TECHNICAL SPECIFICATION

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DIVISION 01

GENERAL

SECTION 1.1 – SUMMARY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents
3. Design Fit-Outs and Deliverables
4. Access to Site
5. Work Restrictions
6. Specification and drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements:

1. General Requirements.

1.3 PROJECT INFORMATION

A. Project Identification: **CONSTRUCTION OF IDEA GENERATION HUB PHASE 2:** EXTERIOR CAFÉ AND THE COVERED WALKWAY FROM INTERIOR 1 TO INTERIOR 2 TO INCLUDE DETAILED DESIGN, FABRICATION AND INSTALLATION OF DESIGN FIT-OUTS, FURNISHINGS, AND FIXTURES (DFOFFs)".

Project Location : **7TH Floor/A, DAP Building, San Miguel Avenue Ortigas Center, Pasig City, 1600 Metro Manila**

B. Owner : **DEVELOPMENT ACADEMY OF THE PHILIPPINES**

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The **Work** includes complete architectural, structural, electrical, mechanical, fire protection, sanitary works, and other site related construction or as defined in the Contract Documents and Specification Documents.
2. **Workmanship:** Only personnel skilled in the operations of each trade required under any and all part of these Specifications shall undertake the works called for in the manner specified herewith.

B. Type of Contract:

1. Project will be implemented/constructed under a single prime contract.

1.5 DESIGN FIT-OUTS AND DELIVERABLES

A. Contractor will supply and install products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing of fit-outs and/or products and making building service connections.

B. Design Fit-Outs for: (Based on BOQ)

1. Exterior Cafe
2. Other Design Concerns

1.6 ACCESS TO SITE

A. General: Contractor should be allowed the use of Project site for construction operations as indicated by requirements of this Section.

B. Use of Site: Use of Project site will be limited only to areas within the project limit/boundary line indicated. **CONTRACTOR** will not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Construction operations will be confined to assigned areas where work is permitted.

2. Driveways, Walkways and Entrances: Driveways, loading areas, and entrances serving premises will be cleared and available to Owner, Owner's employees, and emergency vehicles at all times. These areas will not be used for parking or storage of materials.
    a. **CONTRACTOR** will schedule deliveries to minimize use of driveways and entrances.
    b. **CONTRACTOR** will also schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.7 WORK RESTRICTIONS

A. **General:** Compliance with the restrictions on renovation/construction operations.
    1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. **On-Site Work Hours:** Workers should be allowed to work seven days a week from 8AM up to 10 PM. Any excess/overtime hour prior to the allowed number of hours per day requested by the Building Owner shall be addressed and notified to the Project Manager. End-user should request through letter or formal notice prior to the request of Overtime work.

C. **Existing Utility Interruptions:** As the project commence and progress, Owner/End-user should understand utility interruptions as the need arises. Contractor is not responsible for any disruptions on working hours of employees or client provided that, we:
    1. Notified the Management in formal writing in lieu to the proposed utility interruptions, three (3) days prior.
    2. Obtained written permission from the Owner/End-user.

D. **Noise, Vibration, and Odor:** Inevitable noise, vibration and odor may arise during the renovation/construction phase.

E. **Employee Identification:** All workers and Key Personnel are provided with Company IDs and are required to use at all times inside DAP premise.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. **Specification Content:** The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed only by Contractor unless specifically stated otherwise.

B. Drawing Coordination:

Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products. DAP is expected to review the plans and specifications. Should there be any conflict between the working drawings and this specification, this conflict shall be referred to **DAP IGH Team,** the End-user and Owner of the project for clarification. Any conflict in the document without proper clarification must be undertaken by the Contractor, which is necessary to the completion of the system without compensation.

1.9 MISCELLANEOUS PROVISIONS: REGULATORY REQUIREMENTS

A. