



Republic of the Philippines
WESTERN MINDANAO STATE UNIVERSITY
 Zamboanga City
PHYSICAL PLANT OFFICE AND ENGINEERING SERVICES



WMSU - PPO -FR – 007A.00
 Effective Date: 08 - Sep - 2021

PROJECT TITLE: **ENHANCEMENT OF ARTIFICIAL INSEMINATION FOR ZAMPEN NATIVE CHICKEN RESEARCH AND DEVELOPMENT CENTER**
PROJECT LOCATION: **WMSU SAN RAMON CAMPUS, ZAMBOANGA CITY**
SUBJECT: **SUMMARY OF WORKS, GENERAL REQUIREMENTS AND TECHNICAL SPECIFICATION**

I. SUMMARY OF WORKS

1.0 Introduction

The Works in this Contract is for the New Construction of the **ENHANCEMENT OF ARTIFICIAL INSEMINATION FOR ZAMPEN NATIVE CHICKEN RESEARCH AND DEVELOPMENT CENTER** to be located at WMSU San Ramon Campus, Zamboanga City. The WMSU-Physical Plant and Engineering Services (PPES) 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

ENHANCEMENT OF ARTIFICIAL INSEMINATION FOR ZAMPEN NATIVE CHICKEN RESEARCH AND DEVELOPMENT CENTER to be located at WMSU San Ramon Campus, Zamboanga City

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 :

All Works Complete :

1.3 Work Areas

All works shall be done within the confine of the lot boundaries. Provide temporary work enclosures on all sides affected by building construction works. Provide appropriate announcement boards and signage's, to include all construction permits, clearances, and duration of works



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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 agency, 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 and temporary office facilities
- 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
- d. Roof truss and framing works

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



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2.4 Plumbing/Sanitary Works

- a. General Plumbing Works for toilets 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 drainage.
- d. Domestic water supply system to include pump installation, and installation of stainless-steel overhead storage tanks, and tapping to source.
- e. Installation of all Plumbing Fixtures (water closets, lavatories, urinals, sinks, footbaths 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 cabinet per floor.

2.5 Electrical Works

- a. Electrical wirings and cabling for lights & power supply
- b. Service Entrance and meter connections
- c. Grounding system
- d. Provision and installation Lighting fixtures, switches, receptacles, and outlets
- e. Conduits system and junction boxes
- f. Panel Boards

2.6 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 from 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 agency, 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 agency 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 agency.
- d. The Contractor shall arrange for local authorities' inspections and obtain the required approval and permits or certificates from the local authority at a time as directed by agency. 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 **by the undersigned in the technical specifications**

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 agency if a survey control point has been disturbed.

The Contractor shall plan their activities and coordinate with the agency, 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 8:00am to 5:00pm, 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 5:00pm Monday to Saturday.

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

Work on the site outside those hours can only proceed if authorized in advance by the agency and where approved the Contractor shall ensure that:

- No person shall work more than 14 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 agency

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 agency 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 agency.

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, agency 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 the agency 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

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 Construction 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 the agency prior to the commencement of work at site;

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

Note:

Where a Contractor has not provided the required deliverables or the deliverable are not approved by the agency 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 agency.

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

The agency 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.

The agency's Health & Safety Officer and Discipline Supervisor shall conduct regular inspections and audits of Contractor's work practices and safety management systems in conjunction with the Contractor

The agency 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 agency site safety requirements

The agency may in its 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 agency with the Contractor(s).



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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 agency 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 agency.

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 any time 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 **qualified superintendence personnel duly registered and licensed to act as such (Civil Engineer or Architect)**, 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. 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



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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 the agency 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
- A proposed S- Curve

7.0 Progress Reports

Weekly progress reports shall be prepared by the Contractor and submitted to the agency 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.



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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 agency.

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.



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13.0 Inspection

Any inspection or check by the agency 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 agency whenever such work is ready or about to be covered up or putting out of view. The agency's 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 agency, 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 agency duly certified copies of the tests for his review and acceptance.

15.0 Rejection

If, as a result of inspection, examination or testing, the agency decides that any plant, materials, workmanship is defective or otherwise not in accordance with the Contract, Agency 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 Agency 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 University 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



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discretion of the University Architect or the WMSU Physical Plant and Engineering Service Director. 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

▪ 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 agency.

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.

▪ Construction Area Limits

The agency 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, the agency will issue permits to specific Contractor personnel to enter and perform the Work.

▪ 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 agency.

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

- Permit to Excavate



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- 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

▪ **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 the agency 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 WMSU-Physical Plant Office and Engineering Service Director. or if unavailable, the Agency's duly assigned officer in charge.

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 Agency.

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.



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facilities. All temporary access roads are to be removed prior to completion, unless the agency 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 agency 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 worker's 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 an 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.

Agency 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

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 agency for the purpose of verifying the location of existing underground installations (i.e.: 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.

- o Living and cooking of any nature
- o Smoking, except at designated smoking points
- o Gambling of any kind throughout the work area.
- o Eating of foods except at designated eating area.
- o 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)
- o Firearms, weapons of any kind, and pet animals including any or those persons which are under the age of 18 years.
- o 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.
- o Selling of any goods or giving gifts
- o Parking of bicycles, motor vehicles, scooters unless authorized by the agency All such vehicles when permitted to enter site shall be parked in the designated area for this purpose. The agency shall not be held responsible or accountable of any loss or damage of such vehicles.
- o Visitor's or relatives of personnel are not allowed to enter the project site except at the designated receiving areas for all visitors.
- o 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.



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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 agency 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 the agency 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 the agency. 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 agency.



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26.0 Site Signs

Identification signboards and notices for safety or instruction are permitted on site only after review and approval of the agency 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

The agency 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 agency. These facilities shall be maintained and kept clean by the Contractor; on completion it shall completely dismantle and



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remove them. Any remaining refuse shall be disposed of site following agency 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 agency, 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 agency.

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.



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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 agency or agency's designate thereupon.

