PROJECT TITLE: Construction of Gate 2, USTP CDO Campus
LOCATION: USTP CDO, CM Recto, Lasapan, Cagayan de Oro City
OWNER: University of Science and Technology of Southern Philippines
ARCHITECT: AR. FERNAND G. MACAS, UAP
SUBJECT: SPECIFICATIONS- Summary of Materials and Finishes
DATE: September 17, 2026

DIVISION 00
PROCUREMENT AND CONTRACTING REQUIREMENTS

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1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS
1.1.1Clarification Form (See ANNEXES for Official Copy of Form)
1.1.2Addenda: Bid Bulletin
1.1.3Record Clarification Notices (See ANNEXES for Official Copy of Form)
1.1.4Record Amendments (See ANNEXES for Official Copy of Form)
1.1.5Technical Drawings
1.1.6Specifications

1.2 SUMMARY
This section specifies documentary and procedural requirements for handling technical queries, addenda, and revisions during the pre-bid stages.

1.3 PROCEDURES
1.3.1CLARIFICATIONS
1.3.1.1 In case of queries, submit clarification forms upon the official release of the invitation to bid.
1.3.1.2 Submit all queries to the official email account of IPFDO (see upper right corner of this page for email address), complete with attachments, i.e. annotated copies of the architectural technical working drawings and/or specifications highlighted in relation to the clarification/query and other attachments deemed necessary by the bidder i.e. sample brochures, etc.
1.3.1.3 Submit equivalent hardcopies of emailed accomplished clarification forms within two days after sending the email. No hardcopies submitted, no official responses will be issued.
1.3.1.4 For phased construction work, include extent of scope of work in clarifications.

1.3.2ADDENDA: BID BULLETIN
1.3.2.1 Issue Bid bulletins in the event of owner-approved changes/addenda with significant cost impact.
1.3.2.2 Issuance of Bid Bulletins are by proponents, to be fairly published to all participating bidders.
1.3.3RECORD CLARIFICATION NOTICES
Record all clarification issuances via a roster of issued clarification notices. Include dates of issuance, status of response, and date responded in the records.

1.3.4RECORD AMENDMENTS
Record all addenda/ amendments issued and answered during the bid phase via a roster of clarification notices. Include dates of issuance, status of response, and date responded in the records.

2. **PART 2 PRODUCTS**
No queries related to product substitution allowed during the bidding phase. Official technical specifications will prevail.

3. **PART 3 EXECUTION**
No queries related to product execution allowed during the bidding phase. Official technical specifications will prevail.

END OF SECTION

DIVISION 01
GENERAL REQUIREMENTS

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1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS
1.1.1Technical Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Samples and Mock-Ups
1.1.8Work Program and Methodology Submittals

1.2 WORK COVERED BY CONTRACT DOCUMENTS
This section specifies work covered by the contract documents to be consistent with issues Instruction to Bidders and Special Conditions of this contract.

1.3 RELATED SECTIONS
1.3.101 17 00 Execution Requirements

2. **PART 2 PRODUCTS**

2.1 MANUFACTURER QUALIFICATIONS
Product specifications are itemized per material division with specific manufacturer qualifications, i.e. ISO, ASTM, etcetera. Manufacturer qualifications are relative and pertinent to each material division. Refer to material division in subject for detailed manufacturer qualifications.

2.2 MOCK-UPS
Specific material divisions such as ornamental caseworks and steel fabrications require mock-up approvals prior to implementation. See material division for detailed procedures.

2.3 PRODUCT REQUIREMENTS
Refer to signed physical plans for details on the specified product performance requirements. Secure proper product approval from the designers prior to site implementation. Refer to the procedures process of this section for the general procedure.

2.4 PRODUCT SUBSITITUTION
Requests for product substitutions are subject to the approval of the designers and noted by the owners. Follow the

proper procedure and attach required submittals as specified per material division. The contractor is obliged to indicate whether or not the substitution will incur an impact on the agreed contract costs, such that the agreed contract cost is rendered insufficient or excessive.

2.5 SUPPLIER QUALIFICATIONS

Only contract suppliers with active ISO qualifications and sufficient supply stocks for items specified requiring mass quantities. Ensure that suppliers are equipped with warehousing facilities within the Project's vicinity, have good service performance records for supplying and handling supplies, and have good delivery records to the project site, with minimal delays, in sufficient quantities, and of maximum quality.

2.6 TESTING AND INSPECTING SERVICES

Observe required testing and inspecting services for items marked critical in particular material divisions. Review testing and inspecting requirements as specified in particular material divisions. The job site is subject to inspection by the owner and designer at any time during the progress of work. Any work found inconsistent with technical working drawings are subject to rework, regardless of whether or not the item subject to rework is found later during the work progress.

2.7 PROCEDURES

2.7.1SUMMARY - APPROVALS

Secure all product, execution, and substitution approvals consistent with project timelines. No documentary product approval shall be basis or cause of delays in the approved project implementation schedule.

2.7.2PRODUCT APPROVAL

Attach duly accomplished official approval forms (see Annex), with markings "Product Approval", complete with corresponding submittal attachments and product performance requirements as required per material division to all product approval requests. Attachments will include product samples, mock-ups, manufacturer qualifications, and other documents as indicated in each material division.

2.7.3PRODUCT SUBSTITUTION APPROVAL

Attach duly accomplished official approval forms (see Annex), with markings "Product Substitution", complete with corresponding submittal attachments and product performance requirements as required per material division to all product substitution requests.

In addition to official approval forms, attach a duly accomplished product comparison form (see ANNEX), complete with samples, mock-ups, manufacturer qualifications, and other attachments required per material division.

2.7.4SOURCE QUALITY CONTROL PROCEDURES

Multiple supply sources are acceptable only if the product is the same, consistent, and duly approved. Secure a separate product approval for similar items procured from different suppliers. Refer to material divisions for required submittals. Follow the procedure for product approval (refer to section 2.7.3. PRODUCT SUBSTITUTION APPROVAL).

3. PART 3 EXECUTION

3.1 CONTRACTOR QUALITY CONTROL

This section shall be consistent with eligibility requirements stated in the Instruction to Bidders.

The proponents/owners of the project are entitled to employing a contractor of choice, by bidding following the RA 9184 otherwise known as THE GOVERNMENT SERVICE PROCUREMENT ACT OF 2016 provided that contractors involved in the works are equipped as follows:

3.1.1All contractors and builders involved in the scope of works of the project, whether general contractors, specialty contractors, or subcontractors are licensed and valid members of the Philippine Contractors Accreditation Board during the time of bidding and the entire duration of the construction of the project.

3.1.2All contractors have the financial capacity to acquire the appropriate equipment and manpower for use in the completion of the scope of works, especially for specialty construction involving expertise, i.e. paint works, steel fabrications, and other items specified.

3.1.3All contractors have a sound organizational structure, with a manpower of experienced technical personnel qualified to administer proper supervision of the required work.

3.1.4All contractors duly comply with civil liabilities as prescribed by the prevailing rule of law in the country and regional jurisdiction wherein the project is situated.

3.1.5All contractors are liable to the annual renewal of his license as prescribed by law.

3.1.6Ensure compliance with basic safety requirements as prescribed by the rule of law, including the national building code of the country and regional jurisdiction where project site is situated.

3.1.7All contractors shall comply with the conditions as stipulated in the Instruction to Bidders and Special Conditions of the Contract.

3.2 EXECUTION REQUIREMENTS

Secure execution approvals by submitting duly accomplished official approval forms (see Annex), with markings "Execution Approval", complete with a detailed work program and methodology. Refer to execution requirements as specified in every material division. Refer to appropriate subsections for detailed execution requirements.

3.3 EXECUTION SUBSTITUTION

Secure execution substitution approvals by submitting duly accomplished official approval forms (see Annex), with markings "Execution Approval", complete with a detailed work program and methodology. Submit execution substitution requests via formally submitted requests.

3.4 FABRICATOR QUALIFICATIONS

Ensure that specialty fabricators follow fabricator qualification requirements as specified in plans.

3.5 INSTALLER QUALIFICATIONS

Ensure that contracted installers will follow qualifications as specified in plans

3.6 TESTING AND INSPECTING SERVICES

Ensure that fabricated specialty items are compliant to competent testing and inspecting procedures. Refer to material divisions for detailed performance requirements, tests, and inspection proceedings required per material. Furnish copies of test and inspection results for all contracted fabricators and constructors.

3.7 TESTING LABORATORY SERVICES

Furnish copies of laboratory tests as specified by each material division.

3.8 PROCEDURES

3.8.1SUMMARY

Approval schedule shall not be in conflict with approved project implementation schedules.

3.8.2EXECUTION APPROVAL

The general procedure will include the official submission of execution approval forms (see Annexes for a copy of the official form to be utilized) with corresponding execution submittal attachments as specified per material division. Attachments will include work program and methodology submittals.

3.8.3EXECUTION SUBSTITUTION APPROVAL

For execution substitution, the general procedure will include the official submission of execution approval forms with a clear indication of execution substitution (see Annexes for a copy of the official form to be utilized) with corresponding submittal attachments and execution performance requirements as specified per material division. The changes and similarities of the specified from the proposed execution must be clearly outlined and justified.

END OF SECTION

01 00 00	DIVISION 1 GENERAL REQUIREMENTS	
01 17 00	Execution Requirements	

1. **PART 1 GENERAL**
   - **1.1 RELATED DOCUMENTS**
     - 1.1.1 Technical Drawings
     - 1.1.2 Specifications
     - 1.1.3 Requests for Interpretation
     - 1.1.4 Land and property surveys certified by surveyor
     - 1.1.5 Final property surveys showing the work performed and recorded survey data

   - **1.2 SUMMARY**

     This section includes general prescribed proceedings in execution of general construction work. Refer to each material division for specific execution requirements, especially for special fabrications. General construction work is listed as follows:

     - 1.2.1 Construction Layout
     - 1.2.2 Field engineering and surveying
     - 1.2.3 General installation of products
     - 1.2.4 Coordination of owner-installed products
     - 1.2.5 Protection of installed construction
     - 1.2.6 Correction of the Work

   - **1.3 RELATED SECTIONS**
     - 1.3.1 Requests for Interpretation

   - **1.4 WARRANTIES**

     The following should be included in the Contractor's warranties:
     - 1.4.1 Warrant that materials and equipment furnished under the Contract are of good quality and new unless otherwise required or permitted by the Contract Documents
     - 1.4.2 Warrant that the Work will be free from defects and conforms to the requirements of the Contract Documents. Work not conforming to the contract documents are defective, therefore subject to revision and correction according to the drawings and specifications.
     - 1.4.3 Warrant that all substitutions implemented on site are properly approved and authorized; work without proper approval are considered defective.
     - 1.4.4 Defects and damages NOT executed by the Contractor, i.e. improper or insufficient maintenance of equipment systems that have been turned-over, improper operation, or normal wear and tear and normal usage are excluded from the warranties. In the event that defects and damages occurred upon partial completion of the project or in the duration of the construction, the Owner and Architect may require the Contractor to furnish satisfactory evidence as to the kind and quality of materials and equipment utilized.
     - 1.4.5 **At the minimum, all warranties should be in pursuant to the provisions of RA 9184 otherwise known as the 2016 GOVERNMENT PROCUREMENT REFORM ACT.**

   - **1.5 CONTRACTOR RESPONSIBILITIES**
     - 1.5.1 Perform and complete works as stipulated in the technical working drawings, the performance specifications, and related contracted documents.
     - 1.5.2 The contractor shall comply with all permitting requirements as needed to commence the project and to facilitate proper turnover for the full occupancy of the owner. Permits include building permit application, permit requests for tree removal, excavation permits, fencing permits for both temporary and permanent facilities, occupancy permits, and other permits as needed to complete the project and facilitate the smooth turnover of the project. In case of conflict between approved scope of works, technical drawings, and this specifications, scope of work and physical plans shall prevail.
     - 1.5.3 In performing the work, the contractor is obliged to keep organized, correct, and truthful records of the progress of construction. Included in this documentation are shop drawings, details, execution and work methodology procedures, as well as information furnished by the owner or the designer. Organize the records such that any changes decided upon during construction are traceable.
     - 1.5.4 The contractor is obliged to thoroughly review all contract documents, technical working drawings, and specification and ensure that the implementation on the project site is as true to the drawings as possible. In case of

     inconsistencies between drawings, specifications, actual site conditions, and similar issues resulting to confusion on the work to be implemented on site, the contractor is obliged to file a Request for Interpretation/Clarification to the Design Team. Follow procedures as prescribed during the kick-off conference.
     - 1.5.5 Take field measurements and ensure that drawings are feasible. In case of conflict, inform the design team via execution and work methodology approvals or requests for interpretation through the construction management team and wait for official responses prior to implementation.
     - 1.5.6 The contractor is obliged to properly inform the Construction Manager of any errors, inconsistencies, or omissions discovered in the technical working drawings. The Construction Manager shall in turn consult with designers to manage and resolve any incurred conflicts.
     - 1.5.7 Carefully examine the existing site conditions and ascertain that the actual surveyed location is accurate.
     - 1.5.8 Secure a copy of contract documents, soil borings, and relevant data in order to verify the nature, location, and character of the project and the site, including without limitation, the surface and subsurface conditions and all structures and obstruction both natural and man-made within and around the project site vicinity. Contracts may be requested from the IPFDU or procured by the contractor depending on stipulations on the scope of work, terms of reference, instruction to bidders, and special conditions of the contract.
     - 1.5.9 The contractor is responsible for all erroneous work administered on site without the due information and approval of the architect. Included in this responsibility is the shouldering of costs in the event that the work is to be revised for correction.
     - 1.5.10 All Site supervision, direction, and administration of all site work is the responsibility of the Contractor.
     - 1.5.11 Construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work under the Contract are the responsibilities of the contractor unless otherwise stated in the contract documents.
     - 1.5.12 If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the evaluation of the jobsite safety of such means, methods, techniques, sequences or procedures is the responsibility of the Contractor. If specifications are deemed unsafe, the Contractor shall give timely written notice to the Owner and Architect via and shall not proceed with that portion of the Work without further written instructions from the Architect.
     - 1.5.13 The contractor is obliged to inform IPFDU through the construction manager or project coordinators of any substitutions to occur on site. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage.
     - 1.5.14 The Contractor is responsible for the acts and the quality of work of its employees, subcontractors, including their agents and employees and other work commissioned by the contractor on site.

2. **PART 2 PRODUCTS**

   Refer to specific material divisions for product particulars.

3. **PART 3 EXECUTION**
   - **3.1 SITE INVESTIGATION PRIOR TO COMMENCEMENT OF WORK**

     The contractor is to examine existing conditions and verify location of existing site utilities, existing structures, vegetation, and other considerations existing on site before beginning work. Include subsurface equipment in this investigation. Verify invert elevations at points of connections for sanitary sewers, storm sewers, underground electrical wiring, and water service piping existing on site. Furnish location data acquired to the architect. In case of conflict and inquiries, the contractor shall inform the construction manager to facilitate resolution.

   - **3.2 FIELD MEASUREMENTS**

     Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Verify all dimensions prior to fabrication. Coordinate fabrication schedules with construction progress.

   - **3.3 CONSTRUCTION LAYOUT**

     Verify all layout shown in the technical working drawings. Engage professional and experienced surveyors to establish information shown on the Drawings, especially related to site benchmarks and layout. In case of discrepancies, inform the Architect via a Request for Interpretation. Record all layout control work, coordinates of benchmarks, including deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member and types of instruments and tapes used. Furnish a copy of the records to the Architects on critical progresses of work.

     Engage a professional, experienced, and licensed surveyor to conduct the following activities:

3.3.1 Location and establishment of benchmarks and control points at each story of the construction, and elsewhere needed.
Note: Do not relocate existing benchmarks or control points without securing a written approval from the Architect. Inform the architect of the need for relocation by filing an official Request for Clarification (See Annex for official forms)
3.3.2 Establish dimensions accurately.
3.3.3 Record all benchmark locations, both horizontal and vertical data.
3.3.4 Notify and disseminate to installers, the correct and accurate lines and levels.
3.3.5 Check the accuracy of the location, level and plumb, of every major element as the work progresses and duly notify the Construction Manager of any discrepancies.
3.3.6 Close site surveys with an error of closure equal to or less than the standard established.
3.3.7 Locate and layout control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work.
3.3.8 Transfer survey markings and elevations for use with control lines and levels when a written approval by the Architect or Construction Manager has been secured.
3.3.9 Establish temporary reference points necessary to complete and commence specific construction work, provided that these reference points are removed when the work in subject has been completed. Do not delete temporary reference points without proper recording.
3.3.10 Prepare certified survey records showing dimensions, locations, elevations, and angles for every major site improvement completed on site, specifically completion of foundation works, completion of every floor or zone as decided by the construction manager with the conformity of owners and designers.
3.3.11 Prepare and submit a final property survey showing the real records and features of the finished project, namely actual floor to floor ceiling heights, final building height, benchmarks and coordinates of critical underground facilities, if any. Show boundary lines, streets, tree data, adjacent properties, landmarks, grade contours, and the distance and bearing from a site corner to a legal point. Certify this document and certify all data as accurate and true and be labeled by authorities as the official property survey.

