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TERMS OF REFERENCE

PROCUREMENT AND IMPLEMENTATION OF THE PROJECT:

COMPLETION OF SCIENCE AND RESEARCH FACILITY

Of

PHILIPPINE SCIENCE HIGHSCHOOL-CENTRAL MINDANAO CAMPUS
LOCATED IN NANGKA, BALO-I, LANA DEL NORTE

BACKGROUND AND OBJECTIVE OF THE PROJECT

The PHILIPPINE SCIENCE HIGH SCHOOL-CENTRAL MINDANAO CAMPUS (PSHS-CMC) through approved allocation for capital outlays under FY 2018 General Appropriations Act intends to apply the sum of THIRTY-EIGHT MILLION EIGHT HUNDRED THOUSAND PESOS (P38,800,000.00) being approved budget for the project: **COMPLETION OF SCIENCE AND RESEARCH FACILITY**

The project, subject of this procurement process, is called the **COMPLETION OF SCIENCE AND RESEARCH FACILITY** of the Philippine Science High School - Central Mindanao Campus (PSHS-CMC).

The infrastructure project - COMPLETION OF SCIENCE AND RESEARCH FACILITY addresses the design phase, technical drawings, and the spatial requirements that are needed within the facility.

The PSHS-CMC is a three-storey reinforced concrete, geometrical shaped building. It should support the components of a contemporary futuristic building design. This building shall house the following:

<u>Ground Floor</u>
Information, Lobby and Visitors' Holding Area
Display Area and/or Museum
Office (good for 5 personnel)
One Pantry
Comfort Rooms (Male and Female) and for Disabled/Elderly Persons
Utility Room
<u>Second Floor</u>
Robotics Laboratory
Air Laboratory
Bio Molecular Laboratory
Water Laboratory
Soil Laboratory
Material Science Laboratory
<u>Third Floor</u>
AVR and Function Rooms
Science Garden and Showroom
Interactive Room

This building will be located in front of Multi-Purpose Gymnasium with an allowable foot print 1,800 square meter floor area.

PROJECT TIME SCHEDULE

The CONTRACTOR shall complete the project within one hundred eighty (180) calendar days from signing of the Contract.

OBJECTIVE OF THE TERMS AND REFERENCE (TOR)

The Philippine Science High School- Central Mindanao Campus is considering the construction of a Science Research Facility that would house appropriate facilities suitable of a research center.

1. To provide a background information regarding the preparation and submission of the proposed project.
2. To provide a background information regarding the proposed project which should be handled in the shortest possible time, at the lowest possible cost and at an acceptable quality and performance.
3. To outline the work of the Contractor that will perform under the terms of its contract with the PSHS-CMC.

SCOPE OF WORK

Pre-Construction Phase

- Preparation of the PERT-CPM/ Gantt chart of the construction phase.
- Provide all other necessary documents that shall be required by PSHS-CMC

Construction Phase

- Shall furnish all labor, materials, tools, equipment, fixtures and other necessary items needed to perform the said building as per approved drawings and specifications and complete in good and workmanlike manner the work describes in the agreement. All work shall be done in accordance with, all laws, ordinances, building codes, rules and regulations to the work, including, but not limited to the Person with Disabilities Act, environmental regulations and Occupational Safety and Health Act of 1970.
- Construct the building components complete resulting in operable and usable structure.
- Layout piping, conduits, manholes, boxes and other lines for utilities including tapping to existing utility lines.
- Conduct all necessary tests (as required by PSHS-CMC) and issue reports of results.
- Rectification of punch-listing works to be inspected and issued by PSHS-CMC and/or by the Consultant.
- Provide all other necessary documents that shall be required by PSHS-CMC.

Post-Construction Phase

- Preparation of as-built plans where necessary.

MODE OF PAYMENT

- PSHS-CMC shall pay the CONTRACTOR progress payments based on billings for actual works accomplished, as certified by PSHS-CMC and the Designer. In no case shall progress billing be made more than once every thirty (30) calendar days. Materials or equipment delivered on the site but not completely installed in place or used in the project shall not be included for payment.
- All progress payment shall be subject to retention of ten percent (10%) based on the amount due.
- The CONTRACTOR may request in writing which must be submitted to form part of the Contract Documents, for an advanced payment equivalent to fifteen percent (15%) of the total Contract Price. The advance payment shall be made once the CONTRACTOR issues its irrevocable standby letter of credit from a reputable bank acceptable to PSHS-CMC, or GSIS Surety Bond of equivalent value, within fifteen (15) days from the signing of the Contract Agreement to cover said advanced payment.
- First Payment/Billing shall have an accomplishment of more than 15% for being there will be a one-time deduction of the 15% advance payment
- The following documents must be submitted to PSHS-CMC in order before processing of payments to the CONTRACTOR can be made:

PROGRESS BILLING

- Request for Payment by the Contractor.
- Statement of Work Accomplished
- Test results and analysis
- Pictures/photographs of original site conditions (First Billing)
- Pictures/photographs of work accomplished
- Contractor's Affidavit On Payments of Labor And Materials
- Disbursements vouchers (Past Billings)

QUALIFICATION AND MANPOWER REQUIREMENTS

Selection of Contractor

- Bidding shall be conducted by the Bids and Awards Committee (BAC) constituted to conduct the procurement of the project.
- The CONTRACTOR shall have valid PCAB License and registration for the type and cost of the contract to be bid
- Construction Safety and Program Approved by Department of Labor and Employment

Personnel

Civil Engineer /Architect – The Civil Engineer/Architect must be duly-licensed Civil Engineer/ Architect with at least five (5) years' experience in Structural/Architect design Preferably with experience in *green building design*.

Electrical Engineer – The Electrical Engineer must be a registered Electrical Engineer with at least five (5) years' experience in the design of lighting, power distribution, and communication systems.

Mechanical Engineer– The Mechanical Engineer must be a Mechanical Engineer with at least five (5) years' experience in HVAC and fire protection systems.

Sanitary Engineer / or Master Plumber– The Sanitary Engineer must be duly licensed with at least five (5) years' experience in the design of building water supply and distribution and plumbing.

Safety Officer – Should be a Construction Occupational Safety and Health (COSH) or BOSH Certified.

CAD operator / Draftsman - with at least two (2) years' experience in CAD works.

Labor

- It is understood that the work shall be done and executed in accordance to the good engineering methods and practices.
- The Contractor shall and thereby warrants all work performed by him directly and for which guarantee are required. The Contractor shall and thereby warrants and/or guarantees for a period of one year, or for longer periods where so provided in this Specifications, a evidenced by date of final certificate issued by the Architect, all materials and workmanship installed under Contract to be of good quality in every respect and to remain so for periods described herein.

- Such any defects develop in aforesaid work, within the specified periods, due to faults in material and/or workmanship, the Contractor thereby agrees to make all repairs and do all necessary work to correct defective work to the Architect's satisfaction. Such repairs and corrective works shall be done without cost to the Owner and at entire cost and expense of the Contractor.

Equipment

2-UNITS CONCRETE MIXER (1-BAGGER)

3-UNITS WELDING MACHINE,

1-UNIT MINI DUMPTRUCK

1-UNIT MINIMUM OF 25KWATT Generator Set

1-UNIT WATER TRUCK

1-LOT OF SCAFFOLDINGS

GENERAL TERMS AND CONDITIONS

GENERAL TERMS AND CONDITIONS

PART 1 – GENERAL

1.0 Description

- A. The work specified herein is for the completion of the **PROPOSED 3-STOREY SCIENCE RESEARCH FACILITY** located at, Nangka, Balo-I, Lanao Del Norte.

1.1 Introduction

- A. The Drawings and the Specifications are complementary to each other. Drawings are graphic means of showing work to be done. They are particularly suited to show where materials are located. Thus, drawings exist essentially to show dimension, location and placement. Not all works, however, can be represented in the drawings. Generalized works are usually in statement form, and hence, the Contractor is required to read the Specifications carefully.
- B. Specifications, on the other hand, are used to describe the materials, construction techniques, samples, shop drawings, guarantees, and other contract requirements. Together, the Drawings and the Specifications are used to inform the Contractor.

1.2 National laws, Local Ordinances and Building Rules and Regulations

- A. Constructions of the structure stipulated under this Specification and related Contract Documents prepared for this project by ELJ Builders, Inc. shall be in conformity with National Laws, Local Ordinances and Building Rules and Regulations.

1.3 Reference to Other Related Contract Documents

- A. Work listed and described in this Division as well as those called for and described in other divisions of this Specifications are subject to the General Conditions of the Contract which forms part of this work.
- B. Detailed Specifications of more significant or highly involved phases or trades of Construction work, or those which under certain circumstances are deemed to require further elaboration or clarifications, are also included in this set of specifications.

1.4 The Language of Specifications

- A. The Specifications are of the abbreviated type and include incomplete sentences.
- B. The selection of sentence structure depends on the underlying principles of specifications:
1. That the technical specifications are only one part of the Contract Documents;

2. That the contract is between Owner and the General Contractor; and;
3. That the General Contractor is the only party responsible for completing the work in accordance with the Contract Documents.

Therefore:

- a. Only the General Contractor is referred to in the Specifications so as not to violate the intent of the contract and so as not to undermine the proper chain of command.
- b. Any reference to Specialty Trade Contractor in the technical specifications is made only in so far as selection of Specialty Trade Contractors are made through bidding. Once the Specialty Trade Contractors are selected and assigned to the General Contractor, the General Contractor assumes all responsibilities for the execution of the whole project in accordance with the Contract Documents. Therefore, in the contract between the Owner and the General Contractor, the Specialty Trade Contractor is not referred to. In all the Contract Documents, the word "Contractor" is meant the General Contractor.
- c. The omission of the phrase "The Contractor shall" is intentional because the whole specifications is directed to the Contractor. Omitted words or phrases shall be supplied by interference in the same manner as they are when "note" occurs on the drawings.
- d. Where "as shown", "as indicated" or words of similar import are used, it shall be understood that reference to the drawings accompanying the specifications is made unless otherwise stated.
- e. Where "as directed", "as required", "as permitted", "as authorized", "as approved", "as accepted" or words of similar imports are used, it shall be understood that the direction, requirement, permission, authorization, approval, or acceptance of the Architect is intended unless otherwise stated.
- f. As used herein, "provided" shall be understood to mean "provide complete in place" that is "furnished and installed".
- g. Most sentences are in the imperative mood. This style is specially suited for instructions covering installation of products and equipment.

Example:

"spread adhesives using notched trowel"

"use a notched trowel"

"install flooring with textured side up"

The verb is the first word of the sentence clearly defining the action to be performed. This style is readily understandable and concise.

PART – 2 GENERAL PARAGRAPHS

2.0 Project Information

- A. The work shall conform to the following contract drawings, details and maps, all of which form a part of these specifications.
- B. Omissions from the drawings or specifications or the mis-description of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or mis-described details of the work but they shall be performed as if fully and correctly set forth and described in the drawings and specifications.
- C. The Contractor shall check all drawings furnished him immediately upon their receipt and shall promptly notify the Project Manager of any discrepancies. Figures marked on drawings shall be followed in preference to scale measurements. Large scale drawings shall govern small scale drawings. The Contractor shall compare all drawings and verify the figures before laying out the work and will be responsible for any errors which might have been avoided thereby.
- D. All drawings issued for construction to General Contractor/s, Sub-Contractors shall be furnished solely by the Architects.
- E. Physical Data: The physical conditions indicated on the drawings and in the Specifications are the result of site investigations by surveys and soil boring conducted. However, it is expressly understood that the Architect/Designers will not be responsible for any interpretation or conclusion drawn there from.
- F. It shall be the duty of the Contractor to carefully examine, compare, and verify the data furnished by the Plans and Specifications. Any doubt as to the meaning of the plans (including notes thereon) and the Specifications, or any obscurity as to the wording of the Specifications will be explained. All directions and explanations necessary and proper to make more definite and certain any requirements of the plans (including notes thereon) or of the provisions of the Specifications to give them due effect, will be given by the Architect.
- G. In any case of discrepancy in the figures or drawings, the matter shall be submitted immediately to the Architect, before any adjustments be made by the Contractor save only at the latter's own risk and expense. The decision of the Architect on the adjustment of discrepancies so as to confirm the real intent of the plans and Specifications shall govern and shall be followed by the Contractor without extra charge.

