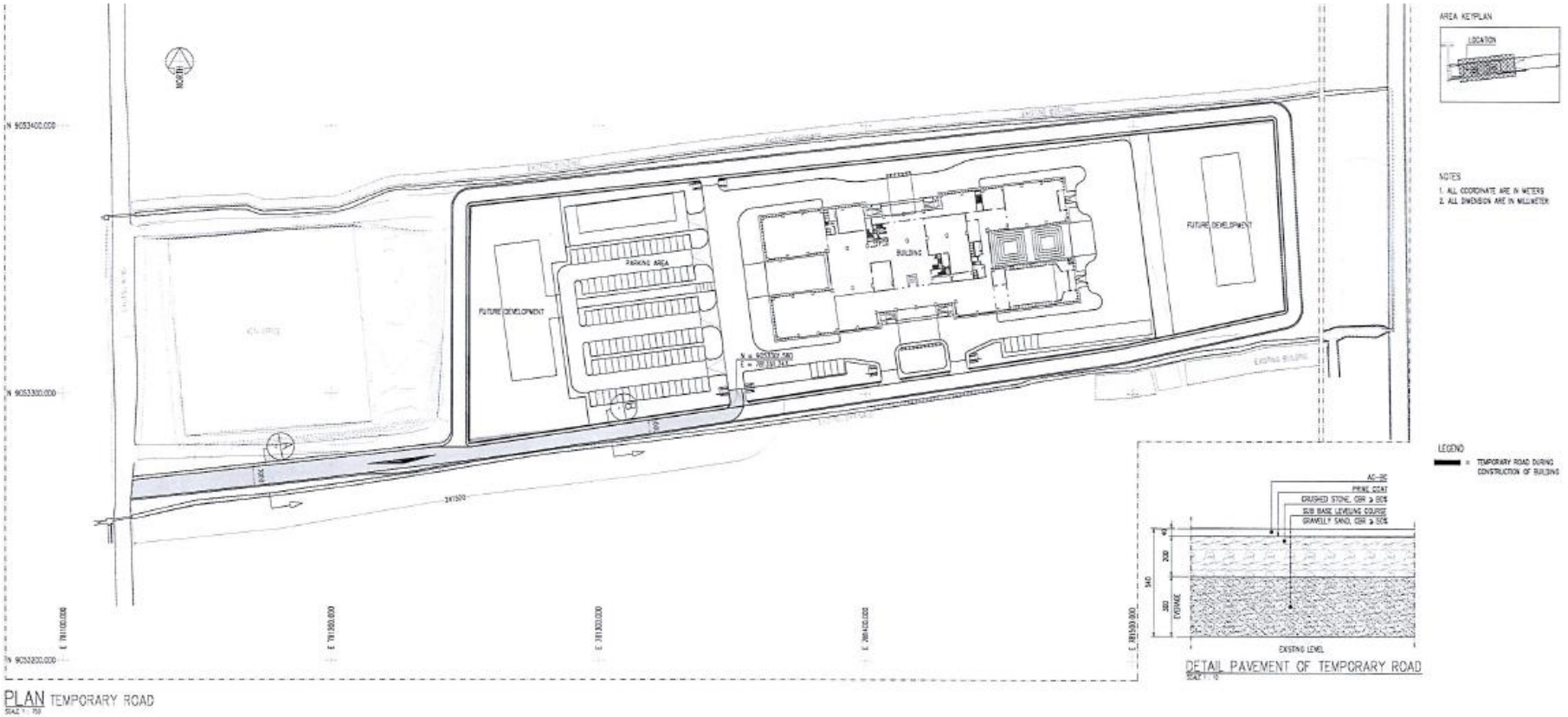


Figure 2: Lay out of Temporary Road during Construction

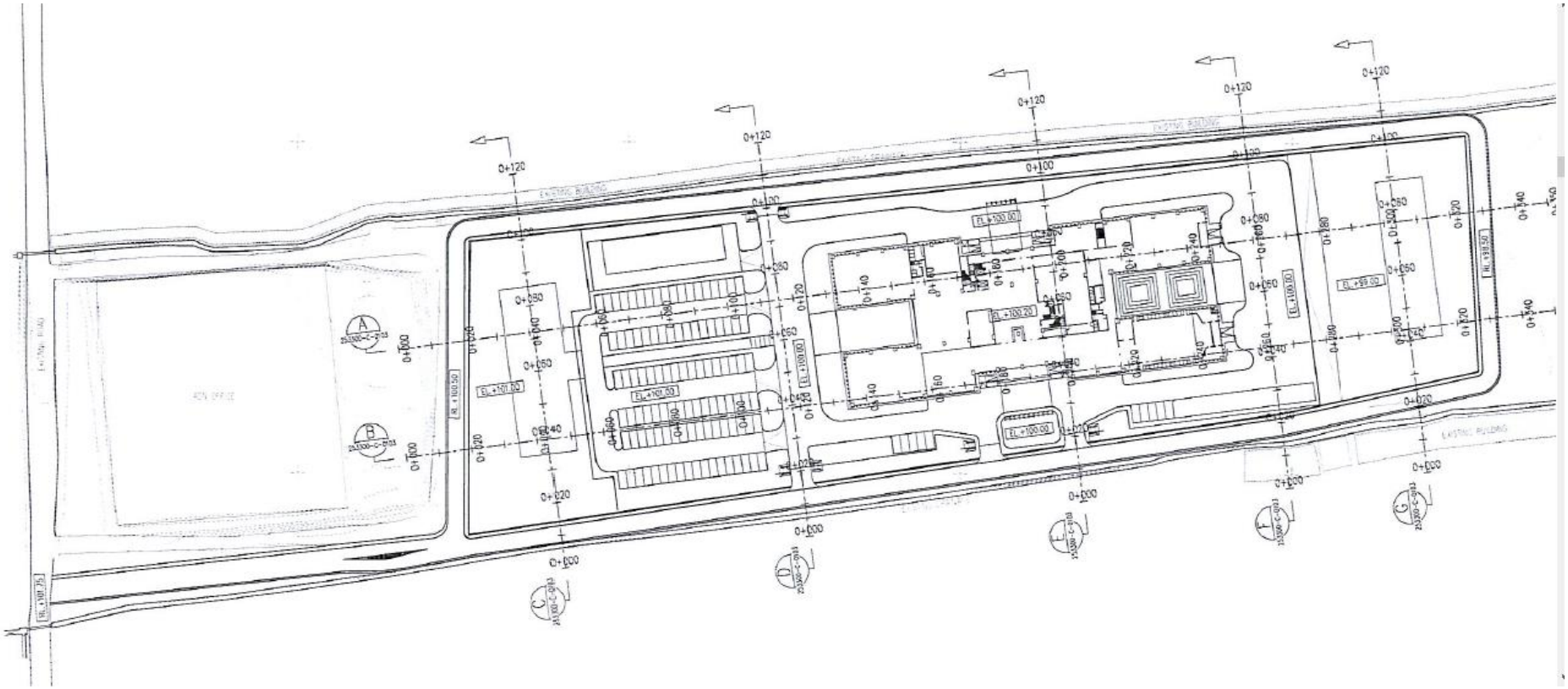


Figure 3: Lay out of Final Grading

6.3 Stage A: Detailed Engineering Design (DED)

6.3.1 DED Services

The Contractor will carry out following Works in the detailed engineering design stage:

1.	Perform evaluation, verification and endorsement of all provided Conceptual Design documentations from Principal for compliance with the Building Code of Australia standard or international best practices in relation to architectural, structural, electrical and mechanical Concept Design Specifications and Drawings, and Bill of Quantity (A1).
2.	Perform the ground water availability survey in order to endorse the Site conditions of water supply requirement (A2).
3.	Perform detailed architectural design drawings for all building elements such as but not limited to walls, floors, roofing, doors, windows, ceilings, openings, stairs, ornaments, landscapes, interiors, gates, etc. as indicated in the drawing (A3).
	Prepare architectural detailed drawings, but not limited to: - Block plans: Scale 1:1000 - Site plans: Scale 1:500 - Site plan elevations: Scale 1:500 - Site plan sections: Scale 1:500 - Site plans details: Scale 1:100 - Floorplans - Main Building: Scale 1:200 and Utility Building: 1:100 - Partial Floorplans (for zoom / details blow up): Scale 1:100 - Elevations including elevations details: Scale 1:200, 1:100, 1:50, 1:20 - Sections including section details and typical/principal sections: Scale 1:200, 1:100, 1:50, 1:20 - Ceiling - Plans and details: Scale 1:200/1:100, 1:50, 1:20 - Roofs - Plans and details: Scale 1:200/1:100, 1:50, 1:20 - Floor pattern - plans and details: Scale 1:200/1:100, 1:50, 1:20 - Stair - plans and details: Scale 1:50, 1:20 - Elevator/Lift plans and details: Scale 1:50, 1:20 - Toilets - plans and details: Scale 1:50, 1:20 - Kitchen/Pantry - plans and details: Scale 1:50, 1:20 - Any other special room which required to be more detailed - Doors-Windows schedule and details: Scale 1:50 / NTS - Wall partition schedule and details: Scale 1:50 / NTS - Facade details: Scale 1:50, 1:20

	- Standard architectural details: Scale 1:50, 1:20 - Information of each architectural material specifications - Material/Finishing schedule and details: Scale 1:50 / NTS - Fixed Interior Details: Scale 1:50, 1:20 - Fence and Gates plans and details: Scale 1:50, 1:20
4.	Prepare detailed structural design drawings including but not limited to, dimensioned plans, elevations, internal layout, sections, details etc. for individual buildings / structures. The drawing output must show the designed structural elements such as foundation, slab, columns, beams, reinforcements, roofs, steel structure, and core walls (A4).
	The Structural detailed drawings to be carried out such as, but not limited to: - Plans, Sections and Details Sections of Piling, Foundations, Pile Caps, Columns, Beams, Slabs, and Roof: Scale 1:250, 1:100, 1:50, 1:20 - Column and Beam Schedules: NTS - Shear/Core Wall - plan, detail and sections: Scale 1:100, 1:50, 1:20 - Stair - Plan, section and details: Scale 1:50, 1:20 - Elevator/Lift - plan, section and details: Scale 1:50, 1:20 - All steel structure; plan, framing, section, connection, details and schedules: Scale 1:100, 1:50, 1:20 - General standard structure details: Scale 1:50, 1:20 - General information of each structural material specifications
5.	Prepare detailed electrical and electronics drawings. Internal electrification Works for the buildings will cover Works: preparation of power loads estimation and optimization, design of system/equipment, selection, and description. Electronic system will cover all low voltage power consumption for the required building system (A5).
	The electrical-electronic detailed drawings to be prepared such as, but not limited to: - Electrical single line diagram: NTS - Electronic single line diagram for system of: Fire alarm, telephone-communication, data-access card, CCTV, Sounds and Television: NTS - Lightning protection system: plan, section and details: Scale 1:250, 1:100, 1:50 - Outdoor lighting installation: Scale 1:250, 1:100, 1:50 - Wiring and Grouping diagrams: NTS - Panels details: NTS - Building automatization system (if applicable): Scale 1:250, 1:100, 1:50 - Plans, section and details for installations of Indoor lighting, GPO's, Telephone, data, TV, fire alarm, sound system, access card, cable tray, sparing conduit, and junction box: Scale 1:250, 1:100, 1:50 - Panel and transformer layout and details in Power House: Scale 1:100, 1:50, 1:20 - Any special lighting: plan and details: Scale 1:100, 1:50, 1:20 - General standard electrical and electronic details: Scale 1:50, 1:20

	- General information of each electrical and electronic equipment /material specifications - Backup Power (Generator Set) plans and details: Scale 1:100, 1:50, 1:20 - External and Internal Networking system: plan and details: Scale 1:100, 1:50, 1:20
6.	Carry out plumbing and mechanical system detailed drawings. Design and preparation of system/equipment description, technical Specifications and Drawings, BOQ, and layout drawings, data sheets and calculations ensuring compliance with the Applicable Standards and Codes, detailed cost estimates, rate analysis with back-up quotations, obtaining clearances from statutory authorities, wherever applicable, any other information required to be included to complete the specification for the following Works (A6).
	The **plumbing** system detailed drawings to be carried out such as, but not limited to: - System schematic diagram for clean water, waste water and firefighting system: NTS - General plan for clean water, waste water and firefighting system: 1:500 / 1:200 - Layout and details for Pump Room, Sewage Treatment Plan, clean water treatment plant (if applicable), shallow or deep well, water storage tanks, oil treatment plan: Scale 1:100, 1:50, 1:20 - Plumbing standard details: Scale 1:50, 1:20 - Internal building installation of clean water, waste water, firefighting system, rain water, ponds and special water feature: Scale 1:250, 1:100, 1:50, 1:20 - General standard plumbing details: Scale 1:50, 1:20 - General information of each plumbing equipment/material specifications
	The **mechanical** system detailed drawings to be carried out such as, but not limited to: - Schematic system of Air conditioning, ventilation, and elevator: NTS - Standard details of air conditioning, ventilation system and elevator: Scale 1:50, 1:20 - Installation plan of Air conditioning, ventilation, and elevator: Scale 1:250, 1:100, 1:50, 1:20 - Ventilation detail and schedules: NTS - Air Handling Unit details and sections: NTS - Pressurized fan details and section: NTS - Elevator plan, section, and details: Scale 1:100 , 1:50, 1:20 - General standard mechanical item details: Scale 1:50, 1:20 - General information of each mechanical equipment /material specifications
7.	Perform acoustic study and prepare detailed drawings (A7)
8.	Perform building thermal performance study and prepare detailed drawings (A8)
9.	Prepare total cost estimate for detailed engineering design, construction and fit-out (A9).

10.	Prepare Project Activity Schedule to establish the execution time for the detailed engineering design, construction and fit-out (A10).
11.	Prepare the detailed Project Specifications and Drawings for construction phase, include fit-out (A11).
12.	Assist the Principal to obtain building construction permit (A12).
13.	Present to the Principal's Engineer/WG/SC all DED Services for review and approval. Any changes required to the design prior to the SC giving their approval are to be carried out and documents re-submitted at no additional cost to the Principal (A13).

6.3.2 DED Deliverables

1.	Report on the evaluation, verification and endorsement of all provided conceptual design documentations.
2.	Provide to the Principal the detailed engineering design drawings consisting of: - Architectural - Structure - Electrical and Electronic - Mechanical and Plumbing - Acoustic - Building Thermal Performance
3.	Provide to the Principal the detailed project specifications for the Detailed Engineering and Construction phases, including fit-out.
4.	Provide to the Principal total project final cost estimate.
5.	Provide Project Activities Schedule.
6.	Report detailing the DED Services (drawings, technical specifications and cost), and provide to the Principal in the format of drawings and reports as referred in Clause 9.3 - Format of Drawings and Reports.

6.4 Stage B: Construction

This Section describes Services and Deliverables to be carried out and completed by the Contractor for the construction of the National Library of Timor-Leste, and also fit-out materials and equipment to be supplied, installed and completed.

6.4.1 General Requirement

NO.	SERVICES DESCRIPTION	UNIT OF MEASUREMENT & QUANTITY	REFERENCE CODE & STANDARD	DELIVERABLES
GR.	**GENERAL REQUIREMENT**			
GR.1.	**Surveying Services**		**Project Spec. Div.1: 01320**	
1.	Setting out the Works Tasks: • Obtain necessary information, basic Site survey data and BM points from the Principal; • Provide the registered surveyor and precise scientific surveying instruments for that purpose; • Carry out surveying Works and setting out of position, level, dimensions or alignment of Site; • Perform all surveying calculations; and • Report to the Engineer.	Ref: BoQ General Requirement and Site Construction - Item GR1.1	Requirements: • Registered surveyor and precise scientific surveying instruments to be approved by the Engineer • the new established BM shall be made of mild steel or cast iron encased in an appropriate size of concrete block In places where the soil is weak, the steel with an anchor shall be embedded in a concrete block (f'c =18.5MPa) and sizes shall be as approved by the Engineer. • SOW Clause 7.3.15 (Existing Dimensions and Surveyor Confirmation)	• Contractor obtained basic Site survey data and BM points from the Principal. • Engineer verified the surveyor's qualification and competence; and approved survey instruments. • New BM points have been set up in compliance with the materials used in making it and required dimensions, inspected and approved by the Engineer. • A report detailing the surveying services and the results have been reviewed and approved by the Engineer.
GR.2.	**Temporary Facilities and Controls**		• **Project Spec. Div.1: 01500**	
1.	Site Office Tasks: Set up Site office	Ref: BoQ General Requirement and Site Construction: Item GR.2.1		• A Project office of 80 sq.m built in the Project Site
2.	Material Storage	Ref: BoQ General Requirement and Site Construction: Item GR.2.2		• A storage of 30 sq.m built in the Project Site
3.	Project Sign Board	Ref: BoQ General Requirement and Site Construction: Item GR.2.3		• A Project Sign Board of 18 sq.m built in the Project Site.

4.	Barrack for the worker	Ref: BoQ General Requirement and Site Construction: Item GR.2.4	SOW Clause 7.3.3 (Facilities)	• A barrack for the workers of 130 sq.m built in the Project Site.
5.	Temporary fence (not required)			
6.	Temporary water & Electricity for the work Tasks: • Obtain permits from the Principal, End user, Engineer and local authorities having jurisdiction on the Power and Water facilities • Install or connect water facilities, Power and lighting for the Works, piping, lighting fixtures, accessories • Install and operating and maintaining all temporary connections to public utilities in locations acceptable to the Engineer	Ref: BoQ General Requirement and Site Construction: Item GR2.6	SOW Clause 7.3.5 (Temporary Services)	Contractor completed installation and connection of: • Temporary light and power, • Temporary cooling, ventilation and enclosures, • Temporary water, • Temporary drainage, • Temporary firefighting services, • Site offices and sheds, • Temporary fencing, and • Environmental protection and safety plan
7.	Security, Safety, Health and welfare for the work	Ref: BoQ General Requirement and Site Construction: Item GR.2.7	SOW Clause: 7.3.4 (Hoardings), 7.3.9 (Site HSE), 7.3.10 (Temporary Crossing), 7.3.12 (Hours of Work)	• Security, Health and Safety tools, facilities set at the Project Site, such as boot shoes, jacket, helmet, safety belt, mask, eye glasses, safety net, First Aid box, toilets for male and female, warning sign.
8.	Shop drawings, as-built drawings & Documentation	Ref: BoQ General Requirement and Site Construction: Item A2.8	SOW Clause: 7.3.14.2 7.3.14.3	
GR.3.	**Mobilization and Demobilization**	Ref: BoQ General Requirement and Site Construction: Item GR.3		• Contractor mobilized and demobilize construction equipment.

6.4.2 Site Construction Work

No.	SERVICE DESCRIPTION	UNIT OF MEASUREMENT & QUANTITY	REFERENCE CODE & STANDARD	DELIVERABLES
SC.	**SITE CONSTRUCTION WORK**		**Project Spec. Div.2 (SITE CONSTRUCTION) & Project Spec. Div.2 (SITE CONSTRUCTION)**	
SC.1	**Water Distribution System**	**Ref: BoQ General Requirement and Site Construction: Item SC.1**	• **Project Spec. Div.2 (SITE CONSTRUCTION); Spec.: 02500 (1)** • **Project Spec. Div.15 (MECHANICAL): Spec.: 15100**	• Contractor to provide a Quality Plan for SC.1 until SC.9. • Conduct pressure tests (acc. DIN 1988, part 2). • Write a report with conclusion of water distribution system's installation (pumps, pipes, fittings, valves & accessories), include report of Water Distribution System tests result which will include: a. Time, date, and duration of test b. Water pressures at the most remote and the highest fixtures c. Operation of each fixture and fixture trim d. Operation of each valve, hydrant, and faucet e. Pump suction and discharge pressures f. Temperature of domestic hot water supply (if any g. Operation of each floor and roof drain by flooding with water h. Operation of each backflow preventer i. Complete operation of each water pressure booster system, including pump start pressure and stop pressure j. Commissioning • The required Booster Pumps with capacity of 5m3/hr and head 46 m, the length and dimension of PPR PN-10 Pipe for Clean Water Distribution, fittings, support, valves & accessories, supplied, installed, tested and functioning. The completion of this work includes excavation & backfill. • Submit copies of all equipment and materials quality control test results and tests certifications.
1	**Equipment**			

1.1	**Booster Pumps** • Type: Booster Pump • Capacity: 5m3/hour • Head: 46 m	Ref: BoQ General Requirement and Site Construction: Item SC.1.1.1	Requirements: • Test curves shall be furnished showing capacity head in 46 meters. • Each pump motor shall be provided with enclosed across-the-line type, magnetic controller complete in enclosure with three-position, "HAND-OFF-AUTOMATIC," selector switch in cover. • Pumps shall be automatically started and stopped by float or pressure switches. A multi-position sequence selector switch shall be provided so that any two pumps may be operated simultaneously, with a third pump being standby.	• 3 Booster pumps with capacity 5m3/hour and head 46 meters supplied, installed and tested.
2	Piping	Ref: BoQ General Requirement and Site Construction: Item SC.1.2	Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02500 (1a & 1b). • Water supply piping shall use PE pipe of PE-100 type of class S-8 with working pressure of 10bar. • Comply with ISO 4427, such as Wavin Black, Pralon, Vinilon or Tyco-Eurapipe product	• Before installation, Contractor shall examine internal and external surfaces condition of the pipe, and measure the length, nominal outside diameter and wall thicknesses of the pipe. • Contractor shall apply hydrostatic strength test without leakage through the pipe body. • Conduct plumbing system operating tests to demonstrate satisfactory functional and operational efficiency. The tests shall cover a period of not less than 8 hours for each system.
	HDPE PN-10 including fittings, valves & accessories, excavation & back fill			• The required length of HDPE PN-10 pipes including fittings, valves supplied, installed, tested and functioning. • Excavation and backfill completed.
	- dia. 65 mm			• The required length of pipe dia. 65mm installed.
	- dia. 50 mm			• The required length of pipe dia. 50mm installed.
	- dia. 32 mm			• The required length of pipe dia. 32mm installed.

SC.2.	**Reservoir and Tank**	**Ref: BoQ General Requirement and Site Construction: Item SC.2**		
1.	Water Tank	Ref: BoQ: SC.2.1		
	(a) Foot Valve dia.50 mm (2")			• The required quantity of foot valve dia. 50mm (2") supplied and installed.
	(b) Float Valve dia.65 mm (2 1/2")		Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02500 (1b).	• The required quantity of float valve dia. 65mm (21/2") installed.
	(c)Quantity meter			• The required quantity meter supplied, installed and tested.
2.	Filter Tank	Ref: BoQ: SC.2.2		
	(a) Sand Filter Cap. 4.5 m3/h			• The required quantity of Sand Filter with capacity of 4.5m3/h supplied, installed, and tested and functioning.
	(b) Carbon Filter Cap. 4.5 m3/h			• The required quantity of Carbon Filter with capacity of 4.5m3/h supplied, installed, and tested and functioning.
	(c) Gate Valve dia.65 mm (2 1/2")			• The required quantity of Gate Valve dia.65 mm (2 1/2") supplied, installed, and tested and functioning.
	Clean Water Distribution System Testing & Commissioning			• Clean Water Distribution System tested, certified and commissioned.
SC.3	**Sewerage Systems**	**Ref: BoQ General Requirement and Site Construction: Item SC.3**	**Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02500 (2)**	
1.	Equipment	Ref: BoQ: SC.3.1		
	(a) STP bio system capacity 12 m^3/day	Ref: BoQ: SC.3.1(a)		• STP bio system with the capacity of 12 m^3/day installed.
	(b) Pump Pit , Including Control Panel	Ref: BoQ: SC.3.1(b)		• Submersible pump pit with capacity of 500 LPM, head 10 m including control panel supplied, installed and tested.
	Type : Submersible			
	Capacity : 500 LPM			
	Head : 10 m			
2.	Piping	Ref: BoQ: SC.3.2	• Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02500 (2a & 2b)	• Before installation, Contractor shall examine internal and external surfaces condition of the pipe, and measure the

			• Sewer system shall use uPVC pipe of solvent cement joint type. Working pressure of 10kg/cm² complying with ISO 4422, such as Wavinsafe, Pralon, Vinilon or approved equal.	length, nominal outside diameter and wall thicknesses of the pipe. • Carry out test on resistance of pipes to hydrostatic pressure. • Carry out test on resistance of integral sockets to hydrostatic pressure.
	PVC, class 10 kg/cm² including fitting, valves & accessories, excavation and back fill		• Fittings for PVC pipes such as elbow, reducer, knee, tee and others shall come from the same manufacturer and in accordance with ISO 4422 requirements.	
	- dia. 200 mm			• The required length of PVC pipe dia. 200mm installed.
	- dia. 150 mm			• The required length of PVC Pipe dia. 150mm installed.
	- dia. 100 mm			• The required length of PVC Pipe dia. 100mm installed.
	Sewerage System Testing & Commissioning			• Sewer system tested and commissioned.
SC.4	**Fire Fighting Distribution System**	**Ref: BoQ General Requirement and Site Construction: Item SC.4**	• **Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900**	• Contractor shall carry out fire pumps flow tests and write report of fire pump tests result.
1.	**Equipment**		Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (5a-c)	
	(a) **Diesel Pump** Type: horizontal split case centrifugal fire pump, UL/FM Standard Cap. : 750 USGPM Head: 90 m	Ref: BoQ: SC.4.1(a)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (5b) • Diesel fire pump and its accessories shall comply with NFPA 20 requirements, and shall be of UL and FM approved, such Patterson, Aurora, Armstrong.	• Diesel Pump (type horizontal split case centrifugal fire pump, UL/FM Standard, with capacity of 750 USGPM and head 90 meters) supplied, installed and tested.
	(b) **Electric Main Pump** Type : horizontal split case centrifugal fire pump, UL/FM Standard	Ref: BoQ: SC.4.1(b)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (5a)	• Electrical Main Pump (type UL/FM Standard, Cap.: 750 USGPM and head 90 meters) installed and tested.