33.0 Acceptance Requirements

- a. Prior to acceptance of the Works by the agency under this Contract, all works shall be fully operational, and free from any defect to the full satisfaction of the agency 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 agency 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 agency 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.



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Unless otherwise specified in the Special Provisions, the Contractor shall submit two (2) sets of As-Built Drawings to the agency 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 agency. 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 (HSEC)

- a. The Contractor shall adhere to WMSU, 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 agency.
- 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 WMSU Physical Plant and Engineering Service, University Architect and the University Project Engineer, and all contractors of other works e.g. IT/Communication, ventilating system (optional), etc., for proper implementation of the Drawings and Specifications.



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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 agency.

No personnel of the Contractor are 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 agency.
- 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 Health, Safety, Environment and Community Guidelines

The Contractor is responsible for meeting the requirements of WMSU 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 the agency 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. The agency has the right to stop work whenever safety violations are observed which could jeopardize the wellbeing of personnel and equipment. The expense of any such work stoppage and resultant standby time shall be for the Contractor's account. The



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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 the agency 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 agency 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 the agency, 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 the agency. Contractor shall keep a maintenance and inspection record



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or log of all mechanical and electrical equipment on the Site for inspection by the agency, 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. The Agency should approve these measures beforehand.
- 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 placed 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 the Agency.

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 easily 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 of 2 meters or higher. Adequate provisions such as barricades, nets, cover, rails, etc. shall protect the workers on the roof, on scaffolds and on elevated platforms.



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- 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 kef per bay
 - ii. be at least 860 mm wide is supporting more than 2 persons per bay and weight of tools exceeds 25 kilogram-force (kgf) but not more than 100 kilogram-force (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 kilogram-force (kgf) per bay.
 - v. the maximum average loading on any working platform in any 1 bay shall not exceed 220 kilogram-force (kgf) per square meter for persons and materials for metal scaffold and 75 kilogram-force (kgf) per square 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 worker's 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



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- 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. Agency 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 the Agency 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 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 a fire 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 agency. The Contractor shall submit to the agency 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 agency, 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.



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The Contractor and or Subcontractor shall immediately report any incidents to the agency and shall conduct an incident investigation and table a report at the Contractor's next progress meeting with the agency 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 agency.

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 the agency)
- b. Safety Shoes (leather steel capped, medium cut to be approved by the agency)
- 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.



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The Contractor shall ensure that the workers wear the PPE's and other equipment where required in the above worksituations 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 the agency 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 the agency 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 the agency, or to effect such cleanup or removal immediately after receipt of written notice to do so, the agency 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. The agency 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.



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21.0 Equipment Maintenance

Maintenance work on the Contractor's equipment shall to be undertaken within a designated area, approved by the agency, 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 agency.

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 the agency.

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



IV. TECHNICAL SPECIFICATIONS

1.0 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 **CONSTRUCTION OF NATIVE CHICKEN RESEARCH AND DEVELOPMENT CENTER** as shown on attached Drawings and as stipulated in the Contract Documents.

References:

All Works shall be referred to the following Codes and Standards, norms and best Engineering Practices.

1. National Structural Code of the Philippines, 2010 Latest Edition
2. National Building Code of the Philippines (NBCP) and its Revised IRR and all its referral codes
3. Fire Code of the Philippines and its latest IRR
4. American Concrete Institute (ACI)
5. American Society of Testing Materials
6. Uniform Building Code (UBC)
7. Other relevant Industry Codes, Standards & Norms.

2.0 Execution

- a. The Contractor shall be required to provide the following minimum essential equipment;

bar cutters (manual)

minor tools/hand tools

Tile Cutters

bagger concrete mixer,

engine driven concrete vibrator, at least

vibrator tip, oscillating type

standby power generator set as back-up

dump trucks

compactor

Utility vehicle



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Submersible pump with hose 1-unit fan blower

Air compressor

Steel scaffolding

- b. The Contractor shall execute the Work in accordance with the condition of the Contract Documents
- c. All works shall be properly coordinated with WMSU-Physical Plant and Engineering Service Office assigned/supervisory personnel/project engineer.

2.1 NOTICE BOARD

The Contractor shall erect notice board (4' x 8') at the site giving details of the Contract in the format provided by COA. It shall be removed upon receipt of Certificate of Completion.

2.2 SITE DIARY OR MANUAL FIELD / LOGBOOK

The Contractor shall keep Site Diary or Manual Field Book wherein full details of the work carried out during each day shall be fully recorded. The Site Dairy or Manual Field Book shall be available for inspection by WMSU-Physical Plant and Engineering Service Office anytime during normal office hours. It shall include:

1. Project Name,
2. Contractor's Name,
3. Contractor's Representative,
4. Weather Conditions, rainfall and water level (indicate "NO WORK ", if unworkable days)
5. Description, quality, and location of work performed,
6. Shift and working hours,
7. Number and category of workers working at the site,
8. Test carried out and results,
9. Inspection carried out by PPES and others in authorities,
10. Problems or abnormal occurrence,
11. DEFECTIVE / Non-Compliant Work & Corrective Action,
12. Site Instructions,
13. Visitors; and
14. Accidents (if any)

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



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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 WMSU-Physical Plant and Engineering Service Office

4.0 Site Preparation / Demolition Works

4.1 Clearing/Demolition

- a. Works herein include demolition of existing Storage Facility, Concrete fence, and Steel Gate, including Clearing, grubbing, and cutting of trees and to handling, savaging, piling and disposing off the cleared materials with all leads and lifts. Trees shall cut in sections from the top downwards.
- b. All timber shall not be used by the Contractor for any purpose and shall remain the property of WMSU.
- c. Clearing shall consist of demolition of structures, cutting, removing and disposal of trees, bushes, shrubs, grass, weeds, other vegetation, anthills rubbish, fences, top organic soil and rocks and boulders exposed or lying on the surface.
- d. The construction site shall be leveled according to plans and cleared of rubbish, roots, and other perishable and objectionable matters to a suitable subgrade.
- e. All such unsuitable materials shall be removed from the construction site and spread uniformly over the areas adjacent to the proposed project, or otherwise disposed of as maybe directed by the Architect/ Engineer in-charge of construction.
- f. Materials obtained from demolished existing storage facility, steel gate, concrete fence shall be turned over to WMSU-Property Management Office (PMO) for assessment.
- g. Demolished materials assessed by WMSU-Property Management Office (PMO) for discarding shall be disposed of by the Contractor. Burning of demolished or any unwanted materials shall not be allowed.



