

I. SUMMARY OF WORKS

1.0 Introduction

The Works in this Contract is for the **CONSTRUCTION OF RESEARCH HUB FOR AGRICULTURE AND ALLIED SCIENCES** to be located at PSHS-SRC Campus Complex, Barangay Paraiso, City of Koronadal, South Cotabato. The PSHS-SRC PMO engineers shall perform the construction management services including the management of project deliverables and all issues arising from this Contract Document.

1.1 Name of Project

The Project shall be named: CONSTRUCTION OF RESEARCH HUB FOR AGRICULTURE AND ALLIED SCIENCES

1.2 Start and Completion Dates

The Contractor shall be held responsible for meeting intermediate dates as contained within the attached documents. Such dates are binding, and damages will apply to intermediate as well as end dates:

Start on Site : Based on date stipulated on Notice to Proceed
Punch listing : 30 days before completion
All Works Complete : _____ calendar days

1.3 Work Areas

All works shall be done within the confines of the lot boundaries. Provide temporary work enclosures on all sides affected by renovation works. Provide appropriate announcement boards and safety signage, to include all construction permits and clearances.

2.0 Scope of Work – General

The Scope of Work includes the furnishing of all labors, materials, equipment, and tools including supervision necessary to complete all the Works stated herein. All Works are to be complete in accordance with the Contract Documents and as directed by the PSHS-SRC to result in a completely functional facility.

The Scope of Work shall consist of the following in accordance with the Drawings and Specifications, including Supplemental Agreement but is not limited to the following;

2.1 Site Works

- a. Health, Safety, & Environment
- b. Security
- c. Temporary Enclosures
- d. Clearing of site and disposal off-site debris, etc
- e. Construction safety, and providing of peripheral hoarding
- f. Soil treatment for subterranean termite control
- g. Excavation and backfilling for plumbing/sanitary and drainage including septic vault system
- h. Filling and grading, bedding, backfilling of structural excavations, and compaction
- i. Preparation of sub-grade for slab-on-grade and or pavements, and final site grading all as shown on Drawings.

2.2 Structural Works

- a. Structural concrete including steel reinforcements and formworks
- b. Structural steel and miscellaneous metal, and anchorages
- c. Masonry works and plastering
- d. Roof truss and framing works
- e. All other structural steel works as indicated in drawings

2.3 Architectural Works

- a. Roofing, flashings, rain gutter, etc
- b. Installation of all doors (wooden, steel, and glass) and windows (fixed, awning, sliding)
- c. Painting works, general(Interior, cabinetries, and Exterior)
- d. Concrete finishes as shown or as indicated in drawings
- e. Tiling and wall finishes as indicated in drawings
- f. Ceiling works as indicated in drawings
- g. Construction of drywalls/partitions as indicated in drawings
- h. Installations of hardware.

2.4 Plumbing/Sanitary Works

- a. General Plumbing Works for toilets and pantries as indicated in drawings
- b. Construction of septic tank.
- c. Tapping of toilet drain to septic tank and connection of outflow to water collection areas or existing main street drainage.
- d. Domestic water supply system to include pump installation, construction of cisterns and installation of stainless steel overhead storage tanks, and tapping to source.
- e. Installation of all Plumbing Fixtures (water closets, lavatories, urinals, sinks, foot baths, etc) as indicated in drawing
- f. Construction of catch basins as indicated in drawings. Tapping of catch basins to main storm drainage.
- g. Installation of downspouts and construction of catch basins and tapping to existing storm drain
- h. Provision and installation of Siamese outlet, dry standpipe, fire house cabinets .

2.5 Electrical Works

- a. Electrical wirings and cabling for lights & power supply
- b. Service Entrance and meter connections
- c. Grounding system and lightning arrestors
- d. Provision and installation Lighting fixtures, switches, receptacles, and outlets
- e. Conduits system and junction boxes
- f. Panel Boards
- g. Provision and installation of Emergency lights, Illuminated Exit signs as indicated in drawings

2.6 Mechanical Works, Fire Protection System, Ventilation

- a. Provide drain pipes and power supply for air conditioning units as indicated in drawings
- b. Provision and installation of air conditioning units
- c. Provision and installation of window aircon steel cages and condenser stand as applicable
- d. Provision and installation of all exhaust fans
- e. Provision and installation of fire sprinkler system including cistern and pumps

2.7 Electronics and Communications

- a. Provision and Installation of complete CCTV system as indicated in drawings
- b. Provision and installation of public address system
- c. Provision and installation of Fire detection and alarm system.

2.8 Specialty

- a. Provision of Modular toilet partitions as indicated in plans and drawings
- b. Construction of Lavatory and sink Counters
- c. Provision and installation of Toilet Paper and soap Holders
- d. Provision and installation of Liquid Soap Dispenser
- e. Provision and installation of Stainless Grab bars (for PWD toilet)
- f. Fabrication of modular Cabinets
- g. Provision and Installation of signages

2.9 Moisture Protection

- a. Waterproofing of all elevated toilet floors
- b. Waterproofing of all concrete gutter
- c. Waterproofing of exposed deck
- d. Provision and Installation of roofing

2.10 Furniture

2.11 Thermal Protection

- a. Provision and Installation of Roofing Insulation

2.12 Glass and Glazing

- a. All Glass works as indicated in drawings.
- b. All Mirrors for toilet

2.13 Land Development

- a. Landfill as indicated in drawings and BOQ

2.14 Pre-commissioning, Commissioning & Completion

- a. Method Statement
- b. Program

- c. Test Equipment
- d. Demonstration
- e. Documentation

2.15 As-Built (Record) Drawings & Related Documents

3.0 GENERAL REQUIREMENTS

3.1 General

Unless otherwise definitely excluded, the Works to be executed and the materials and equipment to be supplied shall include all necessary provision for a complete and satisfactory working and or functional installation. **Minor items that are necessary in normally accepted trade practice with installations of this type though not specifically mentioned shall be included.**

3.2 Regulations, Permits & Certificates

- a. All works covered by this specification shall be complete and functional in all respects and shall comply with the rules, regulations and requirements of local authorities having jurisdiction over the installations and all other relevant statutory requirements.
- b. The Contractor shall apply for all local authority necessary permits and certificates. These shall include but are not limited to building permits and associated construction permits. The timing for the applications shall be such that, to the opinion of PSHS-SRC PMO Engineer, the overall work progress will not be affected.
- c. Upon completion of the Works, the Contractor shall carry out all necessary tests on the various systems of the installations as required by PSHS-SRC PMO Engineer or the local authorities, and shall apply for and obtain all certificates and approval from the relevant authorities for the work done and shall submit same to PSHS-SRC PMO Engineer.
- d. The Contractor shall arrange for local authority's inspections and obtain the required approval and permits or certificates from the local authority at a time as directed by PSHS-SRC PMO Engineer. The Contractor is to note that the contracted works will not be considered as practically complete prior to the receipt of the approval of certificates.

3.3 Materials & Workmanship

All materials and equipment used in the Works shall be new and best in quality, design and performance. All materials used shall be of the quality specified and where not specified shall be in accordance with the relevant Standards acceptable by the Architect.

All materials and work necessary for the efficient functioning of the installation shall be provided even if not explicitly mentioned in the Contract Documents

All works shall be carried out to the best engineering practice by fully competent tradesmen.

3.4 Survey Control & Setting Out

Contractor shall set out the works and employ methods, procedures, and appropriate plant or equipment to ensure that excavations and construction shall be completed within the tolerance specified in the Contract. The setting out and installation of all works shall follow the approved drawings except for approved site variations. The Contractor shall work from established datum for finish floor levels.

The Contractor shall ensure that all reasonable measures are taken to ensure that the survey control points are not disturbed from their correct positions. The Contractor shall immediately notify the PSHS-SRC PMO Engineer if a survey control point has been disturbed.

The Contractor shall plan their activities and coordinate with the PSHS-SRC PMO Engineer providing reasonable notice for survey control activities.

3.5 Delays

In the event the Contractor falls behind the Project Schedule, then he may be required to accelerate his work. In such cases, the Contractor shall immediately apply appropriate extra resources at his own expense until such time as the schedule slippage has been recovered.

3.6 Normal Working Hours

The Site is open for access from 6:00am to 7:00pm, Monday to Saturday. Contractor shall ensure that their personnel complete their work in a safe manner and leave the work site by not later than 7:00pm Monday to Saturday.

Site working hours will generally be from eight hours a day, six (6) days a week with 1 hour noon break.

Work on the site outside those hours can only proceed if authorized in advance by the PSHS-SRC PMO Engineer and where approved the Contractor shall ensure that:

- No person shall work more than 12 hours within a 24-hour period
- Contractor shall maintain regular hours of work for all their personnel and provide a schedule of personnel movements to the PSHS-SRC PMO Engineer at the weekly progress meeting.

No allowance of public holiday has been made for legal and special holidays.

The Contractor is assumed to be aware of the Site Normal Working Hours and to have made sufficient allowance for all necessary overtime and shift work as needed and as directed.

3.7 Works beyond Normal Working Hours

If the Contractor wishes to carry out work beyond or outside working hours, then an application shall be made to PSHS-SRC PMO Engineer in ample time to enable satisfactory arrangements to be made for inspecting the work in progress. During periods of darkness the Contractor shall provide lighting to the approval of PSHS-SRC PMO Engineer

3.8 Clean Installation

The Contractor shall be liable for clean installation works on the site and shall closely supervise compliance thereof. To assure clean installation works on the site, PSHS-SRC PMO Engineer will impose cleaning and gowning practices to the Contractor. The Contractor shall instruct all his staff, personnel of these obligations and provisions. The Contractor shall be liable for cleaning within the area of his scope of works and exact compliance thereof.

The Contractor shall provide adequate training to his personnel on site with respect to the ruling clean construction and clean installation practices. The Contractor shall be obliged to make their personnel to attend such training, supply by PSHS-SRC PMO Engineer or others.

The Contractor shall assign a person expressly dedicated to:

- a. The wet/dry cleaning of working areas on a daily basis;
- b. The removal of litter and waste from working areas to refuse containers off the site;
- c. The removal of excess materials and or waste materials from working areas and maintenance of a material recovery facility.

3.9 After Contract Award & Prior to Mobilization

After the Contract award and prior to Mobilization, the Contractor shall:

- a) Submit Safety Management Plan (SMP) specific to the project clearly stating how the Contractor intends to execute the Works. The SMP shall be supported by a description of the safety administration system to be maintained on the site and specific safe work procedures to be employed by the Contractor's personnel and sub-contractors
- b) Nominate a Site Safety Officer, supported by evidence of qualifications and experience
- c) Complete site entry documentation packages for all personnel including subcontractors

3.10 Upon Mobilization to Site

The Contractor shall submit the following to PSHS-SRC PMO Engineer prior to the commencement of work at site;

- a) Copies of all certificates of Competency for the Contractors and subcontractor personnel, to be presented at their site safety induction
- b) Names of persons authorized to operate cranes, to be used at site (if applicable)
- c) Names of authorized power tools operators.
- d) Copies of inspection certificates for any classified equipment the Contractor or subcontractor will bring on Site.
- e) Completed site access documentation for all vehicles and mobile plant including that of subcontractors
- f) Record of inspection and tagging of all Contractor and subcontractor owned electrical equipment
- g) A register of any hazardous substances the Contractor or subcontractors will bring to site supported by relevant Material Safety Data Sheets (MSDS)
- h) The Contractor shall table the above at the initial **kick-off meeting** convened by the PSHS-SRC PMO Engineer

Note:

Where a Contractor has not provided the required deliverables or the deliverable are not approved by the PSHS-SRC PMO Engineer, access to the Site or approval to commence work will be withheld.

3.11 PRIORITY OF DOCUMENTS

- a. The Contract agreement
- b. The letter of acceptance
- c. Agreed letters, minutes of meetings, and other communications during clarifications or negotiation prior to award.
- d. The General Conditions& Specification
- e. Building Plans

- f. Bill of Quantities
- g. Instruction to Bidders

II. CONSTRUCTION MANAGEMENT, RULES AND REGULATIONS

1.0 Site Management

All construction activities on site will be managed by the PSHS-SRC PMO Engineer.

Contractor will be advised of the person holding this position when requesting approval to mobilize to Site.

PSHS-SRC PMO Engineer shall be available to provide assistance to and work with Contractors in order to ensure effective communication; appropriate safety practices and procedures are implemented and maintained during the entirety of the Contract.