2.1 Protection of Materials, Work and Property

- A. The Contractor shall put up and continuously maintain adequate protection of all his work from damage and shall protect the Owner's property, as well as all materials furnished and delivered to him by the Owner, from injury or loss arising in connection with this Contract. He shall make good any such damage, injury or loss except such as may be caused by agents or employees of the Owner.
- B. The Contractor shall adequately protect adjacent property as provided by law and the Contract Documents. The construction, building, or work in addition to any neighboring property or building which may be jeopardized in any manner, must be thoroughly and substantially braced against winds, floods, settling, falling or like occurrences, and when necessary, covered and protected from sun and rain at the Contractor's expense. The Contractor shall be liable for all damages occasioned in any manner by his acts or neglect, or of his agents, employees, or workmen.
- C. If it is necessary in the prosecution of the work to interrupt or obstruct the natural flow of rivers or streams, the drainage of the surface, or flow of artificial drains, the Contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interests. For any neglect to provide for either natural or artificial drainage which he may interrupted, he shall be liable for all damages which may result therefrom during the progress of the work.

2.2 Inspection of Work

- A. The Architect and his representatives shall, at all times, have access to the work wherever it is in preparation or progress and the Contractor shall provide facilities for such access and for inspection.
- B. If the Specifications, the Architect's instructions, laws, ordinances or any public authority require any work to be specially tested or approved, the Contractor shall give the Architect timely notice of its readiness for inspection, and if the inspection is by another authority than the Architect, of the date fixed for such inspection. Inspections by the Architect shall be promptly made, and where practicable, at the source of supply. If any work should be covered up without approval or consent of the Architect, it must, if required by the Architect, be uncovered for examination at the Contractor's expense.
- C. Should it be considered necessary or advisable by the Architect at any time before final acceptance of the entire work, to make an examination of the work already completed, remove or tear out same, the Contractor shall, on request, promptly furnish all necessary facilities, labor and material. If such work is found to be defective in any material respect, due to the fault of the Contractor or his sub-contractors, he shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, plus 15 percent, shall be allowed the Contractor and he shall, in addition, if completion of the work has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.

- D. Defective work and material may be condemned or rejected by the Architect at any time before the final acceptance of the work. When such work has been condemned, it shall be taken out immediately by the Contractor and rebuilt in accordance with the plans and Specifications. When defective materials have been condemned, they shall be removed at once by the Contractor from the line of the work.
- E. Failure or neglect on the part of the Architect, or any of his representatives, to condemn or reject bad or inferior work or materials shall not be construed to imply an acceptance of the work of the same, if such bad or inferior work or materials are discovered at any time prior to the final acceptance of the work by the Owner and the release of the Contractor.

2.3 Correction of Work

- A. The Contractor shall promptly remove from the premises all materials condemned or rejected by the Architect as failing to conform to the contract, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the contract and without expense to the Owner and shall bear the expenses of making good all work of other Contractors destroyed or damaged by such removal or replacement.
- B. If the Contractor does not remove such condemned or disapproved work and materials within a reasonable time, fixed by written notice, the Owner may remove them and may store the material at the expense of the Contractor.
- C. Neither the final certificate, nor payment, nor any provision in the Contract Documents shall relieve the Contractor of the responsibility for faulty materials or workmanship and, unless otherwise specified, he shall remedy any defects due thereto and pay for any damage to other work resulting there from, which shall appear within a period of one (1) year from date of substantial completion.
- D. The Owner shall give notice of observed defects with reasonable promptness. All questions arising under this article shall be decided by the Architect, subject to arbitration.

2.4 Cutting, Patching and Digging

- A. The Contractor shall do all cutting, fitting or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of and other Contractors shown upon, or reasonably implied by the plans and Specifications for the completed structure, and shall make good after them as the Architect may direct.
- B. Any cost caused by defective or ill-timed work shall be borne by the party responsible, therefore. The Contractor shall not endanger any work by cutting,

digging, or otherwise, and shall not cut or alter the work of any other Contractor save with consent of the Architect.

PART - 3 SUBMITTALS

3.0 Proposed Material Submittals, Catalog Data and Samples

- A. Proposed material submittals required of the Contractor shall be submitted within 30 calendar days after Notice to Proceed to allow sufficient time for processing, review, approval and procurement before the Contractor is ready to use prior to written approval.
- B. The Contractor shall furnish the name and address of the manufacturer of each item of material and equipment. Each submittal shall be accompanied by a cover letter signed by the Contractor.
- C. The Contractor shall furnish three copies for approval, giving full information, such as identifying description, catalog numbers, catalog cuts, and data sheets as maybe required for all material and equipment designated in the technical sections of this specification. Clearly mark each item proposed to be incorporated into the contract and identify in the submittals, with cross-references to the item number of the Contract drawings and specifications so as to identify clearly the use for which it is intended. Data submitted in a bound volume in the same numerical sequence as specification section paragraphs.
- D. The Contractor shall certify on all submittals that the material being proposed conforms to contract requirements. In the event of any variance, the Contractor shall state specifically with portions vary, and request approval of a substitute. Incomplete submittals and submittal with inadequate data will be rejected.
- E. Methodology should be provided by the manufacturers/suppliers.

3.1 Shop Drawings

- A. Before starting the fabrication or installation of any of this work, the Contractor shall submit drawings as may be required and designated in the technical sections of this specifications.
- B. In addition to the drawings designated in the technical sections, the Contractor shall furnish any and all sketches, drawings, and/or diagrams used in connection with the completion of the project, to the Architect thru Project Manager. Drawings submitted for review or approval shall be clearly identified as their intended use in the project.
- C. The Contractor shall prepare at his own expense and submit with such promptness as to cause no delay in his own work or in that of any other Contractor doing work on the same building, one (1) electronic copy of pdf file in cd format (2) blue print copies in 20" x 30" size of all shop drawings, as well as

schedules, required corrections, including all necessary corrections relating to artistic effect. The Contractor shall make any corrections required by the Architect, file with him two (2) corrected copies and furnish such other copies as may be needed.

- D. The Contractor shall not relieve responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data or Samples unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation.
- E. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Architect's approval thereof.
- F. No portion of the work requiring submission of a Shop Drawings, Product Data or Sample shall have commenced until the submittal has been approved by the Architect. All such portions of the work shall be in accordance with approved submittals.

3.2 Manufacturer's Certificates of Conformance

- A. Before delivery, manufacturer's certifications shall be furnished by the Contractor as required by the technical specifications. Preprinted certifications will not be acceptable. All certifications shall be in the original copy. The original of all manufacturer's certifications shall name the appropriate items of equipment or material, specification, standard, or other document or material, specification, standard or other document specified as controlling the quality of that item and shall have attached thereto certified copies of test data upon which the certifications are based. All certificates shall be signed by the manufacturer's official authorized to sign certificates of conformance.
- B. If the product is LEED Certified, provide a copy the LEED Certification of the Product.

3.3 Laboratory Reports

- A. Reports shall cite the contract requirements, the test or analysis procedures used, the actual test results, and state that the item tested or analyzed conforms or fails to conform to the specification requirements. All test reports shall be signed by representative of the testing laboratory authorized to sign certified test reports.

3.4 Warranty Documents

- A. In addition to the warrantees required, the Contractor shall submit together with the technical publications specified herein, a copy of all warranty documents on all items of equipment, including those obtained in writing from sub-contractors, manufacturers and suppliers.

3.5 Mock-Up

- A. General: As soon as practicable, provide a complete installation of mock-up test panels as required by the Contract Documents. Modifications deemed necessary shall be made in mock-up for evaluation, and re-tested, until specified results are obtained.
- B. Test shall be conducted at Contractor's expense. Modifications for the mock-up as required from results of test shall be at the expense of the Contractor as well.
- C. Coordinate mock-up test conditions and procedure with the Architect prior to test.

3.6 Tests and Inspections (Testing and Commissioning by "Third Party"- from client)

- A. Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so the Architect may observe such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.
- B. If the Architect, Owner or public authorities having jurisdiction determine that portions of the work require additional testing, inspection or approval not included under Sub-paragraph 3.6, item-A, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so the Architect may observe such procedures. The Owner shall bear such costs except as provided in Sub- paragraph 3.6, item-C.
- C. If such procedures for testing, inspection or approval under Subparagraph 3.6, items-A and B reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses.
- D. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.
- E. Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

3.7 Extra Materials (ATTIC STOCK)

- A. Provide extra materials in quantities specified below:
1. Interior Stone: Provide 1/10 of 1% of each size, color and surface finish of Granite/Marble specified for countertop.
 2. Finish Hardware: Provide ten (10) extra key lock cylinders for each Master keyed group.
 3. Tile: Provide 1/10 of 1% of each size, color and surface finish of tile specified:
 - a. Ceramic tiles (floors and walls)
 - b. Homogenous tiles (matte and polished finish)
 4. Acoustical Ceilings: Provide 1/10 of 1% of total acoustical unit area for extra tiles or panels.
 5. Resilient Flooring: Provide 1/10 of 1% of flooring, linear meter of base and of each material specified.
 6. Carpet Tiles: Provide 1/10 of 1% of carpet tiles of each selected color and pattern selected.
 7. Resinous Flooring: Provide 2 gallons(8-liters) of resinous coating material, of each color selected. Label each container with color, type, texture, room locations and in addition to the manufacture's label.
 8. Painting: Provide 1 gallon (4-liters) of each color, type and surface texture. Label each container with color, type, texture, room locations and in addition to the manufacture's label.
 9. Window Shades: Provide 2-each for control cords, rods and wands.
- B. Deliver all extra materials to site with proper labels and place in location as directed by Owner.

3.8 Operating and Maintenance Manuals

- A. The accuracy, relevancy, and timeliness of well-developed, user-friendly O&M manuals are becoming increasingly important. Hence, it is becoming more common for detailed, facility-specific O&M manuals to be prepared prior to commissioning. The goal is to effectively support the life cycle of the product/equipment by realizing life-cycle cost savings. These manuals should be provided by manufacturers/suppliers for the protection of product/item supplied as well as to serve the warranty given.

3.9 As-Built Plans (By Contractor)

- A. Revised set of drawings submitted by a contractor upon completion of a project. They should reflect all changes made in the specifications and working drawings during the construction process, and show the exact dimensions, geometry, and location of all elements of the work completed under the contract.

PART – 4 GENERAL CONDITIONS

4.0 Owner's Right to Stop the Work

- A. If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Paragraph of "Correction of Work" or persistently fails to carry out Work in accordance with the Contract Documents, the Owner, by written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by coordination of activities of the Owner's own forces and of each separate Contractor with the work of the General Contractor.

4.1 Owner's Right to Carry Out the Work

- A. If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and prompt-ness, the Owner may after such seven-day period give the Contractor a second written notice to correct such deficiencies within a second seven-day period. If the Contractor within such second seven-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate "Change Order" shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

4.2 Owner's Right to Terminate the Contract

- A. The Owner may terminate the Contract if the Contractor:
1. Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
 2. Fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
 3. Persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or
 4. Otherwise is guilty of substantial breach of a provision of the Contract Documents.
- B. When any of the above reasons exist, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and

the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

1. Take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
 2. Accept assignment of subcontracts pursuant to contingent assignment of sub-contracts; and
 3. Finish the Work by whatever reasonable method the Owner may deem expedient.
- C. When the Owner terminates the Contract for one of the reasons stated in paragraph 4.3, item A, the Contractor shall not be entitled to receive further payment until the Work is finished.
- D. If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

4.3 Changes in the Work

A. Changes

1. Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this article and elsewhere in the Contract Documents.
2. Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.
3. Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.
4. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

B. Change Orders

1. A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect, stating their agreement upon all of the following:
 - a. A change in the Work;
 - b. The amount of the adjustment in the Contract Sum, if any; and
 - c. The extent of the adjustment in the Contract Time, if any.
 2. Methods used in determining adjustments to the Contract Sum may include those listed in "Construction Change Directive."
- C. Construction Change Directives
1. A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly:
 2. A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.
 3. If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
 - a. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
 - b. Unit prices stated in the Contract Documents or subsequently agreed upon;
 - c. Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
 - d. As provided in sub-paragraph 6.
 4. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.
 5. A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
 6. If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under Subparagraph C, item 3-b, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract

- Documents, costs for the purposes of this item 6 shall be limited to the following:
- a. Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by the agreement or custom, and workers' or workmen's compensation insurance;
 - b. Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
 - c. Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
 - d. Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
 - e. Additional costs of supervision and field office personnel directly attributable to the change.
7. Pending final determination of cost to the Owner, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.
8. If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Architect for determination.
9. When the Owner and Contractor agree with the determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.
- D. Minor Changes in The Work
1. The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be affected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

4.4 Contract Time

- A. Progress and Completion
1. Time limits stated in the Contract Documents are of the essence of the Contract by executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.
 2. The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article in "Insurance and Bonds" to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by a notice to proceed given by the Owner, the Contractor shall notify the Owner

in writing not less than five days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

3. The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

B. Delays and Extension of Time

1. If the Contractor is delayed at any time in progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate Contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.
2. Claims relating to time shall be made in accordance with applicable provisions of "Claims and Disputes".
3. This paragraph "Delays and Extensions of Time" does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

4.5 Substantial Completion

- A. When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. The Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

4.6 Partial Occupancy or Use

- A. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under paragraph "Substantial Completion". Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and the Contractor or, if no agreement is reached, by decision of the Architect.
- B. Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.
- C. Unless otherwise agreed upon, partial occupancy or use of a portion of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

4.7 Protection of Persons and Property

- A. Safety Precautions and Programs
 - 1. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.
 - 2. In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated Biphenyl (PCB), or when it has been rendered harmless, by written agreement of the Owner and Contractor, or in accordance with final determination by the Architect on which arbitration has not been demanded, or by arbitration under "Administration of the Contract".
 - 3. The Contractor shall not be required, pursuant to paragraph on "Changes in the Work", to perform without consent any Work relating to asbestos or polychlorinated biphenyl (PCB).
- B. Safety of Persons and Property
 - 1. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:
 - a. Employees on the Work and other persons who may be affected thereby;
 - b. The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control

- of the Contractor or the Contractor's Subcontractors or Sub-subcontractors;
and
 - c. Other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
 - 2. The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
 - 3. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying Owners and Users of adjacent sites and utilities.
 - 4. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.
 - 5. The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in sub-paragraph 4.7, B, items - 1b and -1c caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under sub-paragraph 4.7, B, items - 1b and -1c, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph of "Indemnification".
 - 6. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and the Architect.
 - 7. The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
- C. Emergencies
- 1. In an emergency affecting safety persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided as provided in paragraphs of "Claims and Disputes" and "Changes in the Work".