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4.2 Layout

- a. The building lines shall be staked out on the lines and grades shown in the plans should be established before any excavation is started.
- b. Batter boards and reference marks shall be erected at such place where they will not be disturbed during the excavation works.
- c. During the commencement of works, the contractor shall survey the construction area and confirm the levels. He shall immediately notify WMSU-Physical Plant and Engineering Service Office of any discrepancies and shall agree with the WMSU-Physical Plant and Engineering Service Office any amended values on the plan.
- d. All station and reference points shall be clearly marked and protected to the satisfaction of the WMSU-Physical Plant and Engineering Service Office. All working benchmarks shall be near major/medium structure sites.
- e. Accurate establishment of the centerlines based on the plans is required.
- f. The existing profile and cross-section shall be jointly taken with the WMSU-Physical Plant and Engineering Service Office.

4.3 Excavation

- a. Works herein shall include excavation of foundations, ground beams, septic tank, plumbing and electrical pipelines.
- b. Foundation trench shall be dug to the exact width, depth and level as indicated in the plans. Sides of the trenches shall be vertical.
- c. In case soil does not permit vertical sides, the Contractor shall protect the sides with stable shoring. Excavated earth shall not be placed shall not be placed 1.50 meters off the edge of the trench.
- d. PPES may direct the Contractor to place the excavated materials at a particular site 30 meters away from the project site.

4.4 Backfilling

- a. Works herein include backfilling of unfilled trenches for foundations, ground beams, septic tank, plumbing and electrical pipelines.
- b. Work also includes furnishing placing, placing, compacting, and shaping suitable materials obtained from approved sources in accordance with lines, levels, grades, dimensions shown on plans.
- c. After completion of the foundation masonry, the remaining portion of trench shall be filled up with approved selected borrow in 30 cm layers watered and well rammed to 95% dry density at optimum moisture content.



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 works specified herein indicated or as shown on the Drawings.

Work includes but is not limited to:

a.1 Construction footings, tie beams, columns, slabs, beams, roof beams, concrete gutters etc.

a.2 Septic Vault, Cisterns, Catch basins, 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.** 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 G1** for structural concrete, ¾ "max properly graded

c.4 **Course 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



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d. Steel Reinforcements

- d.1 Main Steel reinforcements shall be **ASTM A615**, deformed steel bars, Grade 60. Stirrups shall be **ASTM Grade 40**.
- 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.
- d.6 Storage

- All reinforcements shall be delivered to the site either in straight lengths or cut and bent.
- No reinforcement shall be accepted in long lengths, which have been transported bent over double.
- Any reinforcement, which is likely to remain in storage for a long period, shall be protected from the weather to avoid corrosion and pitting.
- All reinforcement which has become corroded or pitted to an extent which, in the opinion of PPO, will affect its properties, shall either be removed from site or may be tested for compliance at the contractor's expense.
- Reinforcement shall be stored at least 150 mm above the ground on a clean area free of mud and dirt and sorted according to category, quality, and diameter.

d.7 Bending

- Unless otherwise shown on the plans, bending, and cutting shall comply with ASTM Standards.
- The Contractor shall satisfy himself as to the accuracy of any bar bending schedule supplied and shall be responsible for cutting, bending, and fixing reinforcement in accordance with the plans.
- Bars shall be bent mechanically using appropriate bar benders. Bars shall be bent cold by the application of slow steady pressure.
- At temperatures below 5 degrees Celsius the rate of bending shall be reduced if necessary to prevent fracture in the steel.
- The minimum bending of bars for 10mm to 25mm is bend plus 5 times the bar diameter for 180 degrees bends and bend plus 6 times the bar diameter, and for 90 degrees bend extended up to 12 times diameter.
- For stirrups and tie hooks, the minimum bending of bars is bend plus 10 times the bar diameter.
- Bending reinforcement inside the forms shall not be permitted except for mild steel bars of diameter less or equal to 12mm when it is necessary. After bending, bars shall be securely tied together in bundles or groups.
- The contractor shall ensure that reinforcement left exposed in the works shall not suffer distortion, displacement, or other damages. When it is necessary to bend protruding reinforcement aside temporarily, the radius of the shall not be less than four times the bar diameter for mild steel bar or six



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times the bar diameter for high yield bars. Such bend shall be carefully straightened without leaving residual kinks or damaging the concrete before concrete placing.

d.8 Splicing

- No splices shall be made in the reinforcement except were shown on the plan or as approved by PPO.
- For suspended slab and continuous beams, bottom bar splices shall be located at supports while top bars shall be located at mid span.
- For cantilever beams, bottom bar splices shall be located at support while top bar splices away from support.
- Splices for columns, shall be located within middle thirds but preferably not to terminate all reinforcing bars for splicing at the same location.
- Lap splices shall be 40 times the bar diameter but not less than 600 mm in length.

e. Fixing Reinforcement

e.1 All The minimum concrete cover to protect all reinforcements for each different structure is as follows:

Footings, and Ground beams75 mm
Beams and Columns40 mm
Concrete Slab20 mm

- e.2 Spacer blocks shall be used for ensuring that the correct cover is maintained on the reinforcement. Block shall be as small as practicable and of a shape approved by PPO.
- e.3 They shall be made of mortar mixed in the proportions of one part of cement to two parts of sand by weight.
- e.4 Wires cast into the block for tying into the reinforcement shall have not less than 50 mm or any length enough to attached and fix spacer block on the reinforcing bars and shall be soft annealed iron.
- e.5 All reinforcements shall be checked of shape, size, diameter, and number where necessary. Reinforcement shall be rigidly fixed so that it remains intact during placing of concrete.
- e.6 Any fixers made to the formwork shall not remain within the space to be occupied by the concrete being placed.

f. Formworks

- f.1 All forms shall be designed by the Contractor for a safe construction activity and installed to dimensions shown on the Drawings.
- f.2 All materials for formworks shall be durable and free from warps, de-lamination and shall produce a neat surface upon



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stripping.