PSHS-SRC PMO Engineer, Health & Safety Officer and Discipline Supervisor shall conduct regular/periodic inspections and audits of Contractor's work practices and safety management systems in conjunction with the Contractor

PSHS-SRC PMO Engineer requires that all Contractors and their Sub-contractors demonstrate in the performance of their work, that their application of safety is an integral part of their normal business process and not as aspect that can be discarded by executive discretion in the interests of commercial expediency.

Contractors shall comply with the PSHS-SRC PMO Engineer site safety requirements

PSHS-SRC PMO Engineer may in his sole discretion suspend the work or any part thereof for such periods as he thinks fit if, in his opinion, the Contractor has failed or neglected to comply with the site safety requirements, applicable laws and regulations. In this event, the Contractor shall not be entitled to and shall not claim any extension of time for this Contract or additional compensation for delays due or attributed to the Contractor's failure or neglect.

Safety shall be the first agenda item at all formal meetings convened by the PSHS-SRC PMO Engineer with the Contractor(s).

2.0 Contractor's General Obligations

The Works as completed by the Contractor shall be wholly in accordance with the Contract and fit for the purpose for which they are intended, as defined in the Contract. The Works shall include any work which is necessary to satisfy Employer's requirements, or is implied by the Contract but which may be inferred to be necessary for stability or completion or the safe, reliable and efficient operation of the Works. The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations, of all methods of construction and of all the Works, irrespective of any approval or consent by the PSHS-SRC PMO Engineer or the duly designate Employer's representative.

3.0 Contractor's Representative

Unless the Contractor's representative is named in the Contract, the Contractor, shall upon the signing of the Contract, immediately submit to the Employer's Representative for consent of the name and particulars of the person the Contractor proposes to appoint. The Contractor shall not revoke the appointment of the Contractor's Representative without prior consent of the PSHS-SRC PMO Engineer.

The Contractor's Representative shall give his whole time to directing the construction activities. Except or otherwise stated in the Contract, the Contractor's Representative shall sign, receive (on behalf of the Contractor) all notices, official written correspondence, instructions, certificates, consents, approvals, and other communications under the Contract. The Contractor's Representative may delegate any of his powers, functions, and authorities to any competent person, and may at anytime revoke any such delegation. Any such delegation or revocation shall be in writing and shall not take effect until the Employer's Representative has received prior notice signed by the Contractor's Representative, specifying the powers, functions and authorities being delegated or revoked.

4.0 Contractor's Superintendence, and Personnel

The Contractor shall provide all necessary superintendence during the execution of the Works, and as long thereafter as the Employer's Representative may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. Such superintendence shall be given by sufficient persons having adequate knowledge of the operations to be carried out including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents for the satisfactory and safe execution of the Works

The Contractor shall employ only persons who are careful and appropriately qualified, skilled and experienced in their respective trades or occupations.

Minimum Technical Personnel to be assigned to the project:

1. Construction Manager/ Authorized Owner's designated representative who will take charge of all communication with PSHS_SRC
2. Full time Project Engineer/Supervisor (must be licensed Civil Engineer or Architect) with at least 10 years experience in vertical construction supervision
3. Certified Construction Safety Officer who have completed at least 40 hrs of COSH training with at least 3 years experience
4. Master Electrician with at least 5 years experience
5. Experienced Plumber with at least 5 years experience
6. Skilled Mason/Tiler (minimum 3 years experience)
7. Skilled Finishing Carpenter(minimum 3 years experience)
8. Skilled Glass Installer with nat least 3 years experience
9. Skilled Finishing Painter(minimum 3 years experience)
10. ECE Technician with at least 3 years experience
11. Certified Fire Sprinkler Installer with at least 5 years experience

The Employer's Representative may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative, who in the opinion of the Employer's Representative:

- a. Persist in any misconduct
- b. Is incompetent or negligent in the performance of his duties
- c. Fails to conform with any provision of the Contract, or
- d. Persist in any conduct which is prejudicial to safety, health, or the protection of the environment

If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

5.0 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful or disorderly conduct by or amongst his staff, labor, and to preserve peace and protection of persons and property in the neighborhood of the Works against such conduct.

6.0 Programme

The Contractor shall submit to PSHS-SRC PMO Engineer, for information, within the time as agreed during the Project kick-off meeting. The programme shall include the following:

The order in which the Contractor proposes to carry out the Works (including each stage of design (if any), procurement, manufacture or fabrication, delivery to Site, construction, erection, test and commissioning)

All major events and activities in the production of Shop Drawings

The sequence of all tests as herein specified

7.0 Progress Reports

Weekly progress reports shall be prepared by the Contractor and submitted to PSHS-SRC PMO Engineer in three (3) copies. The first report shall cover the period up to end of the week after the Commencement Date occurred. Progress report shall include:

- Photographs and detailed descriptions of progress including each stage of construction activities, fabrication, delivery to the Site, erection
- Records of personnel and Contractor's equipment on Site
- Copies of quality assurance documents, test results and certificates of materials
- Safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and
- Comparisons of actual and planned progress, with details of any aspects which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome aspects.

8.0 Contractor's Equipment

Unless otherwise stated elsewhere, the Contractor shall provide all his equipment necessary to complete the Works. All of the Contractor's equipment shall, when brought to the Site, be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any such Contractor's equipment without the consent of the PSHS-SRC PMO Engineer. The Contractor shall provide the following minimum tools and equipment solely for the project.

2-bar cutters

- 1-lot minor tools/hand tools
- 2-Tile Cutters
- 2-unit 1-bagger concrete mixer, engine driven
- 2-concrete vibrator, at least 1-1/2 vibrator tip, oscillating type
- 1-standby power generator set as back-up
- 1 unit pay loader
- 1 unit backhoe
- 2 unit dumptrucks
- 1 unit Utility vehicle
- 1 unit jackhammer
- 1 unit Submersible pump with hose
- 1 unit fan blower
- 1 unit air compressor
- 2 unit welding machines
- 2 unit vacuum cleaners
- 2 unit electric grinders
- 2 unit electric drills

9.0 Matters Affecting the Execution of the Works

The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Contract Price. Unless otherwise stated in the Contract, the Contract price shall cover all his obligations under the Contract (including those under Provisional Sums, if any) or covered by Supplemental Agreement and all the things necessary for the proper execution and completion of the entire Works and the remedying of any defects.

10.0 Unforeseeable Sub-surface Conditions

If sub-surface conditions are encountered by the Contractor which in his opinion was not foreseeable, by an experienced contractor, The Contractor shall give notice to the Employer's representative so that the employer's representative can inspect such conditions. After receipt of such notice and after his inspection and investigation, the Employer's representative shall, if such conditions were not foreseeable by an experienced contractor, proceed to agree or determine:

- a. any extension of time to which the Contractor is entitled
- b. the additional cost due to such conditions, which shall be added to the Contract Price and shall notify the Employer accordingly.

11.0 Quality Assurance

Unless otherwise stated elsewhere, the Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. Such system shall be in accordance with the applicable Industry Codes and Standards. Compliance with the quality assurance system shall not relieve the Contractor of his duties, obligations and responsibilities.

12.0 Plant, Materials and Workmanship

All Plant, Materials to be supplied shall be manufactured, fabricated, and all work to be done shall be executed, in the manner set-out in the Contract. Where the manner of manufacture and execution is not set out in the Contract, the Work shall be executed in a proper, workmanlike and careful manner, with properly equipped facilities and non-hazardous Materials, and in accordance with recognized good practice.

13.0 Inspection

Any inspection or check by the PSHS-SRC PMO Engineers or representatives of the company of any materials or equipment or of the placing or setting of such materials or equipment during the progress of work shall not relieve the contractor of any of his responsibilities.

The Employer's Representative shall be entitled, during manufacture, fabrication and preparation at any places where work is being carried out, to inspect, examine and test the materials and workmanship, and to check the progress of manufacture, fabrication, of all Plant and Materials to be supplied under the Contract.

The Contractor shall give due notice to the PSHS-SRC PMO Engineer whenever such work is ready or about to be covered up or putting out of view. The PSHS-SRC PMO Engineer of Staff shall then carry out the inspection, examination, measurement, or testing without unreasonable delay, or notify the Contractor that it is considered unnecessary.

14.0 Testing

If the Contract provides for tests other than the Test after Completion, the Contractor shall provide all documents and other information necessary for testing and such assistance, labor, materials, electricity, fuel, stores, apparatus and instruments as are necessary to carry out such tests efficiently. The Contractor shall agree, with the PSHS-SRC PMO Engineer, the time, place for the testing of Plant or Material or any other parts of the Work as specified elsewhere in the Contract Documents. After tests are completed, the Contractor shall forward to the PSHS-SRC PMO Engineer duly certified copies of the tests for his review and acceptance.

15.0 Rejection

If, as a result of inspection, examination or testing, the PSHS-SRC PMO Engineer decides that any Plant, Materials, workmanship is defective or otherwise not in accordance with the Contract, the PSHS-SRC PMO Engineer may reject such Plant, Materials, or workmanship and shall notify the Contractor promptly, stating his reasons. The Contractor shall promptly make good of the defect and ensure that the rejected item complies with the Contract.

If the PSHS-SRC PMO Engineer requires such Plant, Materials, or workmanship to be retested, the test shall be repeated under the same terms and conditions. The cost of retesting as a result of the rejection shall be borne by the Contractor.

16.0 Substitute Equivalent Materials

If during the course of the Work certain materials required for the use in the Work become unobtainable despite the efforts of the Contractor, then it may offer a substitute equivalent or higher in quality materials for the approval of the Architect. These substitute materials nevertheless be suitable and appropriate for use in the Work. Acceptance or rejection of such substitute materials shall be at the sole discretion of the Architect. The Contractor shall not be entitled to any additional cost incurred as a result of any material substitution of higher quality or its efforts to locate such materials.

17.0 Site Rules

17.1 Security Program

The Contractor is responsible for the security of its workers, tools materials, and equipment on (and to and from) the jobsite and for keeping unauthorized persons off the Site.

Authorized persons shall be limited to the employees of the Contractor, employees of his Sub-contractor, and persons authorized by the Employer or PSHS-SRC PMO Engineer.

It is permitted to bring in or take out of the Site goods (materials, tools, equipment, appliances, etc.) that are the property of the Contractor, on the condition that these items are necessary to carry out the assigned works.

The Contractor shall ensure that all materials, tools, equipment, appliances, etc. are clearly marked and recognizable as his property.

It is forbidden to bring photographic, film and video equipment onto the premises.

Tools including personal tools are subject to inspection at the security gate on arrival and departure.

17.2 Construction Area Limits

PSHS-SRC PMO Engineer will designate the boundary limits of access roads, parking areas, and construction areas. Contractor's employee or workers shall not trespass in or on areas not so designated. Contractor shall be responsible for keeping all of its personnel out of areas not designated for Contractor's use. In the case of isolated work located within such areas, PSHS-SRC PMO Engineer will issue permits to specific Contractor personnel to enter and perform the Work.

17.3 Work Permit, Inspection Request Applications

Before commencement of the work on Site, the Contractor shall complete and apply for a Permit to Work (PTW) from PSHS-SRC PMO Engineer.

Before the start of activities with an increased level of risk, the Contractor shall apply for the applicable work permits from the PSHS-SRC PMO Engineer. The following work permits can be applied for:

- Permit to Excavate
- Permit to Work on Temporary Site Electrics
- Permit to Work on High Voltage Distribution
- Permit to Work on Mechanical Services
- Hot Work Permit
- Permit to Work in Confined Spaces
- Permit to Work at Location with Fire Risk

- Permit for Special Work
- Permit to Work Overhead
- Permit to Temporary Stop Work

17.4 Approval to Commence Work System

As part of the application procedure for the permits mentioned above and before commencing work, the Contractor shall complete a Permit to Work including the checklist (to be provided by PSHS-SRC PMO Engineer) attached to the Permit to Work together with any additional permits that may apply e.g. Hot Work Permit, Excavation Permit etc and submit a list with the work activities, the location, the tools and equipment, all potential hazards associated with the Work and the protective measures and provisions.

The Permit to Work shall be supported with the Contractor's Method Statement setting out how the work will be carried out or executed, Job Safety Analyses (JSA's) and the safety procedures that will be employed.

Review and approval of Permits will be by the PSHS-SRC PMO Engineer Discipline Supervisor or if unavailable, the PSHS-SRC PMO Engineer.

Approval of Permits to Work is contingent on the Contractor satisfying all relative requirements prior to start of work and when approved, the Contractor assumes responsibility for safe management and access control of the work area and activities the Permit to Work covers.

18.0 Contractor's Work Area

The Contractor will be allocated areas for materials lay down area, fabrication, offices and equipment. The Contractor must confine its storage and activities to these areas as nominated by the PSHS-SRC PMO Engineer.