3.4 INSTALLATION
3.4.1 Verify that the location of the work to be implemented is accurate, correctly aligned, and correctly elevated.
3.4.2 Plumb all vertical work and level all horizontal work. Work with specific angles must be properly reviewed on the drawings and correctly laid out.
3.4.3 Unless otherwise indicated with special treatment, conceal all pipes, ducts, and wiring in finished areas.
3.4.4 Unless otherwise indicated, all headroom clearances must be maintained at least 2.40M for mechanically ventilated areas and 2.70M for areas with natural ventilation. Follow indications on technical working drawings if prescribed heights are above the minimum.
3.4.5 Comply with written instructions and recommendation for installation as provided by manufacturers and suppliers.
3.4.6 Conduct installation works at times and conditions that ensures the best possible results.
3.4.7 Maintain installed works in good condition throughout the duration of construction until final completion of the project.
3.4.8 Conduct construction and installation work without damaging the operations of other works within its vicinity.
3.4.9 Do not use tools, equipment and methods, that produces noise levels that are hazardous to human health.
3.4.10 Check that the measurements on the shop drawings are in accordance to actual site conditions.
3.4.11 When using anchors and fasteners, secure the fasteners such that they are accurately located and do not obstruct any mandatory clearance heights. Where mounting heights are not indicated, propose to the Architect via a duly written request for clarification/interpretation to mount components according to standards. Installation proceeds when the architect issues an approval.
3.4.12 Install all joints to the best visual effect, such that all joints are of uniform width, and if the work is exposed, that the joints are arranged as neatly as possible unless otherwise indicated by the technical working drawings and specifications.
3.4.13 Ensure the safety of all installation work and take care not to damage any separate work in the vicinity.
3.4.14 Test all equipment and tools to be used and ensure that it is safe and is in good working condition. Replace all parts as needed to ensure maximum efficiency.

3.5 SITE PREPARATION
If upon investigation, existing site conditions are deemed unsuitable for work intended to commence, duly inform the architect and the owners via written notice. Included in this section are issues on utilities, i.e. electrical posts that need to be relocated, water pipe utilities that need to be adjusted, abandoned, or terminated, as well as other pertinent issues affecting the intended design. Included in the written notice are the following information:
3.5.1 Description of the work to be commenced
3.5.2 List of detrimental conditions

3.5.3 List of unacceptable installation tolerances
3.5.4 Recommended corrections.
3.5.5 Authorities that need to be informed.

3.6 PROTECTION OF INSTALLED CONSTRUCTION
Whenever any portion of work is completed prior to the substantial completion of the project, ensure that the installed or completed portion of work is protected, without damage, and without deterioration up to the substantial completion of the project.

3.7 CORRECTION OF THE WORK
3.7.1 Any defective construction should be repaired, removed, or replaced. This includes the restoration of any damages incurred on the finishes or substrates during the time work.
3.7.2 Repairs include material touch-ups on painted finishes and replacement of units on substrates, or the cutting and patching of portions of masonry or chipped portions of the substrate.
3.7.3 Repair all components that are not in good working condition.
3.7.4 Remove and replace chipped, scratched and broken glass, mirrors, and similar surfaces.
3.7.5 Ensure that the original condition of the finish or substrate is maintained after correction.

END OF SECTION

01 00 00	DIVISION 1 GENERAL REQUIREMENTS	
01 17 10	Final Cleaning	1 of 2

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Technical Drawings
1.1.2 Specifications

1.2 SUMMARY

This section specifies administrative and procedural requirements for final cleaning upon completion of scope of works. Specific cleaning agents and procedures are specified in each material division. Ensure that cleaning and waste disposal procedures are compliant with local laws and ordinances. Do not dispose flammable, volatile, and poisonous wastes in storm or sanitary drains of the project. Ensure that no debris, rubbish, or other waste material will be burned, buried, and improperly disposed, especially not within the premises of the project site.

2. PART 2 PRODUCTS

2.1 CLEANING AGENTS

Review product-specific requirements of cleaning agents and materials recommended by the manufacturer or fabricator or the surface and material to be cleaned.

3. PART 3 EXECUTION

3.1 SAFETY AND PRECAUTION

3.1.1 Ensure safety handling of cleaning agents that are hazardous to health or safety of the property. Secure the safe storage of volatile cleaning agents and ensure that it is only accessible to authorized personnel.
3.1.2 Organize storage of cleaning materials and agents on site to allow maximum access, no traffic barriers, and no unnecessary material wastage.
3.1.3 Properly dispose debris, scrap, and waste materials on a daily basis. Accumulation of wastes is a safety hazard. Ensure that disposal management proceedings do not destroy the ecology of the project site and its neighboring vicinities.

3.2 PROGRESS CLEANING

3.2.1 Demonstrate sample-cleaning work before cleaning the entire surface area to be cleaned. Check that the cleaning agent and material that was sample-cleaned does not change the immediate properties of its surfaces before proceeding with complete clean-out.
3.2.2 Complete all cleanout works one week prior to the scheduled turnover to ensure maximum time for inspection.

3.3 FINAL CLEANOUT

3.4 Comply with local laws and ordinances for all waste-removal operations.
3.5 Comply with manufacturer's written instructions on maintenance and operations.
3.6 Clean the project site, yard, and grounds of construction activities. Ensure that the landscape development area is clear of any waste material and other foreign substances.
3.7 Sweep and wipe all paved areas and finished flooring. Remove stains and other deposits.
3.8 Do not clean surfaces marked for natural weathering.
3.9 Rake all pervious grounds free from foreign waste.
3.10 Remove all construction tools, machinery and equipment from the project site.
3.11 Clean all exposed surface areas, both interiors and exteriors. Ensure that it is free from stains and similar substances.
3.12 Do not paint over labels, especially specialized marks namely "UL" and fire rating marks. Do not excessively clean these labels such that the surface marks become illegible.
3.13 Vacuum all soft surfaces, i.e. carpet flooring, sofa, wooden ceilings, and all surfaces with crevices etc.
3.14 Clean and polish all transparent materials such as mirrors, glass partitions, door lights, vision windows, etc. Replace broken or chipped glass and mirrors and ensure that surfaces are free from scratches. If the glass surface has a texture enhancement sticker, ensure that the sticker is adjoined to the surface neatly and properly and is not chipped off by excessive cleaning.
3.15 Wipe the surfaces of all mechanical and electrical equipment such that it is dust free. There should be no excess lubricants and similar chemicals on the surface of the equipment.

3.16 Clean plumbing and sanitary fixtures to a sanitary condition. Wipe it free of stains and foreign markings, including hard water marks.
3.17 Replace all disposable air filters. Wipe all diffusers, registers, and grills free from surface dust, stains, and foreign markings.
3.18 Clean light fixtures, lamps, bulbs, globes, and reflectors such that it is free from surface dust, stains, and is functional at maximum efficiency.
3.19 All bulbs must be in working condition. Replace dimmed, old bulbs with new bulbs in good working conditions.
3.20 The following spaces should be clear of debris and surface dust:
3.20.1 Plenum
3.20.2 Shafts and chutes
3.20.3 Vaults
3.20.4 Manholes
3.20.5 Attics
3.20.6 Utility rooms
3.20.7 Other, similar spaces.

END OF SECTION

01 00 00	DIVISION 1 GENERAL REQUIREMENTS	
01 17 30	Operation and Maintenance Data	1 of 3

1. **PART 1 GENERAL**
   - **1.1 RELATED DOCUMENTS**
   - 1.1.1 Technical Drawings
   - 1.1.2 Specifications

   - **1.2 SUMMARY**

     This section specifies administrative and procedural requirements for the management of operation and maintenance data for turnover to the proponents upon completion of the project.

   - **1.3 PREPARATION OF MAINTENANCE MANUALS**
   - 1.3.1 Include in the manual all information specified in individual specification divisions
   - 1.3.2 Ensure that technical personnel charged in the preparation of maintenance manuals are properly trained and experienced. Include clear written instructions to communicate critical steps in maintenance. Accompany written instructions with diagrams and drawings for clarity.
   - 1.3.3 Operation and maintenance manuals must be of a manageable size, bounded by a heavy duty binder, and properly labeled on the front and spine of the hard bound binder.
   - 1.3.4 Neatly fold oversized drawings attach and check that punch holes do not damage any critical information.
   - 1.3.5 Prepare, orient, and transfer knowledge on the following manuals:
     - 1.3.5.1 Building operating systems
     - 1.3.5.2 Equipment operating systems
     - 1.3.5.3 Preservation and maintenance manuals of all products and finishes

   - **1.4 PROCEDURES OF MANAGING MANUALS**
   - 1.4.1 Furnish one copy of the operation and maintenance manual to the design team, and another copy to the owner's side via the property management team.
   - 1.4.2 Duly demonstrate the contents of the manual during the turnover process. Coordinate a schedule for site walk-thru and maintenance demonstration.

   - **1.5 MANUAL CONTENT**
   - 1.5.1 MATERIAL AND FINISHES MAINTENANCE MANUAL
     - 1.5.1.1 Complete manufacturer name
     - 1.5.1.2 Manufacturer's address and contact details
     - 1.5.1.3 Manufacturer's catalog number
     - 1.5.1.4 Care and maintenance instructions
     - 1.5.1.5 Color and Texture code and swatch
     - 1.5.1.6 Re-ordering information
     - 1.5.1.7 Applicable standards
     - 1.5.1.8 Chemical composition
     - 1.5.1.9 Installation details
     - 1.5.1.10 Inspection procedures
     - 1.5.1.11 Maintenance information
     - 1.5.1.12 Repair procedures

   - 1.5.2 EQUIPMENT OPERATION AND MAINTENANCE MANUAL

     Include the following information in the manual:
     - 1.5.2.1 General system or equipment description including functions
     - 1.5.2.2 Start-up procedures
     - 1.5.2.3 Equipment or system break-in
     - 1.5.2.4 Routine and normal operating instructions
     - 1.5.2.5 Regulation and control procedures
     - 1.5.2.6 Instruction on stopping
     - 1.5.2.7 Shutdown and emergency instructions
     - 1.5.2.8 Required sequences for electric or electronic systems
     - 1.5.2.9 Special operating instructions
     - 1.5.2.10 Operating characteristics

     - 1.5.2.11 Servicing schedule
     - 1.5.2.12 Control diagrams
     - 1.5.2.13 Circuit Directories
     - 1.5.2.14 Valve tag diagrams
     - 1.5.2.15 Printed operating and maintenance instructions
     - 1.5.2.16 Maintenance Assembly drawings and diagrams
     - 1.5.2.17 List recommended spare parts that should be stocked
     - 1.5.2.18 Limiting conditions
     - 1.5.2.19 Performance curves
     - 1.5.2.20 Engineering data and tests
     - 1.5.2.21 Complete nomenclature and number of replacement parts
     - 1.5.2.22 Design factors and assumptions
     - 1.5.2.23 Copies of applicable shop drawings and product data
     - 1.5.2.24 System and equipment manufacturer
     - 1.5.2.25 Equipment model number
     - 1.5.2.26 Equipment serial number
     - 1.5.2.27 Operating Instructions
     - 1.5.2.28 Emergency Instructions
     - 1.5.2.29 Wiring diagrams
     - 1.5.2.30 Safety diagrams
     - 1.5.2.31 Inspection and test procedures
     - 1.5.2.32 Maintenance procedures and schedules
     - 1.5.2.33 Precautions against improper use and maintenance
     - 1.5.2.34 Copies of warranties
     - 1.5.2.35 Repair instructions and spare parts listing
     - 1.5.2.36 Routine operations
     - 1.5.2.37 Trouble-shooting guide
     - 1.5.2.38 Disassembly, repair and re-assembly instructions
     - 1.5.2.39 Alignment, adjusting and checking instructions
     - 1.5.2.40 Supply sources of required maintenance materials and related services
     - 1.5.2.41 Index

2. **PART 2 PRODUCTS**
   - **2.1 TAGS**

     Label equipment with proper tags such that it can be properly referred to on the manual.

3. **PART 3 EXECUTION**

   (NOT APPLICABLE)

END OF SECTION

01 00 00	DIVISION 1 GENERAL REQUIREMENTS	
01 17 70	Closeout Procedures	1 of 3

1. **PART 1 GENERAL**
   - **1.1 RELATED DOCUMENTS**
     - 1.1.1 Technical Drawings
     - 1.1.2 Specifications
   - **1.2 SUMMARY**
     This section includes administrative and procedural requirements for closeout proceedings. Warranties and inspection procedures are included.
   - **1.3 PARTIAL OCCUPANCIES**
     Partial occupancies will be managed following final closeout procedures. Include documents delineating and demarcating the portion that is ready for turnover, i.e. highlighted and demarcated floor plans and a complete listing of equipment systems for final turnover.
   - **1.4 PROCEDURES FOR INSPECTION**
     - 1.4.1 Submit a written request for inspection for substantial completion to the owner side.
     - 1.4.2 Deploy an inspection team composed of duly represented owner sides, designer sides, and builder's side for joint inspection.
     - 1.4.3 On the owner's side, prepare a list of items for re-inspection. A copy of the list must be furnished to the owner and the contractors for reference.
     - 1.4.4 Schedule a time for re-inspection of all items not accepted. Correct all punch-listed items until substantial turnover.
   - **1.5 PROCEDURES FOR RE-INSPECTION**
     - 1.5.1 Request for re-inspection when the work identified in previous inspections are completed and corrected.
     - 1.5.2 Prepare punch lists specific to the item of work for closeout. Indicate a remarks column for marking whether items are accepted or for revision. Indicate causes of revision.
     - 1.5.3 Close and resolve all punch lists by the third round of inspection.
     - 1.5.4 Proceed with Final Completion when all punch lists are accepted.
   - **1.6 PROCEDURES AND DOCUMENTS TO ACCOMPLISH PRIOR TO FINAL INSPECTION OF COMPLETION OF WORK**
     - 1.6.1 Advise owner on warranty periods, workmanship bonds, maintenance service agreements, final certifications, and similar documents. Furnish a copy of warranties, certificates and similar documents to the owner.
     - 1.6.2 **Obtain all release permits that allow the owners unrestricted access and use of the services, utilities, and other features of the building. Include occupancy permits, operating certificates, and similar documents. Facilitate proper turn over and document release to the client.**
     - 1.6.3 Prepare and submit project record documents, operation and maintenance manuals, final completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
     - 1.6.4 Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
     - 1.6.5 Deliver labeled keys and permanent locks to the owner. Demonstrate to the owner's personnel in charge of security the due location of all locks and instruct accordingly.
     - 1.6.6 Startup and test all equipment systems.
     - 1.6.7 Submit test/adjust/balance records.
     - 1.6.8 Remove and demolish temporary facilities, mock-ups, construction tools, scaffolds, and similar items from the project site.
     - 1.6.9 Complete all final cleaning and restoration requirements, including painting touch ups and repairs of damaged or exposed finishes
     - 1.6.10 Submit a final application for payment.
     - 1.6.11 Submit a copy of all punch listed items with remarks as completed, corrected, and accepted, duly certified by the architect or the technical working group. Clearly indicate in the punch list that all identified works are inspected, corrected, completed, and accepted.
     - 1.6.12 Submit evidence of final, continuing insurance coverage complying with insurance requirements.
     - 1.6.13 Submit pest-control final inspection report and warranty.
   - **1.7 PUNCH LIST CONTENT**

- 1.7.1 Prepare three copies of the punch list, one copy must be furnished to the designers, one copy for the owner's representative, and one copy for the builders.
- 1.7.2 Organize spaces for inspection in sequential order, according to the route that will be taken on site.
- 1.7.3 Organize items applying to each space by major element and by category:
  - 1.7.3.1 Ceiling
  - 1.7.3.2 Individual Walls
  - 1.7.3.3 Floors
  - 1.7.3.4 Equipment
  - 1.7.3.5 Building Systems
- 1.7.4 Include the following information inside the punch list:
  - 1.7.4.1 Project name
  - 1.7.4.2 Date of inspection schedule
  - 1.7.4.3 Date of re-inspection
  - 1.7.4.4 Page number
  - 1.7.4.5 Signature of Contractor
  - 1.7.4.6 Signature of Architect

1.8 WARRRANTIES

Organize warranty documents into an orderly sequence based on the table of contents of the project manual.

- 1.8.1 Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents.
- 1.8.2 Provide heavy paper dividers with plastic covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number If installer.
- 1.8.3 Identify each binder on the font and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

2. **PART 2 PRODUCTS**
   Use appropriate cleaning agents as recommended by particular manufacturers. See the final cleanout section of this division for detailed procedures.

3. **PART 3 EXECUTION**
   - **3.1 PEST CONTROL**
     Inspect that the project site is free of rodents, insects, and other pests. Submit a certification duly issued, signed and certified by an experienced and licensed exterminator.

END OF SECTION

01 00 00	DIVISION 1 GENERAL REQUIREMENTS	
01 26 63	Requests for Interpretation	1 of 2

1. **PART 1 GENERAL**
   - **1.1 RELATED DOCUMENTS**
   - 1.1.1Technical Drawings
   - 1.1.2Specifications
   - 1.1.3Clarification Form (See ANNEXES for Official Copy of Form)
   - 1.1.4Record Clarification Notices (See ANNEXES for Official Copy of Form)

   - **1.2 SUMMARY**
     This section specifies administrative and procedural requirements in the event of clarifications, assistances required in plan interpretation, and other similar information required from the technical and design team to assure maximum accuracy in construction. The contractor is obliged to thoroughly review all contract documents, especially technical drawings prior to the commencement of construction.

   - **1.3 PROCEDURE**
     This section specifies administrative and procedural requirements in the event of clarifications, assistances required in plan interpretation, and other similar information required from the technical and design team to assure maximum accuracy in construction. The contractor is obliged to thoroughly review all contract documents, especially technical prior to the commencement of construction.