- f.3 All joints shall be free from mortar leak during placement of concrete
- f.4 Stripping of forms shall only commence after the concrete has gained sufficient strength (min of 7 days) for major structural elements.

g. Removal of Formworks

- g.1 All Formworks shall be carefully removed without shock or disturbance to the concrete.
- g.2 No formworks shall be removed until the concrete has attained sufficient strength to support its own weight and carry loads that maybe placed on it.
- g.3 Side forms of beams and girders may be removed earlier than bottom forms, but the additional post or shoring must be placed under the beam or girder until it attains the sufficient strength.
- g.4 The minimum periods, which shall elapse between completion of placing concrete and removal of forms, are given below:

	Minimum Time	Minimum % Design Strength
Beams	14 days	80%
Slabs	14 days	70%
Columns	2 days	70%
Sides of Beams	1 days	70%

h. Earth Works

- h.1 Works herein shall include filling areas with approved selected borrow with gravel and coarse sand as base preparation of concrete floor slabs, pavements, platforms, steps, and ramps.
- h.2 forms shall be designed by the Contractor for a safe construction activity and installed to dimensions shown on the Drawings.
- h.3 All materials for formworks shall be durable and free from warps, de-lamination and shall produce a neat surface upon stripping.
- h.4 Before filling the areas for base preparations, surfaces shall be free of garbage, roots, and mud.
- h.5 All joints shall be free from mortar leak during placement of concrete.
- h.6 Selected borrow shall be of PPO approved type and shall be filled in 3cm layers, watered, and compacted to 95% dry density at optimum moisture content.
- h.7 Stripping of forms shall only commence after the concrete has gained sufficient strength (min of 7 days) for major structural elements



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h.8 Areas, Shape, and Level of earthwork shall be as shown in the plans and works herein shall coordinate with masonry, plumbing and electrical works.

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 WMSU-Physical Plant Office (PPO).
- 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.

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 colored 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 as indicated in drawings, minimum, meeting the requirements of AWS A.5. All welders shall meet the



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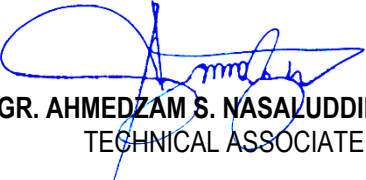


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qualifications under the AWS Codes and standards.

- d. All Works under this item shall be subject to verification by the University 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.

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TECHNICAL ASSOCIATE



I. 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 0.60mx0.60m Semi Granite Floor Tiles and Grade AAA 0.60mx0.60m Semi Granite Outdoor Tiles** for ground floor hallways, exit and front platforms or approved equivalent. Material shall be subject to review and approval of the University Architect. Contractor to submit samples for color and texture selection prior to delivery and installation.

a.1.2 Wall Finishes for all toilets shall be 3 layers of **0.30m X 0.60m Glazed Ceramic Wall Tile** for all toilet cuttings on both ends of the walls shall be of equal width.

a.1.3 Grout shall be ABC type, color to match color of tiles or as directed by the University 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 **Premium 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 for toilets.

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 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 University Architect.

b.1.3 Examine substrate and conditions under which painting will be performed. Proceed with the work only when



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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 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 Latex Semi-Gloss by roller allow two hours' interval between coats.

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 latex semi-gloss paint 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 Acrylic Concrete Primer Sealer by brush, roller or spray. Let it dry for 2 hours.
- Repair surface imperfections with Concrete Putty using putty knife let it dry for 2 hours



and sand.

- Apply one coat of 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. Steel:

4.1 Structural Steel

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

4.2 Architectural Steel

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



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c. **Suspended Ceilings**

- c.1 All ceilings (except to be retained as indicated in drawing) shall be **0.35mm thick X 4' X 8' thick fiber cement board**. Interior ceiling joints shall be sealed with plaster of Paris and non-woven paper tapes without forming any bubble and joints shall be finished flush to make the ceiling in one piece.
- c.2 Both fiber cement boards and metal ceiling paneling shall be riveted to metal **furring ceiling joist, 3/4" x 2" x 5m, spaced at 0.60m both ways**. Metal furring ceiling joist shall have adequate hangers and carrying metal runners to stay in perfect line and level.
- c.3 Provide Ceiling hangers as indicated in the drawings.

d. **Rendering to CHB or Concrete Surfaces**

- d.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.
- d.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.
- d.3 Tampering of previously mix concrete will not be permitted.
- d.4 All surfaces to receive paint finish shall be smooth whilst surfaces to receive tiles shall be rough to provide better adhesion or bond.
- d.5 Toilet rooms shall be water proofed.

e. **Doors and Windows**

- e.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.
- e.2 Unless otherwise specified, All Solid 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.
- e.3 Unless otherwise specified, all windows shall be made of **Aluminum Casement Window (Analok) and Aluminum Awning Type Window (Analok)** as specified in the plan and schedule of windows.
- e.4 Windows (glass/glazing) shall be as shown on Drawings and herein specified. Glass shall be 6mm thick reflective glass on powder coated aluminum framings.
- e.5 Unless otherwise specified, all toilet doors and cubicle shall be **PVC doors** with louver/vent slats on the lower part. Sizes as indicated in drawings.
- e.6 Unless otherwise specified, all door jambs for wooden doors shall be pre-fabricated 2"x5" jamb finished with epoxy paint.
- e.7 Locks of doors shall be filled at the lock block, 1000 mm above the finished floor level. Locks shall be installed in conformity with the templates and instructions supplied with the locksets



e.8 Deliver all doors and windows free from any damage. Store materials to avoid contamination from soil or unwanted materials.

f. Roofing

f.1 Roofing

- f.1.1 Roofing shall be **Corrugated GI Sheet 0.25mm GA 26x12"**, **pre-painted GI roofing panels** as shown in the plan and shall be strictly followed
- f.1.2 Roofing shall be fastened properly to the purlins by a 2-½ inch tex screw.
- f.1.3 Apply silicon sealant at all gutter and downspout joints.
- f.1.4 Flashing and ridge rolls shall be from 0.5mm flat pre-painted GI sheets.
- f.1.5 Screws and rivets shall be placed at top of corrugation and shall have gutter or silicon sealant application to prevent leakage. Unnecessary holes made on the roofing materials shall be rejected.