The Contractor's work area shall be constructed and maintained by the Contractor at his own cost. Any access road constructed by the Contractor shall be adequate for applied traffic loads and to prevent damage to existing underground facilities. All temporary access roads are to be removed prior to completion, unless PSHS-SRC PMO Engineer directs them to be retained.

The Contractor shall provide proper and adequate drainage for its construction, storage, parking, and site fabrication areas including the necessary piping for disposal to designated ditches, or sewers. Temporary drainage facilities shall be removed upon completion of Work unless the PSHS-SRC PMO Engineer directs to have the facilities left in place. The Contractor shall be responsible for providing and operating any temporary pumps for keeping its area drained. The Contractor shall furnish and place any necessary surfacing material to avoid loss of time due to muddy conditions.

The Contractor or Subcontractor shall provide covered bins outside their workers area, workshops, offices and storage sheds in compliance with Environmental procedures.

19.0 Contractor's Office at the Site

During the performance of this Contract, the Contractor shall provide and maintain a suitable office at the Site that shall serve as his representative station to receive drawings, instructions, or other communication or articles. Any communication given to the said representative, or delivered at the Contractor's office at the Site of the Work in his absence, shall be deemed to have been delivered to the Contractor.

20.0 Entering and Leaving the Site

At all times when on Site, the Contractor's (and associated Subcontractors') employees shall conspicuously wear a Identification (ID) badge stating firm name, name of bearer, area clearance and period of validity.

The Contractor at his own cost shall provide the necessary ID to all of his employees and or Subcontractor's employees working either directly or indirectly under its supervision.

PSHS-SRC PMO Engineer shall provide for daily registration sheets to indicate presence on Site. Each employee of the Contractor is obliged to sign his/her presence on and off on the sheet every day.

At the request of Site security personnel or security guard, all Contractor employees may be subject to search and such request must be granted.

21.0 Use of Existing Building or Facility

- a. The Contractor under this contract will not be permitted to use the existing building or facility at the Site during the entirety of the Contract. The Contractor shall provide his own facilities such as toilet, first aid clinic, stores and the like. These facilities shall be maintained by the Contractor at his own expense.

22.0 Existing Facilities or Under-ground installations

- a. Prior to the start of the Work or any part of the work, the Contractor shall give notice to the PSHS-SRC PMO Engineer for the purpose of verifying the location of existing underground installations (ie: drainage culverts or utility lines) that may be affected by the works under this Contract.
- b. Any damage to existing facility or underground installations previously identified or located shall be repaired or reinstated by the contractor without any additional cost to the Company.

23.0 On-Site Conditions

The following activities are strictly not allowed inside the premises of the construction site.

- Living and cooking of any nature
- Smoking, except at designated smoking points
- Gambling of any kind throughout the work area.
- Eating of foods except at designated eating area.
- Bringing or taking of drugs of abuse, alcoholic drinks or liquors including at the car park under any circumstances. (Persons affected are not permitted on site and those caught will be dealt with accordingly)
- Firearms, weapons of any kind, and pet animals including any or those persons which are under the age of 18 years.
- Fighting on the construction site. Any persons caught fighting will be banned immediately from the construction site and shall turn over his ID badge to the site security.
- Selling of any goods or giving gifts
- Parking of bicycles, motor vehicles, scooters unless authorized by PSHS-SRC PMO Engineer. All such vehicles when permitted to enter site shall be parked in the designated area for this purpose. PSHS-SRC PMO Engineer shall not be held responsible or accountable of any loss or damage of such vehicles.
- Visitor's or relatives of personnel are not allowed to enter the project site except at the designated receiving areas for all visitors.
- Contractor's and or personnel vehicles are to be parked in the designated car park and are not to be taken on the job site at any time.

24.0 Wet Weather

In the event of wet weather, the Contractor or sub-contractor shall provide and place such means as is necessary, including the issue of wet weather gears, tarps, diverting water flow, use of pumps or other means to protect their personnel, plant, equipment, workplace facilities and the work area from rain.

25.0 Protection of the Environment, Prevention of Pollution

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations. The Contractor shall ensure that air emissions, surface discharges and effluent from the Site during the Contract Period shall not exceed the values indicated in the PSHS-SRC PMO Engineer environmental requirements, and shall not exceed the values prescribed by law.

The Contractor shall, at its own expense, take greatest care:

- a. to prevent the introduction of any substances or materials into any stream, or other body of water which may pollute water or constitute substances or materials deleterious to wildlife;
- b. to prevent discharge of air contaminants into the atmosphere in violation of the laws, rules and regulations of the government entities having jurisdiction;
- c. to prevent contamination of clean materials by waste material – environmental pollutants (paint, solvents, stripping agents, oil, grease, etc)
- d. to institute industry-accepted methods of dust control determined by PSHS-SRC PMO Engineer which are a cause from all excavations, haul, demolition works, waste disposal areas, construction and fabrication areas, and other areas such as continuous water sprinkling or any similar treatment acceptable to PSHS-SRC PMO Engineer. No separate payment will be made for dust control.

Mechanical plant or equipment which emit excessive noise, smoke, fumes, obnoxious liquids, gases, water will not be allowed to be used on Site

Constructing of surrounds of entire storage areas sufficient to contain or prevent overflows, leaks or spills of flammable liquids, drums or containers containing diesel fuel, oil, petrol, waste oil.

Environmental incidents shall be reported immediately to PSHS-SRC PMO Engineer.

26.0 Site Signs

Identification signboards and notices for safety or instruction are permitted on site only after review and approval of PSHS-SRC PMO Engineer for formal location and quantity.

Contractor shall post prominently signage indicating building permits and other compliances.

All posted safety and warning signs, barricades and tags on the construction site shall be obeyed at all times.

27.0 Construction Entrance

PSHS-SRC PMO Engineer will designate site entrance gate dedicated for Contractors use. This gate shall be manned by the Contractor's gateman to control site access of the Contractor's personnel and the gateman shall notify the receiving area when shipments are at the gate. No individual drive-in passes will be issued.

28.0 Utilities and Facilities

28.1 Power Supply

Power for the general use during the entirety of the Contract shall be the responsibility of the Contractor. The Contractor shall be responsible for arranging with the power utility firm in connecting into their existing power supply required by the Contractor. All costs incurred shall be borne by the Contractor. The Contractor will also be responsible for providing his portable construction power at times that no power is available from the utility firm to avoid disruption of work.

28.2 Water Supply

Water for construction purposes and potable water shall be the responsibility of the Contractor. The Contractor shall be responsible in coordinating with utilities firm for the connection of services to the construction site. The Contractor shall pay all costs associated with the connection and its consumption and shall allow for maintaining, and clearing same way on completion.

28.3 Toilets, Sanitary Facilities

The Contractor shall provide at its own expense all requisite approved sanitary facilities for its workmen, in an area selected or nominated by the PSHS-SRC PMO Engineer. These facilities shall be maintained and kept clean by the Contractor; on completion it shall completely dismantle and remove them. Any remaining refuse shall be disposed off site following PSHS-SRC PMO Engineer policies. It shall also fill in and disinfect all rubbish pits, latrines, etc and leave the entire area level and thoroughly clean.

29.0 Transport Costs

The cost of transporting the Contractor's equipment, construction plant, machinery services or construction items, transport of his personnel to and from Site, or any other goods, relating to the Works shall be borne by the Contractor.

The cost of loading and unloading of all materials, equipment, plant or other goods shall be borne by the Contractor.

Demobilizing and freight of the Contractors plant, and construction equipment from the Site is the responsibility and cost of the Contractor.

30.0 Damage to Existing Structure

The Contractor shall arrange to carefully expose any existing electric cables, water and sewer pipes, etc which may be encountered during the execution of the Work. It shall arrange to carefully support, and protect any such cables, or service pipes to the satisfaction of the PSHS-SRC PMO Engineer, in order that such services installation shall remain operative.

Any damage to the existing services installation, roads, fence, and other works, etc caused by the Contractor's workmen in the execution of their work or duties or otherwise shall be made good by the Contractor at its own expense.

The Contractor shall also take adequate precautions when excavating against or close to any existing structure. No excavation shall proceed in the vicinity of existing cables or service pipes or installations until the necessary permit to work has been issued to the Contractor. The Contractor shall provide adequate shoring or strutting to prevent the movement of any existing installation, as required by and to the satisfaction of the PSHS-SRC PMO Engineer.

31.0 Care of the Works

- a. The Contractor shall provide sufficient cover or protection to partially or virtually completed works. Any damage to the works shall be rectified or remedied by the Contractor at his own expense.
- b. The Contractor shall where necessary assign a full time watcher for this exercise without additional cost to the Company.

32.0 Test and Pre-commissioning

All works shall be subject to test from leaks using pressure testing in accordance with standard norms in the industry.

- a. Any non-conforming works shall be repaired by the Contractor without additional cost to the Company or any extension of contract time.

- b. The Contractor shall establish contemporary records of test and pre-commissioning which shall be submitted to the PSHS-SRC PMO Engineer or Owner's designate thereupon.

33.0 Acceptance Requirements

- a. Prior to acceptance of the Works by the PSHS-SRC PMO Engineer under this Contract, all works shall be fully operational, and free from any defect to the full satisfaction of the PSHS-SRC PMO Engineer and the Contract Owner.
- b. Upon acceptance, the Company will operate and maintain the system and will assume responsibility for maintenance and custodial service of the entire system except otherwise stipulated in the Conditions of Contract.

34.0 Rates of Wages and Conditions of Labor

The Contractor shall pay rates, and observe conditions of labor, not less favorable than those established for the trade or industry where the work is carried out. If no such established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions not less than favorable than the general level of wages and conditions observed by employers whose trade or industry is similar to that of the Contractor.

35.0 As-Built (Record) Drawings

The Contractor shall maintain a neat and accurately marked set of As-Built Drawings which shall be provided to the PSHS-SRC PMO Engineer for review and approval prior to final acceptance of the Work.

The As-Built Drawings shall represent the Work as constructed and document changes to the Work shown on the Project Plans, and shall show the actual as-constructed conditions of installed or modified systems, equipment, and material.

The As-Built (Record) Drawings shall show, by field measured dimensions, the exact locations of all underground work, including all piping and components, and the final elevations and locations of all improvements constructed, modified or adjusted. Record

Drawings shall be available for inspection by the PSHS-SRC PMO Engineer at all times and shall be updated at least weekly with all Field or Site Instructions and other written directives, Contract Change Orders, and Contract adjustments shown thereon and initialed by the Agency. Progress payments or portions thereof may be withheld if As-Built Drawings are not kept up to date.

Unless otherwise specified in the Special Provisions, the Contractor shall submit seven (7) sets of As-Built Drawings to the PSHS-SRC PMO Engineer at the final inspection. These As-Built Drawings shall include certification by the Contractor that the As-Built Drawings are a true representation of the Work as actually constructed. The Work will not be formally accepted until the As-Built Drawings are provided to and approved by the PSHS-SRC PMO Engineer. Final payment or a portion thereof may be withheld if final As-Built Drawings are not provided.

Full compensation for As-Built Drawings is included in the prices paid for the various items of work and no separate payment will be made.

36.0 Safety, Health, Environment, Security and Community

- a. The Contractor shall adhere to PSHS-SRC -HSEC policies and Procedures during the entirety of the Work.
- b. General housekeeping during and upon completion of the work shall be observed by the contractor.
- c. Work will be considered incomplete unless the HSEC requirements are adhere to the satisfaction of the PSHS-SRC PMO Engineer.
- d. The Contractor shall at his own expense employ watchmen to provide security of his personnel and materials from loss, damage or any cause. The Company shall be responsible for such loss, pilferage, damage or of any kind during the execution of the Works.

37.0 Coordination

All works shall be properly coordinated with the Owner, Architect and the PSHS-SRC Project Engineer, and all contractors of other works e.g. IT/Communication, ventilating system (optional),etc., for proper implementation of the Drawings and Specifications.

III SAFETY RULES

1.0 Dissemination and or Distribution of Safety Rules, Safety Inductions

The Contractor shall make sure all its employees working either directly or indirectly under its supervision are informed of and comply with the applicable safety rules, including those stated in this document.

All personnel of the Contractor who will be working on the site shall undergo Safety Induction provided by PSHS-SRC PMO Engineer.

No personnel of the Contractor is permitted to enter site and perform work without first receiving the appropriate safety induction and on completion issued an induction card.

The Safety Inductions are:

- Construction Induction – for all personnel working in areas under the control of the PSHS-SRC PMO Engineer
- Commissioning Induction – a refresher induction that covers tags, isolations and commissioning procedures immediately prior to the start of the commissioning phase of the Project.
- Additional inductions may be conducted to suit project requirements.