   - 1.3.1Submit clarification forms upon issuance of notice to proceed.
   - 1.3.2Submit all queries to the official email accounts of the IPFDU (see upper right corner of this page for email address), complete with attachments, i.e. annotated copies of the architectural technical working drawings and/or specifications highlighted in relation to the clarification/query and other attachments deemed necessary by the bidder i.e. sample brochures, etc.
   - 1.3.3Submit equivalent hardcopies of emailed accomplished clarification forms within two days after sending the email. No hardcopies submitted, no official responses will be issued.
   - 1.3.4The IPFDU will only be accountable to changes that are issued with official approvals issued by the IPFDU.

   - **1.4 RECORD CLARIFICATION NOTICES**
     Record all clarification issuances via a roster of issued clarification notices. Include dates of issuance, status of response, and date responded in the records.

2. **PART 2 PRODUCTS**
   Refer to product approval procedures. Clarification forms are reserved for technical working drawings and specification queries only. All product approvals must be processed accordingly. Refer to the procedure on section 01 25 13 of this division.

3. **PART 3 EXECUTION**
   Execution approvals are separate from clarifications and queries. Refer to the procedure on execution approval in section 01 25 16 of this division.

END OF SECTION

01 00 00	DIVISION 1 GENERAL REQUIREMENTS	
01 26 46	Construction Change Directives	1 of 2
01 26 57	Change Order Requests	1 of 2
01 26 63	Change Orders	1 of 2

1. **PART 1 GENERAL**
   - **1.1 RELATED DOCUMENTS**
   - 1.1.1Technical Drawings
   - 1.1.2Specifications

   - **1.2 SUMMARY**
     This section specifies administrative and procedural requirements in the event of modifications on construction directives, such as modifications on the technical drawings, specifications, the adjustment of the agreed scope of work, etc., that shall result to change order requests and change orders. The contractor cannot amend the agreed scope of work unless a change order has been issued by the technical team of the IPFDU.

     The following section includes generic procedural advice for Construction Change Directives, Change Orders, Change Order Requests, and general management of material specifications. Note that material-specific procedural advice is indicated in each material division. **All amendments should be in pursuant to RA 9184 otherwise known as the Government Procurement Act of 2016.**

   - **1.3 MINOR CHANGES IN WORK**
     Minor changes in work are work classified as without cost-impact and can therefore be implemented once a written approval from the IPFDU is secured. This includes resulting advice from Requests for Interpretation, Approved Product Substitution, and approved Execution Substitution. The contractor is obliged to properly indicate product substitutions and execution substitutions submitted and as such mark the attached Approval forms to as "Without Cost Impact".

2. **PART 2 PRODUCTS**
   The designers shall prescribe the performance specification of all materials and finishes on the technical working drawings. The execution of each shall be indicated through this specification or by the prescribed installation manuals and brochures of the approved material. The contractor is obliged to install the material consistent with requirements stipulated on the plans and on this specification. Any material replacement or substitutions shall be approved by the IPFDU. If with cost impacts, such replacements shall incur change orders which shall be reviewed and approved by the procuring entity upon the recommendation of the IPFDU prior to implementation. No changes with significant cost impacts shall be implemented with the approval of the procuring entity.

3. **PART 3 EXECUTION**
   - **3.1 CHANGE ORDER PROCEDURES**
   - 3.1.1The owner/ procuring entity will issue via a written request, official changes that are to be implemented on the project.
   - 3.1.2No amendments to the original contract work shall commence on the project site without official approvals and orders by the procuring entity.
   - 3.1.3Amendments that are not aligned with the guidelines of RA9184 are not acceptable.
   - 3.1.4The contractor, owner, and designers are to maintain detailed records of all construction change directives.

END OF SECTION

DIVISION 02
SITEWORKS

02 00 00	DIVISION 2 SITEWORKS	
02 36 1	Termite Control	1 of 3

1. **PART 1 GENERAL**
   - **1.1 RELATED DOCUMENTS**
     - 1.1.1 Technical Drawings
     - 1.1.2 Specifications
     - 1.1.3 Product Brochures
     - 1.1.4 Work and Methodology Submittals
     - 1.1.5 Structural Engineering Specifications for Excavation Work (By Structural Designer)
   - **1.2 SUMMARY**
     This section includes provisions on termite management systems to be employed on the project site.
   - **1.3 GENERAL PROVISION**
     Include external and internal termite control, namely soil treatment for all elements of the project that are in contact with the ground such as foundations and slabs on ground. Termite control systems employed should be installed such that replenishment/re-treatment systems will not incur any damages/demolition work on the project site throughout the duration of the construction. Chemical Barrier systems are acceptable.
   - **1.4 MAINTENANCE**
     Contracted manufacturers are to advise the proper maintenance procedures of termite control systems, including advised schedules of maintenance, allowable product substitutions if any, proper work methodology. Include provisions on continuous service including monitoring, inspection, re-treatment, and troubleshooting procedures for occurrence of termite activity within the five (5) year warranty and a separate contract options for continuing services after the expiration of the warranty.
   - **1.5 SUBMITTALS**
     Attach the following information to a duly accomplished Product Approval Form and/or Execution Approval Form.

     1.5.1 PRODUCT APPROVAL ATTACHMENTS
     The contractor is to facilitate the Product Approval request, regardless of whether the termite control work is subcontracted. Whether subcontracted or applied by the Contractor, submit the following documents"
     - 1.5.1.1 Technical data including a list of termiticide products to be administered on site, including the Food and Drug Administration-registered (FDA-registered) labels of all products.
     - 1.5.1.2 Include and emphasize the approximated number of years of effectivity of the termiticide system.
     - 1.5.1.3 Include lists of completed projects by manufacturer/installer/applicator. The list of projects should include the name of the project, the address, the architects, owners, and builders of previous projects indicated in the list.
     - 1.5.1.4 A copy of the official accreditation of termiticide manufacturer, if any.
     - 1.5.1.5 A copy of the license and registration of the termiticide operator's registration from the Food and Drugs Administration.

     1.5.2 EXECUTION APPROVAL ATTACHMENTS
     - 1.5.2.1 Work Methodology indicating the following information:
     - 1.5.2.1.1 Date and time of application
     - 1.5.2.1.2 Moisture content of soil before application
     - 1.5.2.1.3 Brand name and manufacturer of termiticide
     - 1.5.2.1.4 Quantity of Undiluted termiticide used.
     - 1.5.2.1.5 Dilutions, methods, volumes, and rates of application used.
     - 1.5.2.1.6 Areas of application
     - 1.5.2.1.7 Water source for application
     - 1.5.2.1.8 Application plan indicating the method or list of steps of how the treatment will be applied
   - **1.6 QUALITY ASSURANCE**

Only contract applicators with significant experience in the application of termite control systems. Application procedures can only be conducted in the presence of qualified installers and specialists, who are duly licenses according to pertinent regulations.

- **1.7 WARRANTIES**
  Submit an application warranty, signed and certified by the Pest Control Operator/ Applicator, and contractor that certifies that the termite control work administered on site will prevent infestation of subterranean termites for at least five (5) years. If termite activity occurs during the warranty period, re-treat the soil, repair and replace damages caused by termite activity or infestation.

2. **PART 2 PRODUCTS**
   - **2.1 PERFORMANCE REQUIREMENTS**
     - 2.1.1 Ensure that all termiticide systems applied on site are effective against infestation for at least five (5) years.
     - 2.1.2 Ensure that all termiticide systems are approved by the Food and Drug Administration
   - **2.2 TERMITICIDES FOR SOIL TREATMENT**
     - 2.2.1 Ensure the use of non-repellent FDA-registered termiticides that are compliant with all legal codes.
     - 2.2.2 Ensure the use of termiticides that are not harmful to vegetation.
     - 2.2.3 Ensure that the instructions of the FDA-Registered Label are affixed on all containers including the maximum quantity and rate of concentration allowed per use, as well as safety instructions.
     - 2.2.4 Chemical solutions should be classified as either Chemical Barrier Systems or Replenish/ Re-treatment systems.
   - **2.3 DELIVERY AND STORAGE**
     - 2.3.1 Ensure that the delivery of all termiticides to the project site are done in safe conditions.
     - 2.3.2 Ensure that all containers are properly sealed and labeled as supplied by the formulator of the chemicals. Check that all labels are complete and bear correct application instructions.
     - 2.3.3 Minimize the length of temporary storage of insecticides at the project site.
     - 2.3.4 Ensure that no chemical infests any potable waters stored or managed on site.
     - 2.3.5 Ensure that the storage of chemicals are safe and not hazardous to human health.

3. **PART 3 EXECUTION**
   - **3.1 JOB CONDITIONS**
     Do not apply soil treatment solutions until excavating, filling, and grading operations are completed unless otherwise specified by the manufacturer, with the approval of the Construction Manager. Do not apply soil treatment solutions to excessively wet soils or during inclement weather. Ensure that the application instructions of the manufacturer are duly followed.
   - **3.2 PREPARATION AND EXAMINATION OF APPLICATION AREA**
     - 3.2.1 Examine all areas for application and ensure that the moisture content of the area for application is of levels suitable to the optimum performance of termiticides. Check substrates, earthworks, landscaping, slab and foundation work, and other conditions that can impact the performance of the termite control system.
     - 3.2.2 Correct all conditions that are not suitable for application. Proceed with application of the termite control system only when all conditions that need correction have been implemented.
     - 3.2.3 Remove foreign matter and other surface materials that could decrease the effectiveness of the treatment.
     - 3.2.4 Loosen, rake, and level all the soil and earth subsurface that need to be treated except areas that require compaction for structural purposes of the project. Secure the approval of the construction manager before loosening soil that is near slabs, foundation, and footings, and other soil compacted for critical parts of the building.
     - 3.2.5 If there are wood forms present on site, check whether the wood forms can be exposed to termiticides.
     - 3.2.6 Ensure that the application of termiticides do not damage other wood elements available on the project site, unless the approval of the Construction Manager has been secured.
     - 3.2.7 Ensure that no vegetation or major trees that are part and critical to the design of the project are hazardously affected by the termiticides for application.
     - 3.2.8 Remove all wood and other termite-edible materials such as stakes, formworks and construction waste from soil around foundations.
     - 3.2.9 Check and comply all pertinent laws, local codes and ordinances pertinent to the jurisdiction of the project site and ensure that there are no violations.

3.3 APPLICATIONS

3.3.1 Consistently mix all termiticide solutions. Check the labels and prescribed methods of applications of the chemical to be utilized and ensure that it is duly followed.
3.3.2 Ensure that the chemical barrier applied between the building, its structural and other elements can protect the project from infestation of termite colonies.
3.3.3 Treat soil materials beneath ground-supported slabs, foundations, footings, etc., before concrete works are commenced.
3.3.4 Treat soil surfaces surrounding the perimeter of foundation walls, footings, ground-laid pipes and conduits, piers, other bases, i.e. porches, ground lobbies, , and other physical built elements inherent to the structure that have ground contact.
3.3.5 Avoid the washout and similar disturbances of soil surrounding treated surfaces. Upon the technical advice of the applicator, re-treat in case of washout.
3.3.6 Treat voids in masonry, as well as expansion joints, control joints, and other areas where slabs can be penetrated by termites.
3.3.7 Ensure that the termiticide solution is not diluted during application.
3.3.8 Post appropriate warning signs during application to ensure maximum surface.
3.3.9 Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

02 00 00	DIVISION 2 SITEWORKS	
02 75 1	Concrete Pavement	1 of 5

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Technical Drawings
1.1.2 Specifications
1.1.3 Structural Engineering Specifications for Excavation Work (By Structural Designer)
1.1.4 Tests and Laboratory work Results

1.2 SUMMARY

This section includes requisites and stipulations on concrete pavement work, namely curbs and gutters, pedestrian ramps, driveways, outdoor concrete stairs on the ground floor level, walkways and sidewalks, embossed pedestrian crossings, unit paver concrete floor base, exterior podiums, concrete stages, and other concrete paving elements consistent to the technical working drawings.

1.3 RELATED SECTIONS

1.3.1 Joint Sealants

1.4 GENERAL PROVISION

1.4.1 Ensure that all concrete mixes follow the specifications of structural designers and landscape architects.
1.4.2 Verify all indications on the technical working drawings and issue Requests for Clarification in case of conflicting indications.
1.4.3 Comply with all local codes and ordinances governing the project site if the local standards are more stringent with than indicated on drawings but do not implement any such standards without verifying with the architect. Secure an official advice from the Architect via a Request for Clarification prior to implementing any work that deviates from the technical working drawings.
1.4.4 Implement all landscape and concrete pavement work such that safe vehicular and pedestrian access is retained and maintained on site, as required for construction and other activities.
1.4.5 Always use form-release agents on formwork surfaces prior to concreting.
1.4.6 Maintain the quality of concrete surfaces as indicated and make sure that removal of forms do not tarnish, destroy, or impair the concrete surface.
1.4.7 Protect existing concrete pavement on site **ONLY if found suitable to the proposed design** as indicated in the technical working drawings. Unless indicated in the technical working drawings, do not demolish, damage, or destroy existing concrete pavements, especially pavements that are passable or subject to pedestrian and vehicular use. In case of damages on the existing concrete pavements due to construction work, the contractor is obliged to shoulder repairs of existing pavements. If existing concrete pavements are found in conflict with the design as indicated on the technical working drawings, submit a request for clarification.

1.5 MAINTENANCE

1.5.1 When portion of the pavement work has been completed, ensure that it is properly protected and secured that no pedestrian or vehicular access damages the completed work especially during the curing stages.
1.5.2 Until the work has not been accepted by the parties involved, maintain the pavement as clean as possible. Remove surface stains and material spillage. Regularly sweep the completed concrete pavement work such that it is free of dusts that can affect the quality of the surface material.

1.6 SUBMITTALS

1.6.1 PRODUCT APPROVAL ATTACHMENTS
1.6.1.1 Submit mix design for each mixed to be used.
1.6.1.2 Submit manufacturer's product data, particularly application and installation instructions for cement, additives, and other materials used.
1.6.1.3 For concrete pavement mixes, submit data showing the compressive strength, slump limit, and air content of the concrete. The contractor must certify this concrete mix as true and accurately applied on site.

1.6.1.4 For loose stone aggregates used as site decoration, submit actual samples of the aggregate sample attached to the Product Approval Form. Ensure that the product code and other unique identifiers of the sample are clearly indicated on the approval form.
1.6.1.5 Ensure that all horizontal and vertical exposed surfaces are smooth, continuous, and straight, unless otherwise indicated on the technical working drawings. Refer to the technical working drawings for other details.

1.6.2EXECUTION APPROVAL ATTACHMENTS
1.6.2.1 Detailed work methodology, indicating at least the following
1.6.2.1.1 Date and time of application
1.6.2.1.2 Area of application
1.6.2.1.3 Restoration procedures upon completion of work.

2. PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS (CONCRETE MIX)

Mix concrete using the standard Portland cement, aggregated, sand, and water combination and ensure that the compressive strength is 3000psi minimum at the 28th day of curing, unless otherwise stipulated by the structural designer. Ensure that the concrete slump limit is at 75mm or 3 inches and that the air content is at maximum 5% to 8%. Comply with requirements of Division 03 Section "Concrete Floor Topping" for details on concrete mix design, sampling and testing, and quality control.

2.2 PERFORMANCE REQUIREMENTS CONCRETE MATERIALS (PAVEMENT)

Follow as indicated in the structural consultant/designer plans. Ensure the following qualities of concrete, unless otherwise specified by the structural designer. In which case, the specifications of the structural designer prevails.

2.2.1Portland Cement: ASTM C 150, Type I; Furnish Grey cement
2.2.1.1 Normal Weight Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as indicated in Structural Consultant's Specifications.
2.2.2Ensure that fine Aggregates are free of materials with deleterious reactivity to alkali in cement.
2.2.3Ensure that the sizes, color and percentage of exposed decorative aggregates are as intended for the project. Refer to the technical working drawings for details.
2.2.4Use aggregate Mix Type 1B: 10mm size; percentage as intended for the project.
2.2.5Use aggregate Mix Type 1A: 3mm size; percentage as intended for the project.

2.3 PERFORMANCE REQUIREMENTS — STEEL REINFORCEMENTS

Ensure the following qualities of steel reinforcements, unless otherwise specified by the structural designer. In which case, the specifications of the structural designer shall prevail.
2.3.1Use Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
2.3.2Use Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.
2.3.3Use Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60, deformed.
2.3.4Use Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
2.3.5Use Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.
2.3.6Use Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed

2.4 PERFORMANCE REQUIREMENTS — CURING MATERIALS

2.4.1When using curing materials, use liquid-membrane forming and sealing curing compound. Comply with ASTM C 309, Type I, Class A and ensure that moisture loss is no more than 0.055 gr./sq.cm. When applied at 200 sq ft/gal., unless specified otherwise on the technical working drawings or by the structural designer.
2.4.2When using anti-spalling compound, use a combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.

2.5 PERFORMANCE REQUIREMENTS — EXPANSION JOINT MATERIALS

Refer to and comply with requirements of Division 07 Section "Joint Sealants".

2.6 PERFORMANCE REQUIREMENTS — FORMS

2.6.1Use standard form materials, i.e. plywood, metal, metal-framed plywood, phenolic boards, and other standard form materials available in the market.
2.6.2When curved surfaces are indicated on the technical working drawings, ensure the use of flexible forms or curves.
2.6.3All forms must be attached with a commercially formulated form-release agent that does not damage the resulting concrete surface.

3. PART 3 EXECUTION

3.1 SURFACE PREPERATION

3.1.1Compact sub-base surface and remove all loose material before concrete placement. Check any unstable areas and conduct additional compaction when needed.
3.1.2Commence paving works only when all compaction work has been corrected.