4.8 Uncovering and Correction of Work

A. Uncovering of Work

1. If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for the Architect's observation and be replaced at the Contractor's expense without change in the Contract Time.
2. If a portion of the Work has been covered which the Architect has not specifically requested to observe prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the Owner or a separate Contractor in which event the Owner shall be responsible for payment of such costs.

B. Correction of Work

1. The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby.
2. If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Subparagraph 4.6, item-A, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This period of one year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation under this Subparagraph item-2 shall survive acceptance of the Work under the Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.
3. The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.
4. If the Contractor fails to correct non-conforming Work within a reasonable time, the Owner may correct it in accordance with Paragraph 4.1, Item-A. If the Contractor does not proceed with correction of such non-conforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and store the salvageable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage within ten days after written notice, the Owner may

upon ten additional days' written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Architect's services and expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

5. The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate Contractors caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.
6. Nothing contained in this Paragraph 4.8, item-B shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the time period of one year as described in Subparagraph 4.8,item-B-2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

4.9 Construction Guidelines

A. The General Contractor and its nominated sub-contractors and/or suppliers including specialty contractor must comply to the following procedures in compliance to materials, specifications per owner's requirements for endorsement of the Architect in charge for Owner's approval.

B. Submit at least 3 material samples as specified. c/w product technical data and existing project where the materials have been installed/applied.

C. Plan visit if required, accountable to the supplier.

D. Submit shop drawings plans for Architect's review. Provide 3 mock-ups for endorsement to the Owner.

1. Any discrepancy or details not clear/shown on plan and specification shall be as (RFI) Request for Information to be replied by the Design Architect.
2. All mock-ups and materials sample based on specifications, the contractor must provide (RFA) Request for Approval for Architect's comments and review prior to endorsement to the Client.
3. The Owner/Client has right to conduct value engineering works to be reviewed by the Architect.

E. Methodology/Application procedures. (Method Statement).

F. Upon approval of materials, the Contractor shall & must provide warranty at least 2 to 5 years as per client's requirements and attic stock (Spare materials) at least 2% to 10% of total materials for Owner's maintenance stock.

1. The Contractor must submit updates on BOQ & Progress Work Schedule without cost implication.
2. The Contractor must conduct monthly progress report, with power point presentation during fortnightly meeting to be scheduled every last Friday of the month.

G. No change order and price escalation with or without cause, delays or acts of nature. The Contractor shall not be relieved from their responsibilities.

H. Upon turn-over all works are subject to Punch listings: Pre-punchlist and final punchlisting prior to Certificate of Acceptance or Closing out of material workmanship quality.

I. The Contractor must provide Safety Officer & Security Guard, QA/QC procedures, as-built plans and materials maintenance manual & procedures, as-built plans and maintenance manual & procedures.

J. All and above procedures shall be the responsibilities of the contractor without time and cost impact to the project duration based on Contractor's Contract.

K. The Contractor must be aware & faithfully following all restrictions, house rules, regulations, within the premises of the project as per requirements of the client.

L. All Workers must have (PPE) Personal Protection Equipments, safety shoes, hardhat, gloves, goggles, harness reflectorized vest, boots & coats to ensure safety on all times.

GENERAL REQUIREMENTS AND SPECIFICATIONS

GENERAL REQUIREMENTS AND SPECIFICATIONS

PART – 1 SUMMARY OF MATERIALS AND FINISHES

1.0 General

- A. All applicable provisions of the different divisions of the Specifications for each work trade shall apply for all items cited in this Specifications.
- B. Materials and workmanship deemed necessary to complete the works but not specifically mentioned in the Specifications, Working Drawings, or in the other Contract Documents, shall be supplied and installed by the Contractor without extra cost to the Owner. Such materials shall be of the highest quality available and installed or applied in a workmanlike manner at prescribed or appropriate locations.
- C. Materials specifically mentioned in this Summary shall be installed following efficient and sound engineering and construction practice, and specifically as per manufacturer's application or installation which shall govern all works alluded to this Specifications.
- D. Any details shown on the plans/drawings but not stated in the specifications shall be considered as existing in both. In case of conflict in scale and dimensions, the interpretation of the designing Architect shall be followed.
- E. Materials and Finishes for on-site improvements and facilities:
 - 1. Demolition/clearing, excavation and site grading works in preparation for the construction and eventually, for landscaping.
 - 2. Construction of: (i) Curbs and gutters, walks and miscellaneous slabs, (ii) Below grade structures such as septic vault, manhole, area drain, catch basins and grease trap.
 - 3. Exterior utility lines, raceway system, fixtures, switches/buzzers of control at their terminals and including fittings and accessories as required by the specialty trades under plumbing and electrical works.
- F. Off-site improvements shall generally be under responsibility of the Owner included in the Contract with the exception of the following which shall be part of the Contractor's work.
 - 1. Permanent connections to the local utility lines for electrical, water, drainage and sewer lines including equipment, facilities, materials, fees, and/or work which utility companies or authorized may require of the applicant Owner.

1.1 Securing of Permits

- A. Visit the site of the work and examine the premises to fully understand all existing conditions relative to work. No increase in cost or extension of performance time be considered for failure to verify and know actual site conditions.
- B. Contractor to secure and pay for all necessary permits needed for the work.

- C. Contractor to protect adjacent properties, persons, shrubs, trees, lawns, structures, and utilities therein against harm or damage.
- D. Contractor to provide sheet piles, if necessary, to protect adjacent properties.

1.2 Site works

1.2.1 Demolition Works

- A. Demolish and remove from site existing structures and other obstructions which are in the project area and are not being reused. Where existing concrete on ground is to be demolished, remove all existing concrete and obstructions to a depth of 600mm (24") below grade.
- B. Removal and storing of salvageable materials: Special care should be done in removing reusable materials resulting from the premises and dumped at sites provided by the Contractor in a manner approved by the Architect.

1.2.2 Clearing and Preparation of the Site

- A. Clearing and disposal of resulting trash, waste on the site of the structure and within the limits of grading.
- B. Repair damages done to property of any person or persons on or off the premises, by reason of the required work for Demolition and Clearing. The Contractor shall be liable and hereby assumes full responsibility for and shall hold the Owner free and harmless from any injury or damage that may be sustained by any person or property in connection with the performance of the works contracted for under this Agreement.

1.2.3 Excavation

- A. Excavation to the dimensions and elevations indicated on the drawings. Carry excavation to depths directed by the Architect should unsuitable bearing be encountered at elevations indicated. Contract price shall be adjusted according to the Owner and the Contractor.
- B. Precautions shall be taken such that excavation do not extend below the exact lines of bottoms of footings and other soil bearing foundations. Otherwise, Contractor shall fill to the level for bearing with concrete specified for footings at Contractor's expense.
- C. Bottoms of excavation shall be level, free from loose materials, and brought to indicated or required levels in undisturbed earth or in compacted fill.
- D. All footings sub grade shall be approved by the Architect before proceeding with the Construction of the footings.
- E. Unauthorized Excavation: In case of suitable bearing soil is encountered at the sub-grade elevation shown in the drawings and the excavation has been made to

greater depth, the concrete fill shall be installed by the Contractor as directed by the Architect and/or Engineer at Contractor's expenses.

- F. If the grade does not meet the above requirements (or if unsatisfactory materials as determined by the testing laboratory is encountered), the sub-grade shall be compacted or unsatisfactory materials shall be removed and replaced with materials approved by the testing laboratory and the Architect and/or Engineer before proceeding with the work.
- G. Pump water or remove water by other approved method out of excavated areas throughout the construction. Water shall not be conducted into adjacent develop property and shall be discharge at a safe distance from the excavation.

1.2.4 Backfilling

- A. Prior to backfilling around structures, backfilling materials shall be free from large voids of earth or stones larger that 75mm (3") in longest dimension, remove all forms of rubbish and organic matters including roots, weeds, leaves and grasses, trash, debris and other unsatisfactory materials. Use only approved backfill material and place symmetrically on all sides in layers, compacted in accordance with Item 5.2.5 of this Section.
 - 1. Minimum depth from the bottom of column footing shall be as indicated in the Structural drawings.
 - 2. Minimum depth from the bottom of wall footing shall be 600mm (24") from the Natural Grade Line (NGL).
 - 3. All footings and tie beams shall rest on solid natural ground or engineered fill consisting of granular materials, preferably sand and gravel mixture with binder. Submit compaction test results for three (3) specimen samples prior to complete excavation.
 - 4. Engineered fill shall be placed in 200mm lifts, moisture conditioned and compacted to at least 95% of the Maximum Dry Density prescribed by ASTM D1557.
 - 5. Backfill around structures only after the concrete has sustained sufficient strength to resist lateral pressure resulting from the backfill.
 - 6. 19mm (3/4") crushed base course for slab on fill shall be wetted and compacted to desired thickness.
- B. Construct earth fill of satisfactory fill materials free from organic material, or rock with maximum dimensions not greater than 75mm (3"). Place fill material not more than 250mm (9") in depth. Filling shall be made in layers 200mm (8") in thickness and each layer shall be thoroughly wet and compacted to 95% optimum moisture content. Each layer shall be spread uniformly on prepared surface and plowed.