2.0 PSHS-SRC PMO ENGINEER HSEC Guidelines

The Contractor is responsible for meeting the requirements of PSHS-SRC PMO Engineer Health, Safety, Environmental and Community guidelines and procedures. Notwithstanding the provisions contained in this section, shall form the basis of HSEC management of the Project.

3.0 Safety Organization

All Contractors working on this project shall have in effect a safety plan and shall designate a Full Time Safety Officer.

- a. The Contractor's Safety Officer shall be responsible for initiating the Contractor's safety program, ensuring that jobsite safety requirements and procedures are being accomplished, conducting safety inspections of Work being performed, conducting safety meetings with craft employees and submitting a weekly report to PSHS-SRC PMO Engineer documenting safety activities. The Safety Officer will also be responsible for a continual survey of its operations, to ensure that probable causes of injury or accident are controlled and that operating equipment, tools and facilities are used, inspected and maintained as required by applicable safety and health regulations.
- b. PSHS-SRC PMO Engineer have the right to stop work whenever safety violations are observed which could jeopardize the well being of personnel and equipment. The expense of any such work stoppage and resultant standby time shall be for the Contractor's account. The failure or refusal of a Contractor to correct an observed violation may result in the termination of the Contract, and / or the dismissal from the jobsite of those responsible for such failure or refusal.
- c. The Contractor shall provide to PSHS-SRC PMO Engineer a copy of all reports made to government agencies or insurance companies relating to any jobsite accident or injury during the Contractor's performance of the work.
- d. Contractor shall provide a minimum of one (1) full time Safety Officer for every fifty (50) craft personnel assigned to the Work. The nominated Safety Officer will be responsible for insuring that the rules and regulations governed by applicable laws and the safety rules and regulations are implemented and enforced. If a conflict should arise between the Government regulations and these safety rules, the more stringent of the regulations will apply.
- e. The Safety Officer will work closely with PSHS-SRC PMO Engineer and construction management & safety team and shall form part of the Site Safety Team.

4.0 Safe Working Conditions

- a. The Contractor shall set up sufficient and appropriate warning and safety signs to inform its personnel and others of hazardous conditions or operations. The Contractor shall take adequate measures in the work area, in consultation with PSHS-SRC PMO Engineer, to ensure dangerous situations and/or work are barricaded or shielded properly. After verification of completion of the hazardous operations or termination of hazardous conditions, the warning and safety signs, covers, barricades and tags shall be removed by the responsible supervisor of the Contractor.
- b. Efficient and correct temporary lightning provisions shall be required in all rooms/areas where work is performed.

5.0 Safe Operations & Maintenance of Tools and Equipment

- a. No plant or machinery, hand tools or any other type of equipment are to be operated without effective guards
- b. All cranes shall be provided with the required swing radius protection. Clear and standard crane signals must be used at all times by licensed personnel. Prior to operating or directing the operation of cranes, ensure equipment has current approval and work is carried out by certified personnel.
- c. All earthmoving and compaction equipment shall be provided with acoustic and light signaling devices in accordance with the local regulations. These devices shall warn all other personnel that equipment is operating and or moving. An additional signal person shall be required when the operator has an obstructed view.
- d. All tools, regardless how small or large, shall be in good working condition and inspected before use. Equipment with missing or defective parts or guards shall be immediately modified or repaired or will not be used and or shall be removed from site.

- e. The operators of machinery and cranes, lifting and hoisting equipment shall be qualified and where appropriate, possess a license to demonstrate their qualification to operate.
- f. All plant, machinery, equipment or tools must be properly maintained, inspected and tested regularly per manufacturer's recommendations, statutory requirements or as directed by PSHS-SRC PMO Engineer. Contractor shall keep a maintenance and inspection record or log of all mechanical and electrical equipment on the Site for inspection by PSHS-SRC PMO Engineer, or external auditors or relevant Authorities.

6.0 Safe Handling & Storage of Materials

- a. In cases where materials and products are used which can lead to an increased level of risk, measures shall be taken to ensure that these materials and products are transported, stored and processed safely and in accordance with the vendors' printed instructions. PSHS-SRC PMO Engineer should approve these measures before hand.
- b. All building materials shall be stored or stacked in a safe and orderly manner so as not to obstruct any passageway or place of work. Any material stored inside the building under construction shall not be place within 2.00 meters of any hoist way or floor openings or within 1 meter of exterior wall if wall does not extend beyond the top of the stored material.
- c. Fuel and oil shall be processed safely following vendor's printed instructions and in an approved container, and stored in designated locations authorized by PSHS-SRC PMO Engineer.

7.0 First Aid and Clinic

- a. The Contractor shall provide for and maintain its own first aid kit and clinic at a prominent and easy accessible location on the construction site. The first aid kit shall be appropriate for the number of employed persons and the type of work to be performed.
- b. The Contractor shall assign at least one person in its workforce trained in basic first aid at all times during working hours on the construction site. This person shall be responsible for maintaining the first aid kit up to the requirements for the type of work being performed.
- c. All construction personnel requiring first-aid treatment are to contact the Contractor's Safety Officer who will render treatment.

8.0 Emergency Response and Fire Protection

All personnel, when attending the construction safety induction will be instructed on the Site Emergency Response Procedures. Evacuation alarm and the location of evacuation muster points.

Contractor shall provide and maintain readily accessible fire extinguishers in all their workplace and shall regularly inspect all their fire extinguishers to ensure they are serviceable at all times.

9.0 Gravitational Hazards

Fall prevention is required in situations with possibility of a fall or 2 meters or higher. Adequate provisions such as barricades, nets, cover, rails, etc shall protect the workers on the roof, on scaffolds and or elevated platforms.

- a. All work platforms, suspended or otherwise, shall conform to statutory regulations. Among other requirements, the following must be noted:
- b. All working platforms shall be closely boarded, planked or constructed in metal decking
- c. Strip formworks and the like (timber, plank, plywood, etc) shall not be used as a stage for working platform
- d. Working platform shall:
 - i. be at least 650 mm wide if used to provide footing for not more than 2 persons and to support loads and materials not exceeding 25 kgf per bay
 - ii. be at least 860 mm wide is supporting more than 2 persons per bay and weight of tools exceeds 25 kgf but not more than 100 kgf per bay
 - iii. be at least 1.1 meters wide if used to support any higher working platform
 - iv. Not be used to support more than 4 persons and the total weight of tools and metals exceeding 100 kgf per bay.
 - v. the maximum average loading on any working platform in any 1 bay shall not exceed 220 kgf per sq meter for persons and materials for metal scaffold and 75 kgf per sq meter for persons and materials for timber scaffold of All hoists and scaffolding are to be the standards of the Occupational Health and Safety Association or the current governing local laws
- e. Defective scaffolds shall not be used
- f. Bamboos or bamboo poles are not allowed or permitted to be used on site.

- g. All deep excavations shall be provided with adequate safety railings and no materials or equipment shall be stored as close to the excavation edge
- h. Buildings under construction where the height is above 15 meters shall be provided with peripheral overhead protection. Except for the designated entrance/exit point, other areas at ground level shall be guarded from inadvertent entry. At building entry/exit points, adequate overhead protection shelters shall be provided to ensure a safe means of access and egress to the workers workplace.

10.0 Electrical Hazards

- a. All portable electrical hand tools and appliances used at site shall comply with the following safety requirement;
 - Support voltage of 230 volts or lower
 - Be fully insulated or of doubts insulation construction
 - Be connected to a power source, operating with an ELCB of 30mA tripping sensitivity and tripping time of 0.1 second
- b. Electrical installations and the wiring distribution system on site shall be inspected at least once a month and tested in accordance with the requirements of the relevant code before the installation is energized
- c. All AC welding machines must be equipped with low voltage shock preventers which shall effectively reduce the open circuit secondary voltage to a safe level of 25 volts
- d. Power cabling shall be secured correctly at high levels. Cables shall by preference not run on the floor. Only tested power cabling joints are allowed. Bare cable/wire connections shall be prohibited.
- e. Only connections from electric power panels, switch boxes, junction boxes or other approved means shall be made. Cables shall not be spliced or tied into temporary lighting cables or power cables/wires.
- f. Electric leads shall not be over-extended and shall be switched off at the point of power supply and removed when not in use. Leads shall be supported clear of floors by use of stands or other suitable means or run through protective covers in turn do not create hazard.
- g. Metal ladders, scaffoldings, or metal platforms shall not be used when working on electric power panels, MCCs or other potential live parts.

11.0 Fire Hazards

- a. Adequate and appropriate measures shall be taken to prevent the occurrence of a fire and /or an explosion when a naked flame has to be used. PSHS-SRC PMO Engineer shall be consulted on this matter
- b. No cooking of foods is permitted on site and no open fires will be permitted elsewhere on the Site.
- c. Adequate fire protection or suppression system shall be provided as necessary. In particular, a suitable fire extinguisher shall be available in hot work areas. Approved flash-back arrestors shall be provided for oxy-acetylene used for gas cutting operations.
- d. Bringing to Site of flammable liquids will not be permitted without prior approval from PSHS-SRC PMO Engineer. Indoor storage of flammable liquids is also not permitted.
- e. The Contractor shall maintain a clearly defined area for storage of petrol, diesel, gasses, etc. The Contractor shall provide the area with appropriate signs and adequate fire extinguishers.

12.0 Welding and Grinding

- a. Welding operations shall be screened to protect all personnel against welding flashes.
- b. Welding, cutting, burning, soldering and grinding equipment shall be inspected daily before use. During the operation of this equipment and other machining operations, adequate fire prevention precautions shall be taken. This includes removal and or covering of flammable and combustible materials, protection of adjacent areas, number and type of portable fire extinguishers and similar measures and provisions.
- c. At the end of each working day, all hoses and manifolds shall be removed from the bottles and be capped off. Oxygen and acetylene cylinders shall be stored separately by afore resistant barrier or at a safe distance from hazardous areas. All compressed gas cylinders shall be held and secured upright and capped when not in use. All cylinders once empty shall be immediately removed from the construction site.

13.0 Hazardous Products

- a. Prior to bringing in any hazardous products to the Site, the Contractor must first obtain prior approval from the PSHS-SRC PMO Engineer. The Contractor shall submit to PSHS-SRC PMO Engineer the corresponding Material Safety Data Sheet for reference.
- b. The use of any hazardous material in the course of the Contractor's work shall be made familiar with the precautionary safety measures and provisions and be trained in handling those materials. All safety procedures shall be followed to the latter.

- c. Without prior approval from PSHS-SRC PMO Engineer, no indoor storage of hazardous chemicals is allowed.

14.0 Ventilating

The Contractor shall;

- a. Ventilate storage spaces containing hazardous, volatile or high temperature sensitive materials
- b. Provide adequate ventilation whenever harmful airborne contaminants are produced in areas occupied during construction. Fans, blowers, ductwork or other approved equivalent means shall be installed and the hazardous agents are exhausted safely to the outside. Sufficient fresh outside air shall be routed to the work areas where necessary;
- c. Dispose of materials in a manner that will not result in harmful exposure to persons or disrupt or otherwise affect the operations of existing facilities.

15.0 Confined Space Hazards

No entry will be permitted to confined spaces until:

- a. Means of entry and exit are agreed
- b. Quality of air supply has been checked for oxygen deficiency, combustibility and toxicity. Work in confined spaces includes tanks, ductwork, shafts, crawling spaces and places where there is oxygen deficiency, difficult exit or escaping, high temperatures as well as the production of harmful gases and contamination, etc can occur.

16.0 Cable Trays and Pipe Racks

Under no circumstances shall cable trays or pipe racks be used as work platforms or cable ladders for access by personnel.

17.0 Reporting of Incidents, Investigations and Statistics

The Contractor and or Subcontractor shall ensure that employees report all incidents, immediately to their Supervisor, whether the incident has involved injury or not.

The Contractor and or Subcontractor shall immediately report any incidents to PSHS-SRC PMO Engineer and shall conduct an incident investigation and table a report at the Contractor's next progress meeting with the PSHS-SRC PMO Engineer or within 24 hours, whichever comes first.

Where the incident is of a type which requires notice to any statutory Authority, the Contractor shall give any such notices in accordance with the relevant statutory regulations within two (2) day of accident occurring, and supplies copies of notice to PSHS-SRC PMO Engineer.

18.0 Personal Protection Equipment (PPE) and Dress Code

All the employees working either directly or indirectly under the supervision of the Contractor shall use personal protection in order to perform the work safely and in compliance with the ruling Codes and regulations. The Contractor shall provide at his own expense his personnel with any required personal protection.