3.2 FORM CONSTRUCTION

3.2.1Check technical working drawings to determine accurate setting of forms as to required grades and lines.
3.2.2Check the alignment of the assembled formwork. Ensure that the displacement tolerance of the resulting concrete work is not more than 3mm for horizontal faces and not more than 6mm for vertical faces. Install secure braces on the formworks to ensure alignment.
3.2.3Ensure that forms are applied with the appropriate form-release agent prior to installation to make sure that separation from cured concrete will not incur any damages.
3.2.4Clean forms after each use.

3.3 REINFORCEMENT

3.3.1Refer to the drawing and specifications of the structural designer for the installation of reinforcements. For details in execution, check Division 03 sections of this specification.

3.4 CONCRETE PLACEMENT

3.4.1Comply with requirements of Division 03 sections for mixing and placing concrete.
3.4.2Check all line and grade of forms before concrete placement.
3.4.3If a dampened conditions are required at the time of concrete placement, ensure that the sub-base is properly moistened.
3.4.4Ensure that elevations and alignments of concrete manholes are accurate before placing concrete.
3.4.5Only use concrete placement methods that prevent segregation of the concrete mix.
3.4.6Use internal vibrator to consolidate concrete along face of forms and areas adjacent to transverse joints. Use square-faced shovels via hand spreading to consolidate concrete placed near joint assemblies, reinforcement, or side forms. Do not use a vibrator to consolidate concrete in these areas. Consolidate with care such that dislocation of reinforcing, dowels, and joint devices is avoided. In case of dislocation, make sure to correct the alignment prior to concrete setting.
3.4.7Make sure that a bonding agent is used at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
3.4.8Make sure that concrete placement in horizontal surfaces is as continuous as possible. If the interruption between concrete placements is more than thirty (30) minutes, use a construction joint.
3.4.9For pavement lanes adjacent to each other and placed separately, do not allow equipment to pass through the lane with previously poured concrete until the lane has cured enough to gain the concrete strength required to carry loads.

3.5 FABRICATED BAR MATS

3.5.1Ensure that fabricated bar mats are clean and free from excessive rust and dust.
3.5.2Check that bars are not distorted in a way that affects its strength or that it deviates away from the indications of the structural engineer.
3.5.3When arranging bar mats, follow the technical working drawings issued by the structural engineer.
3.5.4 Establish a minimum of 2-inch mat overlaps for adjacent maps.

3.5.5 When placing concrete on mats with a required finish surface, place the concrete in two batches. The first concrete placement batch should be up to beneath the finish surface level only. The second batch will be dedicated to the surface finish. Check the thickness of the surface finish according to technical working drawings. If not indicated, un-bonded toppings should be at least 70mm thick. A 50mm topping thickness is acceptable only if bonding agents are used. The time gap between the placements should not be more than 15minutes.

3.6 JOINTS

3.6.1 Construction joints must be installed where necessary such as at the end of concrete placements and in between concrete placements that have a huge time gap between placements. Install dowels for concrete placements designed to withstand heavy loads.

3.6.2 For weakened planes, use contraction joints or expansion joints such that there shall be no unnecessary breakage for the concrete.

3.6.3 Ensure that the layout of contraction joints are as square-shaped as possible. The length to width ratio of the square must never exceed 1 ½ to 1.

3.6.4 For expansion joints between concrete curbs and pavements, catch basins and manholes, inlets, structures, walks, and other objects, use a pre-molded filler to ensure the smooth plane of the abutments.

3.6.5 When using joint fillers, ensure that full width and depth of the joint is not less than 12.7mm or 25mm. The joint filler must be flushed with the finished concrete surface. Refer to Division 07 Section "Joint Sealants" for material and installation performance requirements of joint sealers.

3.6.6 Dry-cut joints are acceptable provided that it is positioned on the pavement within 1-4 hours after the completion of pouring and finishing.

3.6.7 Install isolation joints at the intersections of horizontal and vertical surfaces such as slabs and columns, walls and footings and where curbs or sidewalks meet other concrete structures.

3.7 CURBS AND GUTTERS

3.7.1 Refer to the site development plan details to identify the correct location and details of curbs.

3.7.2 Ensure that required cross-section, lines, grades, finish and jointing are as specified for the formed concrete.

3.7.3 In case of curb inlet manholes, refer to the technical working drawings in the Site Development and Drainage plan.

3.8 CONCRETE FINISHING

3.8.1 Smooth concrete finishes by screeding and floating. The use of mechanical floating device is preferred.

3.8.2 When the use of a mechanical floating and screeding device is not possible, ensure that hand power methods deliver consistent finishes, free from unwanted lumps.

3.8.3 For float finishes, ensure that floating works begin only when bleed-water sheen is no longer visually present on the concrete surface. Check that the concrete of the surface being finished is stiff. Refer to technical working drawings whether the indicated area is dedicated as float finish.

3.8.4 For burlap finishes, use damp burlap across float finished concrete. Ensure that the texture is uniformly installed.

3.8.5 For fine textured-broom finish, use a soft bristle broom across float-finished concrete surface.

3.8.6 For medium to coarse texture broom finish, use a soft bristle broom to etch 1.6mm to 3mm deep marks on the concrete surface.

3.8.7 Check all technical working drawings for the appropriate application areas of respective concrete finishes.

3.8.8 Check all planes and slope marks of the finishes.

3.8.9 When finishing, ensure that the slope marks as indicated in the technical working drawings are followed. Avoid surfaces that allow for water accumulation unless indicated in the technical working drawings.

3.8.10 Check that the texture of the final finish is approved. Submit a mock-sample of the concrete finish to the designers and secure an approval prior to completion of work. Indicate the area of application.

3.8.11 Use an edging tool to round-finish edges of slabs, gutters, back top edge of curb, and formed joints. Round up to 12.7, radius unless otherwise indicated on the technical working drawings.

3.8.12 Eliminate all excess moisture or surface sheen on the concrete

3.9 CURING

3.9.1 Do not allow any traffic on the concrete during first fourteen (14) days of curing.

3.9.2 Refer to Division 3 provisions of this specification for specific curing methods depending on area of application.

3.10 REPAIRS AND PROTECTION

Ensure that all finished concrete surfaces are properly protected until acceptance of work. In case of damages and any chipping, repair all chipped or damaged portions. Use a bonding agent when repairing damages to ensure proper adhesion to the original concrete surface.

Make sure that all concrete surfaces are washed clean and free of stains, discolorations, dirt and other foreign material.

END OF SECTION

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1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Technical Structural Drawings
1.1.2 Specifications
1.1.3 Shop Drawings — Setting Layout

1.2 SUMMARY

This section includes provisions and recommendations on cast-in-place and pre-cast concrete works with structural purposes, foundations, floors and slabs on grade, retaining wall foundations, light pole bases, thrust blocks, manhole bases, pits and vaults.

Control, expansion and contraction joint devices associated with concrete work not part of pavement work, including joint sealants, are also discussed in this section.

1.3 RELATED SECTIONS

1.3.1 Concrete Pavement
1.3.2 Concrete Finishes
1.3.3 Concrete Floor Topping
1.3.4 Final Cleaning

1.4 GENERAL PROVISION

1.4.1 Ensure that all concrete mixes follow the specifications of structural designers and architects.
1.4.2 Verify all indications on the technical working drawings and issue Requests for Clarification in case of conflicting indications.
1.4.3 Do not modify the appearance, strength, and durability of the concrete architectural elements without any approval issued by the architect of record and the structural designer of record. Submit a request for approval for any modifications proposed. Any modifications found on site without corresponding approvals are subject to re-work at the expense of the contactor.
1.4.4 Do not modify designs as indicated in the drawings. If modifications are necessary due to actual site conditions, submit shop drawings and annotate reasons for modification. Take care to highlight and explain the portion to be modified by indicating annotated technical drawing clouds.
1.4.5 Comply with all local codes and ordinances governing the project site. If the local standards are more stringent or conflicting with that indicated on drawings, submit a request for clarification and indicate the code or cause of conflict. Do not implement any such code standards without verifying with the architect.
1.4.6 Secure an official advice from the Architect via a Request for Clarification prior to implementing any work that deviates from the technical working drawings.
1.4.7 Implement all concrete casting work such that safe vehicular and pedestrian access is retained and maintained on site, as required for construction and other activities.
1.4.8 Always use form-release agents on formwork surfaces prior to concreting. Refer to the formworks portion of this section.

1.4.9 Contractor may request for design mix substitution to be approved by the structural designer. Refer to the Section 01225 13 Product Substitution Procedures of this specifications for product substitution procedures.
1.4.10 Never overlay fresh concrete on existing concrete found on site unless otherwise approved by the structural consultant. Refer to the execution portion of this section for instructions on batch-laid concrete casting. Ensure that the maximum strength of the concrete is attained. Submit concrete samples subject to laboratory test work. Refer to submittal attachments required for details.
1.4.11 For exposed concrete finishes with specialized texture and color, secure an approval of the final finish from the architect of record. Refer to Division 03 35 0 Concrete Finishes.

1.5 MAINTENANCE

1.5.1 Maintain the quality of poured concrete surfaces as indicated and make sure that removal of forms do not tarnish, destroy, or impair the concrete surface.
1.5.2 Keep the casted concrete free of discoloration, foreign substances, and other elements.
1.5.3 Keep pre-cast concrete delivered on site free of discoloration, foreign substances, and other elements. Refer to the delivery, storage, and handling portion of this Section for details.
1.5.4 In case of damages or surface alterations as a result of on-going construction work and other similar activities that modify the qualities of the concrete after pouring, ensure that the quality of the concrete surface is restored according to indications on the technical working drawings or by the approved shop drawings before final turnover.

1.6 SUBMITTALS

1.6.1 PRODUCT APPROVAL ATTACHMENTS
1.6.1.1 Submit manufacturer's product data, particularly application and installation instructions for cement, cementitious materials, additives, admixtures, bearing pads, and other materials used. Submit material certificates as signed or certified by manufacturers.
1.6.1.2 For concrete surfaces subject to weather exposure and surface water run-off, submit the manufacturer's data of the approved waterproofing material. Include manufacturer's application and installation instructions for waterproofing, particularly data on concrete surface finish and conditions as needed.
1.6.1.3 Submit mix design for each concrete mix to be used.
1.6.1.4 Submit a minimum of three properly labeled samples of each concrete mix delivered on site and for every mix approved by the designers.
1.6.1.5 Submit separate sample cylinders for every 115 cubic yards of concrete mix delivered.
1.6.1.6 Label all concrete cylinder submittals properly and submit laboratory test reports indicating the concrete mix performance for every 7th, 21st, and 28th day of curing. Laboratory test results should include:
1.6.1.6.1 Slump requirement
1.6.1.6.2 Air content requirement
1.6.1.6.3 Project number
1.6.1.6.4 Project name
1.6.1.6.5 Project location
1.6.1.6.6 Area of application (Indicate in drawings)
1.6.1.6.7 Sample date
1.6.1.6.8 Cure type
1.6.1.6.9 Actual slump according to test
1.6.1.6.10 Actual air content according to test
1.6.1.6.11 Unit Weight (Fresh)
1.6.1.6.12 For areas with exterior exposure, indicate water absorption test results.

1.6.2 EXECUTION APPROVAL ATTACHMENTS
1.6.2.1 Detailed work methodology, indicating at least the following
1.6.2.1.1 Date and time of application
1.6.2.1.2 Area of application
1.6.2.1.3 Restoration and cleaning procedures upon completion of work.
1.6.2.1.4 Shop drawings showing fabrication details, for items i.e. concrete railings, if any, wheel stoppers, and other similar architectural elements. Include plans, elevations, shapes and cross-sections in drawings. All drawings must be properly labeled, drawn to scale, and complete with dimensions. Include reinforcement details, locations, tolerances,

and dry joint treatments if casting is in multiple phases. If the architectural concrete will be accepting veneer, i.e. stone units, indicate relationship of architectural pre-cast concrete units to adjacent materials.

1.6.2.1.5 On shop drawings submitted with proposed modifications, clearly indicate modifications through drawing clouds.

1.7 QUALITY ASSURANCE

1.7.1 Comply with ACI 117-90 for Tolerances for Concrete Construction and Materials, unless otherwise indicated on drawings and specifications.

1.7.2 Unless, otherwise specified by the designer, comply with ACI 301 for specifications for Structural Concrete for Buildings.

1.7.3 Comply with field-testing requirements as specified in ACI 301.

1.7.4 Ensure that testing agencies for field tests of concrete samples as required shall be by an ACI Concrete Field Testing Technician Grade I certified in accordance with ACI CPI or equivalent. Ensure that testing agencies are independent and qualified according to ASTM C 1077 and ASTM E 329.

1.7.5 For pre-cast architectural concrete fabricated off site, ensure that the fabricator is experienced in producing architectural pre-cast concrete units similar to items specified in the project.

1.7.6 Measure the fresh concrete temperature at the point and time of discharge in accordance with ASTM C 1064/C1064M. Frequency of temperature determination shall be in accordance with ASTM C 94/C 94M and at the option of the inspector.

1.7.7 When working in hot weather, ensure that the temperature of freshly produced concrete at discharge will not exceed the maximum allowable concrete temperature as specified by structural designers or herein specified standards.

1.7.8 Reduce hot temperatures on site bay casting shade on aggregate stockpiles, sprinkling water on coarse aggregate stockpiles; using chilled water for concrete production; substituting chipped or shaved iced for portions of the mixing water; and cooling concrete materials using liquid nitrogen. Submit work methodologies on concrete cooling methods that will be used. Indicate the order of initiation in the case of multiple methods.

1.7.9 For pre-mixed concrete freshly delivered on site, ensure that deliveries are in accordance with ASTM C 94/C 94M. As such, discharge pre-mix fresh concrete within 1-1/2 hours or before the truck-mixer drum has revolved 300 revolutions, whichever comes first.

1.7.10 Conduct concrete placement and finishing operations as quickly as on-site conditions will allow.

1.7.11 In hot weather, control concrete surface bleed-water evaporation with application of evaporation reducers, plastic sheeting fog spray, or wind breaks. Use materials and method in accordance with ACI 308.1

1.7.12 Cure concrete in accordance with ACI 308.1. Maintain curing conditions until specified levels of durability in the concrete have been achieved. Apply ACI 308R "Standard Practice for Curing Concrete", unless otherwise specified.

1.7.13 The Contractor is required to provide impermeable, watertight concrete and joints in structures and divider walls designed to hold water or other solution.

1.7.14 Repair honeycomb, cracks and such imperfections developed in casted concrete at the Contractor's expense until such is approved. Concrete work or joints with imperfections that cannot be successfully repaired are subject to rework at the contractor's expense.

1.7.15 Test concrete surfaces exposed to surface water run-off by filling each basin, tank, or compartment with water to within one 300mm of the top of the structure. If the water level in the basin, tank or compartment being tested falls more than 25mm in 24 hours, determine and repair the cause of leakage until water tightness is achieved.

1.7.16 All repair work required as a result of the tests for water-tightness shall be the Contractor's expense.

1.8 PERFORMANCE REQUIREMENTS

1.8.1 FIRE PERFORMANCE RATING

1.8.1.1 Comply with 1 hour fire resistance rating for party walls and corridor walls.

1.8.1.2 Comply with 2 hour fire resistance rating for fire-barrier walls, particularly vertical fire exits and shafts.

1.8.1.3 Comply with requirements of the governing Fire Code of the Philippines (RA 9514) and the Philippine Building Code (PD 1096).

1.8.2 STRUCTURAL PERFORMANCE

1.8.2.1 Ensure compliance of load requirements for dead load, live loads, seismic loads, and other applicable loads as computed and designed by the Structural consultant and designers.

1.8.2.2 Provide positive anchorage for pre-cast, pre-fabricated architectural concrete attached to the building. Anchorage details must be properly evaluated and approved by qualified professionals and structural designers.

1.8.2.3 Ensure compressive strength of 7.0 to 10.5Mpa unless otherwise stated in specifications by structural designers.

1.8.2.4 Check concrete weight at 185.53 to 307.59 kg/sqm unless otherwise specified or approved by structural designers.

1.8.3 TERMITE RESISTANCE

Ensure that concrete walls are free of cracks, such that termite entry is prevented.

1.8.4 MOLD RESISTANCE RATING

Ensure that all concrete elements and walls are properly treated such that walls are free of food sources that encourage mold growth.

1.8.5 SOUND PERFORMANCE RATING

If possible, attain 51 to 62 Sound Transmission Class (STC) in decibels (dB).

1.8.6 ZOCALO

Provide 100mm high reinforced concrete upstand zocalo at floor level for all toilet and kitchen applications, and where indicated by the architect. Provide proper anchorage and ensure waterproofing requirements. Refer to Division 7 Thermal and Moisture Protection.

1.8.7 VISUAL APPEARANCE OF CONCRETE WALLS

All finished concrete surfaces should be consistent in appearance unless otherwise indicated in the technical working drawings.

1.9 DELIVERY AND STORAGE

1.9.1 Store all raw materials, equipment, and accessories for cast-in-place concrete in an organized manner such that it doesn't obstruct any on-going construction works.

1.9.2 Allocate proper spaces in anticipation of pre-mixed concrete delivery trucks. Time the delivery so as not to obstruct other on-going construction works, and day-to-day activities within the project site vicinity.

1.9.3 Store pre-cast concrete units properly to prevent contact with soil, staining, cracking, distortion, warping, or other physical damage.

1.9.4 Organize stored pre-cast units so labels are clearly visible and items are easily identifiable. Avoid arrangement of pre-cast units that could cause cracking or damage.

1.9.5 Arrange on-time delivery of architectural precast concrete units in quantities and at times that does not disrupt agreed construction schedule.

1.9.6 During delivery, take care to protect pre-cast units during shipment on non-staining shock-absorbing material. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that could cause cracking or damage.

1.9.7 Lift, transport, and handle the transfer of units to the installation site properly such that items are kept free of deformities.

1.10 WARRANTIES

Ensure a Five (5) year warranty for all interior pre-cast concrete items and ten (10) years for exterior concrete specified under this section, for protection against water penetrations, air penetrations, sealant disengagement, falling-off of surface finish resulting to breakdown in weather-tightness and thermal resistance; failure on mold, termite and seismic resistance. Warranty count shall begin from date of substantial completion and project turnover.

2. PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 CEMENTITIOUS MATERIALS

2.1.1.1 Use Portland Cement: ASTM C 150, Type I or III, standard gray or white cement.

2.1.1.2 Do not use fly ash and gray silica fume for exposed exterior surface applications.

2.1.1.3 Limit use of fly ash to 20 to 40% replacement of Portland cement by weight; ground granulated blast-furnace slag to 15 to 25% of Portland cement by weight; and metakaolin and silica fume to 10% of Portland cement by weight.

2.1.1.4 When using fly ash, comply with ASTM C 618, Class C or F with maximum loss on ignition of 3%.

2.1.1.5 When using metakaolin, comply with ASTM C 618, Class N.

2.1.1.6 When using Silica Fume, comply with ASTM C 1240 with optional chemical and physical requirements.
2.1.1.7 When using coloring admixtures, comply with ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures. Use non-fading color admixture. Check stable temperature.
2.1.1.8 Ensure that chemical admixtures are certified by manufacturers as compliant and compatible with other admixtures. Components of admixtures cannot contain calcium chloride or more than 0.15% chloride ions or other salts by weight of admixture.
2.1.1.9 When using water-reducing admixture, comply with ASTM C 494/ C 494M, Type A.
2.1.1.10 When using, Retarding Admixture, comply with ASTM C 494/ C 494M, Type B.
2.1.1.11 When using, Water-Reducing and Retarding Admixture, comply with ASTM C 494/ C 494M, Type D.
2.1.1.12 When using, Water-Reducing and Accelerating Admixture, comply with ASTM C 494/ C 494M, Type E.
2.1.1.13 When using, High-Range, Water-Reducing Admixture, comply with ASTM C 494/ C 494M, Type F.
2.1.1.14 When using, High-Range, Water-Reducing and Retarding Admixture, comply with ASTM C 494/ C 494M, Type G.
2.1.1.15 When using plasticizing Admixture to increase plasticity of concrete, comply with ASTM C 1017/ C 1017M.

2.1.2AGGREGATES
2.1.2.1 Source aggregates from a uniform supplier or ensure that the quality of aggregates for use are consistent and in accordance with specifications.
2.1.2.2 Comply with PCI MNL 117, ASTM C 33, for normal weight coarse aggregates Class 5S requirements. Provide and stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
2.1.2.3 Check that selected coarse Aggregates are hard, durable; free of material that reacts with cement or causes staining; to match selected finish sample.
2.1.2.4 Check that selected fine Aggregates, natural, or manufactured sand are of a material compatible with coarse aggregate selected to match selected sample finish.
2.1.2.5 Check that backup concrete aggregates comply with ASTM C 33 or C 330.
2.1.2.6 Comply with PCI MNL 117, ASTM C 330, for light weight aggregates. Check that absorption less than 11%.

2.1.3WATER
Use potable water free from any deleterious materials affecting color stability, setting, durability or strength of concrete. Check that the resulting concrete will comply with ASTM C 1602/ C 1602M within chemical limits of PCI MNL 117.

2.1.4STEEL, PLATES, ANGLES, ANCHORS, AND EMBEDMENTS
2.1.4.1 When using Carbon-Steel Shapes and Plates, comply with ASTM A 36 / A 36M.
2.1.4.2 When using Carbon-Steel Headed Studs, comply with ASTM A 108, Grades 1010 through 1020, cold finished, AWS D1.1 / D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
2.1.4.3 When using Carbon-Steel Plate, comply with ASTM A 283 / A 283M.
2.1.4.4 When using Malleable Iron Castings, comply with ASTM A 47 / A 47M, Grade 32510 or 35028.
2.1.4.5 When using Carbon-Steel Castings, comply with ASTM A 27 / A 27M, Grade 60-30 (Grade 415-205).
2.1.4.6 When using High-Strength, Low-Alloy Structural Steel, comply with ASTM A 572 / A 572M.
2.1.4.7 When using Carbon-Steel Structural Tubing, comply with ASTM A 500, Grade B or C.
2.1.4.8 When using Wrought Carbon-Steel Bars, comply with ASTM A 675 / A 675M, Grade 65 (Grade 450).
2.1.4.9 When using Deformed-Steel Wire or Bar Anchors, comply with ASTM A 496 or ASTM A 706 / A 706M.
2.1.4.10 When using Carbon-Steel Bolts and Studs, comply with ASTM A 307, Grade A or C (ASTM F 568M, Property Class 4.6) carbon-steel, hex-head bolts and studs; carbon-steel nuts (ASTM A 563 / A 563M, Grade A); and flat, unhardened steel washers (ASTM F 844).
2.1.4.11 When using Studs, include stud stock and threaded bolts.
2.1.4.12 When using High-Strength Bolts and Nuts, comply with ASTM A 325 / A 325M or ASTM A 490 / A 490M, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel units, (ASTM A 563 / A 563M) and hardened carbon-steel washers (ASTM F 436 / F 436M). Use high-strength bolts for friction-type connections between steel members. Do not high strength bolts between steel and concrete to avoid concrete creep and crushing. As per ASTM A 490 / A 490M do not use galvanized bolts.
2.1.4.13 Non-galvanized steel items shall be of Shop-Primed Finish, except those surfaces to be embedded in concrete and as such shall comply according to requirements in Steel Structures Painting Council, Surface Preparation SSPC-SP3 and shop-apply lead-and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.

2.1.4.14 When using Zinc-Coated Finish for steel items in exterior walls and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123 / A 123M, after fabrication, ASTM A/ A 153M, or ASTM F 2329 as applicable or electro-deposition according to ASTM B 633, SC 3, Type 1 and 2 and F 1941 and F 1941M.
2.1.4.15 For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03% or to between 0.15 and 0.25% or limit sum of silicon content and 2.5 times phosphorous content to 0.09%.
2.1.4.16 Galvanizing Repair Paint: High zinc-dust-content paint with dry film containing not less than 94% zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20. Comply with manufacturer's requirements for surface preparation.

2.1.5CONCRETE MIX
2.1.5.1 READY-MIX CONCRETE
2.1.5.1.1 The Contractor is solely responsible for amount of water added and resulting strength of concrete. If concrete strength does not conform to 28 day compressive strength requirements, it shall be removed and replaced at no cost.
2.1.5.1.2 Comply with requirements of ASTM C94, with the following exceptions:
2.1.5.1.2.1 During hot or cold weather conditions affecting the compressive strength of the concrete upon the 28th day of curing, only add or remove water to the mix with the approval of the structural designers and engineers.
2.1.5.1.2.2 When air temperature is between 85o F and 90oF, reduce mixing and delivery time from 90 to 75 minutes.
2.1.5.1.2.3 When air temperature is above 90oF, reduce mixing and delivery time to 60 minutes.

2.1.5.2 DESIGN CONCRETE MIXES
2.1.5.2.1 Provide normal weight concrete with the following properties, as indicated on applicable details:
5,000 psi 28-day compressive strength. (Type II Cement).
4,000 psi 28-day compressive strength. (Type II Cement).
3,000 psi 28-day compressive strength. (Type II Cement).
2.1.5.2.2 For Slump Limits, proportion and design mixes to result in concrete slump at point of placement as follows:
Reinforced foundation systems and treatment tanks — Not less than 1 inch or more than 4 inches.
Concrete with high range water reducing admixtures — Not more than 8 inches.
Ramps and sloping surfaces — Not more than 4 inches.
Slabs and floors - Not less than 1 inch and not more than 3 inches.
Miscellaneous Concrete — Not less than 1 inch and not more than 4 inches.
2.1.5.2.3 The maximum permissible water-cement ratio will be as follows:
5,000 psi concrete — maximum water/cement = 0.40
4,000 psi concrete — maximum water/cement = 0.45
3,000 psi concrete — maximum water/cement = 0.50
2.1.5.2.4 The minimum cement content utilized for the concrete mix design shall be as follows:
5,000 psi concrete — 715 pounds per cubic yard.
4,000 psi concrete — 611 pounds per cubic yard.
3,000 psi concrete — 564 pounds per cubic yard.

2.1.6GROUT MATERIALS
2.1.6.1 When using sand-cement grout, use Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement.
2.1.6.2 When using non-metallic, non-shrink grout, use pre-mixed, packaged non-ferrous aggregate, noncorrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing admixtures, complying with ASTM C 1107, Grade A for dry-pack and Grades B and C for flowable grout and of a consistency suitable for application within a 30-minute working time.
2.1.6.3 When using Epoxy-Resin Grout, use two-component mineral-filled epoxy-resin complying with ASTM C 881/ C 881M to suit type, grade, and class requirements as specified.

2.1.7FORMWORK
2.1.7.1 Use standard form materials, i.e. plywood, metal, metal-framed plywood, phenolic boards, and other standard form materials available in the market.
2.1.7.2 When curved surfaces are indicated on the technical working drawings, ensure the use of flexible forms or curves.

2.1.7.3 All forms must be attached with a commercially formulated form-release agent that does not damage the resulting concrete surface.
2.1.7.4 Store formworks to minimize task hazards, i.e. tripping, unnecessary deformation and damages to formworks.
2.1.7.5 Provide appropriate bracing to formworks to avoid warping and other deformations detrimental to the quality of the resulting concrete surface.
2.1.7.6 Erect formworks systematically and progressively such that it is stable and safe.
2.1.7.7 Whether using traditional or modular formwork systems, comply with loadings and general principles of formwork erection according to ACI 347: Guide Formwork for Concrete.
2.1.7.8 Use formwork materials and equipment fit for the intended purpose and design of the concrete item being cast.
2.1.7.9 Unless otherwise specified by the structural engineer, follow a safety factor of 2.0 in the design and implementation of all formwork accessories, except formwork anchors supporting form weight, concrete pressures, wind loads, construction personnel live loads.
2.1.7.10 For formwork supporting form weight, concrete pressures, wind loads, personnel live loads, use Safety Factor 3.0.

3. PART 3 EXECUTION

3.1 MOCK-UPS

3.1.1 Construct full-sized mockups to verify selections approved via sample submittals.
3.1.2 Build mock-ups in the location and of the size indicated in the technical working drawings.
3.1.3 Notify architect in advance to secure mock-up approvals prior to implementation.
3.1.4 During construction, maintain mock-ups so as not to incur any damages during construction.
3.1.5 Demolish and remove mock-ups if found unacceptable, or if directed by written notice.

3.2 EXAMINATION AND PREPARATION OF WORK AREA

3.2.1 Verify that subsurface and field conditions are acceptable and ready to receive work. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
3.2.2 Verify requirements for concrete cover over reinforcement.
3.2.3 Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete. In case of inconsistencies in drawings, submit a request for clarification.
3.2.4 Do not place concrete against surfaces of absorbent materials that are dry.
3.2.5 Do not place concrete against surfaces that have free water.
3.2.6 Prepare all materials required for accepted evaporation control measures and have them available on site so that specified measures can be executed as needed. Initiate accepted evaporation control measures when concrete and air temperatures, relative humidity of the air, and the wind velocity have the capacity to evaporate water from a free water surface at a rate that is equal to or greater than 1000 sq.m per hour, unless otherwise specified.
3.2.7 Inspect and complete formworks, reinforcing steel, and items to be embedded or cast-in-place.
3.2.8 **Notify other trades to check slope, degrees, and positioning of conduits and other embedment, and secure approval from involved trades prior to casting.**
3.2.9 Install homogenous vapor barrier under interior slabs on grade. If using multiple sheets, lap joints should be minimum 150 mm and seal with watertight sealant applied between overlapping edges and ends.
3.2.10 In case of damaged vapor barriers during casting, repair remaining vapor barrier with 150 mm laps over damaged seal watertight.

3.3 PLACING CONCRETE

3.3.1 GENERAL PROVISIONS
3.3.1.1 Place concrete in accordance with ACI 301, ACI 304, ACI 305, ACI 306 and ACI 318.
3.3.1.2 Ensure approved reinforcement, inserts, embedded parts, and formed expansion and contraction joints are not disturbed during concrete placement.
3.3.1.3 Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken for each structural pour.

3.3.1.4 Place concrete continuously between predetermined expansion, control, and construction joints. Do not interrupt successive placement; do not permit cold joints to occur.

3.3.2 CONCRETE CAST IN FORMS
3.3.2.1 Deposit concrete into forms continuously or up to thickness levels and layers such that no concrete will be placed on concrete which has hardened to cause formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
3.3.2.2 Deposit concrete in forms in horizontal layers not deeper than 600mm. Avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
3.3.2.3 Use mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping, to consolidate placed concrete. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
3.3.2.4 Do not use vibrators to transport concrete inside forms.
3.3.2.5 Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of machine. Consolidate placed layers and at least 150mm into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

3.3.3 CONCRETE CAST IN SLABS
3.3.3.1 Deposit and consolidate concrete slabs in a continuous operation, within accepted standard limits of construction joints, until the placing of a panel or section is completed.
3.3.3.2 Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3.3.3.3 Bring slab surfaces to correct level with straightedge and strike off. Refer to correct levels and slope requirements as indicated in the technical working drawings. Double check and verify the surface finish requirements and finish the concrete surface accordingly such that it is ready to accept the finish as specified in the technical working drawings.
3.3.3.4 Use bull floats to smooth surface, free of humps or hollows.
3.3.3.5 Do not disturb slab surfaces prior to beginning finishing operations.

3.4 CONCRETE FINISHES

3.4.1 Request for an execution approval from designers to clarify concrete finish if not clearly indicated in the technical working drawings floor and wall finish plan. Include shop drawings showing plans, elevations, and sections, clarifying the final finish for all textures.
3.4.2 Upon removal of forms, maintain concrete surfaces in form-finish and refer to the technical working drawings Floor and Wall finish schedule, and Concrete Finishes section of this Division for surface finish specifications and appropriate area of application.
3.4.3 Repair and patch concrete surfaces defected due to formworks, i.e. tie patches and tie holes, and other defective portions, i.e. excessive honeycomb or damages on the concrete surface caused by embedded debris.
3.4.4 When working patches, utilize the appropriate concrete adhesive to ensure durable patchwork and comply with ACI 301, or until the work is approved and accepted.
3.4.5 Commence surface work within 24 hours of form removal. Moisten concrete surfaces and smoothen with an abrasive tool until a uniform color and texture is produced.
3.4.6 Un-exposed concrete finishes, i.e. areas for water cistern, may be maintained as form-finished, unless otherwise indicated in the technical working drawings. Repair areas affected by form-facing materials such as tie holes. Repair and patch defective areas so as to avoid detrimental water seepage. Use concrete adhesives in all patchworks.
3.4.7 For Horizontal surfaces, i.e. tops of walls, horizontal wall offsets and surfaces occurring adjacent to formed surfaces, verify form finish as indicated on the technical working drawings. Attach shop drawings to request for clarifications if not indicated.
3.4.8 On monolithic slab surfaces to receive membrane or elastic waterproofing, membrane or elastic roofing, verify instructions with manufacturer of the approved waterproofing material. Attach manufacturer's recommendations for concrete finish on the request for execution approval. Refer to waterproofing specifications

divisions for performance requirements of waterproofing membrane for approval. Submit waterproofing material approval prior to commencement of concrete casting for surfaces subject to waterproofing. Allot proper time schedules so as not to affect timely delivery of work.

3.4.9 After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven or manual floats. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units.

3.4.10 Check and level surface plane to a tolerance not exceeding 5mm in every 1meter, unless otherwise specified on the drawings and the Concrete Finish section of this Division. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. For horizontal surfaces with critical drainage slope requirements, i.e. slab on grade with drainage inlets, roof slabs with roof drainage, canopies, toilets and baths, slab work in exterior corridors, and other surfaces with exposure to wet weather, ensure precision in sloping such that surface water will run-off to the desired direction as indicated on the drawings.

3.4.11 For flooring and walls with specific finish plans, verify the wall and floor finish floor plans to check appropriate concrete finish as specified in the Concrete Finishes Section of this specifications and the technical working drawings.

3.5 SURFACE SEALING

Comply with Division 03 Section 03 35 0 Concrete Finishes.

3.6 PROTECTION OF WORK

Protect the concrete against thermal shrinkage cracking due to rapid drops in concrete temperature greater than 22 °C (40 °F) during the first 24 hours unless otherwise specified. Acceptable protection materials to prevent excessive temperature drops are insulating blankets, batt insulation with moisture-proof covering, layers of dry porous material such as straw, hay, or multiple layers of impervious paper meeting ASTM C 171. Do not apply protection materials until the concrete surface temperature has become steady or is beginning to decline.

3.7 CLEANING

3.7.1 Comply with Division 01 Section 01 17 10 Final Cleaning.

3.7.2 Clean all surfaces of precast concrete to be exposed to view, as necessary, prior to installation.

3.7.3 Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.

3.7.4 Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, dirt, stains and other markings.

3.7.5 Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect adjacent work from staining or damage due to cleaning operations.

3.7.6 Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

3.8 JOINT SEALING

3.8.1 Joint sealing between pre-cast concrete and concrete cast-in-place. Separate slabs on grade from vertical surfaces with isolation joint material. Place joint filler in floor slab pattern. Set top to required elevations. Secure to resist movement by wet concrete. Extend joint filler from bottom of slab to within ¼ inch of finished slab surface. Install joint devices in accordance with manufacturer's instructions. Install joint device anchors. Maintain correct position to allow joint cover to be flush with finished surfaces. Install joint covers in longest practical length, when adjacent construction activity is complete.