1.2.5 Compaction

- A. All disturbed materials shall be compacted at optimum moisture content by rolling with approved towed rollers, tampers, vibrator rollers, pneumatic tires rollers, three-wheel power rollers, or other approved equipment well suited to the particular soil being compacted.
- B. Materials shall be moistened or aerated as necessary to provide the moisture content that will facilitate the desired compaction with the equipment utilized.
- C. Each layer shall be compacted to not less than the percentage of maximum density specified below as determined in accordance with ASTM D1557 Method:

Embankments, Backfill and Sub-grade Soil Preparation	Cohesioness Soil	Cohesive Soil
Under Proposed Structures & Building Slabs	100	95
Under Paved Areas Top 300mm (12")	100	95
Under Paved Areas	95	90
Under Sidewalk	95	90
Under Sidewalk Below 300mm (12")	95	90
Backfill Adjacent To Structure	90	90

1.2.6 Site Grading and Soil Poisoning

- A. Batter boards: Second class, pest free lumber, assembled and rendered secure for proper delineation of building lines and grades.
- B. Soil Treatment: To reduce the risk of subterranean termite attack, all roots that have been exposed during excavation shall be removed from the area. Similarly, the sub-floor areas beneath step, patios and verandas shall be kept free from all debris, such as lumber cut-offs and abandoned framework, which can encourage termite activity.
 1. Site Preparation: To ensure uniform distribution of the soil treatment solution and to permit percolation into the soil to a sufficient depth to prevent termite penetration through the barrier, the site shall be prepared as follows:
 - a. Heavy Soils, Sloping Sites: On clays and other heavy soils, where penetration is likely to be slow, and on sloping where run-off of the

- emulsion is likely to occur; the surface of the soil shall be scarified along the contours to form furrows which will hold the solution where it is applied.
- b. Sandy or Porous Soils: Loose, sandy or porous soils shall be moistened with water immediately before treatment to prevent loss of solution through piping or excessive percolation.
 - c. Impervious Surfaces: Surface such as rock or concrete shall not receive direct applications of termiticide. Treatment shall be limited to cracks, faults or joints in such surfaces and to the soil in contact with their perimeter. Alternative measures may be necessary to provide an effective barrier.
 - d. Leveling, Excavations and Filling: All cuttings, trenches and excavations shall be completed and all pipes, wastes or conduits in position before finally leveling and grading the subfloor. Where fill is to be used, the grade level shall be treated to provide a bed of treated soil. Fill shall be free from wooden debris and well compacted. These conditions are necessary to avoid later supplementary treatment.
 - e. Concrete Formwork: All unused concrete formwork, levelling pegs, lumber off-cuts and other building debris shall be removed from the area to be treated. Where framework is left in place at the time of the initial treatment, a supplementary treatment shall be given after its removal.
 - f. Drains: Extra caution shall be observed to ensure that run-off or seepage from treated sites does not contaminate storm water or sewerage systems.
2. Soil Poisoning: Product and application shall be equal to "Biflex 10TC" or "Agenda 2.5EC" or approved accredited termites and pest control Contractor equal to "SSICAI". During soil treatment, the soil to be treated must have sufficient low moisture content to allow uniform distribution and proper penetration into the soil. No application should be done during and after heavy rain. Termiticides or soil poison materials should be applied as a coarse spray to provide a uniform distribution on the soil surface. Soil poison shall be applied at least 2-hours prior to pouring of concrete. Treated soil or fill materials are distributed after treatment It should be re-treated as specified. Apply solution in accordance to the following:
- a. Foundation:
 - (1). Apply soil poison solution at the rate of 7-liters per three linear meters per 30 cm. depth.
 - (2). 1/3 of application is made near the level of bottom of trench or near the top of footing before backfilling is placed.
 - (3). 1/3 when half of the backfill is placed.
 - (4). The rest of the solution should be applied when the trench is almost finished.
 - b. Soil Treatment Before Pouring of Flooring:
 - (1). For overall treatment, apply 4-liters of solution per square meter of floor slab.

- (2). If fill is a coarse material, apply 7-liters of soil poison per square meter.
 - (3). Spraying must be done when the foundation bed has been completed and ready for pouring of concrete.
 - (4). In critical areas such as openings for utility pipes, ducts, conduits, etc, apply additional 5-liters of the solution per linear meter.
 - (5). For exterior perimeter of foundation bed or at the side of the wall, an additional 5-liters of the solution shall be applied per linear meter.
- c. Underground Cables
- (1). Apply solution by spraying bottom and sides of the trench prior to placing any backfill and after cable has been laid and covered by 30cm. of soil but prior to compaction.
 - (2). Apply at the rate of 8-liters per square meter. The application shall be treated for each foot of backfill or to a point one meter above the cable.
- d. Window Walls
- (1). The areas under and around window walls require treatment with about 25 liters of the soil poison per linear meter.
- e. Other Areas
- (1). Treat all voids of masonry walls such as in concrete blocks and to all surfaces before veneer finishes are placed with 4-liters soil poison per 3- linear meters starting from the footing up and every third layer of concrete block thereafter.
- f. Wood Drenching
- (1). All lumbers that will be used permanently into the structure must be drenched thoroughly upon delivery and after installation.
 - (2). Rate of drenching must be observed on wooden boards to avoid being deformed or twisted.
 - (3). Kiln dried lumber must be treated only after installation.
- g. Treatment of Hollow Blocks before Plastering
- (1). Concrete hollow blocks, 3-layers above finish grade must be thoroughly sprayed before plastering at the rate enough to penetrate crevices. This is done on both sides of the wall.
- h. Backfill/Garden Soil Treatment
- (1). After landscaping, the whole structure shall be cordoned properly using soil injector as near as possible to the exterior wall of the structure.
 - (2). Injection spacing must not exceed 450mm and the rate of application shall be observed to ensure that structure is properly condoned.

C. Lawns and Plantings:

1. Topsoil and Plant Pit Backfill: Fertile, clean natural soil of the locality. 250mm (9") thick of topsoil shall be spread over the scarified sub-grade. Compaction: 70%.
2. Planting: Plants are to be supplied and planted by the Owner.

1.2.7 Gravel bed

- A. Provide 100mm (4") thick crushed gravel bed on compacted sub grade prior to installation of all footing/slab-on-fill reinforcing bars and concrete pouring.

1.3 Concrete and Masonry Works

1.3.1 Steel Bars and Tie-works

- A. Standards: Use reinforcing steel conforming with ASTM Standards, deformed for concrete and masonry reinforcements.
- B. High Tensile Grade Deformed Bars: 413.69 MPa, $F_y=60,000\text{psi}$ for 20mm diameter and above. Intermediate Grade Deformed Bars: 275.79 Mpa, $F_y=40,000\text{psi}$ for 16mm dia. and below. All reinforcement bars shall be deformed or otherwise specified. If distances are specified in the plans/drawings do not use undersize reinforcing bars. Use only the size of the ASTM (10mm, 12mm, 16mm, 20mm, and 25mm diameters). Equal to "Powersteel," "DN Steel," or "Steelasia."
- C. Tie Wires: Use Ga. #16 G.I. tie wires, double strands at joints or laps of place reinforcement as indicated in the plans.

1.3.2 Cast-in-Place Concrete

- A. Cement: Shall be as per ASTM Standard Specifications for Portland Cement (ASTM Designation C-150 latest revision) Type 1. Use one (1) brand for the whole structural and masonry works. Class "A" mixture (1:2:4), 27.58 MPa (4,000psi) shall be used for all reinforced concrete slabs, columns, beams, column footings, wall footings, reinforced concrete slab of septic vault. Equal to "Holcim," "Republic" brands, "Cemex."
- B. Aggregates: Gravel-crushed gravel hard uncoated grain, strong, and durable reasonably clean stones. Use 25mm \emptyset (1") maximum for footing, 19mm \emptyset (3/4") for all beams, slabs, columns and 25mm \emptyset (1") for compacted gravel bed for slab on fill.
- C. Sand: clean, washed sand. Sand from saltwater is not allowed.
- D. Water: Fresh and fit for drinking, free from injurious amount of oil, acids, alkali, organic materials, and other deleterious substances.

1.3.3 Masonry

- A. Concrete Hollow blocks (CHB): Use 150mm (6") thick for exterior wall and 100mm (4") thick for interior wall, 700 psi for load bearing capacity and 400psi for non-load

bearing capacity as indicated in the plans. Equal to "Quality-Star Concrete Products" "Jackbilt Industries, Inc." or "CJRN Concrete blocks."

- B. All concrete hollow blocks shall be laid out with cement mortar as specified with vertical joints breaking half-way over course below unless otherwise shown on plans. Bed joints (horizontal) and joints (vertical) must be filled with mortar thoroughly to avoid leakage or moisture.
- C. All concrete hollow block walls shall be built plumbed, true to the given dimension with blocks always set to bond and breaking joints.
- D. Class B - 1:3, 17.24 MPa (2,500psi) as concrete mortar works with mix texture as required. Cement mortar shall be one (1) part Portland Cement and shall be done in one (1) part lime putty and four and one-half (4 ½) parts sand by volume, but not more than one (1) part Portland Cement. No cement shall be used for exceeding one hour. Mortar which shows tendency to become dry before this time shall have added to it and be mixed.

1.3.4 Concrete Formworks

- A. Check all forms to conform to the shape, lines and dimensions of the members as called for in the plans. The forms shall be substantial and designed to resist the pressure and weight of the concrete and be properly tied and braced or shored so as to maintain position and shape. They shall be sufficiently tight to prevent leakage of mortar.
- B. Check all formwork for the plumbness and correct alignment.
- C. Provide openings in column form for cleaning and inspection preferably at lowest point of pour lifts immediately before depositing concrete.
- D. Provide camber for cantilever and long span beams or as indicated in construction notes.
- E. Always provide continuous vertical supports for framework directly below any pour line. All exposed corners shall be square.
- F. Remove form only upon approval of the Engineer in such manner and at such time as to ensure the complete safety of the structure. In no case shall the supporting forms and shoring's be removed until the members have attained sufficient strength to support safely their weight and load thereon.
- G. Exercise due care while stripping forms and protect corners subsequently against shipping or other damage by approved means.

1.3.5 Adhesives and Grouts

- A. Adhesives; for adhesion of tiles and natural stone use polymer cementitious thin-set powder to be mixed with water; equal to "Smartbond tile AdhesiveC2S1-Buildrite

chemical industries", "Laticrete 325 Premium Tile Adhesive" or "Bentonit" or approved equivalent.

- B. Provide a grout joint that is dense, hard and durable; equal to "Tile grip - Buildrite chemical industries" , "Laticrete 1600 Unsanded Grout" or " Parex-Dustless Colorgrout" or "Bentonit" or approved equivalent.
- C. Slip resistant treatment- Slip Resistant Finish: Aluminum oxide dry powder type, color as selected from manufacturer's standard range; manufactured by "MBT's. or "Sika" or "ParexDavco" products.
- D. Epoxy concrete bonding agent-Epoxy Concrete Bonding Agent: For bonding fresh concrete to existing concrete surfaces with direct shear bond strength of 7.0 - 10.5 Mpa, equal to "Buildrite Construction Chemicals", "Sealbond chemical industries", "MBTech." Or "Sika" products.

1.3.6. Standard VOC Limits

Floor coating applied to interior elements shall not exceed the VOC content limits established in South Coast Air Quality Management District (SQAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1,2004. Rule 1168, Adhesives and Sealants, rules in effect July 1, 2005; and Green Seal Standard, GS-11. Calculate according to 40 CFR 59, Subpart D (EPA Method 24).

Coating Category Ceiling Limit Current Limit

Concrete-Curing Compound 350 100

Floor Coatings 420 50

Industrial Maintenance (IM)

Coatings 420 50

Magnesite Cement Coatings 600 450

Mastic Coatings 300

Metallic Pigmented Coatings 500

Waterproofing Sealers 400 100

Waterproofing Concrete/

Masonry Sealers 400 100

Low-Solids Coating 120

1.3.7. Execution

1.3.8. General

- A. Related mis-formed surfaces are to be struck off, floated and/or toweled to produce texture consistent with adjacent formed surfaces or as indicated on the drawings
- B. Do not sand float, bag, sack, grout, clean or otherwise apply cementitious masking to formed surfaces.

- c. Stoning (or rubbing) shall be done with a carborundum stone with only enough water to develop a cement paste from the concrete mortar.

1.3.9. EXAMINATION

- A. Verify site conditions.
- B. Verify that floor surfaces are acceptable to receive the work of this section

1.4 Metals

1.4.1 Structural Steel

- A. All structural steel shall conform to ASTM A-36 steel.
- B. All arc-welding electrodes shall conform to AWS Specification for Iron and Steel Arc Welding Electrodes latest edition. Electrodes for arc-welding shall be E-60 and E-70 series.
- C. All bolts, nuts and washers shall conform to ASTM A-370 and ASTM A-325 specifications
- D. All arc-welding electrodes shall conform to AWS Specification for Iron and Steel Arc Welding Electrodes latest edition. Electrodes for arc-welding shall be E-60 and E-70 series.
- E. All bolts, nuts and washers shall conform to ASTM A-370 and ASTM A-325 specifications.
- F. All arc-welding electrodes shall conform to AWS Specification for Iron and Steel Arc Welding Electrodes latest edition. Electrodes for arc-welding shall be E-60 and E-70 series.
- G. All bolts, nuts and washers shall conform to ASTM A-370 and ASTM A-325 specifications.
- H. Steel Tubing: ASTM A500, Grade B.
- I. Plates: ASTM A283.
- J. Pipe: ASTM A53, Grade B Schedule 40.
- K. Fasteners: Stainless steel.
- L. Bolts, Nuts, and Washers: ASTM A325, galvanized to ASTM A153 for galvanized components.
- M. Welding Materials: AWS D1.1; type required for materials being welded.
- N. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide. VOC content: not more than 250g/L when calculated according to 40CFR 59, Subpart D (EPA Method 24).

1.5 ALUMINUM

- A. Extruded Aluminum: ASTM B221, Alloy 6063, Temper T5.
- B. Sheet Aluminum: ASTM B209.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210, Alloy 6063, Temper T6.
- D. Aluminum-Alloy Bars: ASTM B211, Alloy 6063, Temper T6.
- E. Bolts, Nuts, and Washers: Stainless steel.
- F. Welding Materials: AWS D1.1; type required for materials being welded.