Prior to admittance to the work site, the Contractor shall provide all of his personnel assigned to the Work with the following minimum personal protection equipment;

- a. Skull guard or safety helmet (to be approved by PSHS-SRC PMO Engineer)
- b. Safety Shoes (leather steel capped, medium cut to be approved by PSHS-SRC PMO Engineer)
- c. Safety boots and or rain boots
- d. Safety glasses (with side shields and plastic lenses)
- e. High visibility vest
- f. A long-sleeved shirt with collar
- g. Trousers (wearing of ripped trousers and or short pants will not be permitted)

Storage and proper use and maintenance of these PPEs shall be in accordance with the manufacturer's instructions and recommendations. The Contractor shall ensure that the workers are familiar with these instructions through training.

All employees of the Contractor are obliged to wear an approved hard hat or safety helmet and other PPE's listed above.

In addition, employees are required to wear approved safety belts, harnesses and or lifelines at all times when working on elevated areas. The safety line shall be attached when working above a height of more than 2.5 meter

Approved gloves shall be worn for protection of hands and or arms when handling chemicals such as solvents, acids and caustics, petroleum, oil, grease, or other toxic or hazardous chemicals.

Protection against exposures to harmful gases, vapors, fumes, dust and similar airborne contaminants or agents shall be afforded to all employees and ensure adequate ventilation, approved masks or personal respiratory equipment.

The Contractor shall ensure that the workers wear the PPE's and other equipment where required in the above work situations and ensure that the equipment is in good order and condition.

Workers exposed to sound pressure or noise levels above 85 dB (A) shall wear approved hearing protection (earplugs, earmuffs, hearing bands, etc). The Contractor is obliged to provide hearing protection available above an equivalent sound or noise level of 80 dB (A).

19.0 Safety Committee and Related Activities

A Safety Committee shall be established, representing PSHS-SRC PMO Engineer and the Contractor. This safety committee shall meet each week.

Contractor shall nominate at least one (1) representative of a supervisory level to attend all safety committee meetings, all weekly safety site inspections and all joint safety inspections

Contractors shall also conduct weekly tool box meeting as part of their responsibility to create safety awareness and to communicate site safety requirements of their workers.

20.0 Housekeeping

- a. Contractors shall at all times keep their work areas clean and neat, tidy and safe condition and remove from site and the vicinity with any rubbish, and other hazards removed promptly and properly disposed of.
- b. Fire hazards such as garbage, oil rags and flammable materials must be eliminated by prompt removal or other corrective actions
- c. All protruding nails, metals, bolts or any hard object that may cause injury shall be bent or removed or protected.
- d. The Contractor shall assume full responsibility for correct discarding or disposal of construction waste according to PSHS-SRC PMO Engineer policy and to the local regulations.
- e. Upon completion of the Work, the Contractor shall promptly remove from site all of his equipment, materials, scaffolding and like items, leaving the site and the vicinity clean, safe and ready for use.
- f. In the event the Contractor fails to maintain its work area as described above and in a manner satisfactory to PSHS-SRC PMO Engineer, or to effect such cleanup or removal immediately after receipt of written notice to do so, PSHS-SRC PMO Engineer shall have the right without further notice to the Contractor to perform such cleanup and remove such items on behalf of, at the risk of and at the expense of the Contractor. PSHS-SRC PMO Engineer may store items removed at a place of its choosing on behalf of the Contractor and at the Contractor's risk and expense. The Contractor shall be back-charged for the costs incurred of such cleanup, removal and storage.

21.0 Equipment Maintenance

Maintenance work on the Contractor's equipment shall to be undertaken within a designated area, approved by the PSHS-SRC PMO Engineer, and which is located away from watercourses and other sensitive environmental areas.

Used oil from maintenance work must be collected in suitable trays or containers and transferred to a used drum stored in a bounded storage area designated by PSHS-SRC PMO Engineer.

Where refueling of equipment is to be in the field or within the construction area, use of spill response kit is a must.

22.0 Footnotes

In cases of doubt and in situations not defined in this document, the Contractor should contact PSHS-SRC PMO Engineer.

Statutory regulations and Local Standards are to be taken as a minimum guide only. Where requirements exceed these, PSHS-SRC PMO Engineer's requirements shall be met. Should the Contractor require clarification on any safety matters, discuss them with PSHS-SRC PMO Engineer.

IV. TECHNICAL SPECIFICATIONS

1.0 Name of Project

CONSTRUCTION OF RESEARCH HUB FOR AGRICULTURE AND ALLIED SCIENCES to be located at PSHS-SRC Campus Complex, Barangay Paraiso, City of Koronadal, South Cotabato

2.0 Scope of Work

The **Work** shall consist of the furnishing, installation of materials, provision of sufficient labor, tools and equipment, transport vehicles, supervision, security of his own resources including materials, tools, equipment, etc and all incidentals necessary for the satisfactory completion of the **PROPOSED CONSTRUCTION OF RESEARCH HUB FOR AGRICULTURE AND ALLIED SCIENCES** as shown on attached Drawings and as stipulated in the Contract Documents.

3.0 Setting out Works

The Contractor shall be responsible in setting out reference lines, elevations (lines and grades) prior and during the execution of the Works. All references shall be maintained and protected by the Contractor at his own expense. Disturbed references shall be restored to its original position without extra cost to BIR PMO ENGINEER.

4.0 Excavation and Backfilling

- a. Excavation shall be as to the dimensions or limits shown on the Drawings. Excavation beyond the normal limits shall not be paid for.
- b. Backfilling may only proceed when concrete has sufficiently cured. Where works has to proceed in adjacent areas. Observe enough care during backfilling not to disturb or damage the newly placed concrete.

5.0 Concrete Works (Refer applicable Sections on Chapter 4 of the NSCP) for Quality of Materials, Workmanship, execution, acceptance, etc.

- a. General: Provide all labor, materials, equipment, transportation, and services required to complete all work specified herein indicated or as shown on the Drawings.

Work includes but is not limited to:

 - a.1 Construction slabs, beams, etc.
 - a.2 Septic Vault, Drainage trenches, manholes
- b. Standards: Except as modified by governing Codes and by Contract Documents, comply with the provisions and recommendations of the following, latest Edition:
 1. ANSI American National Standards Institute
 2. ASTM American Society for Testing of Materials
 3. ACI American Concrete Institute
 4. NBCP National Building Code of the Philippines and its revised IRR
 5. NSCP National Structural Code of the Philippines
- c. All materials for concrete shall be from approved source by the Engineer-In-Charge.
 - c.1 Reinforced concrete- 3000 psi @ 28-days, mix proportion shall be 1 : 2-1/2 : 4 (Cement : Sand : Gravel). Concrete mix shall be subject to adjustment to attain the required strength or desired mix consistency, subject to approval of the Engineer-in-Charge.
 - c.2 Portland cement, Type 1
 - c.3 Manufactured or river-run run gravel for structural concrete, $\frac{3}{4}$ "max properly graded
 - c.4 Washed sand for structural concrete
 - c.5 Water: Use potable water free from alkaline or deleterious substance that may affect the strength of concrete. Use of rain water will not be permitted.
 - c.6 All materials shall be free from clay, lumps or any deleterious object or matter that will impair the strength of concrete.
 - c.7 Mixing of concrete shall be in accordance with current industry standards or best practices.
 - c.8 Slump of concrete shall not exceed 3 inches
 - c.9 Placement of concrete shall be in accordance to standard norms, when using portable concrete mixers.
 - c.10 Cure concrete sprinkling water and wetted continuously for 7-day period
- d. Steel Reinforcements
 - d.1 Steel reinforcements shall be ASTM A615, deformed steel bars, Grade 60.
 - d.2 Supply, fabricate and install reinforcing steel as shown on Drawings. Placing of steel reinforcements shall be in accordance with current industry (local) code (or ACI-347)
 - d.3 Tie wires shall be Gauge 16
 - d.4 Provide concrete spacers or plastic spacers to meet the required concrete cover as shown on Drawings.
 - d.5 Steel reinforcements shall be free from mill scales, rusts, oils, contamination that will impair the bonding property to concrete.
- e. Formworks

- e.1 All forms shall be designed by the Contractor for a safe construction activity and installed to dimensions shown on the Drawings.
- e.2 All materials for formworks shall be durable and free from warps, de-lamination and shall produce a neat surface upon stripping.
- e.3 All joints shall be free from mortar leak during placement of concrete
- e.4 Stripping of forms shall only commence after the concrete has gained sufficient strength (min of 7 days) for major structural elements.

6.0 Masonry Works (Refer to Chapter 7 of the NSCP for Hollow Masonry Units)

- a. All CHB walls to be demolished must be removed completely from bottom of beam or topmost blocks down to the floor level. In no case shall unsupported CHB walls be retained whether it is above or below the ceiling line.
- b. Provision of door and window openings on existing CHB walls must be done with the use of electric concrete cutter to prevent impacts that might result to cracks on the existing walls. Lintel beams shall be constructed to support the remaining CHB walls above door and window headers.
- c. Closing of existing openings on existing CHB walls. All new CHB reinforcing bars must be properly anchored/ attached to the reinforcing bars of the existing CHB walls. Adequate trimmer bars of size & length shall be provided within the new openings as indicated in drawings.
- d. Deliver to site CHB units undamaged and free from breakage to edges or corners.
- e. Concrete hollow block units shall be nominal 100 x 200 x 400 or 150 x 200 x 400 (as indicated in plan) stretcher blocks, all cells grouted with steel reinforcements shown on Drawings, (350min) psi when tested to applicable ASTM Standards and Industry norms.
- f. Erect CHB units to plumb and true to alignment within acceptable tolerance.
- g. Mix proportion for grouting and setting bed shall be 1: 4 (Cement: sand), maximum proportion. The Contractor shall make necessary adjustments to suit project requirements without extra cost to the Company.
- h. Damaged unit masonry shall not be used
- i. The Contractor shall provide and maintain extra units or numbers at site without extra cost to BIR PMO ENGINEER.
- j. All masonry units and associated materials shall satisfy test requirements of ASTM C190, C140), non- load bearing test.
- k. Install all CHB based on anchorage details as shown in drawings.

7.0 Wood works

- a. All timber materials where required shall be seasoned timber or hard wood (door jambs, cabinet frames, etc) and other wood works and shall be free from warps, knots, cracks or any defect that will impair the strength of the system.
- b. All members shall be applied with anti-termites control or Solignum or approved equal.
- c. Ceiling system shall be as shown on Drawings.
- d. Supply planed finish (S4S) timber as indicated on Drawings

8.0 Structural Steel and Metal Works (Refer Chapter 5 of the NSCP)

- a. Materials steel and metals for the Works shall meet the requirements of ASTM A36, hot-rolled shapes and plates.
- b. All steels shall be primed with epoxy based paint with -2- finish coats, grey coloured paint. Substrate preparation shall meet the requirements of the applicable Clauses of the Steel Structures Painting Council, for industrial type of construction. All surfaces shall be free from mill scale, rusts, oils or any contaminants detrimental to adhesion of paint.
- c. Welding works shall be in accordance with Structural Welding Code (American Welding Society-D1.1, latest edition). Welding electrodes shall be E60xx, minimum, meeting the requirements of AWS A.5. All welders shall meet the qualifications under the AWS Codes and standards.
- d. All Works under this item shall be subject to verification by the Engineer prior to commencement of fabrication. Contractor is to submit SHOP DRAWINGS for Architect's/Engineer's review prior to execution.
- e. Roof framing
 - e.1 Trusses/Rafters shall be constructed, erected, and properly anchored to the roof beams or columns as indicated in drawings

9.0 Architectural Works

Furnish materials and labor and all incidentals necessary for the completion of all architectural works shown on Drawings and as herein specified.

a. Floor Finishes

a.1 Tile works

General : All surfaces to receive tiles, shall be free from loose plaster, where required, existing setting mortar bed shall be stripped, removed to allow proper setting of tiles to desired finished elevation. No separate payment for trimming existing mortar bed and shall be deemed included elsewhere.