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II. ELECTRICAL WORKS

II.B SUBMITTALS

- A. Sampling shall be conducted by the Contractor in the presence of the Engineer, cost incidentals to materials sampling shall be at the contractor's expense.
- B. Materials such as wires and cables, 300mm long each size and conduits, 1-meter long each size, shall be sampled for testing and/or approved by the Engineer prior to use in the work.
- C. Catalogcuts in three copies of conduit and fittings, wires and cables, circuit breakers, safety devices, panel boards and lighting fixtures shall be furnished by the contractor before any work is started.
- D. Certificates in triplicate from the manufacturer attesting that the materials meet the requirements specified herein shall be submitted by the contractor for approval by the Engineer before delivery of materials to the site. Certification shall be made by approved nationally recognized independent testing organization and shall be submitted only in the absence of label or listing. Three copies of all manuals, instructions or documents furnished with procured equipment shall be submitted.
- E. Three copies shall be submitted of all shop drawings and data for lighting fixtures and A/C control units. Drawings shall show types, sizes, accessories, installation details and other details of construction. Data accompanying and construction details with complete dimensions and coordinates with reference to the layout drawings.
- F. Manufacturer's Data shall be submitted in triplicate for all fixtures with photometric or illumination data and indicating mechanical and electrical construction. Three copies shall be submitted of all manuals, instructions or documents furnished with procured equipment.

II.AQUALITYASSURANCE

- A. Installers shall have or at least three-year experience in electrical work of similar nature.
- B. After the electrical wiring system installation is completed (without any electrical load connected) and when directed, the Contractor shall conduct an insulation resistance test (megger tests with



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500 volts' dc.) and an equivalent operation test, in that order, to demonstrate compliance of installation with the specification.

- C. Tests shall be performed in the presence of the University Electrical Engineer or his representative.
- D. The Contractor shall submit in writing in appropriate tabulated form each branch circuit and feeders. All defective materials and workmanship disclosed as a result of the tests shall be corrected or replaced at the contractor's expense.

II.B 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.

II.C 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 signalling circuit conductors. The color of the insulation shall be white for neutrals and green for grounding conductors.



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Insulation color of the ungrounded conductors in different voltage systems shall be as follows:

- a) 240V,3-phase;red, blue and yellow
 - b) 120/240V,1-phase;red and black
2. Conductor sizes for branch circuits shall be not less than 3.5mm² diameter in rigid conduit.
 3. Unless specified or indicated otherwise, all power and lighting conductors shall be insulated for 600 volts, type THHN solid for 5.5mm² and smaller type THHN 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 sealed with gasket.
- F. 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.
- G. Panel boards and cabinets: Panel boards 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 in to 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. Panel board assembly shall be so designed that any individual breaker can be removed without disturbing adjacent units or loosening or removing supplemental insulation supplied as a means of obtaining clearance and other requirements of UL. Three keys shall be furnished for each cabinet lock. All panel board locks included in the project shall be keyed alike. Directories shall be type to indicate load service by each circuit and counted in a holder behind transparent protective coating.

Panel boards for light and power shall conform to the indications on the drawings with respect to supply characteristics, ratings of main lugs or main circuit breakers, number and sizing of branch circuit breakers.



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Each panel board shall consist of a factory completed dead front assembly of back panel, main busses, over-current and switching units, sheet metal cabinet and trim. Cabinets shall be fabricated from code gauge galvanized sheet metal with corners lapped and fastened by approved methods. Cabinets shall permit suitable wiring gutter space all around at least 100mm or wider.

Panel board cabinets and trims shall be suitable for the type of mounting shown on the drawings. The inside and outside of panel board cabinets and trims shall be factory painted with one rust proofing primer coat and two finish shop coats of enamel paint approved by the PPO.

Power and distribution panel boards shall have inside wiring gutters for branch circuit wiring connections not less than 125mm in width when the largest device does not exceed 225amperes, or less than 200mm in width where the largest device exceeds 225amperes.

Provide panel boards 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.

Panel boards shall be complete with cabinets of the dead-front type, with rating, size and number of automatic circuit breakers, and type of mounting as specified and indicated on the drawings. Circuit breakers shall be molded case bolt-in type and circuit breakers shall be numbered serially from top to bottom with bold numbers. Front of cabinets shall be finished to resist corrosion with not less than one priming coat and two pearl gray finishing coat. Three keys shall be furnished, each of which shall operate all panel board cabinet locks. Panel boards and air circuit breakers shall be approved by the University Electrical Engineer.

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.

H. Motor controllers shall conform to NEMA Standard No. ICS. All controllers shall have thermal overload protection in each phase and short circuit protection. Magnetic type motor controllers shall have



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under voltage protection when used with momentary-contract push button stations or switches and shall have under voltage release when used with maintained-contract push button stations or switches. Control circuits connections to any hand-off automatic selector switch or more than one automatic regulatory control device shall be made in accordance with a manufacturer's means for locking in any position. For each motor, not in sight of the controller, the controller disconnecting means shall be capable of being locked in the open position or a manually operated, non-focused switch which will disconnect the motor from the source of supply shall be placed within sight of the motor location. Over load protective devices which give adequate protection to the motor windings shall be of the thermal inverse-time limit type and shall include a manual-reset type push button on the outside of the motor controller case. The cover of a combination motor controller and manual switch on circuit breakers shall be interlocked with the operating handle of the switch or circuit breakers so that the cover cannot be opened unless the handle of the switch or circuit breaker is in the "OFF" position.