1.6 FINISHES

A. Steel

1. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing. Do not prime surfaces in direct contact with concrete or where field welding is required. Prime paint items with one coat.
2. Structural Steel Members: Galvanize after fabrication to ASTM A123. Provide minimum 380 g/sq. m galvanized coating.
3. Non-structural Items: Galvanized after fabrication to ASTM A123. Provide minimum 380 g/sq. m galvanized coating.
4. Chrome Plating: ASTM B177, weight, nickel-chromium alloy, satin or polished finish.
5. Repair of Zinc-Coated Surfaces: Repair surfaces damaged by welding or other means with galvanizing repair paint conforming to High Zinc Dust Content. Galvanizing repair paint or by the application of stick or thick paste metallic specifically designed for repair of galvanizing as approved. Clean areas to be repaired and remove the slag from the welds. Surfaces to which stick or paste material is applied, shall be heated with a torch to a temperature sufficient to melt the materials in stick or paste, spread the molten material uniformly over surfaces to be coated and wipe the excess material off.

B. Aluminum

1. Before finishes are applied, exposed aluminum sheets, plates and extrusions shall be free of roll marks, scratches, rolled-in scratches, kinks, stains, pits orange peel, die marks, structural streaks and any other defects which will affect uniform appearance of finished surfaces. Finish coatings shall conform to AAMA 605.2, AAMA 606.1, AAMA 607.1.
2. Exterior Aluminum Surfaces: AAMA anodized, prepared with a pre-treatment, anodized to color selected.
3. Interior Aluminum Surfaces: AAMA anodized, prepared with a pre-treatment, anodized to color selected.
4. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.
5. VOC content: 250g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.7. Railings/Handrails:

A. Exterior Railings: Constructed of 38mm diameter, Stainless steel pipe handrails and vertical bar railings, matte finish details as shown on the drawings. Install at Fire escape railings and as indicated in drawings.

B. Provide Stainless Handrails with vertical and horizontal bars on all ramps for all buildings as specified in the drawing.

1.8. Safety Nosing:

- A. At Main Stairs: Shall be 10 mm grooves on architectural none skid tiles or aluminum fluted nosing installed on areas indicated on the drawings.

1.9. Miscellaneous

- A. Miscellaneous materials or accessories not listed above shall be provided as specified hereinafter the various items of work and/or indicated on the plans/drawings

2.0. WOOD

2.1. Lumber:

All lumber shall be of approved quality of the respective kinds required for the various parts of the works and shall be well-seasoned, free from large saps, loose knots, shakes or other imperfections impairing its strength and durability, equal to "Armourwood" or "Matimco-Matwood" or approved equivalent. All exposed surfaces shall smoothly dressed and dried.

- A. *Apitong*: Sound and thoroughly seasoned, warp free, pressure treated with approved preservatives smooth and level on one side or wherever in contact with paneling.
- B. *Tanguile or Mahogany*: Kiln dried, S4S sound, hard and free from lumber defects. Use one color or shade for assembly framing which are exposed. Use Tanguile or Mahogany KD for wood not specified elsewhere, and other interior or finishing carpentry work.
- C. *Frames*: Doors, or other openings where so indicated on plans, shall have frames and sills of the dimensions shown or as indicated on door schedules. Frames in contact with concrete shall be enclosed by 20d nails, spaced not more than 200mm (8") on center around the contact surfaces and paint with two (2) coats of mop asphalt.
- D. *Fastening*: Fastening shall be common nails flathead wood screws (R.H.W.S.), bolts or lag screws where specifically called for. Conceal fastenings as far as possible, locate them in inconspicuous place. Where nailing is permitted through woodwork face, conceal nail heads.
- E. *Hardware and Fasteners*: Use metal nails, screws, bolts, miscellaneous fasteners or anchorage concealed or countersunk whenever called for, with size, shape and type to members in place. Use "*Stikwel*" or other approved water-resistant glue for cabinet framing joints.
- D. *Adhesives*: Laminating adhesives used to fabricate on-site woodworks must not contain added urea-formaldehyde resins. Adhesives must comply with South Coast Air Quality Management District (SCAQMD) Rule #1168, Volatile Organic Compound (VOC) limits as listed below:

Architectural/Specialty Applications	VOC Limit (g/L less water)
• Multipurpose construction adhesives	70
• Contact Adhesive	80
• Special Purpose Contact Adhesive	250
• Structural Wood Member Adhesive	140
Substrate Specific Applications	VOC Limit (g/L less water)
• Wood	30

- E. *Wood Preservative*: All lumber should be treated to prolong its lifespan and be protected from termites, woodborers and fungi, equal to "Woca oil", "Solignum" or "Bona" or approved equivalent.

2.2. Plywood or Plyboard

- A. 19mm (3/4") thk. Class-A Marine Plywood/Plyboard: For woodwork/cabinetry requirements. 1/4" thk. Plywood for backing.

2.3. Built-in Counters, Cabinets and Shelves: Fabricate counters, cabinets and shelves in accordance with details shown.

- A. Make all wood finish, and millwork true to details, clean and sharply defined. Erect cabinet straight, level and plumb and securely anchor in place. Set panels to allow for free movement in case of shrinkage or swelling. Conceal means fastening various parts together. Separate with 6mm (1/4") stone-cut joints all interior trims set against concrete, masonry or wood. Make mill molding perfectly smooth on exposed surfaces and true to profile. Make joints tight and in a manner to conceal shrinkage. Secure trim with fine finishing nails, screws, or glue where required. Set nails for putty stopping. Install counters, cabinets and shelves with complete hardware. Use High Pressure Laminate finish equal to "Formica" or approved equal for Kitchen cabinets or other cabinets specified in the drawings.

3.0 MOISTURE AND THERMAL PROTECTION

3.1. Damp proofing: Provide 6 mil thick polyethylene sheet as vapor barrier on slab to keep out soil moisture, equal to "Laticrete-Drytek Moisture Vapor Barrier" or "Mac Alpha Omega Industrial Sales Inc".

3.2. Caulking

- A. Polyurethane or Silicone sealant, equal to "Bostik, Sika, or Dow Corning", for all joint gaps between steel/metal and concrete, for joint gaps between lavatory and countertop and where indicated. Provide sealant in accordance with the manufacturer's recommendations. Apply sealant in continuous manner so as to fill entire width and required depth of joint without voids or air pockets.
- B. Fire stop Sealants, equal to "Hilti", "Specseal" or "3M", used to seal openings and joints in fire resistance wall and /or floor assemblies. Fire stops are designed to restore the fire-resistance of wall and/or floor assemblies by impeding the spread of fire by filling the openings with fire resistant materials.

3.3. Waterproofing

7.3.1. Capillary Type Waterproofing:

- A. Shall consist of a blend of moisture-activated chemicals, high-grade silica aggregates and selected cements. It waterproofs through the formation and development of crystals in water bearing capillaries and interstices, effectively blocks the further passage of water and ensures

permanent water tightness of the structure. Apply capillary waterproofing on interior face of floor and walls of Elevator pits prior to required finishes. This surface applied capillary water proofer for concrete and mortar shall be equal to "Crystor- Buildrite construction chemical", "Sealproof CW -Sealbond chemical industries".

B. Cementitious/crystallization type: Shall be chemically controls and permanently fixes non-soluble crystalline growth throughout the capillary voids of the concrete. Provide a complete system for horizontal and vertical application including primers and sealants by a single manufacturer.

1. Concentrate Compound: Shall be in dry pack consistency for filling form tie holes, sealing strips and structural defects.
2. Modified Compound: Used for a second coat where 2-coats are required, or in a mortar consistency for placement of a cove strip.
3. Ultra Plug and Liquid Quickset: Used for plugging cracks and joints against a direct flow of water.

A. Membrane Waterproofing

1. Apply surface conditioner at a rate recommended by manufacturer. Protect conditioner from rain until dry. Apply 300 mm wide strip of joint cover sheet over cracks, nonworking joints, and expansion joints over 1.6 mm but not exceeding 13 mm in width. At expansion joints from 13 to 25 mm in width, loop cover sheet down into joint between 31 and 44 mm. Extend sheet 150 mm on either side of expansion joint. Center joint cover sheet over crack or joints. Roll joint cover sheet into 3.2 mm coating of waterproofing material. Apply second coat over sheet extending minimum of 150 mm beyond sheet edges. Apply this procedure to expansion joints between horizontal and vertical surfaces. Apply waterproofing material in accordance with manufacturer's instructions.

Continue waterproofing material up vertical surfaces minimum 150 mm. Install cant strips at internal corners. Apply extra thickness of waterproofing material at corners, intersections, angles, and over joints. Seal watertight, items projecting through waterproofing material. Extend waterproofing material and flexible flashing into drain clamp flange, apply liberal coating of liquid membrane to assure clamp ring seal. Install membrane flashing and seal into waterproofing material.

3.4. Products

A. Manufacturers:

1. Buildrite construction chemicals - "Crystor". Sealbond chemical industries "Sealproof CW Cementitious Crystallization".
2. Buildrite construction chemicals - "Sapal" .Sealbond chemical industries - "Optimastic PU1K60" "Hitchins/Formak 629" (Concealed type, fluid applied, elastomeric

3. waterproofing material) or approved equivalent. : VOC Content: 400g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Elastomeric radiation control coating; emulsion of high-grade acrylic resin in water. "Therma coat" from "Premiere Cleantech". Thermacoat TC 938/45s/101 canbe applied by airless spray or by brush roller.

B. Application Area

- a. For all toilets, male and female toilets, powder rooms, balcony apply cementitious, equal to "Sealproof FCW-Sealbond chemical industries"or " Flexicrete- Buildrite Construction chemical ".
- b. Epoxy Tank Lining: Shall be 100% solids two-component epoxy coating formulated from high-grade resins and curing agents; equal to "Buildrite construction chemicals-Protek ETL""Specserv's Spexcoat", "Crystor - Buildrite Construction chemical". Apply epoxy tank lining for interior slab and perimeter walls of STP Cistern tanks and Water Storage Tanks.
- c. For utility deck elastomeric waterproofing from "Buildrite construction chemicals" or "Sealbond Chemical Industries".

Apply waterproofing in accordance to manufacturer's standard instructions or applications.

3.5. Joints

- A. Apply bentonite packing and sealer at construction control joints.

3.5.1. Protection of finished work

- A. Protect finished Work.
- B. Do not permit traffic over unprotected or uncovered waterproofing.
- C. Protect installed waterproofing from precipitation or ground water with temporary polyethylene sheeting. When back filling begins, remove sheeting.
- D. Protect waterproofing from damage by adhering protection board over waterproofing surface. Scribe and cut boards around projections and interruptions.
- E. Backfill as soon as possible after installation has been approved, working in strict accordance with the pertinent provisions of other Sections of these Specifications.

3.5.2. Joint Sealers

- A. Manufacturer :Company specializing in manufacturing the Products specified in this section with three years documented experience.

B. Applicator: Company specializing in performing the work of this section with three years documented experience.

3.5.3. Environmental Requirements

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

3.5.4. Coordination

A. Coordinate work under provisions of the General Requirements.

B. Coordinate the work with all sections referencing this section.

3.5.5. WARRANTY

A. Provide five-year warranty as required.

B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight

seal, watertight seal, and exhibit loss of adhesion or cohesion, or do not cure.

3.6. Products

Manufacturers/Suppliers

1. Dow Sil- Silicone Building Sealant "795 or 790".
2. Sika – Silicone Sealants- "Sikasil SG-18 or WS-305" or "Sikaflex".
3. GE/Toshiba - Ultraglaze 4000 or Silglaze II or Silpruf.

3.7. Sealants

A. Polyurethane Sealant:ASTM C920, Grade M, Class 25, Use NT; multi component, chemical.

1. curing, non-staining, nonbleeding, capable of continuous water immersion, non sagging type;
2. color as selected.
3. Elongation Capability 25 percent
4. Service Temperature Range 40 to 82 degrees C
5. Shore A Hardness Range 20 to 35

B. Silicone Sealant: ASTM C920, Grade S, Class 25, Use NT; single component, solvent curing, non-sagging, non-staining, non-bleeding; color as selected.

1. Elongation Capability 25 percent
2. Service Temperature Range 54 to 82 degrees C
3. Shore A Hardness Range 15 to 35

C. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Sub part D (EPA Method 24).

1. Architectural sealants: not more than 250g/L.
2. Non-membrane roof sealants: 300g/L
3. Sealant Primers for Non-porous Substances: not more than 250g/L.
4. Sealant Primers for Porous Substrates: not more than 775g/L.