END OF SECTION

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Technical Architectural Drawings

1.1.2 Specifications

1.1.3 Schedule of Finishes

1.1.4 Shop Drawings — Tile Layout

1.2 SUMMARY

Refer to this section parallel to the schedule of floor and wall finishes as indicated in the technical working drawings. This section includes concrete finish provisions in preparation of the final finished surfaces of the project.

1.3 RELATED SECTIONS

1.3.1 Concrete Pavement

1.3.2 Concrete Floor Topping

1.3.3 Thermal and Moisture Protection

1.4 GENERAL PROVISION

1.4.1 Perform patching, when permitted, in compliance with applicable provisions of the Structural Specifications.

1.4.2 Ensure that concrete surface conditions are appropriate and compliant to the requirements of the material for final application on the indicated surface area. Check the Wall and Floor Finishes on the architectural working drawings to identify areas of coverage. Submit Requests for Clarifications in case of queries.

1.4.3 On areas requiring specific concrete finishes to accommodate the final finishing material such as homogenous tiles, pavements, and the like, comply with the concrete surface condition requirements by the manufacturer of the approved finish material. Refer to the manufacturer's printed instructions.

1.4.4 Allow concrete to cure not less than seventy-two (72) hours before commencing surface finish work, unless otherwise acceptable to the Architect or as prescribed by the manufacturer of the final finishing material.

1.4.5 Provide the following concrete finishes appropriate to the requirements of the Schedule of Finishes and Materials:

1.4.5.1 Troweled

1.4.5.2 Floated

1.4.5.3 Brushed

1.4.5.4 Broomed.

1.4.5.5 Fair-faced finish (Rubbed).

1.4.5.6 Straight to finish structural slab and power floated.

1.4.5.7 Smooth form finish

1.4.5.8 Sand Washed Finish

1.4.5.9 Other finishes necessary in conjunction with the required floor finishes.

1.5 FINISHES

Unless otherwise specified in the technical working drawings, take note of the following:

1.5.1 STRUCTURAL SLAB: Steel trowel or power float to give a smooth untextured/textured finish. Provide where required in Schedules to receive hardener/dust proofer, retarder, and other scheduled floor finishes were directed by the Architect as requiring smooth untextured/textured finish. Trowel to Class A tolerance. Moist cure only.

1.5.2 SLABS TO RECEIVE HOMOGENOUS TILES: For slabs to receive thickset homogenous and ceramic tiles, stone flooring and other scheduled flooring finishes requiring lightly roughened textured finish for substrate preparation, provide a roughened texture. Use stiff brush. Trowel to Class A Tolerance. Striate uniformly with fine-haired broom.

1.5.3 SLABS TO RECEIVE WATERPROOFING AND CONCRETE TOPPING: For slabs to receive thin-set homogenous tiles, ceramic tiles, and stone flooring, ensure fins are removed and all honeycombs and voids are repaired. Comply with manufacturer's requirements. Provide even textured finish unless otherwise specified by the manufacturer. Refer to Division 07 Thermal and Moisture Protection.

1.5.4 SLABS TO RECEIVE RESILIENT WOOD FLOORINGS: For slabs to receive laminate wood flooring, vinyl coverings including vinyl tiles, sports floor coverings, and epoxy flooring, use steel trowel to give smooth untextured finish.

1.5.5 SLABS TO RECEIVE THICK-SET STONE PAVING: For concrete slabs to receive pre-cast concrete pavers for vehicular ramps, natural stone paving, use heavy-broomed concrete finish as substrate preparation.

1.6 SUBMITTALS

1.6.1PRODUCT APPROVAL ATTACHMENTS

1.6.1.1 300mm x 300mm sample work for each type of required concrete finish for the color and texture review of the architect.

1.6.1.2 Where used, submit grout samples, complete with manufacturer's data indicating grout color, brand, and other codes of identification.

1.6.2EXECUTION APPROVAL ATTACHMENTS

Detailed work and methodology indicating:

1.6.2.1 Date and time of finishing

1.6.2.2 Area of finish application

1.6.2.3 Restoration and cleaning procedures upon completion of work.

1.6.2.4 Shop drawings indicating area of location.

1.7 QUALITY ASSURANCE

Establish a mock-up surface at least 1000mm x 1000mm to 3000mm X 3000mm, complete with joint and edge termination details if any for the approval of the architect.

2. PART 2 PRODUCTS

2.1 PREMIXED PRE-PACKAGED CEMENTITIOUS GROUT

Request for color approval from the architect. Do not apply grout materials that are not compatible with the finish material as indicated in the schedule of finishes. If used for patching and resurfacing damaged concrete surfaces, use one-component, polymer-modified, shrinkage-compensated renovation mortar.

2.2 EPOXY BONDING AGENT

Unless otherwise approved by structural designer, use two-component solids liquid epoxy bonding adhesive for warm environments.

2.3 CEMENT

Comply with ASTM C150, Type to match original concrete surface.

2.4 AGGREGATE

ASTM C33, one hundred percent (100%) passing the No. 30 mesh sieve.

2.5 BOND COAT MORTAR

Use mortar of the same material as the bond patching mortar and of approximately the same proportions as used for the concrete, excluding coarse aggregates. Mortar ratio shall be (1) part cement to not more than one (1) part sand by damp loose volume.

2.6 PATCHING MORTAR

Use patching mixture of the same materials and of approximately the same proportions as used for the concrete, excluding coarse aggregates. Mortar ratio shall consist of one (1) part cement to not more than two and one-half (2-1/2) parts sand by damp loose volume. White Portland cement may be substituted for a part of the gray Portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete. Implement a trial patch or mock-up prior to commencing work completely. as determined by a trial patch. Use appropriate amount of water needed for handling and placing. Mix patching mortar in advance and allow to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that shall permit placing.

2.7 WATER

Only clean potable water shall be used. Use a calibrated measuring device to measure the proper amount of water to be added to pre-packaged grouts and mortars.

3. PART 3 EXECUTION

3.1 PREPARATION

3.1.1 In repairing surface defects, measure all concrete surface temperatures, and if needed, cool surfaces down to facilitate maximum quality repair.

3.1.2 For honeycombs and other defects, remove down to sound concrete and chip if necessary. Ensure that no reinforcements will be compromised during the chipping process. Always use the appropriate solids-liquid bonding agents during the patching work. Refer to approved material by the structural designer.

3.1.3 Clean and dampen the chipped area for patching and dampen an additional 150mm surrounding it, unless otherwise specified by the manufacturer of the approved bonding agent. Comply with manufacturer's requirements.

3.1.4 Prepare bonding grout mixtures prior to patching.

3.2 CLEAN-UP AND PROTECTION

Clean up and remove concrete chips, dust and debris on all areas of work upon each day of application and upon completion. Prevent migration of airborne dust and debris by using windbreaks. Cooperate with other trades for protection of completed finishes.

3.3 PATCHWORK AND REPAIRS

3.3.1 FLATWORK SURFACES — GENERAL

3.3.1.1 Set bulkheads and screed strips to facilitate continuous concrete placement and to produce cross sections within tolerances specified. For cambered steel or concrete beams, place screed strips or other indicators along the beam centerline to maintain constant slab thickness. Float, trowel, broom, cure, seal and apply other surface treatments to the top of the structural slab or to the top of concrete fills as shown in the Contract Documents.

3.3.1.2 Power Float and Hand Float after water sheen has disappeared to push down aggregate, raise mortar, and level.

3.3.1.3 Power Trowel and Hand Trowel as soon as surface can be worked without cement paste clinging to the blades.

3.3.1.4 Non-Slip: Where non-slip is called for with any finish, embed particles at the rate of 1 kilogram per square meter with the final tooling.

3.3.1.5 Tolerances: 1.Class A: Level to within 3 millimeters in 3 meters (1/1000).

3.3.2 TIE HOLES

Fill tie holes and repair as patchwork unless otherwise specified in the drawings.

3.3.3 SMOOTH FORM FINISH

3.3.3.1 Arrange facing material in a symmetrical and orderly manner to reduce seams.

3.3.3.2 Ground smooth all surface texture defects caused by formworks, such as raised grain, torn surfaces, worn edges, patches,

3.3.3.3 Use patching mortar to fill air voids on formed surfaces.

3.3.4 FAIR-FACED CONCRETE FINISH (RUBBED)

3.3.4.1 Begin surface grinding, using power-driven, abrasive stone grinders, after wearing course has hardened sufficiently to prevent dislodgment of aggregate particles. Keep surfaces wet during grinding process. Remove ground-off material and flush with water.

3.3.4.2 Fill air holes, pits, and other blemishes with cement grout. Spread grout over surface and work into openings with a steel straight edge. Rub grout into surface by use of grinding machine. Keep surface moist an additional three (3) days before final grinding.

3.3.4.3 When surface is in proper condition, begin second or final grinding to remove grout film and polish surface. After final grinding and polishing, wash thoroughly and remove surplus material.

3.3.5Conduct grinding operations and use such techniques as required to provide surface finish to match Architect's samples.

END OF SECTION

03 00 00	DIVISION 3 CONCRETE	
03 35 2	Concrete Floor Topping	1 of 4

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Schedule of Finishes

1.2 SUMMARY

Refer to this section parallel to the schedule of floor and wall finishes as indicated in the technical working drawings.

1.3 RELATED SECTIONS

1.3.1Concrete Finishes
1.3.2Thermal and Moisture Protection

1.4 GENERAL PROVISION

1.4.1Ensure that all concrete mixes follow the specifications of structural designers and architects.
1.4.2Do not modify the appearance, strength, and durability of the concrete architectural elements without any approval issued by the architect of record and the structural designer of record. Submit a request for approval for any modifications proposed. Any modifications found on site without corresponding approvals are subject to re-work at the expense of the contactor.
1.4.3No concrete topping should be less than 50mm thick.

1.5 SUBMITTALS

As required by structural consultant.

1.5.1PRODUCT APPROVAL ATTACHMENTS
1.5.1.1 Submit manufacturer's product data, particularly application and installation instructions for cement, cementitious materials, additives, admixtures, bearing pads, and other materials used. Submit material certificates as signed or certified by manufacturers.
1.5.1.2 For concrete surfaces subject to weather exposure and surface water run-off, submit the manufacturer's data of the approved waterproofing material. Include manufacturer's application and installation instructions for waterproofing, particularly data on concrete surface finish and conditions as needed.
1.5.1.3 Submit mix design for each concrete mix to be used.

1.5.2EXECUTION APPROVAL ATTACHMENTS
1.5.2.1 Detailed work methodology, indicating at least the following
1.5.2.1.1 Date and time of application
1.5.2.1.2 Area of application
1.5.2.1.3 Restoration and cleaning procedures upon completion of work.

1.6 QUALITY ASSURANCE

Repair and replace areas of concrete topping that fail to bond with the substrate, produces a hollow sound when tapped, and disintegrates.

1.7 WARRANTIES

Contractor agrees to a two (2) year warranty to rectify work, which deteriorates excessively or otherwise fails to perform as required, due to failure of materials and or workmanship.

2. PART 2 PRODUCTS

2.1 CEMENT AND AGGREGATES

Use Portland Cement, ASTM c 150 Type I. Furnish grey cement. Combine with standard aggregate ASTM C 33. Fine aggregates using sand, crushed stone screenings should be clean, hard, and free from deleterious matter. Follow grades and sieves:

Fine aggregates:

9.53mm (3/8")	-	100 percent.
No. 4	-	95-100 percent.
No. 8	-	80-90 percent.
No. 16	-	50-75 percent.
No. 30	-	30-50 percent.
No. 50	-	10-20 percent.
No. 100	-	2-5 percent.

Coarse aggregates:

12.7mm (1/2")	-	100 percent.
9.525mm (3/8")	-	30-50 percent.
No. 4	-	0-15 percent.
No. 8	-	0-5 percent.

2.2 REINFORCEMENT

Use ASTM A 185, welded steel wire fabric for all concrete topping thicker than 50mm. Use WWF 4 x 4 — W1.4 x W1.4.

2.3 MISCELLANEOUS

2.3.1Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade" and "Class" to suit project requirements. Apply as per manufacturer's recommendation.

Concrete Hardener and Dust proofer must be colorless, odorless, non — toxic (contains no VOC as per U.S. Federal requirements), non-combustible, and non — flammable.

Depth of Wear, comply with ASTM C 779.
Abrasion resistance — Revolving disks 32.5% improvement at 30 minutes.
Surface Adhesion, comply with ASTM D3359
Compressive Strength, comply with ASTM C39
Rebound Number, comply with ASTM C805
Friction, comply with ASTM C-1028
Light Exposure Degradation, comply with ASTM G23
Depth of Wear, comply with DIN 52 108
Determination of Water Permeability, comply with DIN 1048 T.5

2.4 STANDARD TOPPING MIX

Ensure that compressive strength of topping material is at 3000psi.

3. PART 3 EXECUTION

3.1 MIXING

Use batch type mechanical mixer for mixing topping material at project site. Use only mixers which are capable of mixing aggregates, cement, and water into a uniform mix within specified time, and of discharging mix without segregation.

Mix each batch of 1.5 cubic meters (2 cu. yd.) or less for at least 1-1/2 minutes after ingredients are in mixer. Increase mixing time (15 seconds) for each additional cubic meter or fraction thereof.

3.2 CONDITION OF SURFACES

3.2.1 When topping hardened concrete, remove dirt, loose material, oil, grease, paint or other contaminants. Ensure that the surface is washed clean.

3.2.2 Roughen surface of base slabs that are not suitable for bonding performance by chipping or scarring before cleaning.

3.2.3 Before placing topping mixture, dampen slab surface. Do not leave standing water on the surface. Apply approved epoxy adhesive on dampened surface. Place topping mix while epoxy adhesive is not fully dry.

3.2.4 For reinforced toppings, maintain position of reinforcing mesh through necessary chairs or supports.

3.2.5 Consistently mark locations of joints in base slab and align with joints on the top course.

3.3 PLACING AND COMPACTING

Float Finish: Spread-topping mixture evenly over prepared base to the required elevation and strike-off. Use highway straightedge, bull float, or darby to level surface. After the topping has stiffened sufficiently to permit the operation, and water sheen has disappeared, float the surface at least twice to a uniform sandy texture. Re-straighten where necessary with highway straightedge. Uniformly slope surface to drains.

Where joints are required, construct to match and coincide with joints in base slab. Provide other joints as shown on drawings.

3.4 TROWEL FINISH

After floating, begin first trowel finish operation using power driven trowels. Continue troweling until surface is ready to receive final troweling. Begin final troweling when a ringing sound is produced as trowel is moved over surface. Continue final trowel operation to produce finished surface free of trowel marks, uniform in texture and appearance.

3.5 CURING AND PROTECTION

3.5.1 Protect freshly placed topping from premature drying and excessive cold or hot temperatures. Apply evaporation retarder to topping surfaces in hot, dry, or windy conditions before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying topping, but before float finishing.

3.5.2 Begin curing immediately after finishing topping. Cure by one or a combination of the following methods, according to topping manufacturer's written instructions:

3.5.2.1 Moisture Curing: Keep surfaces continuously moist for not less than seven days with water. Cover topping surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

3.5.2.2 Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 300mm (12 inches), and sealed by waterproof tape or adhesive. Cure for not less than seven (7) days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.5.2.3 Curing Compound: Apply uniformly in two coats in continuous operations by power spray or roller according to manufacturer's written instructions. Re-coat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

END OF SECTION

DIVISION 04
UNIT MASONRY ASSEMBLIES

04 00 00	MASONRY	
04 81 0	Unit Masonry Assemblies	

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Technical Architectural Drawings
1.1.2 Specifications
1.1.3 Requests for Interpretation
1.1.4 Product Samples and Brochures
1.1.5 Manufacturer's Data Sheets and Certificates
1.1.6 Material Safety Data Sheets
1.1.7 Work Program and Methodology Submittals

1.2 SUMMARY

This section includes Unit Masonry Assemblies as specified for fixed wall systems as indicated in the project, namely Reinforced Concrete Hollow Blocks for guard house, concrete fence and the Concrete Masonry Units as indicated in the plans

1.3 RELATED SECTIONS

1.3.1 Anchorage Devices
1.3.2 Joint Sealants

1.4 GENERAL PROVISION

1.4.1 Prior to complete installation of masonry work, build field mock-ups at least 1000sqmm in area for the approval of the architect.
1.4.2 Comply with ASTM C-90- Load Bearing Masonry Units.
1.4.3 Comply with ASTM C-129- Non- load Bearing Masonry Units.
1.4.4 Comply with ASTM C-140- Testing Concrete Masonry Units.
1.4.5 Comply with ASTM C-744-Specification for Pre-Faced Concrete and Calcium Silicate Masonry Units.
1.4.6 Comply with ASTM E-119- Fire Tests with Building Construction and Materials.
1.4.7 Provide special shapes where required for lintels, jambs, corners, sash, control joints, headers bonding, and other special conditions.
1.4.8 Comply with required face size and texture for the exposed face.
1.4.9 Hollow Load-Bearing Block ASTM C-90, normal weight (125 lbs. per cubic foot dry weight).
1.4.10 E. Solid Load-Bearing Block: ASTM C-90n normal weight (125 lbs. per cubic foot dry weight)

1.5 MAINTENANCE, DELIVERY AND STORAGE

1.5.1 Upon delivery on site, ensure that materials are stored in a dry area. Make sure that storage area is weather protected to avoid disintegration of masonry units.
1.5.2 Do not accept damaged or unsealed materials during delivery.
1.5.3 Store cementitious materials off the ground, under cover, and in a dry location.