- I. Ground Rods shall be rolled to a commercially round shape from 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. 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.

II.C INSTALLATION

- a. General Requirements: All electrical installations shall, as a minimum, meet the requirements of the PEC and the requirements specified herein.
- b. Wiring Methods: Wiring shall be insulated conductors installed in conduit, except where specifically indicated or specified otherwise, or required by the PEC to be installed otherwise. Conduit shall be rigid metal conduit.
- c. Conduit Installation: Unless indicated otherwise, conduit shall be concealed within finished walls, ceilings and floors where practicable. Conduit shall be kept at least 150mm away from parallel runs of flues and steam or hot-water pipes. Conduits that will be visible after completion of project shall be installed parallel with or right angles to ceilings, wall and structural members.
- d. Conduits shall be supported by pipe straps, wall brackets, hangers or ceiling trapeze. Fastening shall be by wood screws or screw type nails to wood, by toggle bolts on hollow masonry units; by concrete inserts or



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expansion bolts on concrete brick; by machine screws, welded threaded studs, or spring-tension clamps on steel work.

- e. Threaded studs driven in by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts or machine or wood screws. Threaded C-clamps may be used on rigid steel conduit only.
- f. Conduits or pipe straps shall not be welded to steel structures. The load applied to fasteners shall not exceed one fourth of the proof test load. Holes cut to a depth of more than 38mm in reinforced concrete beams or to depth of more than 19mm in concrete joints shall not cut the main reinforcing bars. Holes not used shall be filled. In suspended ceiling construction, conduit shall be run above the ceiling and only lighting system branch circuit conduits may be fastened to the ceiling supports. Spring steel fasteners may be used for lighting branch circuit conduit supports in suspended ceiling in dry locations.
- g. Changes in direction of runs shall be made with symmetrical bends or cast metal fittings. Field-made bends and offsets shall be made with a hickey or conduit bending machine. Crushed or deformed conduits shall not be installed. Trapped conduits shall be avoided. Plaster, dirt or trash shall be prevented from lodging in conduits, boxes, fitting and equipment during construction. Clogged conduits shall be freed of all obstructions.
- h. Empty conduits, in which wire is to be installed by others, shall have pull wires installed. The pull wires shall be 3.5mm² (gauge 12) zinc-coated steel or of plastic having not less than 890-Newton tensile strength. Not less than 300mm of slack shall be left at each end of the pull wire.
- i. Conduit installed in concrete floor slabs shall be located so as not to adversely affect the structural strength of the slabs. Conduits shall be installed within one-third of the concrete slab. Conduits shall be spaced horizontally not closer than three diameters except at cabinet locations. (Curved portions of bends shall not be visible above the finished slab. Slab thickness shall be increased as necessary to provide a minimum 25mm cover over the conduit. Where embedded conduits cross expansion joints, suitable watertight expansion fittings and bonding shall be provided. Conduit larger than 25mm trade size shall be parallel with or at right angles to the main reinforcement; when right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.
- j. Conduits shall be fastened to all sheet metal boxes and cabinets with two locknuts where required by NEC, where insulated bushing are used and where bushings cannot be brought into firm contact with the box; otherwise, at least a single locknut and bushing shall be used. Locknuts shall be the type with sharp edges for digging into the wall of metal enclosures. Bushings shall be installed on the ends of all conduits and shall be of the insulating type where required by the PEC.



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- k. Conduit stubbed up through concrete floors for connections to free-standing equipment shall be provided with a short elbow and an adjustable brass top or coupling of brass or bronze threaded inside for plugs set flush with the finished floor. Screw driver-operated, recessed-square socket type or threaded flush plugs shall be installed in conduits from which no equipment connections are made.
- l. Flexible connections of short lengths shall be provided for equipment subjects to vibration, noise transmission or movement and for all motors. Liquid-light flexible conduit shall be used in wet locations. A separate ground conductor shall be provided across all flexible connections.
- m. Service Voltage to the Building shall be 110/220 volts, 60 hertz, and single phase.
- n. The contraction shall verify and orient the actual location of concrete terminal pole for connection to the power supply and telephone service
- o. All installation shall be concealed from view, wiring shall be encase in polyvinyl chloride (PVC) pipe schedule 40 except for power supply and telephone service which shall be rigid steel conduit (RSC) unless otherwise noted.
 - Line A RED
 - Line B.....BLUE
 - NeutralYELLOW WITH GREEN STRIPES
 - Equipment groundings GREEN
- p. Tapes shall be rubber conforming to UL Standard No. 510.
- q. Minimum wire and conduit size shall be no. 12 AWG type TW & 1/2Ø PVC trade size, respectively unless otherwise specified.
- r. Pull boxes of appropriate size shall be provided, even if not indicated in the drawings to accommodate the number of splices of wires.
- s. Fluorescent lamps shall be provided with polyester – filled pre – heat, thermally protected, high powered ballast
- t. All Materials to be used shall be new and approved type, appropriate for both location and intended use.



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- u. Light control switches shall be rated 10a, 300 watts and shall not carry a load greater than 50amps.
- v. Duplex Receptacles shall be rated 10a, 250 Volts, rounded slots for 220 volts and for parallel slots for 110 volts, and special outlets shall be rated 15a or 250 volts as required.
- w. For each spare circuit in panel board, provide empty 3/4Ø riser terminating in a 2-1/8" deep by 4" octagonal box above the ceiling.
- x. Electrical Installation shall be under the direct supervision of a duly registered and licensed electrical engineer or a registered master electrician.
- y. Outlet boxes shall be as follows:

Light Outlets 1-1/2" deep, 4" octagonal box 1 or 2 way entries
 2-1/8" deep, 4" octagonal box 3 or 4 way entries

Receptacle and Telephone Outlets
 2-1/8" deep, 2" x 4" utility box 1 or 2 raceway entries
 1-1/2" deep, 4" square box with 1 gang raised
 Plastic cover for 3 or 4 raceway entries

Range Outlet 2-1/8" deep, 4-11/16" square box with A-1 gang
 Raised Plastic Cover

II.D CONDUCTOR IDENTIFICATION

Conductor identification shall be provided within each enclosure where a tap splice or termination is made. Identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, or heat shrink type sleeves. Control circuit terminations shall be properly identified.