	Cap. : 750 USGPM Head : 90 m		• Electric fire pump shall complete with electric motor driven, fittings, valves and accessories. • Conform to the requirements of NFPA 20, and shall be of UL and FM approved such Patterson, Aurora, Armstrong.	
	(c) **Electric Jockey Pump** Type: Vertical multi stage Cap.: 10 USGPM Head: 100 m	Ref: BoQ: SC.4.1(c)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (5c) • Jockey pump complete with all necessary accessories shall Conform to the requirements of NFPA 20, and shall be of UL and FM approved such Patterson, Aurora, Armstrong.	• Electrical Jockey Pump (type: vertical multi stage, Cap.: 10 USGPM and head 10 meters) installed and tested.
	(d) **Hydrant Pillar** (two way) + including foundation	Ref: BoQ: SC.4.1(d)		• Hydrant Pillar (two way) including foundation installed and completed.
	(e) **Hydrant box** (outdoor type), including hose & nozzle	Ref: BoQ: SC.4.1(e)	Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (7a)	• Hydrant box (outdoor type), including hose & nozzle installed.
	(f) **Siamesse connection**, including foundation	Ref: BoQ: SC.4.1(f)		
2.	**Piping**	Ref: BoQ: SC.4.2	• Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02500 (4a-e) & Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (1-3).	
	Carbon Steel Pipe (CSP) sch 40, including fittings, support & accessories=		• Pipes for fire water shall be an electric-resistance welded (ERW) carbon steel pipes of schedule 40: ASTM A 53 type E &grade B, pipe (Tensile strength=415 MPa, Yield Strength= 240. • Fittings of electric butt-welding: AWWA C 208 • Al valves: ASTM A 126 Class B	• Contractor shall apply hydrostatic test without leakage through the weld seam or the pipe body. • Non-destructive electric test shall be made to make sure that the full volume of the pipe must be in accordance with the standard.

			• Disc seat ring, cover gasket and O-ring: ASTM D 2000 AA 7008 • ANSI B 16.1 CL 125: Valves of diameter larger than 65mm shall be manual operated type, and shall be furnished with flanges.	
	- dia. 150 mm			• Carbon Steel Pipe dia. 150mm installed
	- dia. 100 mm			• Carbon Steel Pipe dia. 100mm installed
	Testing & Commissioning of Firefighting Pump, pipes, fittings and other accessories			• Testing & Commissioning of Firefighting Pump, pipes, fittings and other accessories
SC.5	**Power Distribution System**	Ref: BoQ General Requirement and Site Construction: Item SC.5	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 • Project Drawings: Volume 1-Library Building: Electrical Electronic (2533-00-GE-0001_A@0008 & 2533-01-E-101_A@506) for outside and inside electrical and electronic equipment installation.	• The required quantity, type, length and dimension of Power Distribution panels and cables supplied, installed, tested, and commissioned. • Contractor shall carry out standard tests for power distribution system and write report of power equipment panels, cables tests result.
1.	**Panels**	Ref: BoQ: SC.5.1		
	LP (Lighting Panels) / PP (Power Panels)		• LV Panels: Project Spec. Div.16 (ELECTRICAL): Spec.: 16400(1)	
	(a) Panel LP - OL (Outdoor Lighting)	Ref: BoQ: SC.5.1(a)		
	(b) Panel LVMDP including Capacitor Bank 700 kVA including Grounding	Ref: BoQ: SC.5.1(b)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400(2)	• For Low Voltage Switchgear, Contractor shall carry out these tests and follow the procedures associated with it. The tests are temperature rise test on assemblies and busbars, dielectric properties, short-circuit resistance, effectiveness of the protective circuit, clearances and creepage distances, mechanical operation and degree of protection (IP).
	(c) Panel MVMDP	Ref: BoQ: SC.5.1(c)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16345(1-2) • The medium voltage cubicle shall be of first quality and from a manufacturer such as Schneider, Siemens or approved equal	• For Medium Voltage Switchgear, Contractor shall carry out these tests and follow the procedures associated with it. The tests are insulation resistance test, DC or AC hi-pot test, power factor or dielectric loss test, circuit breaker contact resistance test, circuit breaker time-travel analysis test.

			• Medium Voltage Switchgear: IEC 62271-100 & 200 standards	
	(d) Transformer 630 kVA	Ref: BoQ: SC.5.1(d) Ref.: SCG "BOQ ADJUSTMENT 0922"	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16270 (1-2) • IEC 60076-1 Clause 3.11.1: routine test to which each individual transformer. • IEC 60076-1 Clause 3.11.2 states: A test made on a transformer which is representative of other transformers, to demonstrate that these transformers comply with the specified requirements not covered by the routine tests.	• For Transformer, Contractor shall carry out the following inspection and tests: - Inspection of overall finish - Inspection of terminations and connections - Inspection of fixings and overall measurements to drawings - Inspection of markings and labelling • Routine tests include: - Measurement of winding resistances (Clause 11.2.1 General) - Measurement of voltage ratio and check for phase displacement (Clause 1.3). - Measurement of short-circuit impedance and load loss (Clause 11.4) - Measurement of the no load loss and current (Clause 11.5) - Dielectric routine tests (IEC 60076-3) - Induced voltage test using 2 x working voltage at 100 Hz (using 100 Hz generator) - Temperature-rise type test (IEC 60076-2 - Clause 1.1.3a)
	(e) Generator 650 kVA Standby including. Panel Genset DC, Muffler, Accu + Cable, Tools Kit, Manual Book & Certificate Of Origin	Ref: BoQ: SC.5.1(e) Ref.: SCG "BOQ ADJUSTMENT 0922"	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16225 (1-4)	
	(f) Panel Control Genset + AMF Syncronizer including Grounding	Ref: BoQ: SC.5.1(f)		
	(g) Daily Tank 600 l, Including. Pipe Installations	Ref: BoQ: SC.5.1(g)		
	(h) Room Insulation with rockwool density 48kg/m3 completed with cloth glass, wire mesh, spindle pin.	Ref: BoQ: SC.5.1(h)		
	(i) Government Permit & Concerned Department			
2.	**Power cables**		• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (4), 16345 (2)	• Contractor to apply these required tests to calibrate and validate cable design type: (i) bending tests, (ii) thermal

			• Cable feeder of multi conductor for direct burial application at 20kV: XLPE insulated with copper conductor (Acc. with IEC 60502 and IEC 60840 • Low Voltage Cables: Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (4)	stability tests, (iii) impulse (iv) voltage tests, (v) heat distortion tests, (vi) corona level tests, and (vii) dielectric thermal resistance tests. • After installation tests is required are to determine and ensure that cable installed are in optimum operating conditions. The tests are (i) conductor resistance tests on the completed circuit, (ii) verification tests of cross bonded systems, and (iii) surge divertor test.
	a) Cable from Panel LVMDP to Panel LP - OL, NYY 5 x 4 sq.mm		• SNI 04-2701-1999 or equally to VDE 0298 part 1	• The required type and length of cable from Panel LVMDP to Panel LP - OL supplied, installed and tested.
	b) Cable from Panel LVMDP to Panel LP/PP Genset Room, NYY 5 x 4 sq.mm		• NYY cables is in accordance with SNI 04-2701-1999 or equally to VDE 0298 part 1	
	c) Cable from Panel LP - OL to Lighting, NYFGbY 3 x 2,5 sq.mm, including Excavation, Sand, Concrete brick & CoMPacted Back Fill		NYFGbY cable: SNI 04-2700-1992 equally to IEC 60502	
	d) Cable from Panel MVMDP to Transformer 650 kVA, N2XSY 3 x 1 x 70 sq.mm (Vol x3)			
	e) Cable from Transformer 650 kVA to ATS/AMF Syncronizer, NYY 12 x 1 x 185 sq.mm (Vol x12)	Ref.: SCG "BOQ ADJUSTMENT 0922"	• NYY cables is in accordance with SNI 04-2701-1999 or equally to VDE 0298 part 1	
	f) Cable from Genset to ATS/AMF Syncronizer, NYY 12 x 1 x 185 sq.mm (Vol x12)	Ref.: SCG "BOQ ADJUSTMENT 0922"		
	g) Cable from Panel ATS/AMF Syncronizer to Panel LVMDP,			
	- NYY 12 x 1 x 240 sq.mm (Vol x12)	Ref.: SCG "BOQ ADJUSTMENT 0922"		
	- NYA 1 x 120 sq.mm			
	h) Sparing GIP dia. 100 mm (4")			
	i) Cable from Existing to Panel MVMDP, N2XSY 3 x 1 x 35 sq.mm (Vol x3)			

3.	Testing & Commissioning			• Power distribution system supplied, installed, tested and commissioned
SC.6	**Site Lighting Systems**		• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16500**	
1.	**Fixtures Lamp**			• The required quantity of single street lighting HPL - N 150 w & double street lighting HPL - N 2 x 150 w, including pole 7m high and the required cables & MCB installed, tested and commissioned.
	a) Single Street Lighting HPL - N 150 w Including. Pole 7m Heigth, Foundations, Cable NYM 3 x 2,5 sqmm & MCB			
	b) Double Street Lighting HPL - N 2 x 150 w Including. Pole 7m Heigth, Foundations, Cable NYM 3 x 2,5 sq.mm & MCB			
SC.7	**CCTV System**		• **Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13700 (3-4)**	• The required quantity of equipment (Outdoor Fix Camera & HUB/Switch 8 port POE) and length of cables supplied, installed, tested and commissioned. This includes the completion of excavation, sand laying, concrete brick, backfill and compaction, and Conduit PVC 20 mm2 (3/4").
1.	**Equipment**			
	a) Outdoor Fix Camera			
	b) HUB / Switch 8 port POE			
2.	**Cables**			
	a) Cable HUB / Switch to CCTV UTP Cat.6, including Excavation, Sand, Concrete brick & Compacted Back Fill & Conduit PVC 20 mm2 (3/4")			
	b) Cable HUB / Switch to HUB / Switch UTP Cat.6 , including Excavation, Sand, Concrete brick & Compacted Back Fill & Conduit PVC 20 mm2 (3/4")			
3.	**Testing & Commissioning**			• The CCTV equipment and cables supplied, installed, tested and commissioned.

SC.8	**Sound System**		• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16820 (1-6)**	• The required quantity of equipment (horn speaker) and the length of cables supplied, installed, tested and commissioned. This includes the completion of excavation, sand laying, concrete brick, backfill and compaction, and Conduit PVC 20 mm2 (3/4").
1.	**Equipment**			
	a) Horn Speaker			
2.	**Cables**			
	a) Cable NYMHY 3 x 2,5 sqmm, including. Excavation, Sand, Concrete brick & CoMPacted Back Fill & Conduit PVC 20 mm2 (3/4")			
3.	**Testing & Commissioning**			• Horn speaker, cables and conduit PVC installed, tested and commissioned.
SC.9	**Lightning Protection System**		• **Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13100 (1-5)**	The required quantity of equipment (air terminal, control box and exothermic welded) and the length of cables supplied, installed, tested and commissioned.
1.	**Equipment**			
	a) Air Terminal			
	b) Box Control 600 x 600 mm2			
	c) Excothermic Welded			
2.	**cable**			
	a) Cable BC 50 mm2			
	b) Cable BC 70 mm2			
3.	**Testing & Commissioning**			• Air terminal, box control, exothermic welded, and cables installed, tested and commissioned.

6.4.3 NATIONAL LIRARY BUILDING

	SERVICES DESCRIPTION	UNIT OF MEASUREMENT & QUANTITY	REFERENCE CODE & STANDARD	DELIVERABLES
NL.	**LIBRARY BUILDING**			
NL1.	**STRUCTURAL WORK**	**Ref: BoQ Library- NL1.**		
NL10.	***Ground Floor Plan FFL ± 0.000***	**Ref: BoQ Library- NL10**		
1.	**SITE CONSTRUCTION WORK**	**Ref: BoQ Library- NL10: Item 1**	• **Project Spec. Division 2: SITE CONSTRUCTION**	
	Excavation including backfill & compaction, soil disposal and sand bedding			
1.1	**Earth Work**	Ref: BoQ Library- **NL10:** Item 1.1	• **Before starting earth works, Contractor shall perform a joint inspection of the excavation area before approval and issuing of permit for excavation of soil. This inspection is aimed at verifying the excavation is done safely, and preventing no property damage to the buried services such as water mains (fire, industrial and common services), pipes (oil, gas, chemical), electrical cables (high voltage and low voltage, permanent and temporary), drains and sewers, canalization, ditches, communications and fibre optic cables (telephones and instrumentation).** • **The inspection must be attended by mechanical manager from Water authority, electrical manager from**	• **Carried out joint inspection of the excavation area.** • **Obtained approval and issuance of permit for excavation Works.**

			Power authority, instrumentation manager, civil manager from Building construction and permit Department.	
	a) Excavation of Soil	Ref: BoQ Library- Item 1.1(a)	• Project Spec. Div.2: Spec.: 02315	When completed, the excavation Works shall be checked for: - Excavation bottom elevation; - Top and toe of slope; - Excavation axis (for limited section excavation).
	b) Backfill and compacted soil	Ref.: BoQ Library- **NL10:** Item 1.1(a)	• Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02315 (2)	• Conducted test to determine the in-situ water content and dry unit weight in accordance with ASTM standard D 1556. • Follow the procedures and do calculation. • Report the result as required in the ASTM 1556
	c) Disposal soil		• Project Spec. Div.2: Spec.: 02315 (1)	
	d) Compacted sand 100 mm thick		• Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02315 (1)	
	e) Compacted subgrade CBR5%		• Project Spec. Div.2: Spec.: 02315 (1) • Provide required samples mass to the laboratory. • Do tests and calculation. • Record testing apparatus calibration.	• Conducted laboratory compaction method test to determine the optimum water content and the maximum dry unit weight in accordance with ASTM standard D 1557. • Report the information as required by ASTM D 1557
1.2	**Foundations**	**Ref: BoQ Library- NL10: Item 1.2 (a-e)**		• Contractor shall propose Foundation Work Plan which shows specific methods and all equipment used for Bored Pile; the production, placing (conveying, transporting and depositing) of concrete; fabrication and placing of reinforcing steel; formwork to be used; in-situ checks and tests, safety measures. • The Plan also includes tests for concrete and steel (if available), cement, aggregate (fine and coarse aggregates) • Submit copies of all material test results and tests certification.
	Reinforced Concrete Bore pile dia. 400 mm, 24 m high, drilling, steel casing, cutting of pile head		• Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02465 (1-3) • Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-14).	Contractor to carry out following tests for items (a) and (b) below: • Crosshole sonic logging (CSL) for all Bored Piles to verify the structural integrity of drilled shafts and other concrete piles. • Tests on Slump of Hydraulic-Cement Concrete, both in the laboratory and in the Field (ASTM C 143/C 143M). • Obtain representative samples of fresh concrete in accordance with ASTM C172. Follow sampling taking procedure (i.e.

				Sample taking not the beginning and the end of the load, size and time required for sampling. • Hardened concrete tests using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • Sonic Caliper Measurement (ASTMD 6167 – 97) to assess the diameter and depth of Pile Bore before pouring concrete to ensure it complies with design diameter and depth.
	a) Reinforced Concrete Bore pile dia. 400 mm, 24 m high	Ref: BoQ Library- **NL10:** Item 1.2 (a)	• Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02465 (1-3) • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0101@0106) Piles and Foundations Plan, Section and Details, Types and Dimensions of Pile Cap. • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa. • Formwork: Removal of Formwork for Footing and Pile Cap minimum 3 days.	• The bore pile dia. 400mm 24 m depth drilled
	b) Reinforced Concrete Bore pile dia. 400 mm, 12 m high	Ref: BoQ Library- **NL10:** Item 1.2 (b)	• Same as (a) above	• The bore pile dia. 400mm 12 m depth drilled
	c) Drilling bore pile			• The drilling of bore pile dia. 400mm 24 m and 12 m depth conducted
	d) Steel Casing, CS Pipe dia. 400 mm, thickness = 16 mm	Tender 02-2020 Timor-Leste National Library - Bulletin # 6		• Steel Casing CS Pipe dia. 400 mm and thickness = 16 mm is used and verified
	e) Cutting of pile head			• Cutting of pile head conducted
2.	**CONCRETE WORK**	**Ref: BoQ Library- NL10: Item 2**	• **Project Spec. Division 3: (CONCRETE)**	
2.1	**Structural Concrete**	**Ref: BoQ Library- NL10: Item 2.1**	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0103,	All Structural Concrete Works in the Ground Floor shall undergo tests as required below: • Conduct tests on Slump of Hydraulic-Cement Concrete, both in the laboratory and in the Field (ASTM C 143/C 143M).

			0105 & 0106) Pile Cap Types, Section and Details, and Dimensions of Pile Cap. • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	• Conduct standard Dynamic Load Test, Static Load Test, and the Pile Integrity Test in accordance with the following ASTM standards: - ASTM D5882 Standard Test Method for Low Strain Integrity Testing of Piles. - ASTM D 1143 Method of Testing Piles Under Static Axial Compressive Load - ASTM D 3689 Method of Testing Individual Piles Under Static Axial Tensile Load - ASTM D 4945 Test Method for High Strain Dynamic Testing of Piles • Obtain representative samples of fresh concrete in accordance with ASTM C172. Follow sampling taking procedure (i.e. Sample taking not the beginning and the end of the load, size and time required for sampling. • Hardened concrete tests using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • Report the results of tests • Submit copies of all material quality control test results and tests certification. All tests of concrete by the Contractor for item 2.1.1-2.1.8 below and any other structural concrete work defined in this Scope of Work shall be done by an independent laboratory certified in accordance with CSA A283.
2.1.1	**Reinforced Concrete Pile Cap**	**Ref: BoQ Library- NL10: Item 2.1.1 (a-k)**	• Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	• Reinforced Concrete Pile Cap including steel bar reinforcement, formwork and other accessories installed and tested for all item 2.1.1-2.1.8. • Report the results of tests • Submit copies of all material quality control test results and tests certification.
	RC Pile Cap including steel bar reinforcement, formwork and other accessories			
	a) F1, 1700x2000x300 mm	Ref: BoQ Library- **NL10:** Item 2.1.1 (a)	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600	

			• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0105	
	b) F3, see detail		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0103	
	c) F4, 2300x2300x800 mm		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0103	
	d) F5, 2921x2921x800 mm		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0103	
	e) F6, 2000x3200x800 mm		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0103	
	f) F7, see detail		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0103	
	g) F8, 2878x3200x800 mm		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0103	
	h) F10, see detail		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0106	
	i) FD3A, 9900x1200x800		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0105	
	j) FD3B, 7000x1200x800		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0105	
	k) FD4, 15700x1200x800	Ref: BoQ Library- **NL10:** Item 2.1.1 (k)	• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0105	
2.1.2	**Reinforced Concrete wall on ground (lift)**	Ref: BoQ Library- **NL10:** Item 2.1.2	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0601	
	RC Wall including steel bar reinforcement, formwork and other accessories			
	a) W1, 250 mm thick	Ref: BoQ Library- **NL10:** Item 2.1.2 (a)	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0601 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94)	

			• Reinforced steel: deformed bars fy =400 MPa	
2.1.3	**Reinforced Concrete Tie Beam**	Ref: BoQ Library- **NL10:** Item 2.1.3 (a&b)		
	RC Tie Beam including steel bar reinforcement, formwork and other accessories			
	a) TB1 350x700 mm		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) Reinforced steel: deformed bars fy =400 MPa.	
	b) TB2 300x450 mm		• Same as (a) above	
2.1.4	**Reinforced Concrete Slab**	Ref: BoQ Library- **NL10:** Item 2.1.4 (a)		
	RC Slab including steel bar reinforcement, formwork and other accessories			
	a) S1, 150 mm thick		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) Reinforced steel: deformed bars fy =400 MPa	
2.1.5	**Reinforced Concrete Pedestal**	Ref: BoQ Library- **NL10:** Item 2.1.5 (a)		
	RC Pedestal including steel bar reinforcement, formwork and other accessories			

	a) PD1 550x550 mm		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
2.1.6	**Reinforced Concrete column**	Ref: BoQ Library- **NL10:** Item 2.1.6 (a-e)	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Column including steel bar reinforcement, formwork and other accessories			
	a) C1 1200x800 mm		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) C2 1000x800 mm		• Same as (a) above	
	c) C3 400x600 mm		• Same as (a) above	
	d) C4 300x450 mm		• Same as (a) above	
	e) C5 300x300 mm		• Same as (a) above	
2.1.7	**Reinforced Concrete Stair**	Ref: BoQ Library- **NL10:** Item 2.1.7	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600	

			• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0501 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Stair including steel bar reinforcement, formwork and other accessories			
	Stair type 1		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0501 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	a) Reinf. Concrete Beam			
	Trap Beam, 170x250 mm			
	Landing or Bordes Beam, B6 400x600 mm (stair)			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Landing or Bordes Slab, 130 mm thick			
	Stair type 2		• Same as Stair Type 1 above	
	a) Reinf. Concrete Beam			
	Trap Beam, 180x250 mm			
	Landing or Bordes Beam, B6 400x600 mm (stair)			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			

	Landing or Bordes Slab, 130 mm thick			
	Stair type 3		• Same as Stair Type 1 above	
	a) Reinf. Concrete Beam			
	Trap Beam, 200x250 mm			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Landing or Bordes Slab, 130 mm thick			
	Stair type 4		• Same as Stair Type 1 above	
	a) Reinf. Concrete Beam			
	Trap Beam, 200x250 mm			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Landing or Bordes Slab, 130 mm thick			
	Stair type 5		• Same as Stair Type 1 above	
	a) Reinf. Concrete Beam			
	Trap Beam, 200x250 mm			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Landing or Bordes Slab, 130 mm thick			
2.1.8	**Reinforced Concrete Ramp**	Ref: BoQ Library- **NL10:** Item 2.1.8	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Ramp including steel bar reinforcement, formwork and other accessories			
	a) S1, 150 mm thick			

2.2	**Non Structural Concrete**	Ref: BoQ Library- **NL10:** Item 2.2 (a-c)	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 10 MPa (K-125) • Production of Concrete: Concrete mixer & concrete vibrator • Skilled and unskilled labour, foreman • Materials: Portland Cement, sand and gravel	
	a) Lean Concrete 50 mm thick		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 10 MPa (K-125) • Production of Concrete: Concrete mixer & concrete vibrator • Skilled and unskilled labour, foreman • Materials: Portland Cement, sand and gravel	
	b) Grouting		• Project Spec. Div.3 (CONCRETE): Spec.: 03600 • Sika Grout • Materials: water	
	c) Joint sealant & joint filler		• Project Spec. Div.7: Spec.: 07920 • Joint Sealant: 10x10mm • Joint filter: 10 mm thick • Install	
3.	**METAL WORK**	**Ref: BoQ Library- NL10: Item 3.**	• **Project Spec. Div.5: (METAL)**	
3.1	**STRUCTURAL METAL WORK**	Ref: BoQ Library- **NL10:** Item 3.1	• Project Spec. Div.5 (METAL): Spec.: 05210 (1-5), 05500 (1-7), 05810 (1-8)	• All testing of steel materials and/or steel structural shall be done by an independent certified laboratory agreed by Engineer.

			• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0205, 0206, & 0207 Materials: WF Steel (fabrication, transportation, and erection)	• Report the results of tests. • Submit copies of all material quality control test results.
	Steel work including prime coat and finish coat.			• Steel columns and beams under item 3.1 as indicated below erected.
	Drop Off Type 1		• Project Spec. Div.5 (METAL): Spec.: 05210 (1-5), 05500 (1-7), 05810 (1-8) • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0205 • Materials: WF Steel (fabrication, transportation, and erection)	
	Steel column		• Materials: WF Steel (fabrication, transportation, and erection) • Please refer to Div.5 (METAL): Spec.: 05210 (1-5), 05500 (1-7), 05810 (1-8) for steel grade; shape and dimension; bolts, nuts, washers, anchor bolt and plates; welding materials; and applying of hot-dip galvanizing, aluminium, stainless steel, sealant and fire barriers; and other miscellaneous metal	
	a) Steel column, SC1 H 250x250x9x14			
	b) Steel column, SC2 H 150x175x7.5x11			
	c) plate & bolt			
	Steel Beam		• Same as Steel Column above	
	a) Steel Beam, SB1 IWF 350x175x7x11			
	b) Steel Beam, SB2 IWF 125x125x6.x9			
	c) plate & bolt			
	Drop Off Type 2		• Same as Drop Off Type 1 above	

	Steel column		• Same as Steel Column in Drop Off Type 1 above	
	a) Steel column, SC1 H 250x250x9x14			
	b) Steel column, SC2 H 150x175x7.5x11			
	c) plate & bolt			
	Steel Beam		• Same as Steel Column in Drop Off Type 1 above	
	a) Steel Beam, SB1 IWF 350x175x7x11			
	b) Steel Beam, SB2 IWF 125x125x6.x9			
	c) plate & bolt			
	Drop Off Type 3 (2 units)		• Same as Drop Off Type 1 above	
	Steel column		• Same as Steel Column above	
	a) Steel column, SC1 H 250x250x9x14			
	b) plate & bolt			
	Steel Beam		• Same as Steel Column above	
	a) Steel Beam, SB2 IWF 125x125x6.x9			
	b) Steel Beam, SB3 IWF 300x150x6.5x9			
	c) plate & bolt			
NL11	**First Floor Plan FFL + 5.200**			
1.	**CONCRETE WORK**	**Ref: BoQ Library- NL11 Item 1.**	**Project Spec. Div.3: (CONCRETE)**	
1.1	**Structural Concrete**	Ref: BoQ Library- **NL11** Item 1.1		All structural concrete elements in the First Floor shall undergo tests as required below:
1.1.1	**Reinforced Concrete Beam**	Ref: BoQ Library- **NL11** Item 1.1.1(a-h)	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94)	• Conduct tests on Slump of Hydraulic-Cement Concrete, both in the laboratory and in the Field (ASTM C 143/C 143M). • Obtain representative samples of fresh concrete in accordance with ASTM C172. Follow sampling taking procedure (i.e. Sample taking not the beginning and the end of the load, size and time required for sampling.

			• Reinforced steel: deformed bars fy =400 MPa.	• Hardened concrete tests using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • All testing of concrete by the Contractor shall be done by an independent laboratory certified in accordance with CSA A283 • Report the results of tests • Submit copies of all material quality control test results.
	RC Beam including steel bar reinforcement, formwork and other accessories			
	a) B1A 700x1300 mm	Ref: BoQ Library- **NL11** Item 1.1.1(a)	• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) B1B 700x1300 mm		• Same as (a) above	
	c) B3 450x800 mm		• Same as (a) above	
	d) B4A 350x700 mm		• Same as (a) above	
	e) B4B 350x700 mm		• Same as (a) above	
	f) B4C 350x700 mm		• Same as (a) above	
	g) B5 300x600 mm		• Same as (a) above	
	h) B6 250x400 mm	Ref: BoQ Library- **NL11** Item 1.1.1(h)	• Same as (a) above	
1.1.2	**Reinforced Concrete Slab**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa	
	RC Slab including steel bar reinforcement, formwork and other accessories			
	S2A, 120 mm thick			

	Cantilever slab, 120 mm thick			
1.1.3	**Reinforced Concrete column**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa	
	RC Column including steel bar reinforcement, formwork and other accessories			
	a) C1 1200x800 mm		• Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) C2 1000x800 mm		• Same as (a) above	
	c) C3 400x600 mm		• Same as (a) above	
	d) C4 300x450 mm		• Same as (a) above	
1.1.4	**Reinforced Concrete Stair**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa	
	RC Stair including steel bar reinforcement, formwork and other accessories			
	Stair type 2		• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94)	

			• Reinforced steel: deformed bars fy =400 MPa	
	a) Reinf. Concrete Beam			
	Trap Beam, 180x250 mm			
	Bordes Beam, B6 400x600 mm (stair)			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Bordes Slab, 130 mm thick			
	Stair type 3		• Same as Stair type 2 above	
	a) Reinf. Concrete Beam			
	Trap Beam, 200x250 mm			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Bordes Slab, 130 mm thick			
	Stair type 4		• Same as Stair type 2 above	
	a) Reinf. Concrete Beam			
	Trap Beam, 200x250 mm			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Bordes Slab, 130 mm thick			
NL12.	**Second Floor Plan FFL + 10.400**			
1.	**CONCRETE WORK**	Ref: BoQ Library- **NL12** Item 1.	Project Spec. Div.3: (CONCRETE)	
1.1	**Structural Concrete**	Ref: BoQ Library- **NL12** Item 1.1		
1.1.1	**Reinforced Concrete Beam**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa	• Conduct tests on Slump of Hydraulic-Cement Concrete, both in the laboratory and in the Field (ASTM C 143/C 143M). • Obtain representative samples of fresh concrete in accordance with ASTM C172. Follow sampling taking procedure (i.e.

			• Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	Sample taking not the beginning and the end of the load, size and time required for sampling. • Hardened concrete tests using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • All testing of concrete by the Contractor shall be done by an independent laboratory certified in accordance with CSA A283 • Report the results of tests • Submit copies of all material quality control test results.
	RC Beam including steel bar reinforcement, formwork and other accessories			
	a) B1B 700x1300 mm		• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) B2 550x950 mm		• Same as (a) above	
	c) B3 450x800 mm		• Same as (a) above	
	d) B4A 350x750mm		• Same as (a) above	
	e) B4B 350x750mm		• Same as (a) above	
	f) B4C 350x750mm		• Same as (a) above	
	g) B5 300x600 mm		• Same as (a) above	
	h) B6 250x400 mm		• Same as (a) above	
1.1.2	**Reinforced Concrete Ring Beam**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Ring Beam including steel bar reinforcement, formwork and other accessories			

	a) RB1 550x950 mm		• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) RB3 350x700 mm		• Same as (a) above	
	c) RB4 350x500 mm		• Same as (a) above	
	d) RB5 200x400 mm		• Same as (a) above	
1.1.3	**Reinforced Concrete Slab**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Slab including steel bar reinforcement, formwork and other accessories			
	a) S2A, 120 mm thick		• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) S2C, 120 mm thick		• Same as (a) above	
	c) Cantilever slab, 120 mm thick		• Same as (a) above	
1.1.4	**Reinforced Concrete column**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0402 • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94)	

			• Reinforced steel: deformed bars fy =400 MPa	
	RC Column including steel bar reinforcement, formwork and other accessories			
	a) C1 1200x800 mm		• Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) C3 400x600 mm		• Same as (a) above	
	c) C4 300x450 mm		• Same as (a) above	
1.1.5	**Reinforced Concrete Stair**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401) • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Stair including steel bar reinforcement, formwork and other accessories			
	Stair type 2		• Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	a) Reinf. Concrete Beam			
	Trap Beam, 180x250 mm			
	Bordes Beam, B6 400x600 mm (stair)			
	b) Reinf. Concrete Slab			

	Stair Slab, 130 mm thick			
	Bordes Slab, 130 mm thick			
	Stair type 4		• Same as Stair Type 2 above	
	a) Reinf. Concrete Beam			
	Trap Beam, 200x250 mm			
	b) Reinf. Concrete Slab			
	Stair Slab, 130 mm thick			
	Bordes Slab, 130 mm thick			
NL13	***Top Floor FFL + 15.600***	Ref: BoQ Library- **NL13**		
1.	**CONCRETE WORK**	**Ref: BoQ Library- NL13: Item 1.**	**Project Spec. Div.3: (CONCRETE)**	
1.1	**Structural Concrete**	Ref: BoQ Library- **NL13: Item 1.1**		
1.1.1	**Reinforced Concrete Beam**	Ref: BoQ Library- **NL13: Item 1.1.1 (a-f)**	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	• Conduct tests on Slump of Hydraulic-Cement Concrete, both in the laboratory and in the Field (ASTM C 143/C 143M). • Obtain representative samples of fresh concrete in accordance with ASTM C172. Follow sampling taking procedure (i.e. Sample taking not the beginning and the end of the load, size and time required for sampling. • Hardened concrete tests using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • All testing of concrete by the Contractor shall be done by an independent laboratory certified in accordance with CSA A283 • Report the results of tests • Submit copies of all material quality control test results.
	RC Beam including steel bar reinforcement, formwork and other accessories			
	a) B1A 700x1300 mm		• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94)	

			• Reinforced steel: deformed bars fy =400 MPa.	
	b) B3 450x800 mm		• Same as (a) above	
	c) B4B 350x700 mm		• Same as (a) above	
	d) B4C 350x700 mm		• Same as (a) above	
	e) B5 300x600 mm		• Same as (a) above	
	f) B6 250x400 mm		• Same as (a) above	
1.1.2	**Reinforced Concrete Beam**	Ref: BoQ Library- **NL13: Item 1.1.2 (a-e)**	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Ring Beam including steel bar reinforcement, formwork and other accessories			
	a) RB1 550x950 mm		• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) RB2 450x850 mm		• Same as (a) above	
	c) RB3 350x700 mm		• Same as (a) above	
	d) RB4 350x500 mm		• Same as (a) above	
	e) RB5 200x400 mm		• Same as (a) above	
1.1.3	**Reinforced Concrete Slab**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa	

			• Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Slab including steel bar reinforcement, formwork and other accessories			
	a) S2A, 120 mm thick			
1.1.4	**Reinforced Concrete column**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Column including steel bar reinforcement, formwork and other accessories			
	a) C3 400x600 mm			
	b) C4 300x450 mm			
NL14	***Roof Floor (TOC. +19.200)***	Ref: BoQ Library- **NL14**		
1.	**CONCRETE WORK**	**Ref: BoQ Library- NL14: Item 1.**	**Project Spec. Div.3: (CONCRETE)**	
1.1	**Structural Concrete**	Ref: BoQ Library- **NL14: Item 1.1.**		• Conduct tests on Slump of Hydraulic-Cement Concrete, both in the laboratory and in the Field (ASTM C 143/C 143M). • Obtain representative samples of fresh concrete in accordance with ASTM C172. Follow sampling taking procedure (i.e. Sample taking not the beginning and the end of the load, size and time required for sampling. • Hardened concrete tests using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • All testing of concrete by the Contractor shall be done by an independent laboratory certified in accordance with CSA A283

				• Report the results of tests • Submit copies of all material quality control test results.
1.1.1	**Reinforced Concrete Ring Beam**	Ref: BoQ Library- **NL14: Item 1.1.1 (a-c)**	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Ring Beam including steel bar reinforcement, formwork and other accessories			
	a) RB4 350x500 mm		• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	b) RB5 200x400 mm		• Same as (a) above	
	c) RB6 150x250 mm		• Same as (a) above	
1.1.2	**Reinforced Concrete Slab**		• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0401 • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
	RC Slab including steel bar reinforcement, formwork and other accessories			
	a) S2B, 120 mm thick		• Concrete f'c= 25 MPa	

			• Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.	
2.	**METAL WORK**	**Ref: BoQ Library- NL14: Item 2.**	• **Project Spec. Div.5: (METAL)**	
2.1	**NON STRUCTURAL METAL WORK**		• Project Spec. Div.5 (METAL): Spec.: 05210 (1-5), 05500 (1-7), 05810 (1-8) • Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0205, 0206, & 0207 • Materials: WF Steel (fabrication, transportation, and erection).	• Material qualities shall be confirmed by a testing prior to purchase from the shop/supplier • Contractor to carry out mechanical tests of the materials
	SYMBOL			
	Steel work including prime coat and finish coat.			
	a) Steel column, SC3 Pipe dia.8" (galvanize)			
	b) Steel Beam, SB3 Pipe dia.6" (galvanize)		• Project Drawings: Volume 1- Library Building: Structure (2533-01-S-0207 • Materials: WF Steel (fabrication, transportation, and erection)	
	c) Bracing BR1, ROD dia.16 mm		• Use steel deformed bar	
	d) plate & bolt		• Project Spec. Div.5 (METAL): Spec.: 05500 (5) • Base plate and anchor plate: ASTM A 36/A 36M • Bolts and nuts: ASTM A-307	
NL2.	**ARCHITECTURAL WORK**	Ref: BoQ Library- NL2.		
NL20.	***Ground Floor Plan FFL ± 0.000***	Ref: BoQ Library- NL20		
1.	**CONCRETE WORK**	**Ref: BoQ Library- NL20. Item 1.**	• **Project Spec. Div.3: (CONCRETE)**	
1.1	**Architectural Concrete**			

	a) Concrete table	Ref: BoQ Library- NL20. Item 1.1.(a)	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600 • Reinforced concrete f'c = 10 MPa (K-175)	
2.	**MASONRY WORK**	Ref: BoQ Library- NL20. Item 2.	• **Project Spec. Div.4: (MASONRY) Spec.: 03210, 03300, 03600**	
2.1	**Plastering**		• Project Spec. Div.4 (MASONRY): Spec.: 04060 (1-3) • Cement: Portland cement Type I ASTM ASTM C150 • Cement must be from one brand (Tonasa, Gresik, Holsim)	
	a) Plastering & rendering	Ref: BoQ Library- NL20. Item 2.1.(a)		
	b) Concrete plaster	Ref: BoQ Library- NL20. Item 2.1.(b)		
2.2	**Concrete Masonry Unit**		• Project Spec. Div.4 (MASONRY): Spec.: 04060 (2a)	
	a) Autoclaved aerated concrete 125 mm thk, including practical column, lintel beam	Ref: BoQ Library- NL20. Item 2.2.(a)		
3	**METAL WORK**	Ref: BoQ Library- NL20. Item 3.	• **Project Spec. Div.5 (METAL): Spec.: 05500 (1-7)**	
3.1	**Architectural Metal**		• Project Spec. Div.5 (METAL): Spec.: 05500 (1)	• Material qualities shall be confirmed by a testing prior to shop Contractor to carry out mechanical tests of the materials
	a) Steel railing	Ref: BoQ Library- NL20. Item 3.1.(a)		
	b) Steel hand railing			
4.	**THERMAL AND MOISTURE PROTECTION WORK**	Ref: BoQ Library- NL20. Item 4.	• **Project Spec. Div.7: (THERMAL & MOISTURE PROTECTION): Spec.: 07100, 07210, 07410, 07430, 07456, 07600, 07840, & 07920**	
4.1	**Wall / Siding**			
	a) Curtain wall, 10 mm Clear Laminated Glass	Ref: BoQ Library- NL20. Item 4.1.(a)		

	b) Curtain wall, 10 mm Clear Laminated Glass + sandblast sticker			
5.	**DOORS AND WINDOWS WORK**	Ref: BoQ Library- NL20. Item 5.	• **Project Spec. Div.8 (DOORS & WINDOWS): Spec.: 08110, 08115, 08120, 08210, 08450, 08700, & 08800** • **Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-811)**	
5.1	**Doors**	Ref: BoQ Library- NL20. Item 5.1 (a-k)	•	• All doors and windows as indicated below installed in the Ground Floor, functioning and fitted for purpose
	a) DW1 type	Ref: BoQ Library- NL20. Item 5.1 (a)	• DW1 type, double solid timber door w/ solid engineering timber frame size 2100x2400 mm, fin polyurethane alkyd coating, including sealant, gasket, finish hardware and other accessories	
	b) DW2 type		• DW2 type, double solid timber door w/ solid engineering timber frame size 1500x2400 mm, fin polyurethane alkyd coating, including sealant, gasket, finish hardware and other accessories	
	c) DW3 type		• DW3 type, double solid timber door w/ solid engineering timber frame size 1800x2100 mm, fin polyurethane alkyd coating, including sealant, gasket, finish hardware and other accessories	
	d) DW4 type		• DW4 type, single Flush door w/ solid engineering frame size 700x2100mm, fin melamic, including sealant, gasket, finish hardware and other accessories	
	e) DW5 type		• DW5 type, single Flush door w/ solid engineering frame size 900x2100 mm, fin melamic, including sealant,	

			gasket, finish hardware and other accessories	
	f) DW6 type		• DW6 type, single Flush door w/ solid engineering frame size 900x2100 mm, fin melamic, including sealant, gasket, finish hardware and other accessories	
	g) DG3 type		• DG3 type, 12 mm thk frameless glass door size 1500x2100mm including. sealant, gasket, finish hardware and other accessories	
	h) DWA1 type		• DWA1 type, double Flush door w/ solid engineering frame size 1200x1500 mm, fin melamic, including sealant, gasket, finish hardware and other accessories	
	i) DWA2 type		• DWA2 type, double Flush door w/ solid engineering frame size 700x1500 mm, fin melamic, including sealant, gasket, finish hardware and other accessories	
	j) DF1 type		• DF1 Type, single steel panic door size 1100x2450 mm , self closing system, finish hardware and other accessories	
	k) DS1 type	Ref: BoQ Library- NL20. Item 5.1 (k)		
6.	**FINISHES WORK**	Ref: BoQ Library- NL20. Item 6.	• **Project Spec. Div.9 (FINISHES): Spec.: 09250, 09310, 09380, 09500, 09515, 09545, 09630, 09910, 09930, 09960** • **Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-801)**	• All ceramic tiles for floors & walls installed, including ceiling as indicated in the Finishing Schedule Drawing.
6.1	**Floor**	Ref: BoQ Library- NL20. Item 6.1 (a-l)		

	a) Homogenous Tiles 900x1800x5 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting	Ref: BoQ Library- NL20. Item 6.1 (a)	• Project Spec. Div.9 (FINISHES): Spec.: 09310 (1-6) • Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-801_B)	
	b) Homogenous Tiles (cream colour) 800x800 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	c) Homogenous Tiles (grey colour) 800x800 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting		• Same as (a) above	
	d) Homogenous Tiles (wengue colour) 150x900 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting		• Same as (a) above	
	e) Homogenous Tiles 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting		• Same as (a) above	
	f) Floor Hardener, 3 kg/m2, Natural flatness		• Project Spec. Div.9 (FINISHES): Spec.: 093380 (1-4) • Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-801_B)	
	g) Candi Stones 2400x1200 mm		• Same as (f) above	
	h) Andesit Stone		• Same as (f) above	
	i) Andesit with pattern		• Same as (f) above	
	j) Grass Block			
	k) Smooth surface			
	l) Step Nozing	Ref: BoQ Library- NL20. Item 6.1 (a)		
6.2	**Wall**	Ref: BoQ Library- NL20. Item 6.2 (a-m)		

	a) Homogenous tile 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting	Ref: BoQ Library- NL20. Item 6.2 (a)		
	b) Fibercement Ornament 200 mm (Decorative Fibercement including. hollow frame 60x60			
	c) Paras Jogja Stone 300 x 300 finish			
	d) Decorative Wood Finish			
	e) Acoustic finish for wall and column			
	f) Solid surface lavatory top table including. Metal frame			
	g) Skirting Homogenous tile 100x1800 mm			
	h) Skirting Homogenous tile (Cream Colour) 100x800 mm			
	i) Skirting Homogenous tile (Grey Colour) 100x800 mm			
	j) Skirting Homogenous tile (Wengue Colour) 100x900 mm			
	k) Skirting Homogenous tile 100x600 mm			
	l) 10 mm thk clear tempered glass railing w/ stainless steel pipe frame			
	m) Architectural Column (GRC board including metal frame)	Ref: BoQ Library- NL20. Item 6.2 (m)		
6.3	**Ceiling**	Ref: BoQ Library- NL20. Item 6.3 (a-c)		
	a) 6 mm thk calsium silicate board ceiling c/w metal furring frame including. rod hanger			
	b) 9 mm thk Gypsum board ceiling c/w metal furring frame including. rod hanger			
	c) Expose concrete			
6.4	**Painting & Coating**	Ref: BoQ Library- NL20.		

		Item 6.4 (a-c)		
	a) Interior Paint			
	b) Exterior Paint (Weathershield paint)			
	c) Ceiling paint			
7.	**SPECIALTIES WORK**	Ref: BoQ Library- NL20. Item 7.	• Project Spec. Div.10 (SPECIALTIES): Spec.: 10150, 10270, 10350, 10400, 10500,10600, 10810	• All cubicles, accessories for toilets and baths installed and functioning, including installation of glass partitions
7.1	**Cubicles**		• Project Spec. Div.10 (SPECIALTIES): Spec.: 10150	
	a) Cubicle toilet (Phenolic Board 12 mm)	Ref: BoQ Library- NL20. Item 7.1(a)		
7.2	**Toilet and Bath Accessories**	Ref: BoQ Library- NL20. Item 7.2(a-f)	• Project Spec. Div.10 (SPECIALTIES): Spec.: 10810	
	a) Mirror			
	b) Robe hook			
	c) Soap dispenser			
	d) Paper holder			
	e) Handrayer			
	f) Grab bar			
7.3	**Partitions**		• Project Spec. Div.10 (SPECIALTIES): Spec.: 10600	
	a) Glass Partition 10 mm	Ref: BoQ Library- NL20. Item 7.3(a)	•	
8.	**PLUMBING FIXTURES**	Ref: BoQ Library- NL20. Item 8.	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410	• All plumbing fixtures installed and functioning.
8.1	**Plumbing Fixtures**	Ref: BoQ Library- NL20. Item 8.1 (a-h)		
	a) Western closet			
	b) Western closet difable			
	c) Counter lavatory			
	d) Urinoir			
	e) Urinoir partition			
	f) Toilet spray			

	g) Floor drain			
	h) Wall faucet			
NL21.	***First Floor Plan FFL + 5.200***	Ref: BoQ Library- NL21.		
1.	**CONCRETE WORK**	Ref: BoQ Library- NL21. Item 1.	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600	
1.1	**Architectural Concrete**			
	a) Concrete table			• Concrete table put up
2.	**MASONRY WORK**	Ref: BoQ Library- NL21. Item 2.	• Project Spec. Div.4 (MASONRY): Spec.: 03210, 03300, 03600	• All Concrete Masonry Unit constructed, including completion of plastering and rendering Works.
2.1	**Plastering**			
	a) Plastering & rendering			
	b) Concrete plaster			
2.2	**Concrete Masonry Unit**			
	a) Autoclaved aerated concrete 125 mm thk, including practical column, lintel beam	Tender 02-2020 Timor-Leste National Library - Bulletin # 7		
3.	**METAL WORK**	Ref: BoQ Library- NL21. Item 3.	• Project Spec. Div.5 (METAL): Spec.: 05500 (1-7)	• All Steel railing and and hand-railing installed.
3.1	**Architectural Metal**			
	a) Steel railing			
	b) Steel hand railing			
4.	**THERMAL AND MOISTURE PROTECTION WORK**	Ref: BoQ Library- NL21. Item 4.	• Project Spec. Div.7 (THERMAL & MOISTURE PROTECTION): Spec.: 07100, 07210, 07410, 07430, 07456, 07600, 07840, & 07920	• All thermal and moisture protection Works completed.
4.1	**Waterproofing**			
	a) Waterproofing for toilet			
4.2	**Roofing, Gutter & Downspout**			
	a) Canopy (Steel Hollow frame + clear glass t = 10 mm) 14500x15000 mm	Ref.: SCG "BOQ ADJUSTMENT 0922"		
	b) Canopy (Steel Hollow frame + clear glass t = 10 mm) 8700x15000 mm	Ref.: SCG "BOQ ADJUSTMENT 0922"		

	c) Canopy (Steel Hollow frame + clear glass t = 10 mm) 5800 x 6250 mm	Ref.: SCG "BOQ ADJUSTMENT 0922"		
4.3	**Wall / Siding**			
	a) Curtain wall,10 mm Clear Laminated Glass			
5.	**DOORS AND WINDOWS WORK**	Ref: BoQ Library- NL21. Item 5.	• Project Spec. Div.8 (DOORS & WINDOWS): Spec.: 08110, 08115, 08120, 08210, 08450, 08700, & 08800 • Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-811)	• All doors and windows types completed and functioning.
5.1	**Doors**			
	a) DW2 type	Tender 02-2020 Timor-Leste National Library - Bulletin # 7		
	b) DW3 type			
	c) DW4 type			
	d) DW5 type			
	e) DW6 type			
	f) DWA1 type			
	g) DWA2 type			
	h) DF1 type			
6.	**FINISHES WORK**	Ref: BoQ Library- NL21. Item 6.	• Project Spec. Div.9 (FINISHES): Spec.: 09250, 09310, 09380, 09500, 09515, 09545, 09630, 09910, 09930, 09960 • Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-801)	• All ceramic tiles for floors & walls installed, including ceiling as indicated in the Finishing Schedule Drawing.
6.1	**Floor**			
	a) Homogenous Tiles (wengue colour) 150x900 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			

	b) Homogenous Tiles 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	c) Floor Hardener, 3 kg/m2, Natural flatness			
	d) Floor Raiser with Floor Pattern 600x600 mm			
	e) Step Nozing			
6.2	**Wall**			
	a) Homogenous tile 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	b) Paras Jogja Stone 300 x 300 finish			
	c) Decorative Wood Finish			
	d) Accoustic finish for column			
	e) Solid surface lavatory top table including. Metal frame			
	f) Skirting Homogenous tile (Wengue Colour) 100x900 mm			
	g) Skirting Homogenous tile 100x600 mm			
	h) Fibercement Ornament 200 mm (Decorative Fibercement including. hollow frame 60x60			
	i) Drip Edge			
	j) 10 mm thk clear tempered glass railing w/ stainless steel pipe frame			
	k) Architectural Column (GRC board including metal frame)			
6.3	**Ceiling**			
	a) 6 mm thk calsium silicate board ceiling c/w metal furring frame including. rod hanger			

	b) 9 mm thk Gypsum board ceiling c/w metal furring frame including. rod hanger			
	c) Expose concrete			
	d) Metal Ceiling Linear System	Tender 02-2020 Timor-Leste National Library - Bulletin # 7		
	e) Metal Ceiling Curvilinear System	Tender 02-2020 Timor-Leste National Library - Bulletin # 7		
6.4	**Painting & Coating**			
	a) Interior Paint			
	b) Exterior Paint (Weathershield paint)			
	c) Ceiling paint			
7.	**SPECIALTIES WORK**	Ref: BoQ Library- NL21. Item 7.	• Project Spec. Div.10 (SPECIALTIES): Spec.: 10150, 10270, 10350, 10400, 10500,10600, 10810	• All cubicles, accessories for toilets and baths installed and functioning, including installation of glass partitions
7.1	**Cubicles**			
	a) Cubicle toilet (Phenolic Board 12 mm)			
7.2	**Toilet and Bath Accessories**			
	a) Mirror			
	b) Robe hook			
	c) Soap dispenser			
	d) Paper holder			
	e) Handrayer			
	f) Grab bar			
7.3	**Partitions**			
	a) Glass Partition 10 mm			
8	**PLUMBING FIXTURES**	Ref: BoQ Library- NL21. Item 8.	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410	• All plumbing fixtures installed and functioning.
8.1	**Plumbing Fixtures**			
	a) Western closet			

	b) Western closet difable			
	c) Counter lavatory			
	d) Urinoir			
	e) Urinoir partition			
	f) Toilet spray			
	g) Floor drain			
	h) Wall faucet			
NL22.	***Second Floor Plan FFL + 10.400***	Ref: BoQ Library- NL22.		
1.	**CONCRETE WORK**	Ref: BoQ Library- NL22. Item 1.	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600	• Concrete table put up
1.1	**Architectural Concrete**			
	a) Concrete table			
2.	**MASONRY WORK**	Ref: BoQ Library- NL22. Item 2.	• Project Spec. Div.4 (MASONRY): Spec.: 03210, 03300, 03600	• All Concrete Masonry Unit constructed, including completion of plastering and rendering Works.
2.1	**Plastering**			
	a) Plastering & rendering			
	b) Concrete plaster			
2.2	**Concrete Masonry Unit**			
	a) Autoclaved aerated concrete 125 mm thk, including practical column, lintel beam			
3.	**METAL WORK**	Ref: BoQ Library- NL22. Item 3.	• Project Spec. Div.5 (METAL): Spec.: 05500 (1-7)	• All Steel railing and hand-railing installed.
3.1	**Architectural Metal**			
	a) Steel railing			
	b) Steel hand railing			
4.	**THERMAL AND MOISTURE PROTECTION WORK**	Ref: BoQ Library- NL22. Item 4.	• Project Spec. Div.7 (THERMAL & MOISTURE PROTECTION): Spec.: 07100, 07210, 07410, 07430, 07456, 07600, 07840, & 07920	• All thermal and moisture protection Works completed.
4.1	**Waterproofing**			

	a) Waterproofing for toilet			
	b) Waterproofing and anti stain protection for concrete flat roof			
4.2	**Roofing, Gutter & Downspout**			
	a) 3" PVC down spout			
	b) 3" Roof drain			
4.3	**Wall / Siding**			
	a) Curtain wall, 10 mm Clear Laminated Glass			
5.	**DOORS AND WINDOWS WORK**	Ref: BoQ Library- NL22. Item 5.	• Project Spec. Div.8 (DOORS & WINDOWS): Spec.: 08110, 08115, 08120, 08210, 08450, 08700, & 08800 • Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-811)	• All doors and windows types supplied, installed and functioning.
5.1	**Doors**			
	a) DW2 type			
	b) DW4 type			
	c) DW5 type			
	d) DW6 type	Tender 02-2020 Timor-Leste National Library - Bulletin # 7		
	e) DG1 type			
	f) DWA1 type			
	g) DWA2 type			
	h) DF1 type			
	i) DS1 type			
6.	**FINISHES WORK**	Ref: BoQ Library- NL22. Item 6.	• Project Spec. Div.9 (FINISHES): Spec.: 09250, 09310, 09380, 09500, 09515, 09545, 09630, 09910, 09930, 09960	• All ceramic tiles for floors & walls installed, including ceiling as indicated in the Finishing Schedule Drawing.

			• Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-801)	
6.1	**Floor**			
	a) Homogenous Tiles (wengue colour) 150x900 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	b) Homogenous Tiles 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	c) Floor Hardener, 3 kg/m2, Natural flatness			
	d) Step Nozing			
6.2	**Wall**			
	a) Homogenous tile 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	b) Fibercement Ornament 200 mm (Decorative Fibercement including. hollow frame 60x60			
	c) Paras Jogja Stone 300 x 300 finish			
	d) Decorative Wood Finish			
	e) Solid surface lavatory top table including. Metal frame			
	f) Skirting Homogenous tile (Wengue Colour) 100x900 mm			
	g) Skirting Homogenous tile 100x600 mm			
	h) 10 mm thk clear tempered glass railing w/ stainless steel pipe frame			
	i) Architectural Column (GRC board including metal frame)			
6.3	**Ceiling**			

	a) 6 mm thk calsium silicate board ceiling c/w metal furring frame including. rod hanger			
	b) 9 mm thk Gypsum board ceiling c/w metal furring frame including. rod hanger			
	c) Expose concrete			
6.4	**Painting & Coating**			
	a) Interior Paint			
	b) Exterior Paint (Weathershield paint)			
	c) Ceiling paint			
7.	**SPECIALTIES WORK**	Ref: BoQ Library- NL22. Item 7.	• Project Spec. Div.10 (SPECIALTIES): Spec.: 10150, 10270, 10350, 10400, 10500,10600, 10810	• All cubicles, accessories for toilets and baths installed and functioning, including installation of glass partitions
7.1	**Cubicles**			
	a) Cubicle toilet (Phenolic Board 12 mm)			
	Toilet and Bath Accessories			
	a) Mirror			
	b) Robe hook			
	c) Soap dispenser			
	d) Paper holder			
	e) Handrayer			
	f) Grab Bar			
7.2	**Partitions**			
	a) Glass Partition 10 mm			
8.	**PLUMBING FIXTURES**	Ref: BoQ Library- NL22. Item 8.	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410	• All plumbing fixtures installed and functioning.
8.1	**Plumbing Fixtures**			
	a) Western closet			
	b) Western closet difable			
	c) Counter lavatory			

	d) Urinoir			
	e) Urinoir partition			
	f) Toilet spray			
	g) Floor drain			
	h) Wall Faucet			
NL23	***Roof Floor Plan FFL + 15.600***	Ref: BoQ Library- NL23.		
1.	**CONCRETE WORK**	Ref: BoQ Library- NL23. Item 1.	• Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600	• Concrete table put up
1.1	**Architectural Concrete**			
	a) Concrete table			
2.	**MASONRY WORK**	Ref: BoQ Library- NL23. Item 2.	• Project Spec. Div.4 (MASONRY): Spec.: 03210, 03300, 03600	• All Concrete Masonry Unit constructed, including completion of plastering and rendering Works.
2.1	**Plastering**			
	a) Plastering & rendering			
	b) Concrete plaster			
2.2	**Concrete Masonry Unit**			
	a) Autoclaved aerated concrete 125 mm thk, including practical column, lintel beam			
3.	**METAL WORK**	Ref: BoQ Library- NL23. Item 3.	• Project Spec. Div.5 (METAL): Spec.: 05500 (1-7)	
3.1	**Architectural Metal**			
	a) Signature Roof Top Ornament (Aluminum plate and steel frame)	Ref.: SCG "BOQ ADJUSTMENT 0922"		The signature Roof Top ornament in the Roof Floor installed.
4.	**THERMAL AND MOISTURE PROTECTION WORK**	Ref: BoQ Library- NL23. Item 4.	• Project Spec. Div.7 (THERMAL & MOISTURE PROTECTION): Spec.: 07100, 07210, 07410, 07430, 07456, 07600, 07840, & 07920	• All thermal and moisture protection Works completed.
4.1	**Waterproofing**			
	a) waterproofing and anti stain protection for concrete flat roof			
	b) Waterproofing for toilet			

4.2	**Roofing, Gutter & Downspout**			
	a) Aluminum Composite Panel for Roof including frame	Ref.: SCG "BOQ ADJUSTMENT 0922"		
	b) Metal Gutter			
	c) 3" PVC down spout			
	d) 3" Roof drain			
5.	**DOORS AND WINDOWS WORK**	Ref: BoQ Library- NL23. Item 5.	• Project Spec. Div.8 (DOORS & WINDOWS): Spec.: 08110, 08115, 08120, 08210, 08450, 08700, & 08800 • Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-811)	• All doors and windows types completed and functioning.
5.1	**Doors**			
	a) DW6 type			
	b) DWA1 type			
	c) DWA2 type			
	d) DF1 type			
	e) DG1 type			
6.	**FINISHES WORK**	Ref: BoQ Library- NL23. Item 6.	• Project Spec. Div.9 (FINISHES): Spec.: 09250, 09310, 09380, 09500, 09515, 09545, 09630, 09910, 09930, 09960 • Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-801)	• All ceramic tiles for floors & walls installed, including ceiling as indicated in the Finishing Schedule Drawing.
6.1	**Floor**			
	a) Homogenous Tiles 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	b) Floor Hardener, 3 kg/m2, Natural flatness			
	c) Candi Stones 2400x1200 mm			

	d) Deck Wood 300/200 mm			
	e) Crushed Lava Rock Aggregate			
6.2	**Wall**			
	a) Homogenous tile 600x600 mm laid on screed, bedded and jointed in cement and sand (1:4) pointed in coloured grouting			
	b) Solid surface lavatory top table including. Metal frame			
	c) Skirting Homogenous tile 100x600 mm			
	d) Drip Edge			
	e) Glass Railing for Roof Top Area (Stainless steel 70x50, clear laminated glass 12 mm)			
	f) Architectural Column (GRC board including metal frame)			
6.3	**Ceiling**			
	a) 6 mm thk calsium silicate board ceiling c/w metal furring frame including. rod hanger			
	b) 9 mm thk Gypsum board ceiling c/w metal furring frame including. rod hanger			
	c) Metal Ceiling Linear System			
6.4	**Painting & Coating**			
	a) Interior Paint			
	b) Exterior Paint (Weathershield paint)			
	c) Ceiling paint			
7.	**SPECIALTIES WORK**	Ref: BoQ Library- NL23. Item 7.	• Project Spec. Div.10 (SPECIALTIES): Spec.: 10150, 10270, 10350, 10400, 10500,10600, 10810	• All cubicles, accessories for toilets and baths installed and functioning, including installation of glass partitions.
7.1	**Cubicles**			

	a) Cubicle toilet (Phenolic Board 12 mm)			
7.2	**Toilet and Bath Accessories**			
	a) Mirror			
	b) Robe hook			
	c) Soap dispenser			
	d) Paper holder			
	e) Handrayer			
7.3	**Partitions**			
	a) Glass Partition 10 mm			
8.	**PLUMBING FIXTURES**	Ref: BoQ Library- NL23. Item 8.	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410	• All plumbing fixtures installed and functioning.
8.1	**Plumbing Fixtures**			
	a) Western closet			
	b) Counter lavatory			
	c) Toilet spray			
	d) Floor drain			
	e) Urinoir			
	f) Urinoir partition			
NL3.	**MECHANICAL WORK**	**Ref: BoQ Library- NL3. Item 1.**		
NL30.	***Ground Floor Plan FFL ± 0.000***	Ref: BoQ Library- NL30.		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL30. Item 1.	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13100, 13700, 13850, 13900	
1.1	**Hydrant System**		• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900	
1.1.1	Equipment			
	a) Indoor Hydrant Box	Ref: BoQ Library- NL30. Item 1.1.1 (a)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (7a)	• The required quantity of Indoor Hydrant Box installed and functioning.

	b) Fire Extinguisher ABC Dry Chemical 6kg	Ref: BoQ Library- NL30. Item 1.1.1 (b)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (7b) • All fire extinguishers shall comply with the requirements of NFPA 10	• The required quantities and types of Fire Extinguishers ABC Dry Chemical 6kg stationed.
	c) Fire Extinguisher CO2 Type 5kg	Ref: BoQ Library- NL30. Item 1.1.1 (c)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (7b)	• The required quantity and type of Fire Extinguisher stationed.
1.1.2	Piping		• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (2)	
	Carbon Steel Pipe SCH.40 including fittings, support & accessories			• The required length and dimension of Carbon Steel Pipe SCH.40 including fittings, support & accessories installed, tested and functioning.
	- dia. 100 mm			
	- dia. 65 mm			
1.2	**Sprinkler System**		• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (4)	
1.2.1	Equipment			
	a) Sprinkler Head, Pendent type, quick response K factor 5.6, dia. 1/2"			• The required quantity and dimension of Fire Sprinkler System installed.
1.2.2	Piping			
	Carbon Steel Pipe SCH.40 including fittings, support & accessories			• The required length and dimension of Carbon Steel Pipe SCH.40 including fittings, support & accessories installed, tested and functioning.
	- dia. 200 mm			
	- dia. 100 mm			
	- dia. 80 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	- dia. 40 mm			
	- dia. 32 mm			
	- dia. 25 mm			
1.2.3	Valve & Accessories			• Set of valve & accessories installed, tested and functioning.
	Main Control Valve & Accessories , including;			

	- Alarm Control Valve 8"			
	- Wet Alarm Valve 8" w/basic trim & Pressure Gauge			
	- Retand Chamber			
	- Water Motor Alarm Gong			
2.	**CONVEYING SYSTEM WORK**	Ref: BoQ Library- NL30. Item 2.	• Project Spec. Div.14 (CONVEYING SYSTEM)	
2.1	**LIFT**	Ref: BoQ Library- NL30. Item 2.1	Project Spec. Div.14 (CONVEYING SYSTEM): Spec.: 14210 (1-3)	• The lift with capacity 800 kg /11 person and speed 1 m/s installed, tested, functioning
	a) L1 (Passenger/Service Lift), Roomless			
	- Capacity : 800 kg / 11 Person			
	- Speed : 1 m/s			
3.	**MECHANICAL WORK**	Ref: BoQ Library- NL30. Item 3.	• Project Spec. Div.15 (MECHANICAL): Spec.: 15100, 15410, 15700	
3.1	**Plumbing System**		• Project Spec. Div.15 (MECHANICAL): Spec.: 15100	• Before installation, Contractor shall examine internal and external surfaces condition of the pipe, and measure the length, nominal outside diameter and wall thicknesses of the pipe. • Contractor shall apply hydrostatic strength test without leakage through the pipe body. • Conduct pressure tests (acc. DIN 1988, part 2). • Conduct plumbing system operating tests to demonstrate satisfactory functional and operational efficiency. The tests shall cover a period of not less than 8 hours for each system. • Submit copies of all equipment and materials quality control test results. • Write a report with conclusion of water distribution system's installation (pipes, fittings, valves & accessories), include report of Water Distribution System tests result which will include: k. Time, date, and duration of test l. Water pressures at the most remote and the highest fixtures m. Operation of each fixture and fixture trim n. Operation of each valve, hydrant, and faucet o. Pump suction and discharge pressures

				p. Temperature of domestic hot water supply (if any q. Operation of each floor and roof drain by flooding with water r. Operation of each backflow preventer s. Complete operation of each water pressure booster system, including pump start pressure and stop pressure t. Commissioning
3.1.1	Clean Water Distribution System	Ref: BoQ Library- NL30. Item 3.1.1 (a&b)		• The required length and dimension of PPR PN-10 Pipe for Clean Water Distribution including fittings, support, valves & accessories installed, tested and functioning.
	a) Piping		• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (2a, 2b)	
	PPR PN-10 including fittings, support & accessories			
	- dia. 32 mm			
	- dia. 25 mm			
	- dia. 20 mm			
	- dia. 15 mm			
	b) Valve & Accessories			
	- Gate Valve dia.32 mm			
3.1.2	Waste Water Distribution System	Ref: BoQ Library- NL30. Item 3.1.1 (a, b & c)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (3a, 3b)	• The required length and dimension of PVC, class 10 kg/cm² for black and grey waters including fitting, accessories, excavation and back fill installed, tested and functioning.
	a) Black Water			
	PVC, class 10 kg/cm² including fitting, accessories, excavation and back fill			
	- dia. 150 mm			
	- dia. 125 mm			
	- dia. 100 mm			
	- dia. 80 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	b) Grey Water			

	PVC, class 10 kg/cm² including fitting, accessories, excavation and back fill			
	- dia. 100 mm			
	- dia. 80 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	c) Vent Pipe			
	PVC, class 5 kg/cm² including fitting, support & accessories			• The required length and dimension of vent pipe PVC, class 5 kg/cm² including fitting, accessories, excavation and back fill installed, tested and functioning.
	- dia. 80 mm			
	- dia. 50 mm			
	- dia. 40 mm			
	- dia. 32 mm			
3.2	**Plumbing Fixtures**	Ref: BoQ Library- NL30. Item 3.2 (a)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410 (1-6)	• The required quantity and dimension of plumbing Clean Out installed.
	a) Clean Out			
	- Clean out dia. 50 mm			
	- Clean out dia. 100 mm			
3.3	**Ventilating System**		• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type, capacity, power and static pressure of Exhaust Fans (item 3.3.1-3.3.3) including power cable, installation & support for each indicated room installed, tested and functioning.
	Exhaust fan Including Cable Power, Installation, & Support			
3.3.1	Exhaust Fan - Ceiling Mounted type			
	a) EF. GF-04 *(Toilet Back Of Stage)*			
	capacity : 70 CFM			
	power : 30 watt			
	static pressure : 0.2 InWG			
3.3.2	Exhaust Fan - Mini Inline Centrifugal type			

	a) EF.GF-01 *(Toilet Female)*			
	capacity : 420 CFM			
	power : 170 watt			
	static pressure : 0.4 InWG			
	b) EF.GF-02 *(Toilet Male)*			
	capacity : 520 CFM			
	power : 180 watt			
	static pressure : 0.4 InWG			
	c) EF.GF-03 *(Storage Auditorium)*			
	capacity : 280 CFM			
	power : 100 watt			
	static pressure : 0.25 InWG			
	d) EF.GF-05 *(Panel Room 2)*			
	capacity : 200 CFM			
	power : 140 watt			
	static pressure : 0.25 InWG			
	e) EF.GF-06 *(Panel Room 1)*			
	capacity : 100 CFM			
	power : 140 watt			
	static pressure : 0.4 InWG			
3.3.3	Exhaust Fan - Inline Centrifugal type			
	a) EF.GF-07 *(Toilet)*			
	capacity : 730 CFM			
	power : 370 watt			
	static pressure : 0.7 InWG			
3.4	**Air Conditioning System**	Ref: BoQ Library- NL30. Item 3.4	• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type & system, capacity, power and static pressure of Air Conditioning (item 3.4.1-3.4.8) including refrigerant R410A & pipes , drain pipes, ducting system, air outlets and inlets , power cable, installation & support for each indicated room installed, tested and functioning.

	Air Conditioning - refrigerant R410A including Cable Power, Installation, & Support			
3.4.1	AC Indoor Unit - Ceiling Cassete 4 Way Type - VRF (variable refrigerant flow) System (Including Drain Pump)	Ref: BoQ Library- NL30. Item 3.4.1 (a-f)		
	a) FCU GF-03 (TV / Radio Room), cap. 47.800 Btu/H			
	b) FCU GF-04 (Staff Area & Amenities), cap. 38.200 Btu/H			
	c) FCU GF-06 (Locker Room), cap. 12.300 Btu/H			
	d) FCU GF-07 (Book Storage), cap. 30.700 Btu/H			
	e) FCU GF-08 (Book Shop), cap. 19.100 Btu/H			
	f) FCU GF-09 (Cafe), cap. 38.200 Btu/H			
3.4.2	AC Indoor Unit - Duct Connected Type - VRF System	Ref: BoQ Library- NL30. Item 3.4.2 (a-c)		
	a) FCU GF-01 (Main Lobby & Lounge), cap. 95.500 Btu/H			
	b) FCU GF-02 (Main Lobby & News Paper Collection), cap. 95.500 Btu/H			
	c) FCU GF-05 (Foyer & Security Room), cap. 24.200 Btu/H			
3.4.3	AC Unit - Ceiling Cassette 4 Way Type - Single Split	Ref: BoQ Library- NL30. Item 3.4.3 (a-e)		
	a) FCU GF-12 (Auditorium Lobby), cap. 30.700 Btu/H			
	b) FCU GF-13 (Organizer Office 1), cap. 19.100 Btu/H			
	c) FCU GF-15 (Back The Stage), cap. 24.200 Btu/H			
	d) FCU GF-16 (Lobby Exhibition), cap. 34.000 Btu/H			

	e) FCU GF-17 (Organizer Office 2), cap. 42.700 Btu/H			
3.4.4	AC Unit - Duct Connected Type - Single Split	Ref: BoQ Library- NL30. Item 3.4.3 (a-d)		
	a) FCU GF-10 (Teenager Room Collection), cap. 200.000 Btu/H			
	b) FCU GF-11 (Children Collection), cap. 200.000 Btu/H			
	c) FCU GF-14 (Auditorium), cap. 120.000 Btu/H			
	d) FCU GF-18 (Exhibition), cap. 200.000 Btu/H			
3.4.5	Refrigerant Pipe	Ref: BoQ Library- NL30. Item 3.4.5		
	Copper pipe with insulation including metal support & refnet joint (Liquid & Gas)			
3.4.6	Drain Pipe	Ref: BoQ Library- NL30. Item 3.4.6		
	PVC pipe 10 kg/cm2 including. Support, Fitting, & Acc			
3.4.7	Ducting System	Ref: BoQ Library- NL30. Item 3.4.7 (a-i)		
	a) Supply Air Duct			
	Galvanized steel sheet, including Double Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	b) Return Air Duct			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	c) Supply Air Duct			

	Galvanized steel sheet, including Insulation & support (Square Duct)			
	- Zinc Galvanize 60			
	d) Return Air Duct			
	Galvanized steel sheet, including. Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
	e) Plenum Box (For Supply Air Duct)			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	f) Plenum Box (For Return Air Duct)			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	g) Exhaust Duct			
	Galvanized steel sheet, including support (Square Duct)			
	- Zinc Galvanize 50			
	Galvanized steel sheet, including support (Round Duct)			
	- Zinc Galvanize 50			
	h) Fresh Air Duct			
	Galvanized steel sheet, including support			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
	i) Flexible Duct Insulated dia. 200 mm (8")			
3.4.8	Air outlets and inlets	Ref: BoQ Library- NL30. Item 3.4.8 (a-i)		
	a) Supply Air Grille (SAG)			

	- 72" x 20"			
	- 52" x 8"			
	b) Supply Air Diffuser (SAD)			
	- 60" x 7"			
	- 38" x 14"			
	- 30" x 14"			
	c) Return Air Grille (RAG)			
	- 64" x 20"			
	- 62" x 8"			
	- 60" x 20"			
	- 48" x 16"			
	- 40" x 10"			
	d) Exhaust Air Grille (EAG)			
	- 8" x 8"			
	e) Non-Return Damper (NRD)			
	- 10" x 8"			
	- 6" x 6"			
	f) Fire Damper (FD), Include Fuse			
	- 27" x 20"			
	- 24" x 18"			
	- 10" x 14"			
	- 10" x 8"			
	g) Volume Damper (VD)			
	- 39" x 20"			
	- 33" x 20"			
	- 23" x 20"			
	- 12" x 10"			
	- 10" x 10"			
	- 10" x 8"			
	- 8" x 6"			

	- 7" x 6"			
	- 6" x 6"			
	- 6" x 5"			
	- 6" x 4"			
	- 5" x 10"			
	- 4" x 6"			
	h) Motorized Volume Damper (MVD)			
	- 24" x 18"			
	i) Pressure Transmitter (PT)			
NL31.	***First Floor Plan FFL + 5.200***	Ref: BoQ Library- NL31.		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL31. Item 1.		
1.1	**Hydrant System**		• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900	
1.1.1	Equipment			
	a) Indoor Hydrant Box	Ref: BoQ Library- NL31. Item 1.1.1(a)		• The required quantity of Indoor Hydrant Box installed and functioning.
	b) Fire Extinguisher ABC Dry Chemical 6kg	Ref: BoQ Library- NL31. Item 1.1.1(b)		• The required quantities and types of Fire Extinguishers ABC Dry Chemical 6kg stationed.
	c) Fire Extinguisher CO2 Type 5kg	Ref: BoQ Library- NL31. Item 1.1.1(c)		• The required quantity and type of Fire Extinguisher CO2 Type 5kg stationed.
1.1.2	Piping			
	Carbon Steel Pipe SCH.40 including fittings, support & accessories	Ref: BoQ Library- NL31. Item 1.1.2		• The required length and dimension of Carbon Steel Pipe SCH.40 including fittings, support & accessories installed, tested and functioning.
	- dia. 100 mm			
	- dia. 65 mm			
1.2	**Sprinkler System**	Ref: BoQ Library- NL31. Item 1.2	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (4)	• The required quantity and dimension of Fire Sprinkler System installed.
	a) Equipment			

	Sprinkler Head, Pendent type, quick response K factor 5.6, dia. 1/2"			
	b) Piping			• The required length and dimension of Carbon Steel Pipe SCH.40 including fittings, support & accessories installed, tested and functioning.
	Carbon Steel Pipe SCH.40 including fittings, support & accessories			
	- dia. 200 mm			
	- dia. 100 mm			
	- dia. 80 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	- dia. 40 mm			
	- dia. 32 mm			
	- dia. 25 mm			
2.	**MECHANICAL WORK**	Ref: BoQ Library- NL31. Item 2.		
2.1	**Plumbing System**			
2.1.1	Clean Water Distribution System		• Project Spec. Div.2: 02500 • Project Spec. Div.15: 15100 (2a, 2b) • EN 806 Water supply. Requirements for systems and components inside buildings • EN 12266-1 Industrial valves – Testing of valves – part 1: pressure tests, test procedures and acceptance criteria – mandatory requirements • EN 12266-2 Industrial valves – Testing of valves – part 2: type of test, test procedures and acceptance criteria – supplementary requirements.	• The required length and dimension of PPR PN-10 Pipe for Clean Water Distribution including fittings, support, valves & accessories installed, tested and functioning.
	a) Piping	Ref: BoQ Library- NL31. Item 2.1.1 (a & b)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (2a)	

	PPR PN-10 including. fittings, support & accessories			
	- dia. 32 mm			
	- dia. 25 mm			
	- dia. 20 mm			
	- dia. 15 mm			
	b) Valve & Accessories		• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (2b)	• Set of valve & accessories installed, tested and functioning.
	- Gate Valve dia.32 mm			
2.1.2	Waste Water Distribution System	Ref: BoQ Library- NL31. Item 2.1.2 (a, b & c)		• The required length and dimension of PVC, class 10 kg/cm² for black and grey waters including fitting, accessories, excavation and back fill installed, tested and functioning.
	a) Black Water			
	PVC, class 10 kg/cm² including fitting, support & accessories			
	- dia. 100 mm			
	- dia. 50 mm			
	b) Grey Water			
	- dia. 100 mm			
	- dia. 80 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	c) Vent Pipe		• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (3)	
	PVC, class 5 kg/cm² including fitting, support & accessories			• The required length and dimension of vent pipe PVC, class 5 kg/cm² including fitting, accessories, excavation and back fill installed, tested and functioning.
	- dia. 100 mm			
	- dia. 50 mm			

	- dia. 40 mm			
	- dia. 32 mm			
2.2	**Plumbing Fixtures**	Ref: BoQ Library- NL31. Item 2.2 (a)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410 (1-5)	• The required quantity and dimension of plumbing Clean Out installed.
	a) Clean Out			
	- Clean out dia. 50 mm			
	- Clean out dia. 100 mm			
2.3	**Ventilating System**	Ref: BoQ Library- NL31. Item 2.3 (a-d)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type, capacity, power and static pressure of Exhaust Fans (item 2.3 a-d) including power cable, installation & support for each indicated room installed, tested and functioning.
	Exhaust fan Including. Cable Power, Installation, & Support			
	Exhaust Fan - Mini Inline Centrifugal type			
	a) EF. 1-01 *(Toilet Female)*			
	capacity : 310 CFM			
	power : 140 watt			
	stat. pressure : 0.3 InWG			
	b) EF. 1-02 *(Toilet Male)*			
	capacity : 350 CFM			
	power : 170 watt			
	stat. pressure : 0.3 InWG			
	c) EF.1-03 *(Panel Room 2)*			
	capacity : 200 CFM			
	power : 120 watt			
	stat. pressure : 0.4 InWG			
	d) EF.1-04 *(Panel Room 1)*			
	capacity : 100 CFM			
	power : 120 watt			
	stat. pressure : 0.4 InWG			

2.4	**Air Conditioning System**	Ref: BoQ Library- NL31. Item 2.4	• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type & system, capacity, power and static pressure of Air Conditioning (item 2.4.1-2.4.8) including refrigerant R410A & pipes , drain pipes, ducting system, air outlets and inlets , power cable, installation & support for each indicated room installed, tested and functioning.
	Air Conditioning - refrigerant R410A including. Cable Power, Installation, & Support			
2.4.1	AC Indoor unit - Ceiling Cassette 4 Way Type - VRF System	Ref: BoQ Library- NL31. Item 2.4.1 (a-h)		
	a) FCU 1-01 (Adult Collection), cap. 38.200 Btu/H			
	b) FCU 1-02 (Working Group), cap. 38.200 Btu/H			
	c) FCU 1-04 (Lobby & Reading Room), cap. 47.800 Btu/H			
	d) FCU 1-05 (Quite Study), cap. 30.700 Btu/H			
	e) FCU 1-06 (Staff Office), cap. 47.800 Btu/H			
	f) FCU 1-08 (Conservation Room), cap. 47.800 Btu/H			
	g) FCU 1-09 (Copy Room), cap. 15.400 Btu/H			
	h) FCU 1-10 (Computer Collection Room), cap. 19.100 Btu/H			
2.4.2	AC Indoor Unit - Duct Mounted Type - VRF System	Ref: BoQ Library- NL31. Item 2.4.2 (a & b)		
	a) FCU 1-03 (Main Lobby & Lounge), cap. 95.500 Btu/H			
	b) FCU 1-07 (Meeting Room), cap. 30.700 Btu/H			
2.4.3	AC Indoor Unit - Wall Mounted Type - VRF System	Ref: BoQ Library- NL31. Item 2.4.3 (a)		
	a) FCU 1-11 (Server Room), cap. 24.200 Btu/H			

2.4.4	AC Unit - Wall Mounted Type - Single Split	Ref: BoQ Library- NL31. Item 2.4.4 (a)		
	a) FCU/CU 1-12 (Server Room), cap. 24.200 Btu/H			
2.4.5	Refrigerant Pipe	Ref: BoQ Library- NL31. Item 2.4.5		
	Copper pipe with insulation including. metal support & refnet joint (Liquid & Gas)			
2.4.6	Drain Pipe	Ref: BoQ Library- NL31. Item 2.4.6		
	PVC pipe 10 kg/cm2 including. Support, Fitting, & Acc			
2.4.7	Ducting System	Ref: BoQ Library- NL31. Item 2.4.7 (a-i)		
	a) Supply Air Duct			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 60			
	b) Return Air Duct			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 60			
	c) Supply Air Duct			
	Galvanized steel sheet, including. Insulation & support (Square Duct)			
	- Zinc Galvanize 50			
	d) Return Air Duct			
	Galvanized steel sheet, including. Insulation & support (Square Duct)			
	- Zinc Galvanize 50			
	e) Plenum Box (For Supply Air Duct)			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			

	- Zinc Galvanize 80			
	f) Plenum Box (For Return Air Duct)			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	g) Exhaust Duct			
	Galvanized steel sheet, including. support (Square Duct)			
	- Zinc Galvanize 50			
	h) Fresh Air Duct			
	Galvanized steel sheet, including. support			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
	i) Flexible Duct Insulated dia. 200 mm (8")			
2.4.8	Air outlets and inlets	Ref: BoQ Library- NL31. Item 2.4.8 (a-i)		
	a) Supply Air Grille (SAG)			
	- 54" x 16"			
	b) Supply Air Diffuser (SAD)			
	- 70" x 6"			
	c) Return Air Grille (RAG)			
	- 48" x 16"			
	- 36" x 8"			
	d) Exhaust Air Grille (EAG)			
	- 8" x 8"			
	e) Non-Return Damper (NRD)			
	- 8" x 10"			
	- 6" x 6"			
	f) Fire Damper (FD), Include Fuse			

	- 10" x 8"			
	- 8" x 10"			
	- 6" x 6"			
	g) Volume Damper (VD)			
	- 10" x 10"			
	- 8" x 10"			
	- 8" x 6"			
	- 7" x 6"			
	- 6" x 8"			
	- 6" x 6"			
	- 5" x 6"			
	h) Motorized Volume Damper (MVD)			
	- 33" x 18"			
	i) Pressure Transmitter (PT)			
NL32.	***Second Floor Plan FFL + 10.400***	**Ref: BoQ Library- NL32.**		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL32. Item 1.		
1.1	**Hydrant System**		• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900	
1.1.1	Equipment	Ref: BoQ Library- NL32. Item 1.1.1 (a-c)		
	a) Indoor Hydrant Box			• The required quantity of Indoor Hydrant Box installed and functioning.
	b) Fire Extinguisher ABC Dry Chemical 6 kg			• The required quantities and types of Fire Extinguishers ABC Dry Chemical 6kg stationed.
	c) Fire Extinguisher CO2 Type 5kg			• The required quantity and type of Fire Extinguisher CO2 Type 5kg stationed.
1.1.2	Piping	Ref: BoQ Library- NL32. Item 1.1.2		
	Carbon Steel Pipe SCH.40 including. fittings, support & accessories			• The required length and dimension of Carbon Steel Pipe SCH.40 including fittings, support & accessories installed, tested and functioning.