1.6 SUBMITTALS

1.6.1 PRODUCT APPROVAL ATTACHMENTS

1.6.1.1 For prefaced concrete masonry units, submit product data for each type of masonry unit indicating inherent strength of the material in psi and the proportioning of cement, sand, gravel and other cementitious materials or additives as included in each unit. Indicate whether materials is load bearing or non-load-bearing.

1.6.1.2 Submit shop drawings showing prevailing dimensions and detailed sections of the material. Indicate mortar thickness, if any or if needed by the assembly.

1.6.1.3 For prefaced concrete masonry units, submit material samples showing final face of the material for the approval of the architect. Concurrently acquire finishing approval from the architect. Submit a raw-surfaced sample and another sample containing the finished face of the material.

1.6.2EXECUTION APPROVAL ATTACHMENTS
1.6.3Submit a detailed work methodology showing the time and date of application. Indicate steps and procedures to be followed down to the finishing stage of the material. Include instructions on jointing and mortar applications.

1.7 QUALITY ASSURANCE
1.7.1Source exposed masonry units from a single source and ensure uniform texture and color.
1.7.2Source mortar materials from a single supplier to ensure material compatibility.
1.7.3Ensure that masonry units are compliant to fire performance characteristics as require by the code. Employ material that has undergone testing compliance with ASTM E 119.
1.7.4Do not install masonry units with defects such as chipped corners, discoloration, and other such defects that affect the face and strength of the material. Dispose all defecting masonry units properly.
1.7.5Do not apply concentrated loads on the masonry assembly for at least 12 hours after erection.
1.7.6Prevent ground, mortar or soil from staining the face of masonry to be left exposed. Immediately remove ground or mortar in contact with the masonry and restore to original condition.
1.7.7Do not lay wet masonry units. When laying masonry units during inclement weather, ensure that the area of application is protected from bad weather by temporary rainwater protection such as tents and tarpaulin films.
1.7.8Do not lay masonry units with ground stains.

2. PART 2 PRODUCTS

2.1 MORTAR AND GROUT MATERIALS
2.1.1Portland Cement: ASTM C-150, Type I, except use Type III for construction below 40
2.1.2Degrees F. Provide natural color or white cement as required to produce required mortar color.
2.1.3Hydrated Lime: ASTM C-207, Type S.
2.1.4Aggregate for Mortar: ASTM C-144, except for joints less that 1/4 inch use aggregate graded with 100% passing the No. 16 sieve.
2.1.5Aggregate for Grout: ASTM C-404.
2.1.6Water: Clean and potable

2.2 CONCRETE HOLLOW BLOCKS
2.2.1Size: manufacturer's standard units, at least 200mm height, 100mm thick, and 400mm long or approved equivalent.
2.2.2Face: rough face for plastering
2.2.3Minimum compressive strength: 800psi for each CHB
2.2.4Reinforcements: laid in mortar in both horizontal and vertical spaces following specifications by structural engineer.

2.3 EXPOSED CONCRETE MASONRY UNITS
2.3.1Size: manufacturer's standard units, at least 600mm height, 75mm to 100mm thick, and 1200mm long or approved equivalent.
2.3.2Face: rough face for use as exposed surface
2.3.3Minimum compressive strength: 1000psi for each CHB or as certified by manufacturer.
2.3.4Solid load-bearing blocks shall comply with ASTM C-90n normal weight
2.3.5Hollow load-Bearing Block shall comply with ASTM C-90n normal weight.

2.4 JOINT REINFORCEMENT, TIES AND ANCHORS
2.4.1Where anchorage is needed to connect to structural framework, comply with specifications by structural designer. Complete all joint reinforcement, ties, and anchors as needed for the structural soundness of the assembly.
2.4.2Use galvanized metallic accessories appropriate to the load requirements of the assembly.



3. PART 3 EXECUTION

3.1 INSPECTION AND PREPARATION
3.1.1Verify plumb-ness and all tolerances of receiving surfaces. Ensure accuracy and compliance with technical working drawings. If conditions are not met, comply and restore.
3.1.2Verify proper size and location of masonry units to be installed.
3.1.3Establish lines, levels, and coursing. Protect lines from any type of disturbance.
3.1.4Remove laitance, loose aggregate, and other materials that prevents bonding between mortar and foundation.
3.1.5Ensure uniformity in bond patterns and concrete masonry placement.
3.1.6Comply with course heights as specified by manufacturer.

3.2 PLACEMENT OF UNITS
3.2.1Lay units with bed and head joints filled from the faces of the units to a distance in not less than the thickness of the face shell.
3.2.2Webs are fully mortared in all courses of piers, columns, pilasters, starting course on footings or foundations, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.
3.2.3Spread out full mortar bed including areas under cells, for starting course on footings where cells are not to be grouted.
3.2.4Vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with drawings.
3.2.5Keep cavity airspace and weep holes clean or mortar, clean out promptly if mortar falls into cavity airspace or plugs weep holes.
3.2.6In-Progress Cleaning: Remove excess mortar, dry brush exposed masonry prior to the end of each workday, protect wall from mud splatter and mortar droppings, set scaffolds and scaffold boars so that mortar is not deflected onto masonry.
3.2.7At end of each workday turn scaffold boards so that rainwater is not deflected onto masonry.
3.2.8Place Concrete Masonry Unit such that mortar does not run down the face of the wall or smear the masonry face.
3.2.9Adjustments: Do not shift or tap Concrete Masonry Unit after mortar has taken initial set, remove unit and mortar and replace. After joints are tooled, cut off mortar tailings with trowel and dry brush excess mortar burrs and dust from the face of the masonry, fully bond external and internal corners and properly anchor intersecting wall.
3.2.10 Termination of Wall Height: For the fire-rated walls, construct walls to finish against bottom of roof or floor deck and fill voids in fire stopping. For other than fire-rated walls, cut units to match the slope of the roof deck and finish construction to within 2-inches of a parallel to roof deck.
3.2.11 Isolate masonry partitions from vertical structural framing members with the control joint.

3.3 MORTAR AND GROUT MIXES
3.3.1Do not use calcium chloride in mortar or grout. Use only the specified additives to mortar and grout mixes.
3.3.2Mixing: Combine and thoroughly mix cementitious materials, water, aggregates and admixtures
3.3.3 in a mechanical batch mixer.
3.3.4Comply with applicable ASTM standards and material manufacturer's recommendations for mixing time and water content. Measure and batch materials by volume so that required proportions can be accurately controlled and maintained.
3.3.5Mortar for Unit Masonry: Comply with ASTM C-270, Proportion Specifications, Cement-Lime Mortar, for types of mortar required, unless otherwise indicated.
3.3.6Use Type N mortar for interior non-load bearing walls.
3.3.7Air Content: 8-14% Maximum.
3.3.8Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.
3.3.9Color: To be selected by Architect.
3.3.10 Limit cementitious materials in mortar to Portland cement-lime.
3.3.11 Grout for Unit Masonry: Comply with ASTM C-476. Use grout of consistency which at time of placement will completely fill all spaces intended to receive grout.
3.3.12 Place grout within 1-1/2 hours of introducing of mixing water and prior to initial set.
3.3.13 Prevent grout from flowing onto or otherwise staining faces of CMU intended to be exposed.
3.3.14 Confinement: Confine grout to the area indicated on the Drawings.
3.3.15 Grout Pour Height: Use fine or coarse grout in accordance with requirements in technical working drawings

3.3.16 Consolidate grout at the time of placement. Consolidate grout pours 300mm or less in height by mechanical vibration or puddling.

3.3.17 Consolidate grout pours exceeding 300mm in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

3.4 CONCRETE HOLLOW BLOCKS

3.4.1 **Apply architectural plaster as indicated on the technical working drawings**

3.5 CONCRETE MASONRY UNITS

3.5.1 **For prefaced masonry units, ensure that obtained masonry units are of a rough surface material.**

3.5.2 **Prepare masonry unit surfaces as indicated in the technical working drawings and as advised by the manufacturer. Do not apply chemicals on the material that are detrimental to original face and make of the material.**

3.6 CLEANING AND PROTECTION

3.6.1 Clean unit masonry as Work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.6.2 After mortar has set, reached initial curing; within 7 days of completion of work for custom masonry units, clean exposed masonry as follows:

3.6.2.1 Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

3.6.2.2 Cut out any defective mortar joints and holes and re-point with mortar.

3.6.3 Protect non-masonry surfaces from contact with cleaning solution by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

3.6.4 Clean Concrete Masonry Units with proprietary masonry cleaner. Thoroughly wet surface of masonry.

Scrub using non-metallic brushes. Immediately rinse with water. Do small sections at a time. Work from top to bottom. Do not use high pressure cleaning methods.

3.6.5 Cleaned surface shall appear as represented by mockup wall panel.

3.6.6 Maintain protective boards at exposed external corners that may be damaged by construction activities. Provide protection without damaging work.

3.6.7 Protect the base of walls from rain-splashed mud and mortar droppings.

END OF SECTION

05 00 00	DIVISION 5 METAL	
05 12 00	Structural Steel Framing (Refer to specifications by Structural Engineer)	

DIVISION 05
METALS

05 00 00	DIVISION 5 METAL	
05 50 0	Metal Fabrications	

1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS

1.1.1 Technical Drawings

1.1.2 Specifications

1.1.3 Requests for Interpretation

1.1.4 Product Samples and Brochures

1.1.5 Manufacturer's Data Sheets and Certificates

1.1.6 Material Safety Data Sheets

1.1.7 Work Program and Methodology Submittals

1.2 SUMMARY

This section includes the following metal fabrications as follows:

1.2.1 Grill Works

1.2.2 Metal bars gratings/ trench gratings

1.2.3 Access panels

1.2.4 Welded wire fabric enclosures as specified

1.2.5 Truss, Rafter, and Purlin Works for Roofing Assemblies

1.2.6 Miscellaneous steel fabrications

1.3 RELATED SECTIONS

1.3.1 Division 01 26 63 Requests for Interpretation

1.3.2 Division 09 91 1 Interior Painting

1.3.3 Division 09 96 5 Exterior Painting

1.4 GENERAL PROVISIONS

1.4.1 Schedule and sequence all metal fabrications and work such that rework is avoided. Mount handrails on completed/finished surfaces only. Do not finish handrails or metal fabrication works such that it is exposed to construction work that will damage the metal assembly. Any such faulty sequencing resulting to damages will be absorbed by the Contractor.

1.5 PERFORMANCE REQUIREMENTS

1.5.1 Assemblies shall allow for thermal movements resulting from change in ambient and surface temperatures due to both mechanical and weather-induced heat gain and heat loss.

1.5.2 Always use non-shrink, pre-mixed, factory-packaged, corrosion and erosion resistant, non-metallic grout complying with CE CRD-C621 when anchoring steel to concrete. Check all labels by manufacturers and follow proper handling and application instructions. Use waterproofing sealers or coatings as recommended by the manufacturer, especially for metal fabrications exposed to exterior use.

1.5.3Do not exceed the allowable working stress of the assembly, including considerations on its materials, anchors, and connections. Consider the following:
1.5.3.1 For Top Rail of Stair Railings, Guardrails, and hand rails, comply with the following structural loads:
1.5.3.1.1 Any point of the railings shall be capable of withstanding concentrated load at least 136 kgs, whether applied vertically or horizontally.
1.5.3.1.2 The railing assembly shall be capable of withstanding a uniform load of 135kg per linear meter.

1.5.4Ensure that all metal fabrications are compliant to structural requirements, such that it is capable of withstanding structural loads as determined by professional structural designers. Determine allowable design working stresses according to following standards:
1.5.4.1 For aluminum materials, comply with AA 30 "Specifications for Aluminum Structures"
1.5.4.2 For Stainless Steel fabrications, comply with ASCE 8, "Specification for the Design of Cold-Formed Stainless Steel Structural Members."
1.5.4.3 For Cold-Formed Structural Steel, comply with AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members.
1.5.4.4 For Structural Steel, comply with AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."

1.6 MAINTENANCE AND STORAGE
1.6.1Ensure that assemblies are protected from corrosion due to weather and chemical exposure. Apply protecting films and keep materials away from corrosives.
1.6.2When metal works are completed, restore any defects incurred on the assembly during the time of construction. No discoloration or any early markings indicative of early stages of corrosion will be accepted upon substantial completion of work.
1.6.3Regularly clean surfaces where fabricated assemblies are completed, stored or kept. Ensure that the areas of work and storage are free of corrosive substances.
1.6.4Clean all metal fabrications and ensure that items are free of marks, bulges, discolorations, prints, finger marks, etc. Wrap in polyethylene or an equivalent protective material and keep completed metal works protected until substantial completion.

1.7 SUBMITTALS

1.7.1PRODUCT APPROVAL ATTACHMENTS
1.7.1.1 Submit product data. Describe steel composition, including nominal thicknesses for hollowed tubes, finish type. Include detailed description of paint products to be affixed on the steel parts, weld points, etc.
1.7.1.2 For metal assemblies to accept paint works, submit manufacturer's data on the proper handling of paint products, including instructions on application, storage, and maintenance.
1.7.1.3 Indicate areas of application on all requests for approval.

1.7.2EXECUTION APPROVAL ATTACHMENTS
1.7.2.1 Submit a detailed work methodology, indicating at least the following
1.7.2.1.1 Date and time of application
1.7.2.1.2 Area of application
1.7.2.1.3 Welder's certificates compliant to the Quality Assurance portion of this section.
1.7.2.1.4 Shop drawings showing the location of the installation on the project site. Detail all dimensions. Show typical weld points, cross section details of railings, clearly defining relative points of measurement for survey and/or laying out. All drawings shall be to scale. Include plans, elevations, sections, and other drawings required. Properly label all components of the assemblies. If using hollowed sections, indicate nominal thicknesses. If using steel plates, indicate gauge of plate. Label all bolts and anchors, including prescriptive sizes if any. Certify that assemblies on the shop drawings are structurally sound, otherwise drawings will be forwarded to the structural engineer for verification. Clearly label finish types and verify that finish types are consistent with technical working drawings issued. In case of inconsistencies, submit requests for clarification.

1.8 QUALITY ASSURANCE

1.8.1Ensure fabricators are experienced in fabricating metal assemblies similar to the items indicated in the technical working drawings of this project.
1.8.2Ensure installers are equally familiar with fabricators and are in constant communication on the proper installment procedures.
1.8.3Certify that all welders for fabrication assemblies have satisfactorily passed AWS qualifications for welding in accordance to the structural welding code-steel D1.1, D1.2, and D1.3.
1.8.4The contractor is to make sure that all metal fabricators and installers are duly supervised by qualified professional engineers, licensed and experienced in supervising construction works.
1.8.5Do not complete works prior to mock-up approvals. Install a handrail/rail mock up to verify selections and shop drawings and have the mock-ups approved prior to the completion of work. Always build mock-ups in intended locations.

1.9 WARRANTIES
Metal fabricators are to comply with minimum five (5) years warranty, certifying against rusts, corrosion, and any form of metal deterioration.

2. PART 2 PRODUCTS

2.1 METALS
All metal fabrications exposed to views or areas with high user traffic shall be free from surface blemish. Do not use deteriorated materials. Unless otherwise specified or indicate in the technical working drawings, follow the prescribed thicknesses of given metal sections below. In case of conflict, submit requests for clarification. Do not implement any work prior to the verification of the architect.

Only use Welding Rods and Bare Electrodes compatible with steel/ or metal alloy to be welded. Comply with American Welding Society Standards (AWS) specifications.

2.1.16ENERAL METALS
2.1.1.1 For Steel Plates, Shapes, and Bars, comply with ASTM A 36.
2.1.1.2 For Rolled Steel floor Plates, comply with ASTM A 786.
2.1.1.3 For Steel Bars for Gratings, comply with ASTM A 569 or ASTM A 36.
2.1.1.4 When using Wire Rod for Gratings Crossbars, comply with ASTM A 510.
2.1.1.5 For Cold-Formed Steel Tubing, comply with ASTM A 500, Grade A, unless otherwise specified.
2.1.1.6 For Cold-Rolled Structural Steel Sheet, use ASTM A 611, Grade A, unless otherwise specified.
2.1.1.7 For Uncoated Non-structural Cold-Rolled Steel Sheet, comply with ASTM A 366.
2.1.1.8 For Structural Quality Galvanized sheets, comply with ASTM A 446, Grade A, unless another grade is required for design loading, and G90 coating designation unless otherwise directed.
2.1.1.9 For Galvanized finish Steel Pipes for exterior installations and where indicated, comply with ASTM A 53; Type F, Schedule 40, unless otherwise directed, or another weight, type, and grade required by structural loads and/or by technical working drawings.
2.1.1.10 For Malleable Iron Castings, comply with ASTM A 47, grade 32510.
2.1.1.11 For Brackets, Flanges and Anchors, use Cast or formed metal of the same type material and finish as supported rails, unless otherwise directed.
2.1.1.12 When using Concrete Inserts, use Threaded or wedge type, galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.
2.1.1.13 When using Wrought Iron, conform to ASTM designation A-41.
2.1.1.14 When using Gray Iron Castings, conform to ASTM A 48, Class 30.

2.1.2FOR STAINLESS STEEL:
2.1.2.1 For Stainless Steel Bar Stock, comply with ASTM A 276, Type 302.
2.1.2.2 For Stainless Steel Plate, comply with ASTM A 167, Type 302.
2.1.2.3 For Stainless Steel Pipe, comply with ASTM A 312, Grade TP 316.
2.1.2.4 For Stainless Steel Castings, comply with ASTM A 743, Grade CF 8 or CF 20
2.1.2.5 For Stainless Steel Tubing: ASTM A 554, Grades MT301, MT302 or MT304.