II.E SPLICES

All splices shall be in accessible locations. Splices shall be in wires 5.5mm², and larger shall be made with an insulated pressure type connection splices for 8mm² and larger shall be covered with an insulation material equivalent to the conductor insulation.

II.F GROUNDING AND BONDING

Grounding and bonding shall, as a minimum, be in accordance with the PEC requirements. All exposed non-current carrying metallic parts of electrical equipment, metallic raceway systems and neutral conductor of wiring systems shall be grounded. The grounding electrode system shall include made-ground rods driven externally to the building. All grounding conductors shall be of copper.

II.G FIELD TESTS AND INSPECTION

- A. General: The Contractor shall show by demonstration in service that all circuits and devices are in operating condition. Tests shall be such that each item of control equipment will function not less than five times.
- B. Test on wiring: all 600-volt wiring shall be tested to verify that no short circuit or accidental grounds exist. Tests shall be made with the use of a megger with 500volts d.c. to provide a direct reading of resistance.
- C. Grounding System Tests: The grounding system shall be tested to assure continuity and that the resistance to ground is not excessive. Each ground rod shall be tested for resistance to ground. Resistance measurements shall be made in normally dry weather not less than 48 hours after rainfall and with the ground rod under test isolated from other grounds. Written results of each test shall be submitted to the Engineer and shall indicate the location of the rod as well as the resistance and soil conditions at the time the measurements are made.
- D. Tests and Inspection: The contractor shall perform all field tests and inspections in accordance with the General Requirements. The contractor shall give the engineer ample notice time schedules and locations of the tests and inspections.



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II.H TESTS AND GUARANTEE:


The Contractor shall furnish if the apparatus for making tests after the electrical work is complete. All wiring shall be tested thoroughly for shorts and grounds using electrical insulation testers. The Contractor shall guarantee all works installed under this contract to be free all defects for a period of one (1) year after acceptance of the project and shall agree to repair and make good at his own expense any and all defects which may develop in his work during the time, if said defects arise due to poor workmanship and materials furnished by the Contractor.

All electrical works herein shall be done in accordance with the latest edition of the Philippine Electrical Code (PEC), rules and regulations of the National Building Code and shall comply with the requirements of the Local City Ordinances and issued Approved Plans

All materials and fixtures to be used herein shall be brand new and passing Philippine Standard material quality control requirements. It shall have cast, stamp or indelible marks on it like manufacturer's trademarks or name, weight, type or classes of products when so required.

No Revisions in the design shall be done without the prior knowledge and approval of the designer and owner, any revisions done without approval shall cause responsibility of the designer to cease as a whole.

PREPARED BY:


ENGR. RICARDO B. GONZALES
University Electrical Engineer



III. PLUMBING WORKS

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.

The term "Contractor" in this specification means "Trade Contractor" unless otherwise specified. The term "Plumbing & Drainage Installation" in this specification has the same meaning as "Sanitary Works" unless otherwise specified.

B. SCOPE OF WORK:

Under this section of the specification, provide all labor, materials and equipment and perform all the work necessary for the complete execution of all the Work as shown on Drawings and specified in this specification. Scope of works shall include but does not be limited to the following major items of work:

1. a) Furnish and install complete water distribution system for the building and ground including incoming supply pipes and connections, pipes, valves, back-flow preventers, hose bibs, water meters, pressure regulators, insulations, accessories, etc.
b) Storage, delivery, protection before installation and connection of plumbing fixtures (e.g. water closets, shower, sinks, lavatories, faucets in toilets and baths), putting's, trims and accessories.
2. Furnish and install storm drainage system for the building and ground including pipes, valves, drains, cleanouts, storm basins and interceptors.
3. Furnish and install soil, waste and vent systems for the building and ground including pipes, valves, drains, cleanouts, sewer basins and interceptors.



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4. Connections to existing water, storm and sewer drainage mains of the building water distribution, storm and sewer collection systems.
5. Supply and installation of pumps and accessories.
6. Complete testing of storm and sewer drainage systems and equipment.
7. Pressure testing of the installed water distribution system.
8. Leakage testing of soil, waste, vent, and storm drainage systems.
9. Disinfections of water distribution system.
10. Test run of pumping system and other equipment.
11. Electrical power and control/wiring system including motor starter, BMS interfacing devices if applicable, interlock and all necessary protection devices from the equipment to disconnect switch. Coordinate work activity with the electrical contractor.
12. Testing, balancing and commissioning of all equipment.
13. Furnish and install all required consumable materials and materials tube installed.
14. Approved hacking on non-structural walls, roofs, floors and partitions to provide openings for pipes. These works shall be properly coordinated and agreed with the university architect and structural engineer.
15. Investigation of all conflicts of this work and coordination with other trades.
16. If anything has been omitted on any item of works such as materials usually furnished which are necessary for the completion of the sanitary and plumbing works as outlined herein-before, then such items must be and hereby included in this division of work.
17. Provide anchor bolts, sleeves, templates and other materials incidental to equipment installation on concrete base pad. The contractor shall provide steel shims and non-shrink grouting as necessary to ensure accurate leveling of base plates. Clean and wet the concrete base and/or pad surfaces to assure bond.
18. Painting and labeling of pipes, conduit, metal work, etc.



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19. Submittal and certificate of tests on installed equipment and piping system.
20. Securing of all permits and licenses from relevant Authorities as required.
21. Preparation and submittal of reproducible and print as-built plans.