	- dia. 100 mm			
	- dia. 65 mm			
1.2	**Sprinkler System**	Ref: BoQ Library- NL32. Item 1.2	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (4)	• The required quantity and dimension of Fire Sprinkler System installed.
1.2.1	Equipment	Ref: BoQ Library- NL32. Item 1.2 .1		
	Sprinkler Head, Pendent type, quick response K factor 5.6, dia. 1/2"			
1.2.2	Piping	Ref: BoQ Library- NL32. Item 1.2.2		
	Carbon Steel Pipe SCH.40 including. fittings, support & accessories			
	- dia. 200 mm			
	- dia. 100 mm			
	- dia. 80 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	- dia. 40 mm			
	- dia. 32 mm			
	- dia. 25 mm			
2	**MECHANICAL WORK**	Ref: BoQ Library- NL32. Item 2.		
2.1	**Plumbing System**	Ref: BoQ Library- NL32. Item 2.1		
2.1.1	**Clean Water Distribution System**	Ref: BoQ Library- NL32. Item 2.1.1(a & b)		• The required length and dimension of PPR PN-10 Pipe for Clean Water Distribution including fittings, support, valves & accessories installed, tested and functioning.
	a) Piping		• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (2a, 2b)	
	PPR PN-10 including. fittings, support & accessories			
	- dia. 40 mm			
	- dia. 32 mm			

	- dia. 25 mm			
	- dia. 20 mm			
	- dia. 15 mm			
	b) Valve & Accessories			• Set of valve & accessories installed, tested and functioning.
	- Gate Valve dia.40 mm			
2.1.2	**Waste Water Distribution System**	Ref: BoQ Library- NL32. Item 2.1.2(a, b & c)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (3a, 3b)	• The required length and dimension of PVC, class 10 kg/cm² for black and grey waters including fitting, accessories, excavation and back fill installed, tested and functioning.
	a) Black Water			
	PVC, class 10 kg/cm² including fitting, support & accessories			
	- dia. 100 mm			
	- dia. 80 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	b) Grey Water			
	- dia. 100 mm			
	- dia. 65 mm			
	- dia. 50 mm			
	c) Vent Pipe			
	PVC, class 5 kg/cm² including fitting, support & accessories			• The required length and dimension of vent pipe PVC, class 5 kg/cm² including fitting, accessories, excavation and back fill installed, tested and functioning.
	- dia. 100 mm			
	- dia. 50 mm			
	- dia. 40 mm			
	- dia. 32 mm			
2.2	**Plumbing Fixtures**	Ref: BoQ Library- NL32. Item 2.2(a)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410 (1-5)	• The required quantity and dimension of plumbing Clean Out installed.
	a) Clean Out			

	- Clean out dia. 50 mm			
	- Clean out dia. 100 mm			
2.3	**Ventilating System**	Ref: BoQ Library- NL32. Item 2.3	• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type, capacity, power and static pressure of Exhaust Fans (item 2.3 a-d) including power cable, installation & support for each indicated room installed, tested and functioning.
	Exhaust fan Including. Cable Power, Installation, & Support			
2.3.1	Exhaust Fan - Mini Inline Centrifugal type	Ref: BoQ Library- NL32. Item 2.3.1 (a-e)		
	a) EF. 2-01 *(Toilet Female)*			
	capacity : 420 CFM			
	power : 170 watt			
	stat. pressure : 0.4 InWG			
	b) EF. 2-02 *(Toilet Male)*			
	capacity : 520 CFM			
	power : 180 watt			
	stat. pressure : 0.4 InWG			
	c) EF.2-03 *(Pantry)*			
	capacity : 170 CFM			
	power : 120 watt			
	stat. pressure : 0.4 InWG			
	d) EF.2-04 *(Storage)*			
	capacity : 200 CFM			
	power : 200 watt			
	stat. pressure : 0.5 InWG			
	e) EF.2-05 *(Panel)*			
	capacity : 100 CFM			
	power : 120 watt			
	stat. pressure : 0.4 InWG			

2.4	**Air Conditioning System**	Ref: BoQ Library- NL32. Item 2.4	• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type & system, capacity, power and static pressure of Air Conditioning (item 2.4.1-2.4.8) including refrigerant R410A & pipes , drain pipes, ducting system, air outlets and inlets , power cable, installation & support for each indicated room installed, tested and functioning.
	Air Conditioning - refrigerant R410A including. Cable Power, Installation, & Support			
2.4.1	AC Indoor unit - Ceiling Cassette 4 Way Type - VRF System	Ref: BoQ Library- NL32. Item 2.4.1 (a-c)		
	a) FCU 2-01 (Office), cap. 30.700 Btu/H			
	b) FCU 2-02 (Copy Center), cap. 9.600 Btu/H			
	c) FCU 2-03 (Lobby), cap. 47.800 Btu/H			
2.4.2	Refrigerant Pipe	Ref: BoQ Library- NL32. Item 2.4.2		
	Copper pipe with insulation including. metal support & refnet joint (Liquid & Gas)			
2.4.3	Drain Pipe	Ref: BoQ Library- NL32. Item 2.4.3		
	PVC pipe 10 kg/cm2 including. Support, Fitting, & Acc			
2.4.4.	Ducting System	Ref: BoQ Library- NL32. Item 2.4.4 (a-h)		
	a) Supply Air Duct			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	b) Return Air Duct			
	Galvanized steel sheet, including. Double Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			

	d) Supply Air Duct			
	Galvanized steel sheet, including. Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
	e) Return Air Duct			
	Galvanized steel sheet, including. Insulation & support (Square Duct)			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
	f) Exhaust Duct			
	Galvanized steel sheet, including. support (Square Duct)			
	- Zinc Galvanize 50			
	g) Fresh Air Duct			
	Galvanized steel sheet, including. support			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
	h) Flexible Duct Insulated dia. 200 mm (8")			
2.4.5	Air outlets and inlets	Ref: BoQ Library- NL32. Item 2.4.5 (a-h)		
	a) Supply Air Diffuser (SAD)			
	- 14" x 14"			
	- 12" x 10"			
	b) Return Air Grille (RAG)			
	- 26" x 14"			

	- 24" x 14"			
	- 16" x 14"			
	c) Exhaust Air Grille (EAG)			
	- 10" x 10"			
	- 8" x 8"			
	d) Non-Return Damper (NRD)			
	- 8" x 10"			
	e) Fire Damper (FD), Include Fuse			
	- 14" x 12"			
	- 12" x 10"			
	- 10" x 10"			
	- 10" x 6"			
	- 8" x 10"			
	- 8" x 8"			
	f) Volume Damper (VD)			
	- 20" x 16"			
	- 16" x 20"			
	- 16" x 14"			
	- 14" x 16"			
	- 8" x 6"			
	- 6" x 5"			
	- 4" x 6"			
	g) Motorized Volume Damper (MVD)			
	- 14" x 12"			
	h) Pressure Transmitter (PT)			
NL33.	***Roof Floor Plan FFL + 15.600***	Ref: BoQ Library- NL33.		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL33. Item 1.		

1.1	**Hydrant System**	Ref: BoQ Library- NL33. Item 1.1 (a & b)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900	
	a) Equipment			
	Fire Extinguisher ABC Dry Chemical 6 kg			• The required quantities and types of Fire Extinguishers ABC Dry Chemical 6kg stationed.
	b) Valve & Accessories			• Set of valve & accessories installed, tested and functioning.
	- Automatic Air Vent			
	- Pressure Gauge			
1.2	**Sprinkler System**	Ref: BoQ Library- NL33. Item 1.2 (a)	• Project Spec. Div.13 (SPECIAL CONSTRUCTION): Spec.: 13900 (4)	• The required quantity and dimension of Fire Sprinkler System installed.
	a) Valve & Accessories			
	- Automatic Air Vent			
	- Pressure Gauge			
2.	**MECHANICAL WORK**	Ref: BoQ Library- NL33. Item 2.		
2.1	**Plumbing System**			
2.1.1	**Clean Water Distribution System**	Ref: BoQ Library- NL33. Item 2.1.1 (a & b)		
	a) Piping		• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (2a, 2b)	• The required length and dimension of PPR PN-10 Pipe for Clean Water Distribution including fittings, support, valves & accessories installed, tested and functioning.
	PPR PN-10 including fittings, support & accessories			
	- dia. 32 mm			
	- dia. 25 mm			
	- dia. 20 mm			
	- dia. 15 mm			
	b) Valve & Accessories			
	- Gate Valve dia.32 mm			
2.1.2	**Waste Water Distribution System**	Ref: BoQ Library- NL33. Item 2.1.2 (a, b & c)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15100 (3a, 3b)	• The required length and dimension of PVC, class 10 kg/cm² for black and grey waters including fitting, accessories, excavation and back fill installed, tested and functioning.

	a) Black Water			
	PVC, class 10 kg/cm² including fitting, support & accessories			
	- dia. 100 mm			
	- dia. 50 mm			
	b) Grey Water			
	- dia. 65 mm			
	- dia. 50 mm			
	c) Vent Pipe			
	PVC, class 5 kg/cm² including fitting, support & accessories			
	- dia. 50 mm			
	- dia. 40 mm			
	- dia. 32 mm			
	d) Automatic Air Vent			
2.2	**Plumbing Fixtures**	Ref: BoQ Library- NL33. Item 2.3 (a, b & c)	• Project Spec. Div.15 (MECHANICAL): Spec.: 15410 (1-5)	• The required quantity and dimension of plumbing Clean Out installed.
	a) Clean Out			
	- Clean out dia. 50 mm			
	- Clean out dia. 100 mm			
2.3	**Ventilating System**		• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type, capacity, power and static pressure of Exhaust Fans (item 2.4.1-2.4.4) including power cable, installation & support for each indicated room installed, tested and functioning.
	Exhaust fan Including Cable Power, Installation, & Support			
2.3.1	Exhaust Fan - Mini Inline Centrifugal type			
	a) EF.3-01 *(Kitchen)*			
	capacity : 620 CFM			
	power : 240 watt			
	stat. pressure : 0.4 InWG			

	b) EF.3-02 *(Toilet)*			
	capacity : 420 CFM			
	power : 180 watt			
	stat. pressure : 0.4 InWG			
2.3.2	Exhaust Fan - Axial Roof IP44 type			
	a) EF.A-01 *(Toilet)*			
	capacity : 2540 CFM			
	power : 1100 watt			
	stat. pressure : 0.4 InWG			
2.3.3	Intake Fan - Inline Centrifugal With VSD type			
	a) IF.A-01 *(Exhibition)*			
	capacity : 1000 CFM			
	power : 470 watt			
	stat. pressure : 0.4 InWG			
	b) IF.A-04 *(Teenager Room)*			
	capacity : 650 CFM			
	power : 310 watt			
	stat. pressure : 0.4 InWG			
	c) IF.A-05 *(Children Room)*			
	capacity : 650 CFM			
	power : 310 watt			
	stat. pressure : 0.4 InWG			
2.3.4	Intake Fan - Centrifugal With VSD type			
	a) IF.A-02 *(Auditorium)*			
	capacity : 1550 CFM			
	power : 900 watt			
	stat. pressure : 0.5 InWG			
	b) IF.A-03 *(General Building)*			
	capacity : 7750 CFM			

	power : 4000 watt			
	stat. pressure : 1.2 InWG			
2.4	**Air Conditioning System**		• Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type & system, capacity, power and static pressure of Air Conditioning (item 2.5.1-2.5.7) including refrigerant R410A & pipes , drain pipes, ducting system, air outlets and inlets , power cable, installation & support for each indicated room installed, tested and functioning.
	Air Conditioning - refrigerant R410A including. Cable Power, Installation, & Support			
2.4.1	AC Indoor unit - Ceiling Cassette 4 Way Type - VRF System			
	a) FCU 3-01 (Café), cap. 30.700 Btu/H			
2.4.2	AC Outdoor Unit - VRF System			
	a) CU - 01 (Roof Floor), cap. 553.000 Btu/H, For FCU In Ground Floor			
	b) CU - 02 (Roof Floor), cap. 324.000 Btu/H, For FCU In 1st, 2nd & Roof Floor			
	c) CU - 03 (Roof Floor), cap. 461.000 Btu/H, For AHU In 2nd Floor			
2.4.3	AC Unit - AHU			
	a) AHU 2-01 (National Archieve), cap. 276.300 Btu/H			
	b) AHU 2-02 (Library Conservation), cap. 190.500 Btu/H			
	c) AHU 2-03 (Heritage Library), cap. 109.500 Btu/H			
	d) AHU 2-04 (Heritage Library), cap. 166.700 Btu/H			
2.4.4	Refrigerant Pipe			
	Copper pipe with insulation including metal support (Liquid & Gas)			
2.4.5	Drain Pipe			

	PVC pipe 10 kg/cm2 including Support, Fitting, & Acc			
2.4.6	Ducting System			
	a) Exhaust Duct			
	Galvanized steel sheet, including support (Square Duct)			
	- Zinc Galvanize 50			
	b) Fresh Air Duct			
	Galvanized steel sheet, including support			
	- Zinc Galvanize 80			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
2.4.7	Air outlets and inlets			
	a) Exhaust Air Grille (EAG)			
	- 28" x 14", Include Gravity Damper			
	- 12" x 12", Include Gravity Damper			
	- 10" x 10"			
	b) Intake Air Grille (IAG)			
	- 62" x 62"			
	- 10" x 10"			
	- 8" x 8"			
	c) Motorized Volume Damper (MVD)			
	- 62" x 62"			
	d) AHU Control			
3.	**Testing & Commissioning**			
	a) Hydrant and Sprinkler System Testing & Commissioning			• Hydrant and Sprinkler System, supplied, installed, tested and commissioned.
	b) Plumbing System Testing & Commissioning			• Plumbing System supplied, installed, tested and commissioned.

	c) HVAC System Testing & Commissioning			• HVAC System supplied, installed, tested and commissioned.
NL4.	**ELECTRICAL WORK**	Ref: BoQ Library- NL4.		
NL40.	***Ground Floor Plan FFL ± 0.000***	Ref: BoQ Library- NL40.		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL40. Item 1.	• **Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13100, 13700, 13850, & 13900**	
	(Security System, Fire Alarm System, Fire Fitting System, CCTV System)			
1.1	**Security System**	Ref: BoQ Library- NL40. Item 1.1	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13700 (1-5)	• The required quantity, type, capacity of equipment and cables for Security System (item 1.1.1 - 1.1.2) installed, tested and functioning.
1.1.1	Equipment	Ref: BoQ Library- NL40. Item 1.1.1 (a-e)		
	a) UPS 1.2KVA			
	b) PC workstation set include software & printer			
	c) iclass Card, ISO, PVC Blank White			
	d) IP Access Controller			
	e) Access Door, Consist of:			
	- Card Reader			
	- Exit Push Button			
	- Emergency Break Glass			
1.1.2	Cables	Ref: BoQ Library- NL40. Item 1.1.2 (a & b)		
	a) Cable from Card Reader Control Unit to Door Contact, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
	b) Cable from HUB / Switch to Card Reader Control Unit, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			

1.1.3	Testing & Commissioning	Ref: BoQ Library- NL40. Item 1.1.3		• All equipment and cables as indicated in the item 1.1.1-1.1.2 are tested and Commissioned
1.2	**Video Surveillance / CCTV System**	Ref: BoQ Library- NL40. Item 1.2	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13700 (1-5)	• The required quantity, type, capacity, cables for Video Surveillance / CCTV System in the item 1.2.1 (a-h) and 1.2.2 (a & b) installed, tested and functioning.
1.2.1	Equipment	Ref: BoQ Library- NL40. Item 1.2.1 (a-h)		
	a) Fixed Dome Camera			
	b) Network Video Recorder (NVR) 32 ch. including HDMI Cable 2m, HDMI cable 30 m & HDMI Splitter + HDMI Extender (30 m)			
	c) PC Computer, Seagate 500 GB SATA c/w keyboard, LED 21.5"			
	d) 32" LED TV Monitor			
	e) 32" LED TV Monitor (Guard House/Security room)			
	f) UPS 3 Kva			
	g) HUB / Switch 16 port			
	h) HUB / Switch 8 port POE			
1.2.2	Cables	Ref: BoQ Library- NL40. Item 1.2.2 (a & b)		
	a) Cable from HUB / Switch to CCTV, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
	b) Cable from HUB / Switch to HUB / Switch, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
1.2.3	Testing & Commissioning	Ref: BoQ Library- NL40. Item 1.2.3		• All equipment and cables as indicated in the item 1.2.1-1.2.2 tested and Commissioned
1.3	**Fire Alarm System**	Ref: BoQ Library- NL40. Item 1.3	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13850 (1-9)	• The required quantity, type, and cables for Fire Alarm System in the item 1.3.1 (a-i) and 1.3.2 (a, b, & c) installed, tested and functioning.

1.3.1	Equipment	Ref: BoQ Library- NL40. Item 1.3.1 (a-i)		
	a) Smoke Detector conventional			
	b) Manual call point conventional			
	c) Alarm Bell			
	d) Flash Light			
	e) Conventional zone module			
	f) Output Modules for Bell, and Flashing Lamp			
	g) TB - FA.GF			
	h) MCFA Addressable including. Alarm Bell, Manual Break glass addressable, Battery, Surge Protection, Relay Module, Power Supply & Grounding			
	i) Annunciator			
1.3.2	Cables	Ref: BoQ Library- NL40. Item 1.3.2 (a-c)		
	a) Installation for Fire Alarm			
	b) Installation for Alarm Bell			
	c) Cable from MCFA to TB - FA. GF, Shielded Twisted Pair (STP) 2 pair, including. Conduit PVC 20 mm (3/4")			
1.3.3	Testing & Commissioning	Ref: BoQ Library- NL40. Item 1.3.3		• All equipment and cables as indicated in the item 1.2.1-1.2.2 supplied, tested and commissioned
2.	**ELECTRICAL WORK**	Ref: BoQ Library- NL40. Item 2.	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16225, 16270, 16345, 16400, 16500, 16700, 16820**	
2.1	**Power Distribution System**	Ref: BoQ Library- NL40. Item 2.1	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1-7)	• Contractor to apply these required tests to calibrate and validate cable design type: (i) bending tests, (ii) thermal stability tests, (iii) impulse test, (iv) voltage tests, (v) heat distortion tests, (vi) corona level tests, and (vii) dielectric thermal resistance tests.

				• After installation, tests are required to determine and ensure that cables installed are in optimum operating conditions. The tests are (i) conductor resistance tests on the completed circuit, (ii) verification tests of cross bonded systems, and (iii) surge divertor test.
2.1.1	Panels	Ref: BoQ Library- NL40. Item 2.1.1(a-e)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1)	• The required quantity of SDP (Sub Distribution Panel) for both lighting and power panels in the item 2.1.1 (a-e) installed and tested.
	SDP (Sub Distribution Panel)			
	a) Panels SDP - 1			
	LP (Lighting Panels) / PP (Power Panels)			
	b) Panel LP / PP - 1.A			
	c) Panel LP / PP - 1.B			
	d) Panel PP - 1.C (AC)			
	e) Panel PP - 1.D (AC)			
2.1.2	Cables	Ref: BoQ Library- NL40. Item 2.1.2(a-f)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (4)	• The required length and type of cables, and cable tray and ladder including general power outlet (GPO) in the item 2.1.2-2.1.4, installed and tested.
	a) Cable from Panel LVMDP to Panel SDP - 1, NYY 4 x 70 sq.mm + NYA 1 x 50 sq.mm			
	b) Cable from Panel SDP - 1 to Panel LP / PP -1.A , NYY 5 x 10 sq.mm			
	c) Cable from Panel SDP - 1 to Panel LP / PP -1.B , NYY 5 x 16 sq.mm			
	d) Cable from Panel SDP - 1 to Panel PP -1.C (AC) , NYY 5 x 6 sq.mm			
	e) Cable from Panel SDP - 1 to Panel PP -1.D (AC) , NYY 5 x 10 sq.mm			
	f) Installation for GPO'S			
2.1.3	Cable Tray and Cable Ladder including support and accessories	Ref: BoQ Library- NL40. Item 2.1.3(a-d)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (5c)	
	a) Electrical Tray Cable 300 x 100 mm2			
	b) Electronic Tray Cable 150 x 100 mm2			

	c) Electrical Ladder Cable 300 x 100 mm2			
	d) Electronic Ladder Cable 150 x 100 mm2			
2.1.4	General Power Outlet (GPO)	Ref: BoQ Library- NL40. Item 2.1.4 (a & b)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16225 (1-4)	
	a) Socket Outlet GPO 1 Phase, 16 A			
	b) Double GPO'S 16 A, 1 phase			
2.1.5	Testing & Commissioning	Ref: BoQ Library- NL40. Item 2.1.5		• All panels, cables, cables tray, cable ladder, and GPO as indicated in the item 2.1.1-2.1.4 supplied, tested and commissioned
2.2	**Lighting System**	Ref: BoQ Library- NL40. Item 2.2	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16500 (1-7)	• The required quantity of fixtures lamps, switches, and cables in the item 2.2.1 – 2.2.3 installed and tested.
2.2.1	Fixtures Lamp	Ref: BoQ Library- NL40. Item 2.2.1 (a-e)		
	a) TBS TL - 5 2 x 36 w			
	b) TMS TL - 5 1 x 36 w			
	c) Ton Tempo, SON - T 250 w			
	d) Downlight 18 w			
	e) Downlight 2 x 42 w			
2.2.2	Switches	Ref: BoQ Library- NL40. Item 2.2.2 (a-d)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (6)	
	a) Single Switch 1 Phase 10 A			
	b) Double Switch 1 Phase 10 A			
	c) Hotel Single Switch 1 Phase 10 A			
	d) Grid Switch 4 Gang 1 Phase 10 A			
2.2.3	Cables	Ref: BoQ Library- NL40. Item 2.2.3 (a)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (5c)	
	a) Installation for Lighting			
2.3	**Telecommunication System**	Ref: BoQ Library- NL40. Item 2.3	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (1-6)	• The required quantity of Telecommunication System equipment and cables in the item 2.3.1 – 2.3.2 installed and tested.
2.3.1	Equipment	Ref: BoQ Library- NL40. Item 2.3.1 (a-e)		

	a) Socket Outlet Telephone			
	b) Handset			
	c) TB - TP.GF 20 pairs			
	d) MDF - TP 250 Pair			
	e) PABX 30 / 200 w/ Operator Console, including Battery for Back Up, Software for Billing System & ACER PC w/ Printer A4 for Admin & Billing System			
2.3.2	Cables	Ref: BoQ Library- NL40. Item 2.3.2 (a & b)		
	a) Installation for Telephone			
	b) Cable from MDF - TP to TB - TP.GF, Steel - K 001 70 x 2 x 0,6 sq.mm, including. Conduit PVC 20 mm (3/4")			
2.3.3	Testing & Commissioning	Ref: BoQ Library- NL40. Item 2.3.3		• All equipment and cables as indicated in the item 2.3.1 (a-e)- 2.3.2 (a & b) supplied, tested and commissioned
2.4	**Data System**	Ref: BoQ Library- NL40. Item 2.4	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (3a-d)	• The required quantity of Data System's equipment and cables in the item 2.4.1 – 2.4.2 installed and tested.
2.4.1	Equipment	Ref: BoQ Library- NL40. Item 2.4.1 (a-h)		
	a) Socket Outlet Data			
	b) Double Socket Outlet Data			
	c) Wireless Access Point			
	d) HUB / Switch 16 port			
	e) PC Computer, Seagate 500 GB SATA c/w keyboard, LED 21.5"			
	f) Patch Panel HUB / Switch 24 port			
	g) Rack 8U			
	h) Rack 42U			
2.4.2	Cables	Ref: BoQ Library- NL40. Item 2.4.2 (a & b)		

	a) Installation for Data			
	b) Cable from HUB / Switch to HUB / Switch, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
2.4.3	Testing & Commissioning	Ref: BoQ Library- NL40. Item 2.4.3		• All equipment and cables as indicated in the item 2.4.1 (a-h)- 2.4.2 (a & b) supplied, tested and commissioned
2.5	**Sound System**	Ref: BoQ Library- NL40. Item 2.5	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16820 (1-6)	• The required quantity of Sound System equipment and cables in the item 2.5.1 – 2.5.2 installed and tested.
2.5.1	Equipment	Ref: BoQ Library- NL40. Item 2.5.1 (a-o)		
	a) Wall Mounted Speaker			
	b) Ceiling Speaker 3 w			
	c) Digital Voice Evacuation			
	d) MP3/CD/DVD Player			
	e) Emergency Mic w/chime			
	f) Remote Microphone			
	g) AM/FM Tuner			
	h) Digital Matrix Mixer w/ Equalizer Program			
	i) Mixer Amplifier 240 Watt			
	j) Power Amplifier 240W			
	k) Speaker Selector 10ch			
	l) Cabinet Rack w/Acc.			
	m) MDF - SS. 120 Pair			
	n) TB - SS. A 10 Pair			
	o) Car Call Mic w/chime			
2.5.2	Cables	Ref: BoQ Library- NL40. Item 2.5.2 (a & b)		
	a) Installation for Sound System			
	b) Cable from MDF - SS to TB - SS. GF, NYMHY 3 x 2,5 mm2, including. Conduit PVC 20 mm (3/4")			