- a.1.1 Floor finish for all common areas and offices shall be Grade AAA 60cmx60cm polished non-skid granite tiles or approved equivalent. Material shall be subject to review and approval of the Architect. Contractor to submit samples for color and texture selection prior to delivery and installation.
- a.1.2 Floor Finishes for all toilets shall be 30cmx60cm granite tiles for all toilet cuttings on both ends of the walls shall be of equal width.
- a.1.3 Façade cladding shall be from 20x40 brick design textured tiles.
- a.1.4 Grout shall be ABC type, color to match color of tiles or as directed by the architect.
- a.1.5 Setting bed or mortar shall be dry mixed, sand-cement mix with water added to produce the desired consistency and slurry mix for adhesion. Use Redifix tile adhesive for areas that are less than 1.5inches from finish floor line.
- a.1.6 All exposed corner edges shall be provided with PVC tile trims.
- a.1.7 No human traffic or construction loads shall be applied to all newly installed tiles, allow setting mortar and adhesive to cure prior.

b. Wall Finishes

b.1 Painting

- b.1.1 Painting works shall be as indicated on Drawings and described in the Bill of Quantities. Includes substrate preparation, application of neutralizers, putty, sanding, cleaning, protection, etc. to provide a strong or durable paint coating, following manufacturer's written instructions and acceptable trade practices. Provide materials that are suitable for the job and or type of construction.
- b.1.2 Paint materials shall be of the brand specified herein or approved equal by the Architect.
- b.1.3 Examine substrate and conditions under which painting will be performed. Proceed with the work only when conditions are satisfactory.
- b.1.4 Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.
- b.1.5 Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall into wet, newly-painted surfaces.
- b.1.6 Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- b.1.7 Ferrous Metals: Clean non-galvanized ferrous-metal surfaces that have not been shop coated; remove mortar, plaster, grease, dirt, rust, loose mill scale and other foreign substances by solvent or mechanical cleaning methods that comply with the recommendations of the Steel Structures Painting Council, before priming coat is applied.
- b.1.8 Paint system:

1. Exterior Surfaces:

1.1 Perimeter Concrete Facade

- Concrete, concrete masonry, rendered smooth
- One (1) coat of Liquid Tile Penetrating Sealer by roller, let dry for 6 hours.
- Putty surface imperfections, hairline cracks with liquid tile cast using putty knife.
- One (1) coat Liquid Tile Undercoat Primer by roller
- Finish with two coats Liquid Tile Topcoat Semi Gloss

2. Interior Surfaces:

2.1 Interior Walls

- Concrete, concrete masonry, rendered smooth
- One (1) coat of Acrylic Concrete Primer and Sealer by roller, let dry for 2 hours.
- Putty surface imperfections, hairline cracks with Concrete Putty using putty knife.
- One (1) coat Acrylic Concrete Primer and Sealer by roller let dry for 2 hours
- Finish with two coats Bio Fresh by roller allow two hours interval between coats.

3. Ceilings:

3.1 All cement board ceiling surfaces shall be painted as follows;

- Apply one coat of **DS 1350 Acrylic Concrete Primer Sealer** by brush, roller or spray. Let it dry for 2 hours.

- Repair surface imperfections with **DS 5000 Concrete Putty** using putty knife let it dry for 2 hours and sand.
- Apply one coat of **DS 1350 Acrylic Concrete Primer Sealer** by brush, roller or spray. Let it dry for 2 hours.
- Finish with two coats of **STAY CLEAN Premium Washable Paints** by brush, roller or spray allow 2 hours between coats
- Reduction / Cleaning - **Water**

4. Cabinetries, Closets, counters, doorjambs and doors:

4.1 All wooden Cabinetries, Closets, Counters, door jambs and doors shall be painted as follows;

- Apply one coat of **DS 5-700 Liquid Tile Undercoat Primer** by brush, roller or spray and let it dry
- When Necessary, Putty surface imperfections, hairline cracks with **DS 5-1000 Liquid Tile Putty Filler** or **DS 5-700 DS 5-900 Liquid Tile Cast** using putty knife. Let it dry for 4 hours and sand.
- Apply one coat of **DS 5-700 Liquid Tile Undercoat Primer** by brush, roller or spray and let it dry .
- Finish with two coats of **AQUA GLOSS-IT Water Based Quick Dry Enamel** Allow 2 hours in between coats
- Reduction / Thinning / Cleaning – Use **DS 5-70 Liquid Tile Reducer**

5. Steel:

5.1 Structural Steel

- Apply one coat of DS 900 Wash Primer (mix 4 parts by volume of DS Wash Primer base to 1 part of DS wash Primer Catalyst)
- Apply two coats of DS 940 Zinc chromate Yellow
- Apply two coats of Silver Aluminum Paint

5.2 Architectural Steel

- Apply one coat of DS 900 Wash Primer (mix 4 parts by volume of DS Wash Primer base to 1 part of DS wash Primer Catalyst)
- Apply one coat of DS 940 Zinc chromate Yellow
- If necessary apply Home Buddy Filler by using spatula
- Apply one coat of DS 940 Zinc chromate Yellow
- Apply two coats of DS 5-515 Liquid Tile Topcoat Semi Gloss

c. **Dry Walls**

c.1 Gypsum Board. Supply / install materials where indicated on Drawings. All gypsum dry wall as indicated in plan shall be from 12.50mm gypsum moisture resistant boards on 2"x4" ga. 24 metal studs spaced at 0.40m x 0.40m on centers attached with 1-3/4 metal screws. All joints shall be filled up with joint compound, putty and cover with jointing tape. Boards with broken edges, lacerations etc will not be permitted to be installed. The Contractor shall replace rejected materials upon written instruction from BIR PMO ENGINEER or where practical oral notice to the Contractor notifying such defect shall deem official instructions.

c.2 Fibre Cement Board. Supply materials where indicated on Drawings. Fibre cement board shall be stored in elevated and well protected area. Boards with broken edges, lacerations etc will not be permitted to be installed. The Contractor shall replace rejected materials upon written instruction from BIR PMO ENGINEER or where practical oral notice to the Contractor notifying such defect shall deem official instructions. All fibre cement board shall be from **4.5mmx4x8 Hardiflex** mounted on 2"x4" ga. 24 metal studs spaced at 0.40m x 0.40m on centers with flat head metal screws.

d. **Suspended Ceilings**

d.1 All ceilings at main building (except to be retained as indicated in drawing) shall be from **1/4"x48"x96" Cement boards** on ga. 24 Galvanized iron 2"x4" metal studs installed as indicated in drawings.

d.2 All Ceiling for entrance canopy eaves/storage spaces/garage shall be 5"x3m perforated UPVC ceiling soffits on ga. 24 galvanized iron 2"x3" metal studs installed as indicated in drawings.

e. **Gutter Works**

e.1 PVC Gutters

All gutters and valleys shall be UPVC PLAST 6" gutters, with jointers and all accessories complete with fasteners, seals and sealant as shown in Drawings

e.2 Concrete Gutters:

Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall into wet, newly-painted surfaces Apply 2 coats Boysen Plexibond with a mixture of 2:1 (2 gallons of Plexibond to one gallon of cement) on all existing concrete gutters and apply silicon sealant on all downspout connections.

f. Rendering to CHB or Concrete Surfaces

- f.1 All surfaces to be rendered or cement plastered shall be clean from any loose material or contamination to provide strong bond between plaster and the surface.
- f.2 Mix proportion shall not be less than 1 part of cement to 4 parts of screened sand Necessary adjustments shall be made to provide a strong and consistent mix, free from cracking due to rapid hydration of plaster mix.
- f.3 Tampering of previously mix concrete will not be permitted.
- f.4 All surfaces to receive paint finish shall be smooth whilst surfaces to receive tiles shall be rough to provide better adhesion or bond

g. Doors and Windows

- g.1 Furnish all materials and labor, use of tools for the fabrication, delivery and installation of doors and windows as shown on Drawings and herein specified.
- g.2 All Wooden Doors shall be kiln dried and treated Matimco flush doors Panel doors ready for installation with the provisions for locksets, door keys, and hinge completely operational.
- g.3 Windows (glass/glazing) shall be as shown on Drawings and herein specified. Glass shall be 6mm thick reflective glass on powder coated aluminum framings.
- g.4 UPVC doors shall be heavy duty UPVC brown Wood Grain finish doors with louver/vent slats on the lower part complete with UPVC door Jambs and stainless steel hinges. Sizes as indicated in drawings
- g.4 Deliver all doors and windows free from any damage. Store materials to avoid contamination form soil or unwanted materials.
- g.5 All door jambs for wooden doors shall be pre-fabricated 2"x6" metal jamb finished with epoxy paint.
- g.6 All Fire proof doors shall be from cold rolled steel sheets complete with jambs with a fire proof time of 2 hours electro static powder coated installed complete with panic bars. Sizes as indicated in drawings.

h. Roofing

h.1 Roofing

- h.1.1 Roofing shall be 1.5mm ordinary corrugated upvc plastic roofing panels Lapping as indicated in the product brochure shall be strictly followed
- h.1.2 Roofing shall be fastened properly to the purlins by a 2-1/2 inch texscrew.
- h.1.3 Apply silicon sealant at all gutter and downspout joints.
- h.1.4 Flashing and ridge rolls shall be from 2.0mm flat upcv plastic roofing sheets

10.0 Plumbing Works

10.1 PLUMBING GENERAL REQUIREMENTS

PART 1 – GENERAL

10.1.1 GENERAL DESCRIPTION:

A. The work to be done under this Specification consists of the fabrication, furnishing, delivery and installation, complete in all details, testing and commissioning of this contract, at the subject premises and all work materials incidental to the proper completion of the installation, except those portions of the work which are expressly stated to be done by Others. All works shall be in accordance with the governing Codes and Regulations and with this Specification, except those where same shall conflict with such Codes, etc., which the later shall then governs. The requirements with regards to materials and workmanship specify the required standards for the furnishing of all labor, materials, and appliances necessary for complete installation of the work specified herein and indicated on the Drawings. The specification is intended to provide a broad outline of the required equipment, but is not intended to include all details of design and construction.

10.1.2 OTHER APPLICABLE STANDARDS OR CODES FOR THIS SUBCONTRACT:

A. CODES:

- 1. National Building Code of the Philippines
- 2. Revised National Plumbing Code of the Philippines, Latest Edition
- 3. Philippine Code on Sanitation, PD 856
- 4. Uniform Plumbing Code, Latest Edition by International Association of Plumbing and Mechanical Officials

5. Applicable regulations and local ordinances of City of Koronadal, Province of South Cotabato

B. STANDARDS:

1. Underwriters' Laboratories (UL)
2. American Society for Testing and Materials (ASTM)
3. American National Standards Institute (ANSI)
4. National Electrical Manufacturers' Association (NEMA)
5. American Society of Mechanical Engineers (ASME)
6. Factory Mutual (FM)
7. National Fire Protection Association (NFPA)

Proof of conformance shall be submitted to the BIR PMO Engineer for approval. Nothing contained in this specification or shown on the Drawings shall be Constructed as to conflict with National and Local Ordinances of the City of Koronadal, South Cotabato. All such laws and ordinances shall form part of this specification.

10.2 POTABLE WATER SYSTEM

10.2.1 GENERAL

10.2.1.1 SCOPE:

- A. Provide Potable Water System complete in all respects including submittals, shop drawings, piping, valves, back-flow preventers, bibs, water meters, pressure regulators, insulations, pumps, filters, testing and all accessories required, power wiring and motor starting equipment. Potable water system includes flushing and drinking water supply.

10.2.2 PIPE, FITTINGS AND VALVES:

10.2.2.1 COLD WATER LINES:

1. All underground piping, risers and distribution lines shall be Polypropylene (PPR-Random Type 3) and fittings, and rated at PN 20. Basis of design is Vesbo. Joint between PPR and metallic materials shall be made with an approved jointing coupling or flanged connection. Flange gasket and O-ring shall be of EDPM (Ethylene-Propylene-Rubber) quality. Adaptors to threaded connectors for 63 mm diameter and below; and adaptors to flanged for 75 mm diameter and above.
 - a. Cement Mortar Lining: AWWA C-104
 - b. Iron Fittings, 80 thru 1200 mm: AWWA C-110
 - c. Flanged Pipe: ANSI B16.1 and AWWA C-115
 - d. Coal Tar Coatings: AWWA C-203
 - e. Gate Valves, 80 thru 1200 mm: AWWA C-500
 - f. Check Valves, 50 thru 600 mm: AWWA C-508
 - g. Globe Valve: 50 mm thru 150 mm: ASTM B584 200 mm thru 300 mm: ASTM A48; Class 40 350 mm thru 400mm: ASTM A536

10.2.2.2 VALVES:

Provide all valves specified or shown on the drawings. Water working pressure rating for any valve shall not be less than the hydrostatic test pressure for the system in which it is installed.