3.8. Accessories

- A. Primer: Non staining, quick-drying type of consistency recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D1056; round, foam rod; oversize 30 to 50 percent larger than joint width. Glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backing material shall be compatible with sealant.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

3.9. Execution

3.9.1. Examination

- A. Examine the substrates, adjoining construction and the conditions under which the work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Examine anchorage of substrate to determine whether it is strong enough to withstand the tensile and compressive forces which will be included by the sealant. Repair or strengthen substrate as required before proceeding with the work.
- C. Verify that substrate surfaces and joint openings are ready to receive work.
- D. Verify that joint backing and release tapes are compatible with sealant.

3.9.2. Preparation

- A. Surfaces shall be clean, dry to the touch and free from dirt, moisture, grease, oil, wax, lacquer.
paint and other foreign matter that would tend to destroy or impair adhesion. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant.
- B. Remove loose materials and foreign matter which might impair adhesion of sealant. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with ASTM C804 for solvent release and ASTM C790 for latex base sealants.
- D. Protect elements surrounding the work of this section from damage or disfiguration.
- E. Remove temporary protective coatings from aluminum or other surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use non staining solvents recommended by the manufacturer of the item containing aluminum or other metal surfaces.

3.9.3. Installation

- A. Perform installation in accordance with ASTM C804 for solvent release and ASTM C790 for latex base sealants.
- B. Measure joint dimensions and size materials to achieve required width/depth ratios. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width. Install bond breaker where joint backing is not used. Install sealant free of air pockets, foreign embedded matter, ridges, and sags. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges. Tool joints as detailed.
- C. Joint Width-to-Depth Ratios:

1. Acceptable ratios: Joint width joint depth

- a. For metal, glass or Minimum Maximum other nonporous surfaces: 6.25 mm (min.) 6.25 mm 6.25 mm Over 6.25 mm 1/2 of width Equal to width Unless noted otherwise on drawings
- b. For wood, concrete, masonry or stone surfaces: 6.25 mm (min.) 6.25 mm 6.25 mm Over 6.25 mm to 12 mm 6.25 mm Equal to width Over 12 mm to 50 mm 12 mm 16 mm Over 50 mm (As recommended by sealant manufacturer) Unless noted otherwise on drawings.

2. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.

3.9.4. Adjusting and cleaning

- A. Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled. Upon completion of sealant application, remove remaining smears and stains and leave work in a clean and neat condition.
- B. Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hours then remove by wire brushing or sanding.
- C. Remove excess sealant with a solvent-moistened cloth on metal and other nonporous surfaces.

3.9.5. Protection, adjusting and cleaning of finished work

- A. Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled. Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.
- B. Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hours then remove by wire brushing or sanding.
- C. Remove excess sealant with a solvent-moistened cloth on metal and other non-porous surfaces.

4.0 INSULATION

- A. Roof Insulation: Provide insulation material, 100mm Mineral wool insulation or Aluminiumfoil insulation with 100Kg/M density from "Olympus-Eco Foam" as shown on the drawings.
- B. Wall and Ceiling Insulation: Use a closed-cell spray applied polyurethane foam insulation is a two-component, HCFC-141B blown, medium density, structural system designed for commercial, industrial, and residential insulation applications; Closed-cell polyurethane foam yields a high R-value and minimizes air and moisture infiltration. Equal to "Olympus-Eco Foam", "Kawara" or "Multiline".

5.0 DOORS AND WINDOWS

5.1. Doors

- A. Provide and install all doors with complete locksets, hinges, and accessories. Use Guijo KD or Tanguile KD for door jambs of locally fabricated wooden doors, as standard to manufacturers.
- B.
- B. Set door frames plumb and level brace until built-in floor.

- C. All metal and aluminum doors must be guaranteed against twisting or denting. This obligates the Contractor to make good such defects and/or replace entirely any and all such defective door (see Door Schedules).
- D. Metal Flush Doors and Frames: Doors, frames and frame components shall be manufactured from cold-rolled steel conforming to ASTM A 1008; or hot-dipped galvanized steel having an A60 zinc coating conforming to ASTM A653, with minimum coating thickness of .009mm. The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 oz/ft² (122 g/m²), Galvanized door shall have galvanized hardware reinforcements. Fabricated steel doors shall be reinforced, stiffened, sound deadened and insulated with impregnated kraft honeycomb core completely filling the inside of the doors and laminated to inside faces of both panels. All doors, frames and frame components shall be finished as standard to manufacturer with a coat of baked-on rust inhibiting prime paint. Metal doors and frames shall be fabricated according to the design shown on the drawings or selected from Metal Door Manufacturer standard designs, equal to "Jea-Steel", "LEC Steel Mfg. Corp." or "Doortech" or "Maxsteel" or "Metrotech Steel Industries". Provide complete with hardware such as push plate, foot plate, push bars, door lock, hinges, etc.
1. Provide Ga.18 Steel Door with honeycomb insulation, 6mm thk clear glass vision panel, foot plate, glazed paint finish in Ga. 16 mild steel single rabbet door jamb with accessories.
- 2.Provide Ga. 18 Swing Type Steel Door with honeycomb insulation, push plate, foot plate, glazed paint finish in Ga. 16 Hollow core insulated metal doors shall be provided for all Storage, mild steel single rabbet door jamb with accessories.
- 5.Provide Ga.18 Steel Door with honeycomb insulation, glazed paint finish in Ga. 16 mild steel single rabbet door jamb with 4 x 4 Butt Hinges with bearing with louver. Install for all Male and Female Toilets and T & B's.
6. Provide Ga. 18 Flush Steel Door with honeycomb insulation, glass vision panel, glazed paint finish in Ga. 16 Hollow core insulated metal doors shall be provided for all Storage, mild steel single rabbet door jamb and 4x4 butt hinges with bearing
- 7.Ga. 18 Insulated Steel Door. Shall be of steel/polyurethane/steel sandwich type construction with thermal break. Sections roll formed with tho 1-3/4" integral struts sealed with polypropylene rib caps per section. Hot dipped galvanized with R-value of 17.50. Finish: two coat baked-on polyester.
- F. All lumber for wooden doors including door jambs, and all woodwork of similar nature, shall be kiln-dried with not more than 10% moisture content.

- G. All wooden doors shall be manufactured with wood stiffener, and of the lumber specified herein, the plywood edge projection shall consists in rabbeting it around into the outside frame of the door in order to prevent "peeling-off" of the plywood at the edges.
- H. All wood doors must be guaranteed against warping, twisting or cracking. Door protection equal to "Gerflor; SPM Door Protection (Straight Cut Decochoic panel, Decochoc Thermoforming. This obligates the Contractor to make good such defects and/or replace entirely any and all such defective door (see Door Schedules).
- I. Sliding Solid Panel Doors (Pocket Door): 45mm thk. Panel door shall use Tanguile KD or Mahogany KD or Gmelina KD wood door or approved equivalent; for Nurse Lounge Rooms. All wooden doors shall be fabricated in accordance with the designs shown on the drawings and standard to Wood Door Manufacturer/Sash Fabricator, equal to "Wood strong","Pateco" or "Mastercraft" or "Luxacraft" products. Provide complete with Tanguile KD or Guijo KD wood door jambs and door hardware's and accessories. Equal to "Yale", "Dorma", "Nippon","Elmes" or "Assa Abloy".
- L. Aluminum Framed Glass Fixed and Sliding Doors: Frame members shall be designed as shown in the drawings and as per manufacturer's standard sections. Aluminum frame shall be powder coated finish. Provide 10mm, 12mm and 6mm thick tempered glass panels as indicated on the drawings. Provide complete with hardware such as door lock, hinges, sliding mechanism, etc. (Equal to "Dorma" or "Blum" or "Assa Abloy") Aluminum Framed Glassdoor manufacturers/fabricators shall be equal to "Multiple Options", "Aluminum Resource and installation System, Inc.", or "C.G. Umali Commercial Inc." or "Saint Gobain".
- M. Fire Rated Doors with vision panel: Provide insulation on fire-rated doors. Insulated steel doors shall have core of honey come insulation; Face sheets, edges and frames of galvanized steel not lighter than 20-gauge, 18 gauge and 16 gauge respectively; And with required hardware and accessories. Doors and frames shall receive phosphate treatment, epoxy-based primer and baked acrylic enamel finish. At least has 2-hour fire rating. Equal to "Doortech" "Jea steel", "Metrotech", "Doortech Mfg."

5.2. Windows/Glass

- A. Aluminum Framed Glass Casement, Awning, and Fixed Wall Glass type Windows and doors:Frame members shall be designed as shown in the drawings and as per manufacturer's standard profiles/sections. Aluminum frame shall be powder coated finish, equal to "Republic Powder Coat", with color to be selected.
- B. Provide 10mm thick clear, tempered, reflective glass for all windows with fixed glass. Verify drawing for details.
Provide 12mm thick clear, tempered, reflective glass for curtain walls. Verify drawing for details.
Provide 6mm thick clear tempered glass for all windows with awning type. Verify drawing for details and location.

Provide 12 mm thick clear tempered glass canopy on powder coated aluminum frame for canopy. Verify structural for the steel framing of canopy

- C. Manufacturers/fabricators shall be equal to "JNSTW inc". "Coalesce Inc" or "Multiple Options" or "C.G. Umali Commercial Inc".

5.3. Finish Hardware

- A. Locksets: Equal to "Yale", "Dorma", "Nippon", "Schalage" or "Elmes", mortise type for Entrances of secured areas, and cylindrical bored types for all metal doors, keyed entry function, satin chrome finish.
- B. Deadbolts: Equal to "Yale", "Dorma", "Nippon", "Schalage" or "Elmes", heavy duty, double cylinder, satin stainless-steel finish. Provide at Male & Female Toilets.
- C. Hinges: Equal to "Yale", "Dorma", "Nippon", "Schalage" or "Elmes", 3½" x 3½" ball bearing type, loose pin, satin chrome finish. Provide four (4) pieces for metal doors at Service Rooms, Fire Exit Stairs; while other interior doors shall have three pieces hinges.
- D. Door Closer: Chrome finish; equal to "Yale", "Dorma", "Nippon", "Schalage" or "Elmes".
- E. Push Plate: Equal to "Yale", "Dorma", "Nippon", "Schalage" or "Elmes", satin stainless-steel finish, for Toilets or as indicated on architectural drawings.
- F. Pull Plate: Equal to, satin stainless-steel finish, for Toilets or as indicated on architectural drawings.

5.4. Mirror materials

A. Mirror Glass: ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality sizes noted on Drawings. See Section 10800-Toilet and Bath Accessories.

B. Concave/Convex Mirror: Selected from manufacturer's standard profile, to be provided at Laboratory Rooms, Toilets or on areas shown on the drawings.

5.5. Glazing Compounds

A. Polyurethane Sealant: ASTM C920, Type S, Grade NS, single component, chemical curing, non-staining, non-bleeding, Shore A Hardness Range 20 to 35, color as selected. VOC Content: 250g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Silicone Sealant: ASTM C920, Type S, Grade NS, Class, single component; chemical curing; capable of water immersion without loss of properties; nonbleeding, non-staining, cured Shore A hardness of 15 to 25, color as selected. VOC Content: 250g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

6.0. Finishes

6.1. Floor Finishes

- a. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.
- b. Wood float surfaces which will receive ceramic tile with full bed setting system.
- c. Steel trowel surfaces which will receive resilient flooring and thin set ceramic tile. Steel trowel surfaces, which are scheduled to be exposed and colored, shall be smooth obtaining creative edging and scoring texture surface and pattern. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains at 10mm per meter nominal or as indicated on drawings.

6.2. Floor surface treatment

- a. Apply dry shake hardener in accordance with manufacturer's instructions on floor surfaces.
- b. Apply slip resistant finish in accordance with manufacturer's instructions on floor surfaces.
- c. Apply sealer in accordance with manufacturer's instructions on floor surfaces.