2.1.3ALUMINUM

2.1.3.1 Refer to technical working drawings to verify temper, finish, and coats of the Aluminum.
2.1.3.1.1 For Extruded Bars and Shapes, comply with ASTM B 221, 6063-T6
2.1.3.1.2 For Extruded Pipe and Tube, comply with ASTM B 429, 6063-T6.
2.1.3.1.3 For Drawn Seamless Tubes, comply with ASTM B 483, 6063-T832
2.1.3.1.4 For Plate and Sheet, comply with ASTM B 209, 6061-T6
2.1.3.1.5 For Die and Hand Forgings, comply with ASTM B 247, 6061-T6
2.1.3.1.6 For Castings, comply with ASTM B 26, 356.0-T6.
2.1.3.1.7 Minimum Thickness of Plates shall be 3mm.
2.1.3.1.8 Minimum Extrusions shall be 3mm.

2.1.4FASTENERS

Use zinc-coated fasteners for exterior use or where built into exterior walls. Performance Requirements of Fasteners shall be as follows:
2.1.4.1.1.1 When using Bolts and Nuts, use Regular hexagon head type compliant with ASTM A 307, Grade A.
2.1.4.1.1.2 When using Lag Bolts, use Square head type FS FF-B-561.
2.1.4.1.1.3 When using Machine Screws, use Cadmium plated steel FS FF-S-92.
2.1.4.1.1.4 When using Wood Screws, use Flat head carbon steel FS FF-S-111.
2.1.4.1.1.5 When using Plain Washers, use Round, carbon steel, FS FF-W-92.
2.1.4.1.1.6 When using Toggle Bolts, use Tumble-wing type, FS FF-B-588, type, class, and style as required
2.1.4.1.1.7 When using Lock Washers, use Helical spring type carbon steel, FS FF-W-84
2.1.4.1.1.8 When drilling expansion anchors, comply with FS FF-S-325, Group VIII anchors, expansion, non-drilling, Type I (Internally threaded tubular expansion anchor) and machine

2.1.5PAINT

Use shop primers to ensure protection of metal fabrications. Use primers as follows:
2.1.5.1 For ferrous metals, use fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated. Primer should be compatible with field-applied topcoats and compliant to requirements of FS TT-P-645.
2.1.5.2 For galvanized steel, use primers with zinc-dust, zinc-coated steel compatible for priming zinc-coated steel and finish paint systems as indicated. Comply with SSPC-Paint 5.

2.1.6CONCRETE FILL AND REINFORCEMENT

Comply with Division 03 Sections for normal weight concrete. Use reinforcements compliant with ASTM A615, Grade 60 unless otherwise directed.

3. PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1Properly label metal assemblies, and fixtures such as urinals and lavatories in coordination with labels of receiving anchors to avoid incorrect installations.
3.1.2Coordinate with concrete casting schedule and material deliveries to ensure the proper integration of anchorage to be embedded in concrete or masonry construction.

3.2 GENERAL INSTALLATION

3.2.1Provide anchorage and fastening devices in all necessary areas to structurally secure metal fabrications in place. Use toggle bolts, lag bolts, and other masonry inserts and connectors as required for structural soundness without compromising the aesthetic quality of exposed areas.
3.2.2Plumb, set, level, align, edge, measure, and layout all metal fabrications from established lines and levels to ensure accurate fabrication and installation.
3.2.3Comply with AWS Code for procedures of manual shielded metal-arc welding for all feld weldng work.
3.2.4Remove all welding flux immediately.
3.2.5Finish all exposed welds to match adjacent metal surfaces.
3.2.6Coat all exposed steel or metal fabrications for corrosion protection.

3.2.7For metals assemblies specified to receive paint, apply primer on all surfaces including grind smooth welded connections. Comply with Division 09 Section Interior and Exterior Painting.
3.2.8Pre-drill holes on the metal fabrication to receive exposed bolt anchorage.
3.2.9For concrete surfaces, use drilled-in expansion shields and concealed hanger bolts or exposed lag bolts as applicable.
3.2.10 For hollow masonry anchorage, use toggle bolts having square heads.
3.2.11 Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.
3.2.12 Manually clean all metal and concrete surfaces to receive anchorage work. Remove all dirt, weld splatter, grease, and similar loose substances that affect adhesion. Chip, scrape and wire brush to remove dirt on metal.
3.2.13 Correct all chippings on concrete surfaces as affected by installation work. Comply with Division 03 Concrete for all concrete patchwork.
3.2.14 Clean aluminum and stainless steel with through soap and clean water wash and rinse.
3.2.15 Touch up all painting works damaged by installation work.
3.2.16 Restore all other complete finish work damaged during installation work.

3.3 GENERAL FABRICATION

3.3.1Comply with performance requirements as indicated above and as indicated in the drawings. Verify drawings and ensure that metal fabrications are compliant. Use types of materials as specified.
3.3.2All angles, surfaces, edges whether smooth or straight shall true to line and levels and consistent with drawings.
3.3.3Shearing and punching of metals must done cleanly and accurately.
3.3.4Buff exposed edges to no more than 0.8mm unless otherwise indicated in the drawings. Ensure that buffing or easing work will not damage grains or impair work in any way.
3.3.5No sharp, flesh-cutting edges allowed, whether exposed or unexposed.
3.3.6Smoothen exposed welds.
3.3.7Weld corners and seams continuously.
3.3.8Remove welding flux immediately.
3.3.9Fabricate metals such that hairline joints are minimal Conceal hairline joints.
3.3.10 Exposed fasteners shall be consistent as indicated on drawings. If not indicated, use flathead countersunk screws or bolts. Verify drawings for the accurate positioning of fasteners. If not specified on drawings, fabrication shall consider equal and structurally sound spacing of fasteners.
3.3.11 Space anchoring devices to provide adequate support as approved by structural drawings. Refer to approved shop drawings. Consider prescribed anchoring distances during the fabrication stage.
3.3.12 Fabricate weep holes where water is likely to accumulate. Ensure that the metal assembly is fabricated such that no part is subject to accumulation of corrosives and therefore damaging the unit.

3.4 GENERAL FINISHES

3.4.1Prepare steel fabrications to receive the finishes as specified in drawings.
3.4.2Exposed fasteners shall be finished with matching appearance, including color and texture of the steel fabrication, unless otherwise indicated in the approved drawings.

3.5 ROUGH HARDWARE

The contractor shall furnish all custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for all rough support and anchoring work.

3.6 METAL GRATINGS

3.6.1Where required or as indicated in the drawings, provide metal bar gratings.
3.6.2Fabricate gratings such that it is able to carry designed structural loads.
3.6.3When required by the drawings of the architect, provide hinges on gratings that require access for maintenance.

3.7 ACCESS PANELS

3.7.1 Verify location of Access Panels as indicated in technical drawings. Always place Access Panels in obscure locations, accessibly by service personnel.
3. 7.2 No Access Panel shall be lesser than 600mm X 600mm in dimensions.
3. 7.3 For access panels placed on ceilings, locate it adjacent to the nearest to the wall.
3. 7.4 Fabricate access panels according to materials as indicated in the drawings or as needed in the project site.
3. 7.5 Fabricate access panels using materials that comply with fire rating as required by the code.

3. 7.6 Unless otherwise required or specified, provide at least 2 pieces of steel butt hinges, painted to match the color of the corridor wall, or ceiling where the access panel is located.
3. 7.7 Use silicone to adhere borders/perimeters of the access panels.
3. 7.8 Where the access panel is a combination of fiber cement boards and steel perimeters, comply with Division 03 Fiber Cement Boards.
3. 7.9 Submit detailed shop drawings showing dimensions, reference elevations, and materials for access panels installed in exposed areas. Fabricate access panels according to approved shop drawings.

3.8 WELDED WIRE FABRIC ENCLOSURES FOR MECHANICAL EQUIPMENT)

3.8.1 Frames and supports for welded wire fabric enclosures designated for mechanical equipment shall be fabricated with 50mm X 50mm x 2.8mm diameter tubular heavy duty steel unless otherwise intended by the architect or structural designers. Submit shop drawings prior to implementation.
3. 8.2 Angular and flat bars may be used for frames not bearing critical structural load.
3. 8.3 divisi accessories.
3. 8.4 All welded wire fabric enclosures shall be painted. Refer to Division 09 Section for Paint type and procedure requirements.

3.9 MISCELLANEOUS

3.9.1 Provide steel framing and supports for all applications as required to complete structural steel frameworks and as required to complete works.
3. 9.2 Integrally weld and anchor all steel fabrications into concrete or building masonry and ensure structural soundness.
3. 9.3 Furnish inserts, if units must be installed after concrete is placed.
3. 9.4 Except as otherwise indicated, space anchors 609.6mm (24 inches) on center and provide minimum anchor units in the form of steel straps 31.75mm x 6.35mm x 203.2mm (1-1/4 inches wide x 1/4 inch x 8 inches) long.
3. 9.5 Epoxy-prime all framings and supports.
3. 9.6 For lavatory counter, urinal, and other similar finish supports, provide steel angle supports capable of supporting the dead load of the item to be installed.
3. 9.7 Protect all finishes of handrails and railings in exposed areas from damage during construction. Provide temporary protective covering to be removed only upon substantial completion of all construction work
3. 9.8 Restore finishes damaged during installation works.

END OF SECTION

08 00 00	DIVISION 8 DOORS, WINDOWS, and OPENINGS	
08 70 00	Hardware	

1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Work Program and Methodology Submittals

1.2 SUMMARY

1.2.1This section includes provisions for finish hardware for doors, gates and windows where intended for this project.

1.3 RELATED SECTIONS

1.3.1Section Steel Doors and Frames
1.3.2Flush Wood Doors
1.3.3Interior Architectural Woodwork
1.3.4Rough Carpentry

1.4 GENERAL PROVISION

1.4.1Comply with specifications as indicated in the door hardware schedule.
1.4.2The contractor shall provide a key-cabinet of a hinged-panel type that can be secured by a lockset. The Key cabinet shall house all keys to all portions requiring a locking mechanism. Situate the key cabinet in an secure area, not exposed to the public, and accessible only to the owner's administrators.
1.4.3Use appropriate hardware size in proportion to the door/window/panel/any surface requiring the hardware. Check load capacity of hardware, especially hinges to match the load requirements of the door/window/panel/any surface requiring the hardware mechanism.
1.4.4The contractor shall provide and install all necessary hardware intended for the project. This includes the following but not limited to:

1.4.4.1 Hinges
1.4.4.2 Locks and Dummy Trims
1.4.4.3 Cylindrical locks with lever handle
1.4.4.4 Tubular locks with lever handle
1.4.4.5 Deadbolts
1.4.4.6 Fire Exit and Panic Exit Devices
1.4.4.7 Door Closers
1.4.4.8 Floor Closers
1.4.4.9 Door stops
1.4.4.10 Door trims
1.4.4.11 Silencers
1.4.4.12 Door pulls
1.4.4.13 Push plates
1.4.4.14 Armor Plates
1.4.4.15 Kick Plates
1.4.4.16 Flush bolts
1.4.4.17 Door Viewers
1.4.4.18 Door Coordinators
1.4.4.19 Flush pull
1.4.4.20 Door seals and weather-stripping

1.4.4.21 Other required hardware finish

1.5 MAINTENANCE

1.5.1Store all hardware in properly labeled containers, with complete sets to match appropriate installation procedures.
1.5.2Secure all hardware storage and secure all hardware keys.
1.5.3Only deliver the keys directly to the owner and/or bonafide representative of the owner upon substantial completion of the project.
1.5.4Tag each hardware item and its completed set properly for appropriate identification of pieces. Match tags/ identifications with related hardware. Include basic installation instructions in all labels.
1.5.5Store hardware in cool and dry areas.

1.6 SUBMITTALS

1.6.1PRODUCT APPROVAL ATTACHMENTS
1.6.1.1 Submit product brochures detailing the mechanisms and handedness of hardware to match the doors and windows it is specified for. Brochures should include complete hardware codes and a list/code of areas of installation.

1.6.2EXECUTION APPROVAL ATTACHMENTS
1.6.2.1 Submit detailed work methodology indicating installation requirements and procedures.
1.6.2.2 Indicate on shop drawings the proper labels and codes to match the hardware specifications as indicated on technical working drawings.
1.6.2.3 Deliver keys directly to Owner complete with proper labels.

1.7 QUALITY ASSURANCE

1.7.1Source all hardware type from a single manufacturer to ensure uniform quality.
1.7.2Suppliers shall be recognized architectural hardware suppliers with manufacturing capability suitable to the quantity and quality required by the project.
1.7.3Tag all hardware with proper identifying labels related to hardware schedule. Include installation requirements.

1.8 WARRANTIES

1.8.1Manufacturer/ contractor shall agree to replace all defective hardware within two (2) years from date of substantial completion.

2. PART 2 PRODUCTS

2.1 GENERAL PRODUCTS

2.1.1Provide Panic Exit Devices for Fire Rated applications/means of egress intended for fire.
2.1.2All hardware finishes shall be in satin stainless steel finish. Be sure that all hardware are of consistent finishes.
2.1.3Use hardware that is compliant with UL requirements and conforming to NFPA No. 80 requirements.
2.1.4Use hardware compliant to the following:
2.1.4.1 Mortise Hinges: Mortise Hinges: ANSI / BHMA A156.1.
2.1.4.2 Locks and Latches: ANSI / BHMA A156.2
2.1.4.3 Tubular locks: Grade 3 type tubular locks shall not have less than 5 pin tumblers.
2.1.4.4 Cylindrical locks: Grade 2 cylindrical locks shall not have less than 6 pin tumblers.
2.1.4.5 Deadbolts: ANSI / BHMA A156.5; Grade 2.
2.1.4.6 Door Closers: UL Listed.
2.1.4.7 Fire Exit Devices: BHMA / ANSI A156.3, Grade 1, UL Listed.
2.1.4.8 Door Coordinators: ANSI/BHMA A156.3, Type 21A; UL Listed for installation on labeled frame
2.1.4.9 Seals and Weather stripping: BHMA / ANSI A156.22
2.1.4.10 Aluminum Extrusions: B6060+5.
2.1.4.11 Neoprene with service temperature of 40°C to 70°C.
2.1.4.12 PVC extrusions with service temperature of -5°C to 70°C.
2.1.4.13 Silicone with service temperatures of -60°C to 230°C.
2.1.4.14 EPDM with service temperature of -40°C to 100°C.
2.1.4.15 Threshold: BHMA / ANSI A156.21.

2.2 DOOR HARDWARE FOR METAL/ALUMINUM FRAMED STOREFRONT DOORS

2.2.1Coordinate with requirements of manufacturers.
2.2.2Comply with required hardware as specified in the technical working drawings.
2.2.3Only install cylindrical deadbolts with keying mechanisms on the lower rails of doors.
2.2.4Use heavy-duty UL Listed cylindrical deadbolts to be installed on bottom rail of door.
2.2.5Install heavy-duty door closers on the top rail.

2.3 DOOR HARDWARE FOR WOOD PANEL DOORS

2.3.1Coordinate with requirements of manufacturers.
2.3.2Comply with required hardware as specified in the technical working drawings.
2.3.3Verify installation and hardware mechanisms and secure fit with door panels.
2.3.4Use heavy duty cylindrical locks with lever-type handles. Verify handedness of each lever-type installation.
2.3.5Use heavy-duty UL Listed cylindrical deadbolts to be installed on bottom rail of door.
2.3.6Install heavy-duty door closers on the top rail.
2.3.7Install heavy-duty door closers alongside top rail.

2.4 DOOR HARDWARE FOR TOILETS

2.4.1Use heavy-duty privacy locksets, lever-type handles. Verify handedness of each lever-type installation.

2.5 KEYING SYSTEM

2.5.1Provide at least three sets of keys for every lock, group, or set of locks. Test all key sets and verify matching locks. Label properly and store all key sets in key cabinet to be provided by contractor.
2.5.2Provide a master key for all utility spaces.
2.5.3Situate all keys in hinged key cabinet, wall mounted key cabinet. Situate key cabinet in a secure area accessible to administrative staff or security personnel only. Provide extra 50% capacity in the key cabinet on top of all required keysets. Label key sets accordingly.

3. PART 3 EXECUTION

3.1 GENERAL INSTRUCTIONS

3.1.1Comply with manufacturer's instructions for lockset installations.

3.2 GENERAL INSTALLATION

3.2.1NUMBER OF HINGES REQUIRED:
Comply with the following quantities of hinges, unless otherwise specified in the technical working drawings and/or as needed/recommended by the manufacturer to comply with warranties.

Provide two (2) pieces hinge for doors with heights up to 1500mm.
Provide three (3) pieces hinge for doors with heights over 1500mm but not over 2290mm.
Provide four (4) pieces hinge for doors with heights over 2290mm but not over 3000mm.
For doors over 3000mm in height, provide additional hinge for each additional 750mm of door height or fraction thereof.

3.2.1.1 LOCATION OF HINGES:
TOP HINGE: Not over 244mm from inside of frame rabbet at head to center line of hinge.
BOTTOM HINGE: Not over 264mm above bottom of door frame to center line of hinge
CENTER HINGE: Located at equal distances between top and bottom hinges.

3.3 CLEANING AND PROTECTION

3.3.1Protect hardware from damages by covering.
3.3.2Ensure all hardware are working and operating smoothly at the time of substantial turnover.

END OF SECTION

AR. FERNAND G. MACAS, uap
Architect, Project Development Officer I, USTP

Prepared by:

ENGR. GRACE C. BABA
Director, IPFDO-System