1. Bronze Gate Valves: MSS SP-70
2. Bronze Check Valves: MSS SP-71. Non-Slam type
3. Bronze Valves: MSS SP-80
4. Cast Iron Globe Valves: MSS SP-85
5. Cast Iron Backwater Valve: ASTM A-48
6. Butterfly Valves: Flangeless Wafer Body of 500 mm. diameter, suitable for dead end service. Cast iron body, corrosion resistant disc mounted to shaft by two (2) stainless steel screws, field replaceable set with a dovetail or retention groove, complete with gear operator, with two (2) meters extension assembly and floors stands for remote control of valve operator. Connecting flange should be of galvanized steel body.
7. Float Valve: ASTM A-48 Shall be hydraulically operated, pilot controlled, diaphragm actuated, single seated, with resilient disc. Valve shall open wide when float is at low water level and close drip tight when float is at high level. Class 125 and cast iron body with stainless steel trim. Basis of design is Bernad Model 750-60 Series.
8. Pressure Reducing and Pressure Sustaining Valve: Main valve body

and cover; conforming to ASTM A-48. The valve shall be a single seated, hydraulically-operated, pilot controlled, diaphragm type globe valve. The valve shall withstand a temperature up to 180oF Maximum. The trim shall be 304 Stainless Steel. Basis of design is Bermad Model 723 Series, Class 250.

9. Anticipating Surge/Pressure Relief Valve Provide an anticipating surge/relief at the main pump discharge riser. Basis of design is Bermad Model 735 Series, Class 250.

10.2.2.3 JOINTING MATERIALS:

- A. **FLANGE JOINTS:**Gaskets shall be 1.5 mm thick neoprene/natural red rubber. Bolts shall be square-head, ASTM A-307, with heavy stainless steel hex nuts.
- B. **SCREW THREAD JOINTS:** Lubricant shall be non-hardening and non-poisonous. Pipe threads tape to be PTFE of an approved propriety brand.
- C. **SOLDERED JOINTS:** Solder metal shall be 95-5 Tin-Antimony. All metal shall conform to ASTM B32.

10.3 WATER METER:

- A. Multi jet type for 38 mm and below; and Turbo type for 50 mm diameter and above. Water meter shall be of dry dial, registration in cubic meters, complete with bolts, nuts and gasket with companion flange. Basis of design is ARAD.

10.4 DRAIN, WASTE, AND VENT SYSTEM

10.4.1 – GENERAL

- A. Provide Drainage, Waste and Vent Systems complete in all respects including submittals, shop drawings, pipes, valves, cleanouts, drains, basins, and testing and all accessories required.

10.4.2 PIPE, FITTINGS AND VALVES:

A. UNDERGROUND SANITARY, SEWER PIPES:

PVC pipes and fittings, Series 1000, conforming to ASTM D-2729 and/or 180/D154435 and or 180/D153633, and push on joints with rubber ring gasket conforming to ASTM FH77. Basis of design is Emerald Supra Series, Neltex Series 8050.

B. STORM WATER DRAINAGE SYSTEM:

1. Downspouts inside the building: PVC pipes and fittings, Series 1000, conforming to ASTM D-2729 and/or 180/D154435 and or 180/D153633, and push on joints with rubber ring gasket conforming to ASTM FH77. Basis of design is Emerald Supra Series, Neltex Series 8050.
2. Downspouts outside the building: Galvanized steel pipe, Schedule 40, conforming to ASTM A-53, and with corrosion protection when buried underground, petrolatum tapes with outer wraps, densyl mastic and denso tape. Basis of design is Super. Joints shall be malleable iron, 63mm and below, screwed, and 75mm and above, flanged. Basis of design is BIS.
3. Underground storm drainage pipe inside the building: Bell and spigot, extra heavy, conform to ASTM A-74. Basis of ASA. Joints between galvanized iron and cast iron shall be cast iron.
4. For outside the building: Reinforced Concrete Drainage Pipes: ASTM C76, Class II, Wall B, for 300 mm diameter and larger storm drains.

C. AHU/FCU CONDENSATE WATER DRAINAGE SYSTEM:

Waste Stacks and Horizontal Drains: PVC pipes and fittings, Series 1000, conforming to ASTM D-2729 and/or 180/D154435 and or 180/D153633, and PVC socket joints with PVC solvent. Basis of design is Emerald Supra Series, Neltex 8050. Provide 19mm diameter closed-cell insulation for air conditioning condensate water drains. Basis of design is Aeroflex.

D. VENT SYSTEM:

For all sizes

1. PVC pipes and fittings, Series 1000, conforming to ASTM D-2729 and/or 180/D154435 and or 180/D153633, and PVC socket joints with PVC solvent. Basis of design is Emerald Supra Series or Neltex 8050.

10.4.3 CLEANOUTS:

- A. Provide cast bronze, taper thread, counter sunk type cleanout plugs where shown on the drawings and as required by the Local Codes. Furnish access body all cleanouts located behind finished walls. Manufacturer's numbers are basis of design and establish quality level as well as aesthetic features. Basis of design is Jay R. Smith.

- B. CLOSURE PLUGS: Jay R. Smith Mfg. Co. Figure 4470.
- C. FLOOR ACCESS BODY ASSEMBLIES:
Cast iron body and frame, flashing flange, lead-seal or thread-seal bronze plug, round adjustable top with vandal-proof screws.
 - 1. Finished Concrete Floors: Scoriated nickel-bronze cover. Jay R. Smith Mfg. Co. Figures 4021-S-F-U and 4023-S- F-U.
 - 2. Unfinished Concrete Floors: Scoriated cast iron cover. Jay R. Smith Mfg. Co. Figures 4221-U and 4223-U.
- D. FACE OF WALL ASSEMBLIES:
Cast iron ferrule and vandal proof screws. Jay R. Smith Mfg. Co. Figures 4402- U, 4422-U, and 4472-U.
Note: Use of closure plugs, access bodies and assemblies as manufactured by JPI is acceptable.
- E. DRAIN COLLECTOR ASSEMBLIES:
 - 1. Provide Drain Collector Assemblies with cast iron bodies complete with flashing collar or device and hub or screwed bottom outlet, unless otherwise specified. Basis of design is Jay R. Smith.
 - 2. AREA DRAIN:
305 mm diameter cast iron tractor grate seepage flange and 140 mm deep slotted sediment bucket with lift bar with polished bronze top. Jay R. Smith Mfg. Co. Figure 2233
 - 3. FLOOR DRAINS:
 - a. Heavy Duty at Trenches: 100 mm diameter cast iron tractor grate, seepage flange and 140 mm deep slotted sediment bucket with lift bar. Jay R. Smith Mfg. Co. Figure 2233.
 - b. Medium Duty at Toilets and Baths: Cast Iron Body and flashing collar with 127 mm (5") diameter strainer head with solid hinged cover Jay R. Smith Mfg. Co. Figure 2005 Y.
 - c. Kitchen Areas: Cast Iron Body and flashing collar with 127 mm (5") diameter strainer head with solid hinged cover. Jay R. Smith Mfg. Co. Figure 2005-A.
 - d. Heavy Duty at Parking: 75 mm diameter cast iron grate, seepage flange and clotted sediment basket. Jay R. Smith Mfg. Co. Figure 2425 C.
- F. PLANTER DRAINS:
 - 1. Low Profile Dome: 75 mm diameter with cast iron dome grate and gravel stop. Jay R. Smith Mfg. Co. Figure 2685.
- G. ROOF DRAINS:
 - 1. Built-up Felt Roof: 100 mm diameter with cast iron dome grate, seepage flange, under deck clamp and 115 mm high perforated stainless steel gravel stop extension. Jay R. Smith Mfg. Co. Figure 1330 for deck with gutter and 1470 for RD flushed in roof deck
- H. Balloon mesh on top of open vent pipes: #20 copper or stainless steel.
- I. Floor sink, by WADE Model 9100
- J. CHECK VALVES (Pump Discharge):
 - 1. IBBM, 0.9 MPa WSP, bolted cap renewable and regrindable disc and seat ring, swing, flanged. Check valves on sewage ejector discharge shall be complete with outside arm operator. Check ball valve shall be non-slam type.
- K. DRAIN VALVES:
 - 1. 20 mm brass, 1.0 MPa WSP, angle valves, fitted with 20 mm brass hose nipple.

10.5 INSTALLATION OF PLUMBING FIXTURES AND FITTINGS:

- A. SCOPE OF WORK: The work includes the furnishing and installation of plumbing fixtures and fittings, complete and operational.

10.5.1 INSTALLATION OF PLUMBING FIXTURE AND PUMPS:

- A. Plumbing Fixtures:
 - 1. The Trade Contractor shall:
 - a. supply all red lead cement, motor, lead plugs and other necessary materials.
 - b. cut and pin or raw plug brackets.
 - c. make all connections to water supply pipes, overflow pipes, and waste pipes.
 - 2. Water Closet shall be:
 - a. securely bedded on concrete floors or finished floors with red lead cement.
 - b. fixed by floor screws with bolt caps and washers.
 - c. connected to cast iron pipes, caulked with yarn, filled solidly with 1:1 cement sand mortar and pointed with white cement mortar to a neat finish.
 - 3. Waste outlets to lavatory sinks, bath tubs, shower bases and floor drains shall be bedded solidly in red lead cement Taps, basins, sinks, bath tabs, water closet, shower head and those items in the schedule of sanitary fixture and fittings supply list shall be supplied by Trade Contractors. The Trade Contractor is responsible for safe custody after hand-over to them, delivery from storage space to the working location and installation. All hangers, support, connection to pipes, traps, accessories not mentioned in the supply list of plumbing fixture shall be supplied by this Trade-Contractor. Caulking and protection after installation shall be by Trade Contractor.

- B. Pump Installation:
1. Mounting: pump and motor on an integral base plate of welded steel supported on an approved type of anti-vibration rubber pads on static block equal to twice the pump set weights with 50mm machine hard cork. Sample of hard cork to be submitted to the BIR PMO Engineer for approval. Motor are to be accurately aligned with pumps. Plastic drain piping for gland leakage is to be provided for each pump And carried to drain. Appropriate coupling guard shall be provided for shaft coupling between motor and pump.
 2. Pipe Fittings at Pumps, provide:
 - a. Flexible connectors at the suction and discharge sides of each pump. The connectors to be constructed of materials suitable for the conveying medium and capable of withstanding the required working pressure.
 - b. 100mm diameter pressure gauges at the pump suction and discharge sides. All reading for pressure gauge shall be in kPa and psi.
 - c. To provide air cock and drain plug for each pump.
 3. DRAIN PIPING: Provide drain piping for gland leakage for each pump. Such drain pipes to be carried to a proper drain inside the pump room.

11.0 ELECTRICAL WORKS

11.1 INTERIOR WIRING SYSTEM

11.2 MATERIALS DELIVERY, STORAGE AND HANDLING

- A. Materials delivered to the site shall be inspected for damage, unloaded and stored to provide protection from the weather and accidental damage.
- B. Electrical conduits shall be stored to provide protection from the weather and accidental damage.
- C. Cables shall be scaled, stored and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather.

11.3 MATERIALS AND EQUIPMENT

- A. Materials, equipment and devices shall, as a minimum, meet the requirements of UL, where UL Standards are established for those items and the requirements of the Philippine Electrical Code NFPA 70. Further, each item shall meet the requirements of these specifications and publications referenced herein. All items shall be new unless specified or indicated otherwise.
- B. Conduits shall be rigid (IMC) steel, zinc-coated and fittings for rigid (MIC) conduits shall be threaded type, Matsushita and/or Maruichi of Japan or UL approved rigid steel conduit.
- C. Wires and cables shall meet all the applicable requirements of the PEC and UL for the type of insulation, jacket and conductor specified or indicated. Unless indicated or specified otherwise, conductor sizes are based on copper.
 1. Color coding is required for all services feeder, branch, control and signaling circuit conductors. The color of the insulation shall be white for neutrals and green for grounding conductors. Insulation color of the ungrounded conductors in different voltage systems shall be as follows:
 - a) 240V, 3-phase; red, black and blue
 - b) 120/240V, 1-phase; red and black
 All underground conductors of the same color shall be connected top the same ungrounded feeder conductor.
 2. Conductor sizes for branch circuits shall be not less than 3.5mm² diameter rigid steel conduit.
 3. Unless specified or indicated otherwise, all power and lighting conductors shall be insulated for 600 volts, type TW solid for 5.5mm² and smaller type THW stranded for sizes larger than 5.5mm².
- D. Tapes shall be plastic and rubber conforming to UL Standard No. 510.
- E. Device plates shall be UL approved or equivalent of the one piece type and shall be provided for all outlets and fittings to suit the devices installed. Plates on finished walls shall be of metallic material with finish as indicated on the drawings. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster filings will not be permitted. Plates shall be installed with an alignment tolerance of 1.5mm. The use of sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed.