2.5.3	Testing & Commissioning	Ref: BoQ Library- NL40. Item 2.5.3		All equipment and cables as indicated in the item 2.5.1 (a-o)- 2.5.2 (a & b) supplied, tested and commissioned
NL41.	***First Floor Plan FFL + 5.200***	Ref: BoQ Library- NL41.		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL41. Item 1.	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13100, 13700, 13850, & 13900	
	(Security System, Fire Alarm System, Fire Fitting System, CCTV System)			
1.1	**Security System**	Ref: BoQ Library- NL41. Item 1.1	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13700 (1-5)	• The required quantity, type of equipment and cables for Security System (item 1.1.1 - 1.1.2) installed, tested Commissioned, and functioning.
1.1.1	Equipment	Ref: BoQ Library- NL41. Item 1.1.1 (a & b)		
	a) IP Access Controller			
	b) Access Door, Consist of :			
	- Card Reader			
	- Exit Push Button			
	- Emergency Break Glass			
1.1.2	Cables	Ref: BoQ Library- NL41. Item 1.1.2 (a & b)		
	a) Cable from Card Reader Control Unit to Door Contact, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
	b) Cable from HUB / Switch to Card Reader Control Unit, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
1.2	**Video Surveillance / CCTV System**	Ref: BoQ Library- NL41. Item 1.2	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13700 (1-5)	• The required quantity, type of equipment and cables for Video Surveillance / CCTV System in the item 1.2.1 and 1.2.2 supplied, installed, tested and functioning.
1.2.1	Equipment	Ref: BoQ Library- NL41. Item 1.2.1 (a & b)		
	a) Fixed Dome Camera			

	b) HUB / Switch 8 port POE			
1.2.2	Cables	Ref: BoQ Library- NL41. Item 1.2.2 (a & b)		
	a) Cable from HUB / Switch to CCTV, Unshielded Twisted Pair Cat. 6 4 pairs, including Conduit PVC 20 mm (3/4")			
	b) Cable from HUB / Switch to HUB / Switch, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
1.3	**Fire Alarm System**	Ref: BoQ Library- NL41. Item 1.3	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13850 (1-9)	• The required quantity, type of equipment and cables for Fire Alarm System in the item 1.3.1 (a-g) and 1.3.2 (a, b, & c) supplied, installed, tested and functioning.
1.3.1	Equipment	Ref: BoQ Library- NL41. Item 1.3.1 (a-g)		
	a) Smoke Detector conventional			
	b) Manual call point conventional			
	c) Alarm Bell			
	d) Flash Light			
	e) Conventional zone module			
	f) Output Modules for Bell, and Flashing Lamp			
	g) TB - FA. A			
1.3.2	Cables	Ref: BoQ Library- NL41. Item 1.3.1 (a-c)		
	a) Installation for Fire Alarm			
	b) Installation for Alarm Bell			
	c) Cable from TB - FA. GF to TB - FA. A, Shielded Twisted Pair (STP) 2 pair, including. Conduit PVC 20 mm (3/4")			
2.	**ELECTRICAL WORK**	Ref: BoQ Library- NL41. Item 2.	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16225, 16270, 16345, 16400, 16500, 16700, 16820	

2.1	**Power Distribution System**	Ref: BoQ Library- NL41. Item 2.1	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1-7)	
2.1.1	Panels	Ref: BoQ Library- NL41. Item 2.1.1 (a-e)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1)	• The required quantity of SDP (Sub Distribution Panel) for both lighting and power panels in the item 2.1.1 (a-e) installed and tested.
	SDP (Sub Distribution Panel)			
	a) Panels SDP - 2			
	LP (Lighting Panels) / PP (Power Panels)			
	b) Panels LP / PP - 2.A			
	c) Panels LP / PP - 2.B			
	d) Panels PP - 2.C (AC)			
	e) Panels PP - 2.D (AC)			
2.1.2	Cables	Ref: BoQ Library- NL41. Item 2.1.2 (a-f)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (4)	• The required length and type of cables, and cable tray and ladder including general power outlet (GPO) in the item 2.1.2-2.1.4, installed and tested.
	a) Cable from Panel LVMDP to Panel SDP - 2, NYY 4 x 35 sq.mm + NYA 1 x 25 sq.mm			
	b) Cable from Panel SDP - 2 to Panel LP / PP - 2.A, NYY 5 x 16 sq.mm			
	c) Cable from Panel SDP - 2 to Panel LP / PP - 2.B, NYY 5 x 6 sq.mm			
	d) Cable from Panel SDP - 2 to Panel PP - 2.C (AC) , NYY 5 x 6 sq.mm			
	e) Cable from Panel SDP - 2 to Panel PP - 2.D (AC) , NYY 5 x 4 sq.mm			
	f) Installation for GPO'S			
2.1.3	Cable Tray and Cable Ladder including support and accessories	Ref: BoQ Library- NL41. Item 2.1.3 (a - d)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (5c)	
	a) Electrical Tray Cable 300 x 100 mm2			
	b) Electronic Tray Cable 150 x 100 mm2			
	c) Electrical Ladder Cable 300 x 100 mm2			

	d) Electronic Ladder Cable 150 x 100 mm2			
2.1.4	General Power Outlet (GPO)	Ref: BoQ Library- NL41. Item 2.1.4 (a & b)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16225 (1-4)	
	a) Socket Outlet GPO 1 Phase, 16 A			
	b) Double GPO'S 16 A, 1 phase			
2.2	**Lighting System**	Ref: BoQ Library- NL41. Item 2.2	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16500 (1-7)	• The required quantity of fixtures lamps, switches, and cables in the item 2.2.1 – 2.2.3 installed and tested.
2.2.1	Fixtures Lamp	Ref: BoQ Library- NL41. Item 2.2.1 (a - d)		
	a) TBS TL- 5 2 x 36 w			
	b) TMS TL- 5 1 x 36 w			
	c) Downlight 18 w			
	d) Downlight 2 x 42 w			
2.2.2	Switches	Ref: BoQ Library- NL41. Item 2.2.2 (a - c)		
	a) Single Switch 1 Phase 10 A			
	b) Double Switch 1 Phase 10 A			
	c) Hotel Single Switch 1 Phase 10 A			
2.2.3	Cables	Ref: BoQ Library- NL41. Item 2.2.3 (a)		
	a) Installation for Lighting			
2.3	**Telecommunication System**	Ref: BoQ Library- NL41. Item 2.3	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (1-6)	• The required quantity of Telecommunication System's equipment and cables in the item 2.3.1 – 2.3.2 installed and tested.
2.3.1	Equipment	Ref: BoQ Library- NL41. Item 2.3.1 (a - c)		
	a) Socket Outlet Telephone			
	b) Hanset			
	c) TB - TP. A 20 pairs			
2.3.2	Cables	Ref: BoQ Library- NL41. Item 2.3.2 (a & b)		
	a) Installation for Telephone			

	b) Cable from MDF - TP to TB - TP. A, Steel - K 001 20 x 2 x 0.6 sq.mm, including. Conduit PVC 20 mm (3/4")			
2.4	**Data System**	Ref: BoQ Library- NL41. Item 2.4	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (3a-d)	• The required quantity of Data System's equipment and cables in the item 2.4.1 – 2.4.2 installed and tested.
2.4.1	Equipment	Ref: BoQ Library- NL41. Item 2.4.1 (a - c)		
	a) Socket Outlet Data			
	b) Wireless Access Point			
	c) HUB / Switch 24 port			
2.4.2	Cables	Ref: BoQ Library- NL41. Item 2.4.2 (a & b)		
	a) Installation for Data			
	b) Cable from HUB / Switch to HUB / Switch, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
2.5	**Sound System**	Ref: BoQ Library- NL41. Item 2.5	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16820 (1-6)	• The required quantity of Sound System's equipment and cables in the item 2.5.1 – 2.5.2 installed and tested.
2.5.1	Equipment	Ref: BoQ Library- NL41. Item 2.5.1 (a & b)		
	a) Ceiling Speaker 3 w			
	b) TB - SS. A 10 pair			
2.5.2	Cables	Ref: BoQ Library- NL41. Item 2.5.2 (a & b)		
	a) Installation for Sound System			
	b) Cable from MDF - SS to TB - SS. A, NYMHY 3 x 2.5 mm2, including Conduit PVC 20 mm (3/4")			
NL42.	***Second Floor Plan FFL + 10.400***	Ref: BoQ Library- NL42.		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL42. Item 1.	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13100, 13700, 13850, & 13900	

	(Security System, Fire Alarm System, Fire Fitting System, CCTV System)			
1.1	**Security System**	Ref: BoQ Library- NL42. Item 1.1	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13700 (1-5)	• The required quantity & type of equipment and cables for Security System (item 1.1.1 - 1.1.2) installed, tested Commissioned, and functioning.
1.1.1	Equipment	Ref: BoQ Library- NL42. Item 1.1.1 (a & b)		
	a) IP Access Controller			
	b) Access Door, Consist of :			
	- Card Reader			
	- Exit Push Button			
	- Emergency Break Glass			
1.1.2	Cables	Ref: BoQ Library- NL42. Item 1.1.2 (a & b)		
	a) Cable from Card Reader Control Unit to Door Contact, Unshielded Twisted Pair Cat. 5 4 pairs, including. Conduit PVC 20 mm (3/4")			
	b) Cable from HUB / Switch to Card Reader Control Unit, Unshielded Twisted Pair Cat. 5 4 pairs, including. Conduit PVC 20 mm (3/4")			
1.2	**Video Surveillance / CCTV System**	Ref: BoQ Library- NL42. Item 1.2	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13700 (1-5)	• The required quantity and type of equipment and cables for Video Surveillance / CCTV System in the item 1.2.1 and 1.2.2 supplied, installed, tested and functioning.
1.2.1	Equipment	Ref: BoQ Library- NL42. Item 1.2.1 (a & b)		
	a) Fixed Dome Camera			
	b) HUB / Switch 8 port POE			
1.2.2	Cables	Ref: BoQ Library- NL42. Item 1.2.2 (a & b)		
	a) Cable from HUB / Switch to CCTV, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			

	b) Cable from HUB / Switch to HUB / Switch, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
1.3	**Fire Alarm System**	Ref: BoQ Library- NL42. Item 1.3	• Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13850 (1-9)	• The required quantity, type of equipment and cables for Fire Alarm System in the item 1.3.1 (a-h) and 1.3.2 (a, b, & c) supplied, installed, tested and functioning.
1.3.1	Equipment	Ref: BoQ Library- NL42. Item 1.3.1 (a - h)		
	a) Smoke Detector conventional			
	b) Heat Detector conventional			
	c) Manual call point conventional			
	d) Alarm Bell			
	e) Flash Light			
	f) Conventional zone module			
	g) Output Modules for Bell, and Flashing Lamp			
	h) TB - FA. B			
1.3.2	Cables	Ref: BoQ Library- NL42. Item 1.3.2 (a - c)		
	a) Installation for Fire Alarm			
	b) Installation for Alarm Bell			
	c) Cable from TB - FA. A to TB - FA. B, Shielded Twisted Pair (STP) 18 AWG 2 pair, Shielded Twisted Pair (STP) 2 pair, including. Conduit PVC 20 mm (3/4")			
2.	**ELECTRICAL WORK**	Ref: BoQ Library- NL42. Item 2.	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16225, 16270, 16345, 16400, 16500, 16700, 16820	
2.1	**Power Distribution System**	Ref: BoQ Library- NL42. Item 2.1	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1-7)	• The required quantity of SDP (Sub Distribution Panel) for both lighting and power panels in the item 2.1.1 (a-d) installed and tested.

2.1.1	Panels	Ref: BoQ Library- NL42. Item 2.1.1 (a - d)	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1)	
	SDP (Sub Distribution Panel)			
	a) Panels SDP - 3			
	LP (Lighting Panels) / PP (Power Panels)			
	b) Panels LP / PP - 3.A			
	c) Panels LP / PP - 3.B			
	d) Panels PP - 3.C (AC)			
2.1.2	Cables	Ref: BoQ Library- NL42. Item 2.1.2 (a - d)		• The required length and type of cables, and cable tray and ladder including general power outlet (GPO) in the item 2.1.2-2.1.4, installed and tested.
	a) Cable from Panel LVMDP to Panel SDP - 3,			
	- NYY 4 x 1 x 300 sq.mm (Vol x 4)			
	- NYA 1 x 25 sq.mm			
	b) Cable from Panel SDP - 3 to Panel LP / PP 3.A , NYY 5 x 10 sq.mm			
	c) Cable from Panel SDP - 3 to Panel LP / PP 3.B , NYY 5 x 4 sq.mm			
	d) Cable from Panel SDP - 3 to Panel PP - 3.C (AC), NYY 5 x 4 sq.mm			
	e) Installation for GPO'S			
2.1.3	Cable Tray and Cable Ladder including support and accessories	Ref: BoQ Library- NL42. Item 2.1.3 (a - d)		
	a) Electrical Tray Cable 300 x 100 mm2			
	b) Electronic Tray Cable 150 x 100 mm2			
	c) Electrical Ladder Cable 300 x 100 mm2			
	d) Electronic Ladder Cable 150 x 100 mm2			
2.1.4	General Power Outlet (GPO)	Ref: BoQ Library- NL42. Item 2.1.4 (a - d)		
	a) Socket Outlet GPO 1 Phase, 16 A			
	b) Double GPO'S 16 A, 1 phase			

2.2	**Lighting System**	Ref: BoQ Library- NL42. Item 2.2	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16500 (1-7)	• The required quantity of fixtures lamps, switches, and cables in the item 2.2.1 – 2.2.3 installed and tested.
2.2.1	Fixtures Lamp	Ref: BoQ Library- NL42. Item 2.2.1 (a - d)		
	a) TBS TL- 5 2 x 36 w			
	b) TMS TL- 5 1 x 36 w			
	c) Downlight 18 w			
	d) Downlight 2 x 42 w			
2.2.2	Switches	Ref: BoQ Library- NL42. Item 2.2.2 (a - d)		
	a) Single Switch 1 Phase 10 A			
	b) Double Switch 1 Phase 10 A			
	c) Hotel Double Switch 1 Phase 10 A			
	d) Grid Switch 4 Gang 1 Phase 10 A			
2.2.3	Cables	Ref: BoQ Library- NL42. Item 2.2.3 (a)		
	a) Installation for Lighting			
2.3	**Telecommunication System**	Ref: BoQ Library- NL42. Item 2.3	• Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (1-6)	• The required quantity of Telecommunication System's equipment and cables in the item 2.3.1 – 2.3.2 installed and tested.
2.3.1	Equipment	Ref: BoQ Library- NL42. Item 2.3.1 (a - c)		
	a) Socket Outlet Telephone			
	b) Hanset			
	c) TB - TP. B 10 pairs			
2.3.2	Cables	Ref: BoQ Library- NL42. Item 2.3.2 (a & b)		
	a) Installation for Telephone			
	b) Cable from MDF - TP to TB - TP. B, Steel - K 001 20 x 2 x 0.6 sq. mm, including. Conduit PVC 20 mm (3/4")			
2.4	**Data System**	Ref: BoQ Library- NL42. Item 2.4	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (3a-d)**	• The required quantity of Data System's equipment and cables in the item 2.4.1 – 2.4.2 installed and tested.

2.4.1	Equipment	Ref: BoQ Library- NL42. Item 2.4.1 (a – c)		
	a) Socket Outlet Data			
	b) Wireless Access Point			
	c) HUB / Switch 16 port			
2.4.2	Cables	Ref: BoQ Library- NL42. Item 2.4.2 (a & b)		
	a) Installation for Data			
	b) Cable from HUB / Switch to HUB / Switch, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
2.5	**Sound System**	Ref: BoQ Library- NL42. Item 2.5	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16820 (1-6)**	• The required quantity of Sound System's equipment and cables in the item 2.5.1 – 2.5.2 installed and tested.
2.5.1	Equipment	Ref: BoQ Library- NL42. Item 2.5.1 (a & b)		
	a) Ceiling Speaker 3 w			
	b) TB - SS. B 10 pair			
2.5.2	Cables	Ref: BoQ Library- NL42. Item 2.5.2 (a & b)		
	a) Installation for Sound System			
	b) Cable from MDF - SS to TB - SS. B, NYMHY 3 x 2,5 mm2, including. Conduit PVC 20 mm (3/4")			
NL43.	***Roof Floor Plan FFL + 15.600***	Ref: BoQ Library- NL43.		
1.	**SPECIAL CONSTRUCTION WORK**	Ref: BoQ Library- NL43. Item 1.	• **Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13100, 13700, 13850, & 13900**	
	(Security System, Fire Alarm System, Fire Fitting System, CCTV System)		•	
1.1	**Video Surveillance / CCTV System**	Ref: BoQ Library- NL43. Item 1.1	• **Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13700 (1-5)**	• The required quantity and type of equipment and cables for Video Surveillance / CCTV System in the item 1.1.1 and 1.1.2 supplied, installed, tested and functioning.

1.1.1	Equipment	Ref: BoQ Library- NL43. Item 1.1.1 (a & b)		
	a) Fixed Dome Camera			
	b) HUB / Switch 8 port POE			
1.1.2	Cables	Ref: BoQ Library- NL43. Item 1.1.2 (a & b)		
	a) Cable from HUB / Switch to CCTV, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
	b) Cable from HUB / Switch to HUB / Switch, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
1.2	**Fire Alarm System**	Ref: BoQ Library- NL43. Item 1.2	• **Project Spec. Div.13 (SPECIAL CONSTRUCTION WORK): Spec.: 13850 (1-9)**	• The required quantity, type of equipment and cables for Fire Alarm System in the item 1.2.1 (a-h) and 1.2.2 (a-d) supplied, installed, tested and functioning.
1.2.1	Equipment	Ref: BoQ Library- NL43. Item 1.2.1 (a - h)	•	
	a) Smoke Detector conventional			
	b) Heat Detector conventional			
	c) Manual call point conventional			
	d) Alarm Bell			
	e) Flash Light			
	f) Conventional zone module			
	g) Output Modules for Bell, and Flashing Lamp			
	h) TB - FA. C			
1.2.2	Cables	Ref: BoQ Library- NL43. Item 1.2.2 (a - d)		
	a) Installation for Fire Alarm			
	b) Installation for Alarm Bell			
	c) Cable from TB - FA. B to TB - FA. C, Shielded Twisted Pair (STP) 18 AWG			

	2 pair, including. Conduit PVC 20 mm (3/4")			
	d) Cable from TB - FA. C to MCFA, Shielded Twisted Pair (STP) 18 AWG 2 pair, including. Conduit PVC 20 mm (3/4")			
2.	**ELECTRICAL WORK**	Ref: BoQ Library- NL43. Item 2.	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16225, 16270, 16345, 16400, 16500, 16700, 16820**	
2.1	**Power Distribution System**	Ref: BoQ Library- NL43. Item 2.1	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1-7)**	• The required quantity of both lighting and power panels in the item 2.1.1 (a-c) supplied, installed and tested.
2.1.1	Panels	Ref: BoQ Library- NL43. Item 2.1.1 (a – c)		
	LP (Lighting Panels) / PP (Power Panels)			
	a) Panels PP - Lift			
	b) Panels PP - AHU			
	c) Panels PP - CU			
2.1.2	Cables	Ref: BoQ Library- NL43. Item 2.1.2 (a – d)		• The required length and type of cables, and cable tray and ladder including general power outlet (GPO) in the item 2.1.2-2.1.4, installed and tested.
	a) Cable from Panel SDP - 3 to Panel PP - Lift , NYY 5 x 10 sq. mm			
	b) Cable from Panel SDP - 3 to Panel PP - AHU , NYY 5 x 6 sq. mm			
	c) Cable from Panel SDP - 3 to Panel PP - CU,			
	- NYY 4 x 1 x 150 sq. mm (Vol x 4)			
	- NYA 1 x 120 sq. mm			
	d) Installation for GPO'S			
2.1.3	Cable Tray and Cable Ladder including support and accessories	Ref: BoQ Library- NL43. Item 2.1.3 (a – d)		
	a) Electrical Tray Cable 300 x 100 mm2			
	b) Electronic Tray Cable 150 x 100 mm2			
	c) Electrical Ladder Cable 300 x 100 mm2			

	d) Electronic Ladder Cable 150 x 100 mm2			
2.1.4	General Power Outlet (GPO)	Ref: BoQ Library- NL43. Item 2.1.3 (a & b)		
	a) Socket Outlet GPO 1 Phase, 16 A			
	b) Double GPO'S 16 A, 1 phase			
2.2	**Lighting System**	Ref: BoQ Library- NL43. Item 2.2	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16500 (1-7)**	• The required quantity of fixtures lamps, switches, and cables in the item 2.2.1 – 2.2.3 installed and tested.
2.2.1	Fixtures Lamp	Ref: BoQ Library- NL43. Item 2.2.1 (a - c)		
	a) TBS TL- 5 2 x 36 w			
	b) TMS TL- 5 1 x 36 w			
	c) Downlight 18 w			
2.2.2	Switches	Ref: BoQ Library- NL43. Item 2.2.2 (a - c)		
	a) Single Switch 1 Phase 10 A			
	b) Double Switch 1 Phase 10 A			
	c) Hotel Single Switch 1 Phase 10 A			
2.2.3	Cables	Ref: BoQ Library- NL43. Item 2.2.3 (a)		
	a) Installation for Lighting			
2.3	**Telecommunication System**	Ref: BoQ Library- NL43. Item 2.3	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (1-6)**	• The required quantity of Telecommunication System's equipment and cables in the item 2.3.1 – 2.3.2 installed and tested.
2.3.1	Equipment	Ref: BoQ Library- NL43. Item 2.3.1 (a-c)		
	a) Socket Outlet Telephone			
	b) Hanset			
	c) TB - TP. A 20 pairs			
2.3.2	Cables	Ref: BoQ Library- NL43. Item 2.3.2 (a & b)		
	a) Installation for Telephone			

	b) Cable from MDF - TP to TB - TP. B, Steel - K 001 20 x 2 x 0.6 sq. mm, including. Conduit PVC 20 mm (3/4")			
2.4	**Data System**	Ref: BoQ Library- NL43. Item 2.3.2 (a & b)	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16700 (3a-d)**	• The required quantity of Data System's equipment and cables in the item 2.4.1 – 2.4.2 installed and tested.
2.4.1	Equipment	Ref: BoQ Library- NL43. Item 2.4.1 (a - c)		
	a) Socket Outlet Data			
	b) Wireless Access Point			
	c) HUB / Switch 8 port			
2.4.2	Cables	Ref: BoQ Library- NL43. Item 2.4.2 (a & b)		
	a) Installation for Data			
	b) Cable from Patch Panel HUB / Switch 16 port to HUB / Switch 8 port, Unshielded Twisted Pair Cat. 6 4 pairs, including. Conduit PVC 20 mm (3/4")			
2.5	**Sound System**	Ref: BoQ Library- NL43. Item 2.5	• **Project Spec. Div.16 (ELECTRICAL): Spec.: 16820 (1-6)**	• The required quantity of Sound System's equipment and cables in the item 2.5.1 – 2.5.2 installed and tested.
2.5.1	Equipment	Ref: BoQ Library- NL43. Item 2.5.1 (a - c)		
	a) Horn Speaker			
	b) Ceiling Speaker 3 w			
	c) TB - SS. B 10 pair			
2.5.2	Cables	Ref: BoQ Library- NL43. Item 2.5.2 (a & b)		
	a) Installation for Sound System			
	b) Cable from MDF - SS to TB - SS. C, NYMHY 3 x 2,5 mm2, including. Conduit PVC 20 mm (3/4")			

6.4.4 UTILITY BUILDING

NO.	SERVICE DESCRIPTION	UNIT OF MEASUREMENT & QUANTITY	REFERENCE CODE & STANDARD	DELIVERABLE
UT.	**UTILITY BUILDING**			
UT1.	**STRUCTURAL WORK**			
	Slab (TOC ± 0.050)			
1.	**SITE CONSTRUCTION WORK**		**Project Spec. Div.2 (SITE CONSTRUCTION) & Project Spec. Div.2 (SITE CONSTRUCTION)**	
1.1	**Earth Work**			
	Excavation including backfill & compaction, soil disposal and sand bedding			
	a) Excavation of Soil	Ref: BoQ Utility-Item 1.1a	• Project Spec. Div.2: Spec.: 02315	
	b) Backfill and compacted soil	Ref: BoQ Utility-Item 1.1b	• Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02315 (2)	• Conducted test to determine the in-situ water content and dry unit weight in accordance with ASTM standard D 1556. • Follow the procedures and do calculation. • Report the result as required in the ASTM 1556
	c) Disposal soil	Ref: BoQ Utility-Item 1.1c	Project Spec. Div.2: Spec.: 02315 (1)	
	d) Compacted sand 100 mm thick	Ref: BoQ Utility-Item 1.1d	Project Spec. Div.2 (SITE CONSTRUCTION): Spec.: 02315 (1)	
1.2	**Foundations (Pile Cap)** • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-14) • Formwork: minimum time to remove formwork (3 days) • Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0202_B).	• Conduct tests on Slump of Hydraulic-Cement Concrete in accordance with ASTM C 143/C 143M. These tests are done both in the laboratory and in the Field. • Obtain representative samples of fresh concrete in accordance with ASTM C172. • Conduct a rebound number of hardened concrete using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02.

	a) Reinforced Concrete Foundation 3000x3000x700 mm	Ref: BoQ Utility- Item 1.2a		• Reinforced Concrete Foundation 3000x3000x700 mm installed and tested
2.	**CONCRETE WORK**		• **Project Spec. Div.3 (CONCRETE): Spec.: 03210, 03300, 03600.**	
2.1	**Structural Concrete**		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-6). • Formwork: minimum time to remove formwork (3 days). • Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0201@0203_B).	• Conduct tests on Slump of Hydraulic-Cement Concrete in accordance with ASTM C 143/C 143M. These tests are done both in the laboratory and in the field. • Obtain representative samples of fresh concrete in accordance with ASTM C172. • Conduct a rebound number of hardened concrete using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • These tests are applied for all structural concrete in 2.1.1, 2.1.2, 2.1.3, and 2.1.4 below.
2.1.1	**Reinforced Concrete Tie Beam**			• The required dimension and volume of reinforced concrete tie beams constructed and tested.
	RC Tie Beam including steel bar reinforcement, formwork and other accessories			
	a) TB1 350x550 mm • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.		• Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0202_B). • Formwork: minimum time to remove formwork (3 days)	
2.1.2	**Reinforced Concrete Slab**			• The required dimension and volume of reinforced concrete slabs constructed and tested.
	RC Slab including steel bar reinforcement, formwork and other accessories			
	a) S1, 250 mm thick • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa.		• Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0202_B).	