C. BUILDING PROVISION:

Certain provisions have been made in the Building for the accommodation of this installation. These provisions include space allocation, holes through beams and structural slabs, etc. The provisions so made are shown on the Drawings. Before proceeding with the Works, the Trade Contractor has to check and confirm that the provisions are satisfactory for the Works, and where necessary, additional information and requirement is to be furnished. It is the Trade Contractor's responsibility to ensure that the WMSU-Physical Plant Office (PPO) is informed of all holes and any other provision requested in the structure. Any subsequent structural openings required due to negligence in providing sleeves beforehand shall be at the expense of the Trade Contractor unless they are covered on a duly authorized variation order issued by the WMSU-Physical Plant Office (PPO). All pipe sleeves shall be supplied and installed by the General Contractor.

The Trade Contractor shall ensure that the fixing is good and the sleeves will not be shifted or moved by concreting or by other trades. It is also the Trade Contractor's responsibility to check and ensure that all holes, openings etc., are provided correctly during construction of the Building.

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 Zamboanga, Zamboanga del Sur



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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 WMSU-Physical Plant Office (PPO) 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 Zamboanga, Zamboanga del Sur. All such laws and ordinances shall form part of this specification.

C. Materials meeting authoritative standards of other rating agencies and organizations which will ensure an equal or higher quality than standards herein specified will also be accepted. Unless otherwise specified in drawings, materials for potable water line shall with the following specifications:

1. All works herein shall be done in accordance with the latest edition of the Philippine Plumbing Code, rules and regulations of the National Building Code and shall comply with the requirements of the Local City Ordinances and issued Approved Plans.
2. Read the drawing in connection with other related drawing & specification. The Architect and Engineer shall be notified immediately of any discrepancy found therein.
3. The contractor shall determine the actual location and depth and invert all discrepancy of all existing pipe and structures to conform with the proposed sanitary utilities.
4. The location of pipes can be transferred whenever required for proper execution of other trades or conditions that such changes of locations meet the requirements.
5. The Contractor shall provide the facility with calibrated ZCWD water meter and shall tap to nearest existing Zamboanga City Water District (ZCWD) water pipe line shown in the plan. Processing of water connection shall be done by the Contractor.



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6. All Slopes for horizontal branches shall maintain 1-1/2 % as minimum requirement unless otherwise noted
7. Size of water supply pipes to fixtures shall be in accordance with the instruction of the manufacturer.
8. G.I. Pipes and other plumbing fittings shall be Caroline coated, underground or embedded on concrete
9. All downspouts shall use PVC pipes unless otherwise specified
10. Sewer and vent pipes shall be in PVC pipes
11. All floor drains shall use PVC pipes in good quality with square strainers with slot opening "METMA" M-120-G s
12. Clean outs shall be provided @ 15.00 Meters. Horizontal run as indicated in the plans and shall have brass covers for PVC.
13. An individual Control Gate valve shall be provided in all water supply line from the main water line.
14. Sewer Pipes must be tapped to the existing septic vault.
15. Unless otherwise specified, use 3" Ø PVC pipes S-1000 for vent pipes
16. Unless otherwise specified, use 4" Ø PVC pipes S-1000 for sanitary pipes
17. Unless otherwise specified, use 1/2 Ø pp-r pipe PN-20 for water supplies.
18. Provide 4"Ø x 2-1/2"x 2-1/2" Siamese (for Fire Accessories) as indicated in the drawings
19. 2000 liters aluminum tank shall be used for water supply.
20. 3" Ø PVC pipes S-1000 shall be use in every water closets, lavatories and sink for ventilation.
21. Plumbing works shall coordinate with masonry, carpentry and tiling works.
22. All fixtures shall be inspected for installation approval by WMSU-Physical Plant Office (PPO) and color choices shall be approved by Office of the University Architect.



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23. All plumbing works herein shall be done under the direct supervision of a duly registered sanitary engineer.
24. Ensure that the permanent connections to the local lines for water, drainage, electrical and sewer lines including materials, equipment, facility are working in order.
25. No Revisions in the design shall be done without the prior knowledge and approval of the designer and owner, any revisions done without approval shall cause responsibility of the designer to cease as a whole.

III.A CONSTRUCTION OF SEPTIC TANK

1. All works herein shall be done in accordance with the latest edition of the Philippine Plumbing Code, rules and regulations of the National Building Code and shall comply with the requirements of the Local City Ordinances and issued Approved Plans.
2. All materials and fixtures to be used herein shall be brand new and passing Philippine Standard material quality control requirements
3. Septic tank shall not be installed below in any structures.
4. Tanks must be built water tight of concrete, (100mm Thick CHB with 25mm plaster and 100mm thick concrete slab cover) as specified in the drawings.
5. The bottom of the tank shall be made of 100mm thick concrete slab on 100mm thick gravel bedding.
6. The bottom of the tank should have 10% slope towards the manhole in the center to facilitate cleanout.
7. Septic tank must have 2 (two) leaching chambers and 1 (one) digestive chamber as indicated in the drawing.
8. Components are provided with 500mm x 500mm manholes and tight covers for maintenance and necessary repairs.
9. Inlets and outlets shall be of 4" Ø PVC pipe S-1000 and shall be submerged and arranged in such a way that neither sludge nor scum be unduly disturbed.
10. Inlets and outlets shall be arranged so as to deliver the sewage to the middle thirds of the tank dept. for instance, in tank 1.20m deep, the inlet and outlet shall be submerged 0.40m.
11. The vault shall be vented through the sanitary tees in the outlet and inlet having top ends open and screened to make the tank mosquito-proof.



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12. Not less than 0.20m of air space should be left between the top of the sewage and under part of the tank cover.
13. Additional length of 1000mm shall be added to the vault for the for the filter (leaching well).
14. No Revisions in the design shall be done without the prior knowledge and approval of the designer and owner, any revisions done without approval shall cause responsibility of the designer to cease as a whole.

APPROVED BY:


ARCH. JOSEPH ANDREW L. SAHIAL
UNIVERSITY ARCHITECT



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