6.3. Floor Finishes

- A. Provide plain cement concrete with 10mm grooves on vehicular ramps.
- B. 300mm x 600mm Matte homogenous tiles floor tiles equal to Niro Ceramics", "Living n Style-Cebu Overseas Hardware Co Inc", "Tile Gallery". Color and Design shall be selected. For all SS/Janitor's Closets, Male and Female toilets, PWD toilets and T&B's with waterproofing. Provide tile Threshold Tiles for break connection as indicated in the drawings.
- C. 600mm x 600mm nonskid homogenous Floor tiles from "Niro Ceramics", "Living n Style-Cebu Overseas Hardware Co Inc", "Tile Gallery". Color and Design shall be selected. For Ground floor – Pantry. For Second floor – All Laboratory Rooms. For Third floor – Interactive Room, Showroom and Science Garden, AVR Function Rooms.
- D. 800mm x 800mm Homogenous Non-Skid Floor tiles from Niro Ceramics", "Living n Style-Cebu Overseas Hardware Co Inc", "Tile Gallery". Color and Design shall be selected.
- E. For Ground floor – Visitor's Area, Info, Office, and Display Area and Museum. For all Hallways.
- F. Provide Non-Skid self-leveling epoxy floor coating on all FCU Rooms and Utility Rooms. For Second Floor – Balcony. Equal to "Epocoat-Fc with primer from "Buildrite construction chemicals".
- G. Provide 500mm X 500mm carpet tiles for all Office Rooms equal to "Wallcrown- Tuntex", "Milliken" or "Tarkett". Verify design and color.

- H. Provide polished concrete finish for all Laboratory Rooms equal to "Cypress bomanite", "Adco blue" or "Jvazco.Inc". Verify color and design.
- I. Provide plain cement finish with membrane-type waterproofing on utility roof deck.
- J. 300mm x 600mm Non-Skid Porcelain Floor tiles from Niro Ceramis", "Living n Style-Cebu Overseas Hardware Co Inc", "Tile Gallery". Color and Design shall be selected. For all Main Stairs and Fire Exit Stairs.

6.4. Granite countertop:

Granite Standard: Granite shall comply with ASTM C 615, "Standard Specification for Granite Dimension Stone" for material characteristics, physical requirements, and sampling for selection of granite. GENERAL: All granite/marble shall be of standard architectural grade, free of cracks, seams, or starts, which may impair its structural integrity or function. Color or other visual characteristics indigenous to the particular material and adequately demonstrated in the sampling or mock-up phases will be accepted provided they do not compromise the structural or durability capabilities of the material. Texture and finish shall be within the range of samples approved by the Design Professional, equal to "Broer Builders Construction Corp" or "Euroasia". For all toilets, pantry and kitchen countertops as indicated in drawings.

6.5. **Wall Finishes**

- A. Cement Plaster Textured elastomeric paint wall Finish: Consisting of the scratch and finish coats, both consisting of one (1) part of Portland Cement and two (2) parts of clean, washed sand measured by volume. For exterior surfaces called for in the drawings and where plastering is essential to complete the work. Verify design and color.
- B. 300mm x 600mm Polished porcelain Tiles from "Niro Ceramics", "Living n Style-Cebu Overseas Hardware Co Inc", "Tile Gallery", "La Europa Ceramica Tile Center" or "Floor Center" with waterproofing up to 6" of wall height from floor finish. For all toilets, male and female toilets, PWD toilets and t&b's with waterproofing up to 6" on wall. Verify drawing for application of tiles height level.
- C. Provide plain cement plaster elastomeric paint finish for exterior elevations and plain paint finish for interior as indicated in the drawing. Color shall be selected.
- D. Provide Aluminum composite panels 4mm-5mm thick for cladding on the elevation. Color and design shall be selected. Verify section in drawings for details and locations.
- E. Provide Elastomeric paint finishes on elevation. Verify drawings for color, details and locations.

6.6. **Ceiling Finishes**

- A. Painted 12mm thick Moisture Resistant Gypsum Ceiling Boards, Equal to USG BORAL, Knauff, Skycon or Gyproc on metal furring (Equal to "JEA Steel or approved equivalent) and Channels for Male and female toilets, and Balcony.
- B. Painted 12mm thick Gypsum Ceiling Boards USG BORAL, Knauff, Skycon or Gyproc Channels for Second Floor- Air Laboratory, Water Laboratory, Soil Laboratory, Robotics,

Material Science Lab and Simulation Lab and Hallway. Third Floor – Interactive Room, AVR/ Function Room 3 and Showroom and Science Garden.

- C. Acoustic ceiling board ground floor Display Area and Museum and Office Room. Equal to "USG boral" or "Knauff" for pantry.
- D. Exposed Slab painted finish: For All the slab soffits of staircase, FCU rooms, all storage, utility areas, general storages. Color shall be selected.

7.0. PAINTING

Painting materials shall be "Boysen" or "Dunn Edwards". All exposed finish hardware, lighting fixtures and accessories, plumbing fixtures and accessories, glass works, and the like shall be protected so as not to stain with paint and other painting materials prior to painting works. All other surfaces which would be endangered by stains and paint marks should be taped and covered with craft paper or equal and as specified hereunder or as per manufacturer's direction.

7.1. Metal Surfaces

- A. Metal Surfaces (Steel, windows, ornamental grillwork, etc.)
 - 1) Primer: Primer
 - 2) Topcoat: Premium Gloss / Semi Gloss

7.2. Concrete and Plastered Masonry (exterior)

- 1) Primer: Primer
 - 2) Topcoat: Antifade
 - Low VOC, Low Odour, Acrylic Water based, Reduces Temperature, Anti Fungal /Algae, Dirt Resistant

7.3. Wood Surfaces

- 1) Enamel Semi-Gloss Finish
 - 1st coat –Primer
 - 2nd coat –Premium Semi Gloss
 - 3rd coat –Premium Semi Gloss
 - 2) Stain Finish for other stain requirements
 - 1st coat – Sanding
 - 2nd -4th coats – Wood shield Exterior / Deck (flooring /furniture) using Jotun Thinner 02
 - 3) Duco Finish for wood door / jambs
 - 1st coat –Primer
 - 2nd coat- Premium Gloss
 - 3rd coat –Premium Gloss

7.4. Latex Paint:

A. Semi - Gloss: For exterior plastered surfaces

1st coat: Primer

2nd to 3rd coats: Antifade (Sheen finish)

Flat: For interior plastered surfaces & gypsum ceiling boards

1st coat- Majestic Primer 2nd to 3rd coats: Majestic True Beauty Matt

7.5. Fiber Cement Board Surfaces

1st coat:

2nd coat:

7.6. Exterior Concrete Walls:

1. Surface Preparation

a) New Surface: The substrate must be sound, clean, dry and free from dust, oil, grease, laitance etc. All traces of foam release agents must be removed. A light sanding with suitable abrasive material is recommended before application any resulting dust/loose particles must be removed

b) Old Surface: Remove all loose, scaling, flaking, and peeling off paint either with the use of paint remover, wire brushing, scrapping, or water blasting. Let it dry. In case of mildew infestation, treat with Fungicidal Wash solution by swabbing or brushing. To ensure proper treatment, allow to remain

7.7 Paint Application – Dirt Resisting Acrylic Paint System (plain finish)

a) Apply one (1) coat of Primer by brush or roller. Allow two (2) hours before recoating

b) Putty cracks, crevices, and surface defects with putty compound using putty knife. Let dry, sand and spot prime puttied area with the primer used above

c) Finish with two (2) coats of with Antifade Colors Series by brush or roller. Allow (2) hours drying in between coats.

11.8. Paint Application – Elastomeric Paint Finish

a) Apply one (1) coat of Primer by brush or roller. Allow two (2) hours before recoating

b) Putty cracks, crevices, and surface defects with putty compound using putty knife. Let dry, sand and spot prime puttied area with the primer used above

c) Finish with two (2) coats of by brush or roller. Allow (2) hours drying in between coats

8.0. PLUMBING FIXTURES & ACCESSORIES

A. All rough-in pipes and fixtures shall be laid simultaneously with the construction of the masonry and concrete slabs. Hence, no sanitary and plumbing pipes shall be exposed.

Provide and install at all Toilets, color and model as approved by the Architect. All fixtures shall be equal to "Toto" or "American Standard" or "HCG". Include necessary fittings and accessories such as faucets, grab bars, toilet paper holder, tissue holder, seat and cover, p-traps, angle valve, etc. to complete the requirements of the toilet/plumbing fixtures.

B. Toilet lavatory countertop: Refer to Section 10.5.

8.1. For Toilets

A. Water Closets: Flush valve type and flush type, floor mounted elongated front, equal to "TOTO", "American Standard" or "HCG". For all Male and Female T&B's and Toilets.

B. Lavatories:

1. Under-the-counter type, Vitreous equals to "TOTO", "American Standard" or "HCG". For all Male and Female Toilets.

8.2. Fittings

A. Lavatory Faucets:

Single hole lavatory faucet, lever type, chrome finish, with pop up drain; equal to "TOTO", "American Standard" or "Rocca". For all T&B's.

B. Flushing System: Equal to "TOTO", "American Standard": For all flush valve type water closets and urinals.

8.3. Accessories

A. Facial Mirror: 6mm thick plate glass mirror electrolytically copper plated; with Type 304 stainless steel frameless beveled edge type with bolt and cap; furnish with mounting brackets and screws; size, height and length to be determined as to agree with countertop configuration, as specified in drawings. Equal to "Pacific Glass", "San Francisco- Nice Mirrors": For All Male and female toilets, PWD toilets.

Toilet Paper Holder: Constructed of type 304 stainless steel, bright polished finish, complete with mounting screws and plate, furnished with chrome-plated plastic roller; Equal to "TOTO", "American Standard": For All Male and female toilets, PWD toilets.

B. Provide stainless steel grab bars wherever specified in drawing equal to "Toto" or "American Standard" with complete accessories.

8.4. Toilet partitions

A. Partitions shall be fabricated from double faced, autoclaved high-density cellulose fiber cement or wood particle board core, or solid compact laminated panels or phenolic board partition. Thickness of panels shall be 18mm, wall hung or floor

mounted type, of dimension as shown in the drawings. Provide toilet partition system and urinal screens complete with stainless steel standard fittings, accessories and anchorage. Robe hooks and toilet paper holders shall be provided as a standard to toilet partition manufacturer/supplier.

B. Laminates used shall be certified to be made from sustainable pulp sources.

C. Equal to Formica, Wilson Art or Luxacraft- Spazio.

9.0. CONVEYING SYSTEM

Elevators: Provide 2 panel center opening door passenger elevators; equal to "Mitsubishi Electric (Int'l. Elev. & Eqpt. Inc.)" or "Nippon" or "Hitachi" with the capacity of 25 pax ,1.5m per second speed. Design of interior finishes shall be selected from manufacturer's standard or as indicated on the drawings. Indicated speeds of elevators are minimum requirements only and for Manufacturers'/Suppliers' recommendations. Refer architectural drawings.

10.0 PLUMBING WORKS (Refer to Plumbing /Sanitary Engineer's Design Specifications for complete material requirements.

11.0 ELECTRICAL WORKS (Refer to Electrical Engineer's Design Specifications for complete material requirements.)

12.0 ELECTRICAL FIXTURES/MATERIALS

12.1. Scope of Work

- A. Under this section of the specification, the Contractor shall furnish, deliver and install all materials, equipment and labor necessary for the complete execution of electrical works as shown in the drawings and as specified herein. All installation shall conform to the requirements of the latest edition of the Philippine Electrical Code (PEC) and the rules and regulation of local and national authorities concerned with the enforcement of Electrical Laws and the policy of the utility company.

12.2 Permit and Fees

- A. The Contractor shall secure all necessary wiring permits, certificate of electrical inspection and pay all fees necessary thereto. The Contractor shall verify and orient actual location of concrete private pole for connection of power, and telephone services.

12.3 Materials

- A. All materials shall be new and high quality which shall conform to the specification and other applicable standards as to its location and purpose. All materials shall meet the requirements of Bureau of Product Standards and shall bear the inspection label whenever standards have been established. The Contractor shall submit to the Project Engineer and Owner for approval shop drawings, catalog data or samples of materials and electrical equipment before procurement.