	• Formwork: minimum time to remove formwork (3 days)			
	b) S3, 650 mm thick		• Same as S1=250mm thick	
2.1.3	**Reinforced Concrete column**			• The required dimension and volume of reinforced concrete columns constructed and tested.
	RC Column including steel bar reinforcement, formwork and other accessories			
	a) K1 350x350 mm • Concrete f'c= 30 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa. • Formwork: minimum time to remove formwork (3 days)		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-14) • Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0201@0203_B). •	
2.1.4	**Reinforced Concrete Wall**			• The required dimension and volume of reinforced concrete walls constructed and tested.
	RC Wall including steel bar reinforcement, formwork and other accessories			
	a) W1, 200 mm thick • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa. • Formwork: minimum time to remove formwork (3 days)		• Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0202_B).	
	b) W1, 150 mm thick (cable trance)		• Same as W1=200mm thick	
2.2	**Non Structural Concrete**			• The required dimension and volume of non-structural concrete constructed.

	a) Lean Concrete 50 mm thick		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-14) • Concrete f'c= 10 MPa • Production of Concrete: concrete mixer	
	b) Waterstop		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (9)	
	c) Joint sealant & joint filler		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (8)	
	d) Plain concrete		• Concrete f'c= 10 MPa • Production of Concrete: concrete mixer	
	Roof (TOC ± 4.150)			
1.	**CONCRETE WORK**		**Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-6)**	
1.1	**Structural Concrete**		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-6) • Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa. • Formwork: minimum time to remove formwork (3 days) • Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0201@0203_B).	• Conduct tests on Slump of Hydraulic-Cement Concrete in accordance with ASTM C 143/C 143M. These tests are done both in the laboratory and in the field. • Obtain representative samples of fresh concrete in accordance with ASTM C172. • Conduct a rebound number of hardened concrete using a spring-driven steel hammer in accordance with ASTM Standard C 805 – 02. • These tests are applied for all structural concrete in 1.1.1, and 1.1.2 below.
1.1.1	**Reinforced Ring Beam**			• The required dimension and volume of reinforced concrete tie beams constructed and tested.
	RC Ring Beam including steel bar reinforcement, formwork and other accessories			
	a) RB1 250x400 mm		• Project Spec. Div.3 (CONCRETE): Spec.: 03300 (1-6)	

			• Concrete f'c= 25 MPa • Production of Concrete: ready mix (ASTM C94) • Reinforced steel: deformed bars fy =400 MPa. • Formwork: minimum time to remove formwork (3 days) • Project Drawings: Volume 1- Utility Building: Structure (2533-02-S-0201@0203_B).	
	b) RB2 350x550 mm		Same as RB1 250x400 mm	
	c) Reinf. Concrete Fascia			
1.1.2	**Reinforced Concrete Slab**			• The required dimension and volume of reinforced concrete slabs constructed and tested.
	RC Slab including steel bar reinforcement, formwork and other accessories			
	a) S2, 120 mm thick		Same as S1=250 mm thick	
2.	**METAL WORK**		• Project Spec. Div.5 (METAL): Spec.: 05120, 05500, & 05810	
2.1	**NON STRUCTURAL METAL WORK**			• The required dimension and volume of non-structural metal work completed.
	Manhole Cover			
	Steel work including prime coat and finish coat.			
	a) Manhole cover, 100 mm thick			
	b) L 50x50x50 + anchor bar		• Project Spec. Div.5 (METAL): Spec.: 05500 (1-7) • Materials: WF Steel (fabrication, transportation, and erection)	
	c) Steel ladder dia.19 mm			
UT.2	**ARCHITECTURAL WORK**			

1.	**MASONRY WORK**		• Project Spec. Div.4 (MASONRY): Spec.: 04060, 04220, 04400	
1.1	**Plastering**		Project Spec. Div.4 (MASONRY): Spec.: 04060 (1-3)	• The required area to be plastered and rendered completed.
	a) Plastering & rendering			
	b) Concrete plaster			
1.2	**Concrete Masonry Unit**		Project Spec. Div.4 (MASONRY): Spec.: 04220 (1-7)	• The required concrete masonry, including practical column, lintel beam constructed.
	a) Autoclaved aerated concrete 125 mm thk, including practical column, lintel beam			
2.	**METAL WORK**		• **Project Spec. Div.5 (METAL): Spec.: 05120, 05500, 05810 (1-7)**	
2.1	**Architectural Metal**		Project Spec. Div.5 (METAL): Spec.: 05500 (1-7)	
	a) Steel Hollow			
	b) Steel Ladder			
	c) Steel Ladder (Steel pipe galvanised Ø 1.5" and steel pipe galvanised Ø 2")			
3.	**THERMAL AND MOISTURE PROTECTION WORK**		• **Project Spec. Div.7 (THERMAL AND MOISTURE PROTECTION): Spec.: 07100, 07210, 07410, 07430, 07456, 07600, 07840, 07920**	
3.1	**Waterproofing**		• Project Spec. Div.7 (THERMAL AND MOISTURE PROTECTION): Spec.: 07100 (1-4)	
	a) Waterproofing and anti-stain protection for concrete flat roof			• The required waterproofing and anti-stain protection for concrete flat roof area applied.
	b) Waterproofing with screed for concrete wall			• The required waterproofing with screed for concrete wall area applied.
3.2	**Roofing, Gutter & Downspout**		• Project Spec. Div.7 (THERMAL AND MOISTURE PROTECTION): Spec.: 07600 (1a-g)	
	a) 3" PVC down spout			• The required length of 3" PVC down spout installed.
	b) 3" Roof drain			• The required quantity of 3" Roof drain supplied and installed.

4.	**DOORS AND WINDOWS WORK**		• **Project Spec. Div.8 (DOORS AND WINDOWS): Spec.: 08110, 08115, 08120, 08210, 08450, 08700, 08800** • **Project Drawings: Volume 1- Library Building: Architecture (2533-01-A-811)**	
4.1	**Doors**			• The required quantity and type of doors supplied and installed.
	a) DS2 type			
	b) DS3 type			
	c) DS4 type			
	d) LV1 type			
	e) LV2 type			
5.	**FINISHES WORK**		• **Project Spec. Div.9 (FINISHES): Spec.: 09250, 09310, 09380, 09500, 09515, 09545, 09630, 09910, 09930, 09960**	
5.1	**Floor**		• Project Spec. Div.9 (FINISHES): Spec.: 09310 (1-6)	• The required finishes work for floor and ceiling areas, including painting and coating completed.
	a) Floor Hardener, 3 kg/m2, Natural flatness			
5.2	**Ceiling**		• Project Spec. Div.9 (FINISHES): Spec.: 09500, 09515, 09545	
	b) Expose concrete			
5.3	**Painting & Coating**		• Project Spec. Div.9 (FINISHES): Spec.: 09910, 09930, 09960	
	a) Interior Paint			
	b) Exterior Paint (Weathershield paint)			
	c) Ceiling paint			
UT.3	**MECHANICAL WORK**			
1.	**MECHANICAL WORK**		**Project Spec. Div.15 (MECHANICAL): Spec.: 15100, 15410, 15700**	

1.1	**Ventilating System**		Project Spec. Div.15 (MECHANICAL): Spec.: 15700	• The required quantity, type, capacity, power and static pressure of Exhaust Fans (item 2.4.1-2.4.4) including power cable, installation & support for each indicated room installed, tested and functioning.
	Exhaust fan Including Cable Power, Installation, & Support			
1.1.1	Exhaust Fan - Wall Mounted type			
	a) EF.4-01 (Pump Room)			
	capacity : 800 CFM			
	power : 260 watt			
	stat. pressure : 0.2 InWG			
1.1.2	Exhaust Fan - Inline Centrifugal type			
	a) EF.4-02 (Generator Room)			
	capacity : 2200 CFM			
	power : 690 watt			
	stat. pressure : 0.2 InWG			
	b) EF.4-03 (Trafo Room)			
	capacity : 3800 CFM			
	power : 1200 watt			
	stat. pressure : 0.2 InWG			
	c) EF.4-04 (Cubical Room)			
	capacity : 1400 CFM			
	power : 440 watt			
	stat. pressure : 0.2 InWG			
1.1.3	Ducting System			
	a) Exhaust Duct			
	Galvanized steel sheet, including. support (Square Duct)			
	- Zinc Galvanize 60			
	- Zinc Galvanize 50			
1.1.4	Air outlets and inlets			

	a) Exhaust Air Grille (EAG)			
	- 10" x 14"			
	b) Exhaust Grille (EG)			
	- 28" x 18"			
	- 20" x 16"			
	- 16" x 14"			
1.1.5	Testing & Commissioning			
UT.4	**ELECTRICAL WORK**			
1.	**ELECTRICAL WORK**		Project Spec. Div.16 (ELECTRICAL): Spec.: 16225, 16270, 16345, 16400, 16500, 16700, 16820	
1.1	**Power Distribution System**		Project Spec. Div.16 (ELECTRICAL): Spec.: 16400 (1-7)	
1.1.1	Panels			The required quantity for both lighting and power panels in the item 1.1.1 (a & b) supplied, installed, and tested.
	LP (Lighting Panels) / PP (Power Panels)			
	a) Panel LP / PP - PH (Power House)			
	b) Panel LP / PP - PR (Pump Room)			
1.1.2	Cables			The required length and type of cables, and cable tray and ladder including general power outlet (GPO) in the item 1.1.2-1.1.4, supplied, installed, tested and commissioned.
	a) Cable from Panel LVMDP to Panel LP / PP - PH (Power House), NYY 5 x 4 sq.mm			
	b) Cable from Panel LVMDP to Panel LP / PP - PR (Pump Room), NYY 4 x 95 sq.mm + NYA 1 x 70 sq.mm			
	c) Installation for GPO'S			
1.1.3	General Power Outlet (GPO)			
	a) Socket Outlet GPO 1 Phase, 16 A			
	b) Double GPO'S 16 A, 1 phase			
1.1.4	Testing & Commissioning			

1.2	**Lighting System**		Project Spec. Div.16 (ELECTRICAL): Spec.: 16500 (1-7)	The required quantity of fixtures lamps, switches, and cables in the item 1.2.1 – 1.2.3 supplied, installed, tested and commissioned.
1.2.1	Fixtures Lamp			
	a) TL-5 2 x 36 w Fluorescent, Weather proof surface mounted			
1.2.2	Switches			
	a) Single Switch 1 Phase 10 A			
	b) Double Switch 1 Phase 10 A			
1.2.3	Cables			
	a) Installation for Lighting			

6.5 Stage C: Fit-Out

6.5.1 Library

NO.	SERVICE DESCRIPTION	UNIT OF MEASUREMENT & QUANTITY	REFERENCE CODE & STANDARD	DELIVERABLE
FO	**FIT-OUT**			
FO-1	**Ground Floor Plan FFL ± 0.000**			
1.	**FURNISHINGS WORK**	**Refer to BoQ Fit-out**	**Project Spec. Div. 12 (FURNISHINGS): Spec.: 12500 (Furniture)**	• Before installation, Contractor shall examine the brand, internal and external surfaces condition of the materials and/or equipment, and the dimensions. • Inspection of overall finish • Inspection of fixings and overall measurements Specification • Inspection of markings and labelling
1.1	**Fixed interior furniture (kitchen area, toilet area)**			

	a) Fixed interior furniture for toilet area			
1.2	**Children Library**			
	a) Book storage 2 stack (80 - 100 cm)			
	b) Round table			
	c) Library big table for children			
	d) Chair			
	e) Table & chair set			
	f) Long sofa 3 sit			
	g) Works chair			
	h) Front desk			
	i) Coffee table			
	j) Cabinet			
1.3	**Teenager Library**			
	a) Book shelves 3 stack (1.5 m)			
	b) Staff Table			
	c) Works chair			
	d) Round Meeting table			
	e) Chair, PVC			
	f) Sofa L 6 sit)			
	g) Long sofa 3 sit			
	h) Front desk			
	i) Coffee table			
	j) Cabinet			
1.4	**Newspaper & Magazine Collection**			
	a) Book shelves 2 stack (80 - 100 cm)			
	b) Round Meeting table			
	c) Chair, PVC			
1.5	**Lounge & Internet Area**			
	a) Work station for 4 person			

	b) Works chair			
	c) Sofa L 7 sit			
	d) Sofa U 6 sit			
	e) Long sofa 5 sit			
	f) Coffee table			
1.6	**Lobby**			
	a) Round table dia. 60cm			
	b) Chair w/ hand support			
1.7	**Lounge & Waiting Area**			
	a) Long sofa 5 sit			
	b) Coffee table			
1.8	**Auditorium**			
	a) Banquet chair			
FO.2	***First Floor Plan FFL + 5.200***			
1.	**FURNISHINGS WORK**			
1.1	**Fixed interior furniture (kitchen area, toilet area)**			
	a) Fixed interior furniture for toilet area			
1.2	**Adult Library**			
	a) Book shelves 4 stack (2.2 m)			
	b) Staff Table			
	c) Works chair			
	d) Rectangular Meeting table			
	e) Chair, PVC			
	f) Round Meeting table			

FO.3	***Second Floor Plan FFL + 10.400***			
1.	**FURNISHINGS WORK**			
1.1	**Fixed interior furniture (kitchen area, toilet area)**			
	a) Fixed interior furniture for toilet area			
	b) Fixed interior furniture for kitchen area			
1.2	**National Archive**			
	a) Book shelves 4 stack (2.2 m)			
	b) Staff Table			
	c) Works chair			
1.3	**Library Conservation**			
	a) Book shelves 4 stack (2.2 m)			
	b) Staff Table			
	c) Works chair			
1.4	**Heritage Library 01**			
	a) Book shelves 4 stack (2.2 m)			
	b) Staff Table			
	c) Works chair			
1.5	**Heritage Library 02**			
	a) Book shelves 4 stack (2.2 m)			
	b) Staff Table			
	c) Works chair			
FO.4	***Third Floor Plan FFL + 15.600***			
1.	**FURNISHINGS WORK**			
1.1	**Fixed interior furniture (kitchen area, toilet area)**			
	a) Fixed interior furniture for kitchen area			
1.2	**Café**			

	a) Round table dia. 60cm			
	b) Chair w/ hand support			

7 PROJECT REQUIREMENTS

7.1 Contractor Requirements

This is the requirement of works and Project scope to be performed and material to be used in the Design, Construction, Fit-Out and completion of the National Library of Timor-Leste. The Contractor shall note that the Works are to be constructed as identified in the following documents:

- The Scope of Work
- Drawings
- Specifications
- Bill of Quantity

7.2 Methodology and Work Plan

The Contractor's methodology and work plan should clearly define the approach to bring the Contract to a satisfactory completion by describing the methodology of approach to accomplish the Project's required outcomes.

The Contractor shall prepare the relevant and appropriate work method that will consider all safety and quality aspects. This shall include the design and construction method, Subcontractor and vendor list, quality/ safety plan, and reporting and recording systems

7.2.1 Project Execution Strategy (PES)

The Contractor shall prepare a Project Execution Strategy of the National Library of Timor-Leste which will address each required Service and Deliverable defined in the Detailed Engineering Design stage, Construction stage, and fit-Out stage and the final Commissioning prior the hand-over to the Principal.

The Strategy shall include team deployment, Contractor's Equipment mobilisation, project Site Preparation, Site visit, surveying services and data collection, detailed engineering design, obtaining DED approval and building permit, construction and fit-out.

This PES shall also include subcontracting work, appropriate project management, personnel and Contractor's Equipment required to efficiently carry out the Scope of Work, and the proper level of effort directed toward each requirement.

The Project Execution Strategy of the National Library of Timor-Leste shall cover the following:

7.2.2 Project Planning

Upon award of the D&C Contract, the Contractor shall establish Project Plan which includes:

(a) Prepare work plans for detailed engineering design, construction and fit-out including schedules, budgets, project procedures and allocate resources;
(b) Applying Microsoft Office such as MS Project, Primavera/MSP and other software approved by Principal for planning, controlling, scheduling and reporting;
(c) Set-up the Quality Assurance and Control Plan for the Project;
(d) Identify long-lead equipment, materials and activities;
(e) Establish fabrication and contracting plans and sequences so that engineering, procurement and all other project activities can be planned accordingly, including dedicated Local Content Plan;
(f) Arrange necessary meetings with all parties involved in the Project to ensure that the Project objectives, schedules, priorities and all other criteria required making the Project a success to be defined clearly;
(g) Set up, and maintain throughout the project, the appropriate communications and transfer of information with the Principal;
(h) Organize and staff the project teams. Place major emphasis on the selection of a balanced team with expert knowledge of the project's requirements;
(i) Administer the Contract to fulfil its terms and conditions;
(j) Ensure that the requirements of the Principal, governmental regulatory agencies, certifying authorities, insurance underwriters and others are complied with; and
(k) Control the scope, cost, schedule and quality of the project Works.

7.2.3 Project Activity Schedule

Contractor shall maintain a Project Activity Schedule during the execution of the detailed engineering design, construction and fit-out of the National Library of Timor-Leste.

This Schedule shall include the anticipated vs actual timing of each stage of the detailed engineering design, procurement, manufacture, inspection, delivery to Site, construction, erection, installation, work to be undertaken by any nominated Subcontractor, inspection, testing and commissioning.

7.2.4 Project Team and Project Structure

Contractor shall plan project team organisation of personnel with appropriate management and technical skills together with effective management systems and methods appropriate to the successful management of the Project.

The Project Organization chart shall show lines of authority, responsibility, communication with management and Project's Stakeholders, supervisory, and technical personnel.

The Project Structure shall show Project team consist of minimum team leader, structural engineer, mechanical engineer, electrical engineer, Quantity Surveyor/ Cost Estimator, Quality assurance and control officer, Material engineer, HSE officer on Site, technical and administrative support staff.

7.2.5 Project Controlling

Contractor shall:

(a) Manage and control the detailed design, procurement, construction, commissioning and handover of the Project in accordance to the defined standards, specifications and local regulations and in compliance with local required construction permits;

(b) Track, measure and report the Project's progress/status using Earned-Value (EV) analysis/method. If a deviation is detected and based on the forecasts defined, agree and manage the implementation of the applicable recovery plans;

(c) Supervise all construction activities at Sites, according to the approved Project Quality Plan and HSE Plan;

(d) Manage and control the project cost;

(e) Support the required technical evaluations, inspections, quality audits and HSE audits;

(f) Manage the preparation operation and maintenance manuals, and as built drawings for the proper project handover.

7.2.6 Quality Assurance

The Contractor shall do all acts, matters and things necessary to ensure that the work under the Contract is executed in accordance with the appropriate Quality Standards current at the time when the work under the Contract is being executed.

Before commencing the work under the Contract, the Contractor shall:

(a) plan, establish and maintain a quality system which conforms to those requirements;

(b) provide the Engineer with access to the quality system of each of the Contractor and Subcontractors to enable monitoring and quality auditing.

Any such quality system shall be used only as an aid to achieving compliance with the Contract and to document such compliance. Such system shall not relieve the Contractor of the responsibility to comply with the Contract.

For the purposes of this clause, quality system means a system:

(a) that is specifically designed or adapted for use in respect of the Contract;
(b) that includes the documents and details referred to in the Principal's requirements;
(c) that has been devised and implemented in accordance with relevant Quality Standards;
(d) which has been accredited as a quality system by a third party;
(e) which complies with any requirements prescribed for such a plan in the Principal's requirements;
(f) that sets out how all procedures and activities which are carried out in execution of the obligations under the Contract will be carried out such that the requirements of the Contract are satisfied or exceeded; and
(g) that sets out how it will be recorded and subsequently demonstrated that all procedures and activities which are required to be carried out in execution of the obligations under the Contract have been carried out such that the requirements of the Contract are satisfied or exceeded.

7.2.7 Quality Control

The Contractor shall establish a Quality Control System that consists of Quality Controller and Quality Control Engineer as required to meet the specifications and to ensure qualified inspection of work.

The Contractor shall ensure the quality of the Project as follows:

a) Quality Control Program shall be prepared by the Contractor and shall be submitted to the Principal for review and approval.
b) The Quality Control Program shall perform or coordinate and supervise the Performance Test of all required inspections, testing, and document checking and approval. In addition Quality Controller will keep complete, updated records on submittals of documents. As a general procedure, Quality Controller shall:
    - Review the Contract requirements.
    - Check to ensure that the required submittals have been prepared and approved.
    - Make sure that the required materials and equipment are on the Site.
    - Check to ensure that the required off-Site inspections and tests have been accomplished and approved.
    - Coordinate and arrange for the required on-Site inspection and tests.
    - Determine that all preliminary work has been completed.
    - Re-check materials and equipment for compliance.
    - Prepare the schedule of inspection.

c) Quality Controller shall ensure the work is inspected daily, or as required, to assure continuing compliance with the plans and specifications until completion. Upon completion of an item of work, required operational or Performance Testing shall be supervised by Quality Control and required certification and/or approval submitted.
d) When materials being used do not comply with the specifications, or workmanship is not satisfactory, Quality Controller shall stop the Works immediately and assure the corrective actions.
e) As soon as a representative segment of an item of work is accomplished, Quality Controller shall inspect workmanship, dimensional accuracy, and assure use of approved materials. In addition, Quality Controller shall review the testing and inspection operations to insure compliance with the specification.

7.2.8 Materials and Work

7.2.8.1 Quality of Material and Work

The Contractor shall use the materials and standards of workmanship required by the Contract. In the absence of any specification to the contrary, the Contractor shall use suitable new materials and proper and tradesman like workmanship.

Unless specified within the Contract, Materials or items nominated in the Specification or on the drawings may not be substituted without the authority of the Engineer. All substitutions shall be made & declared during the design review phase of the Works, all prior to the construction Works being undertaken.

Where the Contract allows for the substitution of materials or standards of workmanship which are 'equal to' or 'the equivalent of' those specified, the question of their suitability and quality or equivalence will be determined and communicated in writing by the approved Engineer.

7.3 Access to Construction Site Area

7.3.1 Site Inspection

Upon award of Contract, Principal will provide the Contractor with access to the Site within the time specified in the Contractor’s Project Activity Schedule or as necessary to enable Contractor to carry out the Works.

7.3.2 Regulations and Standards

The Contractor shall comply with the requirements and regulations of local and other legally constituted authorities.

Unless otherwise specified all materials and workmanship shall comply with the Best Practice Standard or equally standard defined in the Project Specification.

7.3.3 Facilities

The Contractor shall provide storage sheds for materials, mess rooms for workmen and a Site office and shall be responsible for their upkeep, cleanliness and removal on completion of the Works. Contractor shall establish Site Area for the purposes of materials handling, tools and plant storage, administration, loading, unloading, and with appropriate ablution and messing facilities for staff and tradespersons engaged on the Site.

7.3.4 Hoardings

The Contractor shall provide all necessary street hoardings as required by the local authorities. The Contractor shall provide any internal hoardings, screens, safety signage and the like required to undertake the Works.

7.3.5 Temporary Services

The Contractor shall arrange for the provision of temporary sanitary, water, electricity and telephone services for the duration of the contract. Principal will allow temporary services for use during construction to be extended from the existing facilities. As part of the Construction phase the Contractor shall arrange for and pay for all costs/fees associated with temporary and permanent connections, distribution, maintenance disconnection to these services and other existing services for construction amenities and construction activities, as required to complete the whole of the Works, in accordance with the requirements of the relevant authorities.

The Contractor shall ensure separate toilet facilities are available for both male and females, and shall be responsible for the cleaning and make good of facilities provided should they be damaged through Contractors / Subcontractors and their employees use.

By the Date for Completion, the Contractor shall disconnect temporary services, facilities and clear away all temporary services making good all adjacent surfaces.

7.3.6 Dilapidation Survey

The Contractor shall prepare a dilapidation survey of the area affected by the proposed Works. The dilapidation survey is to include a written description and comprehensive photographic record of existing conditions.

7.3.7 Scaffolding

The Contractor shall provide, erect and maintain all necessary scaffolding (fixed and mobile) and remove same on completion of the Works.

7.3.8 Plant and Contractor's Equipment

The Contractor shall supply, erect and maintain all tools, plant and Contractor's Equipment necessary to carry out the Works.

7.3.9 Site HSE

The Contractor shall establish an HSE Plan including safety rules, applicable PPE (personal protection equipment, safety glass, overall, hard hat, safety shoes), risk analysis, permit to work, tool box talks, hot work, confined space entry and safety audits to manage and control HSE compliance.

The Contractor shall plan a monitoring program including HSE performance reporting, inspections (by Principal and its nominated contractors) and incident reporting.

The Contractor shall submit monthly reports to the Principal or Engineer to track the Contractor's HSE performance. The monitoring program shall give consideration to measure and track both results-based metrics (such as injuries and incidents) and activity-based metrics (e.g., inspections, audits, job safety analyses completed, toolbox safety meetings, number corrective actions from audits, behaviour observation and feedback, etc.).

Once the Contractor is on Site, the Engineer will periodically monitor the work practices of the Contractor. If improper HSE practices are observed, the Engineer needs to take action to ensure the Contractor corrects the situation. The frequency of monitoring will depend on the level of risk associated with the work the Contractor is performing. The Contractor shall conduct internal HSE inspections according to its procedures.

After the completion of the Project, a post-construction evaluation of the Contractor's performance on HSE shall be incorporated in the report based on the data from the Contractor's monthly reports, audit findings, and observations.

7.3.10 Temporary Crossings

The Contractor shall, were required, arrange for and provide such temporary footpath crossings required for the execution of the Works.

7.3.11 Foreman and Site Staff

The Contractor shall appoint a competent Foreman and Site staff necessary to complete the Works and a Contractor Representative to control the construction and completion of the Works, to the satisfaction of the Superintendent.

7.3.12 Hours of Work

All design and construction work shall be carried out in compliance with the local regulations.

7.3.13 Attendance

The Contractor shall monitor access and attendance of all nominated subcontractors in accordance with general practice including the use of scaffolding and temporary services.

7.3.14 Submissions

7.3.14.1 Samples

The Contractor shall provide samples and sample panels for approval by the Engineer prior to commencing the work for each approved product or material. The Contractor shall keep approved samples in good condition on Site for reference until Practical Completion.

The Contractor shall only commence items of the Works for which those samples have been approved by the Engineer, the Principal and members of the consultant team as nominated by the Engineer.

It shall be the Contractor's responsibility to match approved samples during the Works.

7.3.14.2 Shop Drawings

Four copies of each set of shop drawings shall be submitted for the following items.