- F. Toggle switches UL Standard No. 20 shall be totally enclosed with bodies of thermosetting plastic and a mounting strap. Wiring terminals shall be of the screw type, back of side wired. Switches shall be rated quiet-matic with the ratings and number of poles indicated. Color of switches and switch cover shall be white.
- G. Receptacle shall be grounding type. Bodies shall be thermosetting plastic supported on a metal mounting strap. Wiring terminal shall be of the screw type, back of side wired.
- H. Panelboards and cabinets: Panelboards for use as service disconnecting means shall have the rating, class and number of poles indicated. Breakers shall be the thermal magnetic type. Single-pole breakers shall be full module size; two poles shall not be installed in a single module. Multi-pole breakers shall be of the common-trip type having a single operating handle, and for 50-ampere or less, may consist of single-pole breakers permanently assembled at the factory into a multi-pole unit. Breakers shall be the bolt-in type (that is bolted to the current-carrying bus); plug-in units are subjects to approval. Ground fault protection shall be provided where indicated and where required by the PEC and NEC.

Power and distribution panelboards shall have inside wiring gutters for branch circuit wiring connections not less than 125mm in width when the largest device does not exceed 225 amperes, nor less than 200mm in width where the largest device exceeds 225 amperes.

Provide panelboards in the light and power system where shown conforming to the indications on the drawings with respect to the following:

1. Supply characteristics;
2. Requirements for "device mains" or "lugs only means";
3. Sizing of mains; and
4. Number and sizing of branch devices.

Air circuit breakers for overcurrent protection and switching in the various panelboards shall have an interrupting rating as follows:

For Lighting Panels	Minimum acceptable Symmetrical interrupting Rating in RMS amperes
<u>Frame Size</u>	<u>For 200-250V/100-125V</u>
50 AF	5,000 Amps.
100 AF	5,000 Amps.
225 AF	18,000 Amps.
400 AF	25,000 Amps.
500 AF	30,000 Amps.

For Power and Distribution Panel	Minimum acceptable Symmetrical interrupting Rating in RMS amperes
<u>Frame Size</u>	<u>For 200-250V/100-125V</u>
100 AF	30,000 Amps.
225 AF	80,000 Amps.
400 AF	80,000 Amps.
600 AF	80,000 Amps.
800 AF	80,000 Amps.
600 AF	80,000 Amps.
1000 AF	100,000 Amps.
1200 AF	100,000 Amps.

Supporting methods for all electrical equipment and circuitry shall conform to the best practice and shall be in accordance with the standards published by the United States National Electrical Contractors Association and the Philippine Electrical Code.

- I. Fluorescent Fixture: each open tube of fluorescent fixture shall be provided with spring-loaded, telescoping sockets on lamp retainers (two per lamp). Where indicated, fluorescent fixtures shall have line filters integral to the fixture assembly. Filters shall have radio frequency attenuation characteristics.
- J. Emergency Lighting Units: each unit shall have an automatic power failure device, test switch, pilot light, fully-automatic high/low trickle charger and grown-out sensitive circuit to activate battery when AC input falls to 75% of normal voltage and shall provided with a rack for wall mounting. Battery shall be sealed wet-cell type, shall operate un-attended and shall be maintenance free for a period of not less than 10 years under normal operating conditions.
- K. Ground Rods shall be rolled to a commercially round shape from a welded copper-encased steel manufactured by the molten-welding process or by the electro-formed process (molecularly bonded). They shall have an ultimate tensile strength of 516 MPa and an elastic limit of 345 MPA. The rods shall have a hard, clean, smooth and continuous copper surface, and the proportion of copper shall be uniform throughout the length of the rod. The copper shall have a minimum wall thickness of 0.38mm at any point of the rod.

11.4 BOXES, OUTLEST AND SUPPORTS

Boxes shall be provided in the wiring or raceway systems wherever required for pulling of wires, making connections and mounting of devices or fixtures. Boxes for metallic raceways shall be cast-metal hub type when located in normally wet locations; when surface-mounted on outside of exterior surfaces in hazardous areas; and when installation is exposed up to 2.13 meters above interior floors and walkways. Boxes in other locations shall be sheet steel. Each box shall have the volume specified by the PEC for the number of conductors enclosed in the box. Boxes for mounting fixtures shall be not less than 100mm octagonal except that smaller boxes may be installed as required by the fixture configuration as approved. Boxes installed for concealed wiring shall be provided with suitable extension rings or plaster covers as required. Boxes and supports shall be fastened to wood screws or screw type nails of equal holding strength.

Boxes for use with raceway systems shall not be less than 38mm deep except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets shall be not less than 100mm square except that 100mm x 50mm boxes may be used where one raceway enters the outlet. Telephone outlets shall be, as a minimum, 100mm square by 38mm deep.

Pull boxes of not less than the minimum size required by the NEC shall be constructed of code gauged galvanized sheet steel except where cast metal boxes are required in locations specified above. Boxes shall be furnished with screw-fastened covers. Where several feeders pass through a common pull box, the feeders shall be tagged to indicate clearly the electrical characteristics, circuit number and panel designation.

A. Plastic insulating tape shall conform to the requirements of UL 510.

B. POWER, WIRE and CABLE:

- a. Wire and cable conductor sizes are designated in square millimeters. Conductors shall be copper. Insulated conductors shall bear the date of manufacture imprinted on the wire insulation with other identification. Wire and cable manufactured more than 12 months before delivery to the job site shall not be used.
- b. Wires and cables rated for 5KV and above 100 percent insulation level, grounded shall be shielded. Insulation shall be cross linked polyethylene, either, unfilled or non-carbon filled and shall be PVC jacketed or equal, all conforming to NEMAWC7. Insulation and jacket thickness shall be required by IPCEA.
- c. Wires conforming to UL83. THW and TW shall be provided as required. Only wires with "W" in the type designation shall be used in wet or damp locations.
- d. High Voltage Cable Terminations: Potheads shall be provided for termination of single and multiconductor cables when indicated. Potheads shall conform to the requirements of IEEE 48, class 1 termination. The manufacturer shall provided all components and insulating compound for filling two

copies of complete directions for assembly, filling and putting the unit into service, one of which shall be submitted for record. Installation shall include stress relief cones.

Aluminum and copper or copper bearing parts shall not be used in contact with each other in construction or installation of class 1 terminations. Terminators shall be designed for use with specific cable indicated.

- C. Grounding Rods shall be copper clad steel with diameter adequate to permit driving to full length of the rod, but not less than 19mm in diameter and 3 meters long, unless otherwise indicated.

12.0 MECHANICAL WORKS

12.1 FIRE SPRINKLER SYSTEM:

12.1.1.Pipes and Fittings:

All pipes for Fire Sprinkler system shall be unused BI pipes ASTM Schedule 40 without any defects, size as indicated in drawings. Fittings shall be welded type.

12.1.2 Valves:

Valves shall be Butterfly valve 100mm with supervisory switch UL

12.1.3 Pumps:

Pumps specifications as follows: 25 Hp fire pump, 2Hp jockey pump with valve and accessories

12.1.4 Sprinkler heads:

Sprinkler heads shall be new and unused pendant type or sidewall type with mounting plate as indicated in drawing.

12.2 Other Fire Protection

- a) The design, installation and maintenance of standpipe systems shall be in accordance with NFPA 14, standard for the installation of standpipe, private hydrant and hose system.
- b) Fire Hose box shall ALUMINUM FRAMED RED FIRE HOSE BOX with glass cover with 38mm (1-1/2") brass nipple and 1-1/2" BFP approved nozzle with at least 100 feet of 1-1/2" fire hose for first aid fire fighting installed at each floor level as indicated in the drawings.
- c) Provide a 64 mm inlet pipe as indicated in drawings.
- d) Exit Signs shall be Illuminated L.E.D Exit signs Model SKRE 705 230V/60Hz with rechargeable 1.2V/06AH Battery installed at all exit doors as indicated in drawings.
- e) Smoke Detectors shall be First Alert SA340CN Smoke Alarm with Lithium Battery installed at locations as indicated in drawings.
- f) Emergency Lights shall be Truelight dual Emergency Lamps Model ST8051 installed at locations as indicated in drawings.
- g) Fire Alarm bell shall be Hallux Italy Red Round Bell 6" 220V/60Hz with Red Diamond Fire Plus Push Fire Alarm Switch installed at locations as indicated in drawings
- h) Siamese Connections shall be 2-1/2"x2-1/2"x2-1/2" Brass BFP approved female inlet installed as indicated in drawings.

13.0 ELECTRONIC AND COMMUNICATION

13.1 LAN Distribution system

- a.1 LAN Distribution System shall use Cat 5e/6 cable for LAN,
- a.2 Hospital Main Network System Server shall have the following minimum specifications:
 - a.2.1. Pentium III
 - a.2.2 256 KB RAM.
 - a.2.3. 50 MB of available hard drive space.
 - a.2.4 SVGA Monitor—800 x 600, 256 colors or better.
 - a.2.5 1.44 MB Floppy drive and CD-ROM drive.
 - a.2.6 Keyboard and Mouse.
 - a.2.7 Network Interface card 10/100/1000 Base T.
 - a.2.8 Router , Switch with 24 ports minimum, Patch panels, Networks
 - a.2.9 Cabinets and accessories related networks.

13.2 CCTV system

- b.1 CCTV Server PC shall have the following minimum
 - b.1.1. Pentium III
 - b.1.2 256 KB RAM.
 - b.1.3 MB of available hard drive space.
 - b.1.4 SVGA Monitor—800 x 600, 256 colors or better.
 - b.1.5 1.44 MB Floppy drive and CD-ROM drive.

- b.1.6 Keyboard and Mouse.
- b.1.7 One (1) available serial port (for connection to CPU).
- b.1.8. Network Interface card 10/100 Base T.
- b.1.9. Video Capture card

13.3 CCTV Cameras:

- b.2.1 High resolution 550 TV Lines
- b.2.2 1/3" Color CCD
- b.2.3 Minimum illumination: 0.04 lx
- b.2.4 True Day & Night
- b.2.5 Real color picture through ATW
- b.2.6 Signal to Noise ratio: more than 46dB
- b.2.7 Automatic Back Light Compensation
- b.2.8 Fixed and DC type Vari-focal Lens Support

13.4 PABX System

- c.1 PABX System shall be 4 Trunks, 1 console, 24 locals and expandable. Remote in maintenance and added features(call on hold, call transfer, call forwarding... etc..)

13.5 Fire Alarm System

- e.1 Fire Alarm System shall be with control panel and a minimum of 10 active points expandable to (500), capable of supporting alarm initiating appliances , visible signage, strobes and alarm indicating appliances as required in this project.

13.6 Biometric System:

- g.1 Biometric system shall be wall mounted fingerprint, time attendance and access control has a fashionable, design, which utilizes USA BioNano core fingerprint algorithm with high speed and stability. Easy operation and installation. Voice prompt. Standard RS485/USB communication and dry contact output. It has standard USB pen drive module. It has multiple identification methods such as fingerprint only, ID+fingerprint and ID+password. Two in one: time attendance and access control function.

13.7 Other House Cabling and Wiring System

- h.1 Cabling system for Telephone, Fire Alarm use Cat 5e/6 .
- h.2 Cable Ladder use for all Cable network from equipment room to workstation. RG 59/6, 75omhs, 90% braid for CCTV

14.0 SPECIALTIES

14.1 General

Furnish all materials (unless noted otherwise), labor, equipment and use of tools for the satisfactory installation of these items as indicated on drawings and as described in the Bill of Quantities.

14.2 Toilet Partitions

- 13.2.1 PANELS: Shall be 18mm thk. Moisture Resistant laminated melamine boards
- 13.2.2 ACCESSORIES: Shall be black nylon coated or stainless steel accessories and fittings.
- 13.2.3 TOP FRAME: Shall be 2mm thk. Aluminum header in black powder coated finish.
- 13.2.4 U-CHANNEL: Shall be 2mm thk. aluminum in black powder coated finish. FINISHES: Laminate shall be from Smooth Cherry wood grain laminated sheets.
- 13.2.5 LOCKS-provide appropriate locksets with external indicators for all cubicles.

14.3 Locksets and Hinges

- 13.3.1 Provide KWIKSET satin nfinished stainless door locksets or equivalent for all wooden doors complete with keys.
- 13.3.2 Loose Pin Hinges for all wooden doors shall be HAFELE BRAND satin finish stainless steel loose pin hinges or equivalent.

14.4 Signages

- 1. Main Signages
The main signages shall be made from Build-up Aluminum Composite Panel 3.00 mm aluminum Thickness with backlighted with LED tube lights
- 2. Interior Signages (Department Signages) shall be 8" high and 24" wide with ACP Background and sticker cut out text.