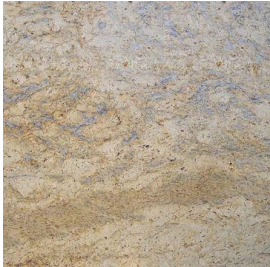

1. Wires and Cables
 - a. All wires shall be copper, soft-drawn and annealed of 98% conductivity. These shall be smooth and true and of a cylindrical form and within 1% of the actual size called for.
 - b. Service entrance, feeder cables and branch circuit wires shall be thermoplastic insulated, heat and moisture resistant type THHN/THWN. Grounding wire shall be TW with green insulation.
 - c. All overhead conduits shall be provided with a hanger rod, angle bar, U-bolts and metal clamp support.
 - d. All wires shall comply with the Bureau of Product Standards and shall bear the PS label.
 - e. Wires shall be as manufactured by American Wire -"Phelps Dodge" or approved equivalent.
2. Wiring Devices
 - a. Wall receptacles shall be flush mounted, duplex, rated 10 or 15 amperes at 230 volts and 20 to 50 amperes for air condition units or other special purpose outlets.
 - b. Type and color of receptacles shall be coordinated with the Architect as manufactured by "Panasonic", or approved equal.
3. Wall Switches
 - a. Wall switches shall be rated 10 or 15 amperes 230 volts and shall be thumbler operation and quiet type with pilot light.
 - b. Type and color shall be as selected by the Architect and should be the same type and brand as the receptacles.
4. Plates
 - a. All wiring devices cover plates shall be ivory plastic or as selected by the Architect or Owner.
5. Junction and Utility Boxes
 - a. Junction, utility and pull boxes shall be of code gauge galvanized steel, Ga.16 and shall be provided as required for pulling of wires. Utility box for receptacles and switches shall be deep type 54mm x 100mm 50mm and covered to protect from physical damage. Pull boxes when installed shall be accessible. Splices and taps in any system shall be made only at junction boxes.
6. Panel boards
 - a. Lighting and power panel board shall be equipped with circuit breakers as indicated in the plans. Circuit breakers shall be bolt-on type, flush or surface mount with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike, finish in manufacturer's standard gray enamel. Total load current shall not exceed eighty percent (80%) of the Circuit Breaker rating. Enclosure shall be NEMA 1 and shall be as manufactured by KOTEN or approved equal.


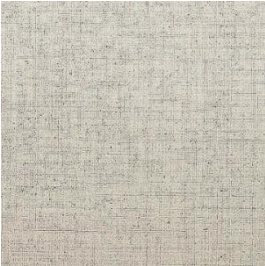
7. Raceways
 - a. Rigid non-metallic conduits uPVC shall be used for installation embedded in concrete. Rigid galvanized steel conduit, zinc coated and hot dipped, shall be used above dropped ceiling, in between wood partitions, exposed installations and for service entrances.
 - b. Acceptable brands for uPVC shall be "Moldex-Moldcon" or approved equal". Acceptable brand for metallic conduits shall be McGill or approved equal.
8. Grounding
 - a. Grounding bus bar shall be provided inside Tenant space for grounding connections of outlets and equipment. Grounding system shall be in accordance with the requirement of the Philippine Electrical Code (PEC), Article 4.2.
 - (1) Ground rods shall be copper-clad steel, 20mm diameter x 3m long.
 - (2) Wire shall be bare copper soft drawn, stranded.
 - (3) Connectors shall be brass, bolt type, equal to Burndy or approved equivalent.
9. Lighting
 - a. Provide the number, type and wattage indicated.
 - (1) All lighting fixtures shall be designed to operate on 220 volts, 60 hertz, complete with ballast, drivers and lamps.
 - (2) All fluorescent lamp lighting fixtures shall be in an enclosed metal box type. Ballast shall utilize high power factor type and shall be located inside the metal box.
 - (3) Outdoor lighting fixtures should have a minimum ingress protection of IP65. Equal to "Ligman" or approved equivalent.
 - (4) High intensity discharge lighting fixtures ballast shall be auto-regulator type, high power factor ballast with solid state igniter or instant re-strike device for rapid starting.
 - (5) Provide fixture hanger capable of supporting twice the weight for suspended light fixtures.
 - (6) Lighting fixtures shall be equal to "Cenit Lighting" or "The Creative lighting Asia".


PART – 2 ALTERATIONS

- 4.0 Any alterations and revisions from the Plans/Drawings and Specifications done without the knowledge of the Architect, that may impair the strength and/or the aesthetic of the project is not the liability of the Architect but shall be borne by the General Contractor instead.


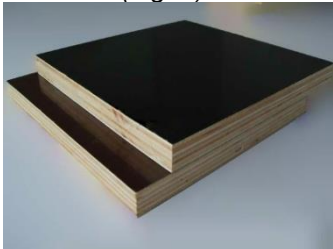
GROUND FLOOR

Area	Feature
Information, Lobby and Visitors' Holding Area	<div>1. Granite Finish</div> <div>(Fig. 1)</div> <div></div>
	<div>2. 800mmx800mm Homogeneous Non-Skid Floor tiles equal to "NiroCeramics" may be selected</div> <div>(Fig. 2)</div> <div></div> <div>*Contractor to submit sample for approval*</div>

<p>Display Area and/or Museum</p>	<ol style="list-style-type: none"> 1. Granite Finish(See Fig. 1) 2. 800mmx800mm Homogeneous Non-Skid Floor tiles equal to "Niro Ceramics" may be selected (See Fig.2) <p><i>*Contractor to submit sample for approval*</i></p> <ol style="list-style-type: none"> 3. Acoustic Ceiling Board <p>(Fig.3)</p>  <p><i>*Contractor to submit sample for approval*</i></p>
<p>Office (good for 5 personnel)</p>	<ol style="list-style-type: none"> 1. Complete amenities of an office, with cubicle-type station; telephone and internet ready; air-conditioned 2. 500mmx500mm Carpet Tiles, Wallcrown-Tuntex, Milliken or Tarkett <p>(Fig.4)</p>  <ol style="list-style-type: none"> 3. Acoustic Ceiling Board <p>(See Fig.3)</p>

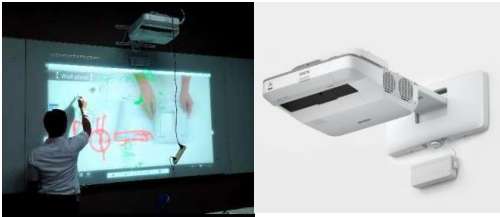

Pantry	<ol style="list-style-type: none"> 1. Provided with whole piece granite counter top and 2-duplex CFCI outlets, cabinets for storage, good quality stainless steel lavatory, with stainless faucet. 2. Lighting shall be LED cool white lights. 3. Drinking fountain is provided. 4. 300mmx600mm Homogeneous Non-Skid Floor tiles equal to "Niro Ceramics" may be selected (See Fig.2) <p><i>*Contractor to submit sample for approval*</i></p> <ol style="list-style-type: none"> 5. Acoustic Ceiling Board (See Fig.3)
Comfort Rooms (Male and Female and for Disable/ Elderly Persons	<ol style="list-style-type: none"> 1. Three (3) cubicles each wherein, one (1) cubicle will be allotted for and with provisions for PWD; hand dryer; water closet and bidet; urinals; lavatories, mirrors, etc. 2. 300mmx600mm Matte Homogeneous Non-Skid Floor tiles equal to "Niro Ceramics" may be selected (See Fig.2) <p><i>*Contractor to submit sample for approval*</i></p> <ol style="list-style-type: none"> 3. Painted 12mm thick Moisture Resistant Gypsum Ceiling Board <p>(Fig 5.)</p>  <p><i>*Contractor to submit sample for approval*</i></p>

SECOND FLOOR

Area	Feature
Robotics Lab	<ol style="list-style-type: none"> 1. Polished Concrete Finish (Fig. 6)  2. Laboratory Counter 1" Compact Phenolic Board 3. Painted 12mm thick Gypsum Ceiling USG BORAL, Knauff, Skycon or Gyproc Channels
Bio Molecular Lab	<ol style="list-style-type: none"> 1. Polished Concrete Finish 2. Laboratory Counter 1" Compact Phenolic Board; black (Fig. 7)  <p><i>*Contractor to submit sample for approval*</i></p> <ol style="list-style-type: none"> 3. Painted 12mm Gypsum Ceiling (See Fig.5) 4. Cove Ceiling
Air Lab	<ol style="list-style-type: none"> 1. Polished Concrete Finish (See Fig. 6) 2. Laboratory Counter 1" Compact Phenolic Board (See Fig. 7) 3. Painted 12mm thick Gypsum Ceiling USG BORAL, Knauff, Skycon or Gyproc Channels (See Fig. 5) <p><i>*Contractor to submit sample for approval*</i></p>
Water Lab	<ol style="list-style-type: none"> 1. Polished Concrete Finish (See Fig. 6)


Water Lab	<ol style="list-style-type: none"> 2. Laboratory Counter 1" Compact Phenolic Board (See Fig. 7) 3. Painted 12mm thick Gypsum Ceiling USG BORAL, Knauff, Skycon or Gyproc Channels (See Fig. 5)
Soil Lab	<ol style="list-style-type: none"> 1. Polished Concrete Finish (See Fig. 6) 2. Laboratory Counter 1" Compact Phenolic Board (See Fig. 7) 3. Painted 12mm thick Gypsum Ceiling USB BORAL, Knauff, Skycon or Gyproc Channels (See Fig. 5)
Material Science Lab	<ol style="list-style-type: none"> 1. Polished Concrete Finish (See Fig. 6) 2. Laboratory Counter 1" Compact Phenolic Board (See Fig. 7) 3. Painted 12mm thick Gypsum Ceiling USG BORAL, Knauff, Skycon or Gyproc Channels (See Fig. 5) <p>*Contractor to submit sample for approval*</p>
Comfort Rooms (Male and Female)	<ol style="list-style-type: none"> 1. Three (3) cubicles each; hand dryer; water closet; urinals; lavatories, mirrors, etc. 2. 300mmx600mm Matte Homogeneous Non-Skid Floor tiles equal to "Niro Ceramics" may be selected (See Fig. 2) <p>*Contractor to submit sample for approval*</p> <ol style="list-style-type: none"> 3. Painted 12mm thick Moisture Resistant Gypsum Ceiling Board (See Fig. 5) <p>*Contractor to submit sample for approval*</p>

THIRD FLOOR

Area	Feature
AVR and Function Room	<ol style="list-style-type: none"> 1. Painted 12mm thick Moisture Resistant Gypsum Ceiling Board (See Fig. 5) *Contractor to submit sample for approval* 2. Epson Projector EB 696 UI (Fig. 8)  3. 600mmx600mm Homogeneous Non-Skid Floor tiles (See Fig. 2) *Contractor to submit sample for approval*
Science Garden and Showroom	<ol style="list-style-type: none"> 1. Trellis with glass/polycarbonate board (for Phase 3 improvements) (Fig. 9)  2. 600mmx600mm Homogeneous Non-Skid Floor tiles (See Fig. 2) *Contractor to submit sample for approval*
Interactive Room	<ol style="list-style-type: none"> 1. Painted 12mm thick Moisture Resistant Gypsum Ceiling Board (See Fig. 5) 2. Epson Projector EB 696 UI (See Fig. 8) 3. 600mmx600mm Homogeneous Non-Skid Floor tiles (See Fig. 2) *Contractor to submit sample for approval*

<p>Comfort Rooms (Male and Female)</p>	<ol style="list-style-type: none"> 1. Three (3) cubicles each; hand dryer; water closet; urinals; lavatories, mirrors, etc. 2. 300mmx600mm Matte Homogeneous Non-Skid Floor tiles (See Fig. 2) *Contractor to submit sample for approval* 3. Painted 12mm thick Moisture Resistant Gypsum Ceiling Board (See Fig. 5)
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OTHERS

<p>Fire Protection</p>	<ol style="list-style-type: none"> 1. Sprinkler system including all accessories as indicated and designed by the mechanical engineer shall be complete to provide functional system. 2. Pump House shall be located above rainwater tank for effective pumping. Pump house shall be 2.00m width x 5.00m length with 2.40m vertical height roofing.  3. Centrifugal Fire Pump system shall be complete with control panels, electronic system, valve system, electrical wirings and accessories to provide functional system. 4. Fire Hose System, Cabinets and accessories as provided in plans shall be subject to phase 3.
<p>Plumbing and Sanitary</p>	<ol style="list-style-type: none"> 1. All waterline, sanitary lines, vent system and drainage shall be in accordance to the National Plumbing Code of the Philippines. 2. Fittings and fixtures shall be standard and shall be verified by the PSHS-CMC Technical Working Group. 3. Pump systems shall be complete with control switches, pressure gauges, floats, relays & contactors, and other accessories to provide functional system.

Electronic System	<p>1.Closed-Circuit Television System (CCTV) shall be complete with Piping, Fittings, Wiring-ins, Devices, 60 pieces CCTV Cameras, 4 units of 16 channels DVR & 4 units of 40" Monitors. DVR and Monitors shall be located at Ground Floor Office.</p> <p>2. Telephone and Data System shall be in accordance to plans. Pipe and fittings including telephone and data outlets for computers, USB Ports and etc. shall be provided by contractor.</p> <p>3. Public Address System (PA) shall be provided including Paging system and speakers as indicated in plan.</p> <p>4.Fire Detection and Alarm System (FDAS) such as smoke detector, fire alarm, fire exit signage, roughing-ins shall be included in this contract. Roughing-ins for FDAS shall be in 3/4" PVC electrical pipe with pull-out cable. Please refer to plan.</p> <p>5. Wiring- ins and fixtures for FDAS system shall be subject to Phase 3.</p>	
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