- Structural concrete
- Structural steel/metal
- Precast concrete panels
- Mechanical and plumbing; and
- Electrical

The drawings shall be comprehensive indicating all details of fabrication, assembly installation furnishing and fixing of the items concerned.

7.3.14.3 As Built Drawings

The Contractor shall provide within 2 weeks of the date of Practical Completion of the Works, three sets of prints of the final as-built drawings and an electronic transfer of information in an approved form.

The drawings shall include locations of all installed services, including mechanical, electrical, communications, security, hydraulics, fire services, stormwater, sewer, gas etc.

7.3.14.4 Site Records

The Contractor's daily records for the Site shall be made available to the Engineer upon request. These daily records shall include but are not limited to the following:

- labour on the Site
- construction plant on the Site
- materials on the Site

- classification of tradesmen and staff employed on the Site
- visitors to the Site including those from the Contractor's head office identifying arrival and departure times
- daily weather record
- inspections and test undertaken
- OHS procedures and records
- all issues in relation to the Occupational Health and Safety Guidelines including all accidents or near incidents
- tests and attendance by authorities having jurisdiction over the Works
- meetings of Contractor's consultants and other project stakeholders on Site
- industrial disputes
- notifications from any party not directly associated with the work (adjoining properties, tenants, public and the like)

7.3.14.5 Existing Dimensions & Surveyor Confirmation

The Contractor shall engage the services of a licensed surveyor for the setting out of the Works and for the confirmation of the existing dimensions as shown on drawings. The Contractor's surveyor must provide confirmation to the Engineer that the set out for the Works are in accordance with the Contract Drawings.

The confirmation of the building set out is to be provided to the Engineer as verification of compliance with the Contract Documents and does not diminish the Contractor's responsibility for the accurate setting out of the Works. The Contractor must undertake all other survey work as necessary to meet its responsibilities under the building contract.

7.3.14.6 Operation & Maintenance Manuals

Before the date of Practical Completion, the Contractor must furnish to the Engineer three copies of operating, service and maintenance instructions or manuals for items of equipment and plant, including supplier's or manufacturer's descriptive literature.

Schedules:

- All schedules described in the Specifications.
- Electrical installation/equipment
- Hydraulic installation/equipment

The Contractor shall allow for comprehensive education and training of the nominated End User's personnel in the use and operation of all installed plant and systems, including engineering services installation.

7.3.14.7 Warranties

Before commencement on Site of any work subject to warranty, the Contractor shall deliver the relevant warranty. No payment will be authorised in respect of any such item of work until the required warranty is delivered.

Each warranty is to be provided in respect of any work referred to in sub-clause 7.3.14.1 (Samples) will:

- be a warranty for the period designated for that work; and
- be provided in writing duly executed by the supplier of the work, by the Contractor, and where the work is supplied by the supplier to a Subcontractor, by that Subcontractor.

No warranty shall be construed as or have the effect of relieving the Contractor of any of his contractual obligations under the provisions of this Contract.

7.3.15 Inspections & Certificates

The Contractor shall not carry out any of the required tests or compliance inspections without approval. The Contractor shall give the Engineer sufficient notice so that all required tests and inspections can be witnessed.

A minimum of 48 hours notice will be provided before any inspection is to be made or a test to be undertaken by the Engineer or its consultants, or any Authority having jurisdiction over the Works.

The Contractor shall manage and coordinate its Works to ensure that this notice can be provided in all instances.

Except for Site tests and those by the building surveyor and statutory authorities, the Contractor shall carry out testing using agencies accredited by the testing authorities to test in the relevant field. The Contractor shall cooperate as required with all testing authorities.

The Contractor shall submit reports showing the observations and results of tests and compliance or noncompliance with the requirements of the contract. These reports shall be forwarded to the Engineer within 2 working days of the tests being undertaken. A copy of the submitted report and test certificates shall be retained on Site.

If tests and inspections are to be carried out on parts of the Works, Contractor will not conceal those parts and will not commence further work on those parts, until the tests and inspections have been satisfactorily completed and compliance substantiated.

Inspections and tests where applicable are to be carried out during the period the building is under the control of the Contractor and thereafter during the Defects Liability Period.

During all normal working hours and at all other reasonable times, the Contractor shall allow Principal's Personnel:

(a) to have full access to all parts of the Site and to all places from which natural Materials are being obtained;
(b) to conduct inspection during production, manufacture and construction (at the Site and elsewhere), to:
    i. examine, inspect, measure and test the Materials, Plant and workmanship,
    ii. check the progress of manufacture of Plant and production and manufacture of Materials, and
    iii. make records (including photographs and/or video recordings); and
(c) to carry out other duties and inspections as specified in the Contract.

The Contractor shall give the Principal's Personnel full opportunity to carry out these activities, including providing safe access, facilities, permissions and safety equipment.

The Contractor shall give a Notice to the Engineer whenever any Materials, Plant or work is ready for inspection, and before it is to be covered up, put out of sight, or packaged for storage or transport. The Principal's Personnel shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or the Engineer shall promptly give a Notice to the Contractor that the Principal's Personnel do not require to do so. If the Engineer gives no such Notice and/or the Principal's Personnel do not attend at the time stated in the Contractor's Notice (or such time as may be agreed with the Contractor), the Contractor may proceed with covering up, putting out of sight or packaging for storage or transport.

If the Contractor fails to give a Notice in accordance with this Sub-Clause, the Contractor shall, if and when required by the Engineer, uncover the work and thereafter reinstate and make good, all at the Contractor's risk and cost.

8 SPECIFICATIONS

All work performed pursuant to specifications shall comply with the requirements of the relevant local Acts, Regulations, Standards and codes and to the best of practice of all authorities having jurisdiction over the work.

The execution of the Works and the completed Works including defects remedied by the Contractor shall comply with the Country's technical standards, building, construction and environmental Laws, Laws applicable to the product being produced from the Works, and other standards specified in Specification, applicable to the Works, or defined by applicable Laws.

8.1 Building Design and Construction Standards and Codes

For the purpose of detailed engineering design and analysis the National Library Project, the Contractor shall apply the following standards, codes and test methods, but are not limited to the following:

No.	Reference Standards and Codes	Purpose
1.	AS 4100-1998 NZS 3404-1997 AISC 360-10 AISC 360-05 AISC ASD-89 AISC LRFD-93 Eurocode 3-2005 Italian NTC 2208 BS 5950-2000	Steel Frame Design
2.	AS 3600-09 NZS 3101-06 ACI 318-11 ACI 318-08 Eurocode 2-2004 Italian NTC 2208 BS 8110-97	Design of Concrete Structures
3.	AISC 360-10 AISC 360-05	Composite Beam Design

	BS 5950-90 Eurocode 4-2004	
4.	AISC 360-10	Composite Column Design
5.	AISC 360-10	Steel Connection Design
6.	SJI-2010	Steel Joist Design
7.	2007 AS 1170.4 2003 IBC/ASCE 7-02 2006 IBC/ASCE 7-05 2009 IBC/ASCE 7-05 2012 IBC/ASCE 7-10	Seismic Loads
8.	AS/NZS 1170.2 ASCE 7-02 2006 IBC/ASCE 7-05 ASCE 7-10 ANSI/ASCE 7-88	Wind Loads
9.	UNI 9182	Water supply and distribution – Plumbing design criteria
10.	SNI 03-1726-2003	Indonesia National Standard – an Earthquake Resistance Design Standard for Buildings (Seismic Zone Map and Factor). Reference: 1997 UBC Seismic Loads
11.	SNI 8153-2015	Plumbing System Planning in Building
12.	SNI 03 – 6572 – 2001	Air Conditioning and Ventilation System Planning on Building Design
13.	SNI 03 – 6573 – 2001	Vertical Transportation System Planning on Building Design

14.	**Earth Excavation**	BS 1377 Methods of Test for Soil for Civil Engineering Purposes
		BS 1924 Stabilised Materials For Civil Engineering Purposes
		BS 5930 Code of Practice for Site Investigations
		BS 6031 Code of Practice for Earthworks

		BS 8002 (1994): Code of practice for earth retaining structures
		BS 8004 Code of Practice for Foundations
		BS 8006 Code of Practice for Strengthened/Reinforced Soils and Other Fills
15.	**Earth Backfill**	ASTM C 131 Standard Test Method for Resistance to Degradation of Small-Size Coarse
		Aggregate by Abrasion and Impact in the Los Angeles Machine
		ASTM C 136 Standard Method for Sieve Analysis of Fine and Coarse aggregates
		ASTM C 535 Standard Test Method for Resistance to Degradation of Large-Size Coarse
		ASTM D 1241 Standard Specification for Materials for Soil-Aggregate Sub-base, Base, and Surface Courses
		ASTM D 1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
		ASTM D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³))
		ASTM D 4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
16.	**Concrete Works**	EN 13670 Execution of concrete structures
		EN 197 Cement
		EN 206 - 1 Concrete
		EN 10080 Steel for the reinforcement of concrete - Weldable reinforcing steel
		EN ISO 17660-1 Welding - Welding of reinforcing steel – Part 1: Load-bearing welded joints (ISO - 7660:2006)
		EN ISO 17660-2 Welding - Welding of reinforcing steel - Part 2: Non load-bearing welded joints (ISO - 7660-2:2006)
		EN 450 Fly ash for concrete
		EN 480-4 Admixtures for concrete, mortar and grout. Test methods.
		EN 934 Admixtures for concrete, mortar and grout

		EN 1008 Mixing water for concrete - Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete
		EN 12350 Testing fresh concrete
		EN 12390 Testing hardened concrete
		EN 12504 Testing concrete in structures
		EN 1260 Aggregates for concrete
17.	**Plumbing and Drainage System**	EN 12201-2 Plastics piping systems for water supply - Polyethylene (PE) - Pipes
		EN 12201-3 Plastics piping systems for water supply - Polyethylene (PE) - Fittings
		EN 12266-1 Industrial valves – Testing of valves – part 1: pressure tests, test procedures and acceptance criteria – mandatory requirements
		EN 12266-2 Industrial valves – Testing of valves – part 2: test, test procedures and acceptance criteria – supplementary requirements
		EN 12334 Industrial Valves - Cas t Iron Check Valves
		EN 1451-1 Plastics Piping Systems for Soil and Waste Discharge (Low and High Temperature) within the Building Structure.
		EN 598 Ductile Iron Pipes, Fittings, Accessories and Their Joints for Sewerage Applications.
		EN 752-4 Drain and sewer systems outside buildings – Hydraulic design and environmental condition
		EN 805 Water supply. Requirements for systems and components outside buildings
		EN 806 Water supply. Requirements for systems and components inside buildings
		UNI ENV 1046 Plastic piping and ducting system – System outside building structures for the conveyance of water and sewage – Practices for installation above and below ground
18.	**Firefighting Water System**	NFPA No.780 Standard for the Installation of Lightning Protection Systems
		Australian/New Zealand AS/NZS 1768 Lightning Protection

		National Electrical Code (NEC) Article 250 Grounding and Bonding
		NFPA 10 Standard for Portable Fire Extinguishers
		NFPA 13Standard for The Installation of Sprinkler Systems
		NFPA 14 Standard for Installation of Standpipe, Private Hydrant, and Hose Systems
		NFPA 20 Standard for The Installation of Stationary Pumps for Fire Protection
19.	**Electrical System for Building**	**6.1 General**
	1.	IEC 60038 IEC standard voltages
		IEC 60071 Insulation coordination
		IEC 60085 Thermal evaluation and classification electrical insulation
		IEC 60364 Electrical installation of buildings
		IEC 60479 Effects of current on human beings and livestock
		IEC 60617 Graphical symbols for diagrams
		IEC 60664 Insulation coordination for equipment within low voltage systems
		IEC 60706 Guide on maintainability of equipment
		IEC 61024 Protection of structure against lightning
		IEC 61936 Power installations exceeding 1KVa.c. – part1 common rules
		IEC 60079 Electrical apparatus for explosive gas atmospheres
		IEC 60909 Short – circuit currents – A.C. systems
		IEC 60529 Degree of protection provide by enclosure (IP code)
		IEC 61000 Electromagnetic compatibility (EMC)
		IEC 60076 Power Transformers
		6.2 Power Switchgears and Equipment

		IEC 60439 Low-voltage switchgear and control gear assemblies
		IEC 60947 Low – voltage switchgear and control gear
		IEC 62271 High voltage switchgear
		6.3 Power and Control Cables
		IEC 60173 Colours of the cores of flexible cables and cords
		IEC 60227 Polyvinyl chloride insulated cables of rated voltages up to and including 450/750V
		IEC 60228 Conductor of insulated cables
		IEC 60245 Rubber insulated cables of rated voltages up to and including 450/750V
		IEC 60332-3-10 Tests on electrical cables under fire conditions – part 3-10 : test for vertical flame spread of vertically – mounted bunched wires or cables apparatus
		IEC 60332-3-22 Tests on electrical cables under fire conditions – part 3-22: test for vertical flame spread of vertically – mounted bunched wires or cables category A TC 20
		IEC 60445 Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system
		IEC 60446 Identification of conductors by colours or numerals
		IEC 60502 Power cables with extruded insulation and their accessories for rated voltages from 1KV (Um)= 1,2KV up to 30KV (Um)=36KV
		6.4 Socket Outlets
		IEC 60309 Plugs, socket-outlets and couplers for industrial purposes
		BS 1363-1 13A plugs, socket-outlets and adaptors. Specification for rewirable and non-rewirable 13A fused plugs13 A
		6.5 Lighting System
		IEC 60598 Luminaries
		EN 12464-1 Light and lighting of work places

		EN 1838 Lighting applications-emergency lighting
		IES LM 37 Determination of average luminance of indoor luminaries
		IES LM 64 Photometric measurements of parking areas
		6.6 Lighting Protection System
		IEC 62305 Protection against lightning
		6.7 Substation Automation and Supervision
		IEC 61850 Communication networks and systems in substations

8.2 Materials Requirements and Compliance with Standards

This section relates to the performance requirements for each material, trade or action required to undertake the Works.

The Project Specification Division 1 to Division 16 (except Division 12: Furnishings) describes detailed requirements related to the Project Site preparation, Site construction (earthwork and utility), and construction materials, the standards and testing methods to be complied and used.

The Project Specification Division 12: Furnishings shows detailed requirements of fit-out materials (i.e. product description, dimension, quantity, type, and product source) to be supplied and installed in each room of the National Library buildings.

The Contractor shall undertake the detailed items of Works under Clause 6.4 (Stage B: Construction) and Clause 6.5 (Stage C: Fit-out) in compliance with the relevant standards as specified in the Divisions of the Project Specification and to the satisfaction of the Local Authority.

8.3 Testing Requirements

The Contractor shall carry out and be responsible for undertaking all tests as required in the Clause 8.2 (Materials Requirements and Compliance with Standards).

8.3.1 Testing by the Contractor

The Contractor shall provide all apparatus, assistance, documents and other information, temporary supplies of electricity and water, equipment, instruments, labour, materials, and suitably qualified, experienced and competent staff as necessary to carry out the specified tests. All apparatus, equipment and instruments shall be calibrated in accordance with the applicable Laws and, if requested by the Engineer, the Contractor shall submit calibration certificates before carrying out testing.

The Contractor shall give a Notice to the Engineer, stating the time and place for the specified testing of any Plant, Materials and other parts of the Works. This Notice shall be given in reasonable time, having regard to the location of the testing, for the Principal's Personnel to attend.

The Engineer may request variations and adjustments, vary the location or timing or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract and Project Specification, the cost and any delay incurred in carrying out this variation shall be borne by the Contractor.

The Engineer shall give a Notice to the Contractor of not less than 48 hours of his/her intention to attend the tests. If the Engineer does not attend at the time and place stated in the Contractor's Notice under this Clause, the Contractor may proceed with the tests, which tests shall then be deemed to have been made in the Engineer's presence.

In the event that any Plant, Materials and other parts of the Works fail to pass a specified test or if, as a result of an examination, inspection, measurement or testing, any Plant, Materials, design or workmanship is found to be defective or otherwise not in accordance with the Contract and Project Specification, the Engineer shall give a Notice to the Contractor describing the item of Plant, Materials, design or workmanship that has been found to be defective. The Contractor shall then promptly prepare and submit a proposal for necessary remedial work.

8.3.2 Tests on Completion

The Contractor shall carry out the Tests on Completion in accordance with this Clause and Clause 8.3.1 (Testing by the Contractor), after submitting the As-Built Records and Operation and Maintenance Manuals documents.

8.3.3 Tests after Completion

The Contractor shall give a Notice to the Engineer, of not less than 21 days, of the date after which the Contractor will be ready to carry out each of the Tests on Completion. The Contractor shall commence the Tests on Completion within 14 days after this date, or on such day or days as the Engineer shall instruct, and shall proceed in accordance with the Contractor's test programme to which the Engineer has given (or is deemed to have given) a Notice of No-objection.

The Tests on Completion shall be carried out in stages in the following sequence:

(a) commissioning tests, which shall including the operational tests specified in the Principal's Requirements to demonstrate that the Works or Section can be operated safely and as specified in the Principal's Requirements, under all available operating conditions; and

(b) trial operation (to the extent possible under available operating conditions), which shall demonstrate that the Works or Section perform reliably and in accordance with the Contract.

During trial operation, when the Works or Section (as the case may be) are operating under stable conditions, the Contractor shall give a Notice to the Engineer that they are ready for any other Tests on Completion, including Performance Tests. Performance Tests shall be carried out to demonstrate whether the Works or Section comply with the performance criteria specified in the Principal's Requirements and with the Schedule of Performance Guarantees.

Any product produced by, and any revenue or other benefit resulting from, trial operation under this Sub-Clause shall be the property of the Principal.

As soon as the Works or Section have, in the Contractor's opinion, passed each stage of the Tests on Completion, the Contractor shall submit a certified report of the results of these tests to the Engineer.

The Contractor shall promptly forward to the Engineer duly certified reports of the tests. When the specified tests have been passed, the Engineer shall endorse the Contractor's test certificate, or issue a test certificate to the Contractor.

9 PERFORMANCE MEASUREMENT & REPORTING

9.1 Progress Reporting

The Contractor shall use Earned Value (EV) method to present analysis and graphs which will allow the Engineer and other relevant parties to track and monitor progress and forecast where the project will end up in terms of both schedule and spending.

The Contractor shall report as follows:

- Two (2) copies of monthly progress reports, in the format specified in 9.3 and submitted to the Engineer.
- The first report shall cover the period up to the end of the first month following the Commencement Date.
- Reports shall be submitted monthly thereafter, each within 7 days after the last day of the month to which it relates.
- Reports shall include curves showing planned and actual progress percentages, together with a statement of work which has not been achieved to schedule and the actions being taken by Contractor to remedy delays.
- Actual physical progress in the field shall be measured upon physical progress measurement procedure prepared by Contractor and approved by Principal. Actual physical progress shall be calculated for each activity from lowest level (job phase) up to highest level of each category of the Work.

9.2 Performance Status Review Meeting

Periodic project status review meetings shall be held monthly or at any time as requested by Principal. It may also be necessary to hold review meetings at regular intervals at management levels as deemed necessary by Principal. Such meetings shall generally be arranged at the place of activity concerned.

Contractor must take minutes of Project and Site meetings held with the Principal and stakeholders, including such details as, but not limited to, the Project Scope, Program Overview, Key Milestones, Health, Safety, Environmental and Quality Issues, progress for the period and project cost controls. Contractor must distribute minutes to the Principal for signature.

The Contractor shall include in the performance status and review meetings all records of:

(a) occupations and actual working hours of each class of Contractor's Personnel;
(b) the type and actual working hours of each of the Contractor's Equipment;
(c) the types of Temporary Works used;
(d) the types of Plant installed in the Permanent Works; and
(e) the quantities and types of Materials used

9.3 Format of Drawings and Reports

All Deliverables shall be submitted to Principal in both soft and hard copy.

English language shall be used exclusively for all reports and drawings. All engineering and design data, specifications and drawings including technical information for Materials, inclusive of vendor documents and drawings shall be in English with consistent use of SI units of measurements.

Where the Contractor is required to provide a drawing or report under this Scope of Work deliverables must be provided to the Principal in the following format (unless agreed otherwise with the Principal):

Deliverable	**Format**	**Copies**
Drawings	To be provided electronically to the Principal in AutoCAD format (.dwg) and as PDF files. Contractor must also provide 3 physical copies of the drawings to the Principal in colour.	1 x electronic 3 x original physical copies
Reports (Progress & Final)	To be provided electronically to the Principal in a Word file using the templates below (if the report contains drawings then the drawings must be provided in the format above). Electronic documents must comply with document naming conventions required by the Principal. A naming convention guide will be provided by Principal The Drawing & Report title, project name, contract number, and date shall appear on the coversheets of all documents. Divide volumes into logical sections. Include an opening summary or overview.	1 x electronic

Project specific details that describe every item in the building ordered into the following sections:

- Civil, Site Works, preliminaries
- Architectural
- Structural
- Hydraulic
- Electrical
- Equipment schedules
- Door and Window furniture schedules Fittings schedules
- Finishes schedule
- Color Schedules

Please use the following templates for progress and final reports.

Contractor's Logo

PROGRESS REPORT

Date:

Contract Name: Design and Construction including Fit-out of the National Library of Timor-Leste

Contract Number:

Monitoring Period:						
No.	**Description**	**Output Expected**	**Actual Output**	**Difference**	**Observation (Action to be taken)**	**Currency (USD)**
Total budget which has utilized during monitoring period						
Total budget which has utilized to this project implementation						

Narrative Report

Contractor's Logo

FINAL REPORT

Contract Name: Design and Construction including Fit-out of the National Library of Timor-Leste				
Contract No.:				
Duration: From dd/mm/yy to dd/mm/yy				
Monitoring period: Final Report				
Expected results / Project purpose		**Outcome Indicator**	**Achieved Result**	**Comment**
Overall Objectives:				
Specific Objective:				
No.	**Description**			

Narrative Report

10 CLOSE-OUT: COMMISSIONING AND HANDOVER

Prior to handover, the Contractor must commission all building services and equipment to fully operational status.

10.1 Construction Validation

Construction validation must be performed by the Contractor to ensure that the Works conform to the Contract Documents, relevant best practices standards and the functional and performance requirements of the Contract.

10.2 Commissioning

The Contractor shall provide the coordination and follow-up of the execution of the commissioning process, to ensure to receive the National Library in accordance to the defined scope of work and specifications.

The Contractor must undertake the process of construction validation after all building and series components have been commissioned.

For all commissioning and testing, the Contractor must ensure the performance and operation of all systems and each item of equipment specified. The Contractor must ensure that systems are operating stably and reliably for the Principal's operation and that the as-built drawings and Operational Manuals have been provided.

The Engineer shall verify the proper running of the components (equipment, machinery and related control systems) and to conduct the Quality and Performance Test against the design specifications.

The Principal will carry out a commissioning close out once the commissioning activities are complete and the National Library facility accepted with the issuance of the provisional acceptance certificate. The closeout consists mainly ensuring that the handover documentation is properly prepared and organized in accordance to the commissioning and handover protocols.

The non-compliances are registered in a "Punch List".

10.3 Defects

Prior to Practical Completion, defects inspections of the Works by the Engineer and its Supervision Consultant are required. These inspections are to provide examination and assessment of the Works as applicable for Practical Completion. The Contractor must organise and coordinate defects inspections with the Engineer and its Consultant and the Engineer and its Consultant will prepare the defects lists.

10.4 Cleaning

10.4.1 During Building Operations

The Contractor must make full provision for the daily removal of all rubbish, debris and redundant materials to ensure the clean and orderly performance of the Works.

All materials delivered for incorporation into the Works shall be tidy and stacked and stored in a safe manner.

The Contractor must remove all plant and Contractor's Equipment no longer required as soon as possible.

10.4.2 On Completion

All of the following will be undertaken prior to the National Library being occupied by the Principal or end user:

General

Each area on completion all surfaces, including walls, floors and ceilings shall be thoroughly and carefully cleaned including scrubbing, polishing and dusting, as necessary, to leave in perfect order.

Glass

All glass shall be cleaned by approved expert cleaners and all paint stains, putty smears etc., removed without damage to glass, frames or surrounding surfaces.

Finishes:

All surfaces including internal and external walls, ceilings and floors will be carefully cleaned and any excess or overspray of all paint, cement, plaster, putty smears removed.

External:

All debris from the entire Site will be removed including removal all debris, nails, washers and all objects from the entire roof surfaces and gutters.

Painting, colouring etc.:

Painting, colouring etc. shall be handed over in perfect order. Touch-up, repaint, etc., as may be required to remove any stain, marks or blemishes prior to the actual occupation of the rooms concerned by the Principal shall be provided.

Locks:

Immediately prior to handing over all window and door locks must be oiled.

Keys:

All keys (including master keys) properly labelled, together with a register must be handed over direct to the Engineer.

Maintenance

Within two weeks of the date of Practical Completion, the Contractor must provide maintenance procedures for all items of plant and equipment. The Contractor must also provide a comprehensive maintenance report for the end user's ongoing building maintenance including internal and external finishes.

10.5 Handover

The Contractor shall ensure the coordination and follow-up of a proper handover process, to ensure that infrastructure facility operation and maintenance protocols are handed over to the Operator and properly understood.

The whole project file including the As Built Drawings, Operation and maintenance manuals must be handed over to the Principal..

Prior to occupation, the Contractor shall carry out training of employees of the End User in the operation and maintenance of the National Library facility and any other aspect of the scope of Works.

The Contractor must provide in-situ training to nominated National Library Directorate staff (approximately 5 persons) in the operation and maintenance of all integrated building & fit out services (such as lighting, air-conditioning, as well as equipment and provide "How To..." reminder sheets in each room for future reference.

In addition, the Contractor must:

- Prepare and install Emergency Egress Maps in appropriate locations throughout the National Library and provide training to nominated staff
- Provide all required Operational and Maintenance Manuals within 7 Calendar Days of Practical Completion (including two sets of data CD's).
- Provide advice and training to nominated staff on all maintenance requirements.

This is likely to include matters such as:

- Emergency Generator – maintenance, fuel supplies etc.
- Mechanical & Electrical Services
- Fire Services
- Air-conditioning

The Contractor shall prepare, and keep up-to-date, a complete set of "as-built" records of the execution of the Works, showing the exact as-built locations, sizes and details of the work as executed by the Contractor. The format of the as-built records and the number of copies of as-built records to be submitted by the Contractor shall be as stated in the 9.3.

The Contractor shall submit to the Engineer:

(ii) the as-built records for the Works or Section before the commencement of the Tests on Completion; and

(iii) updated as-built records to the extent that any work is executed by the Contractor:
  - during and/or after the Tests on Completion, before the issue of Certificate of Practical Completion; and
  - after Certificate of Practical Completion the Works and Sections, before the issue of the Performance Certificate.

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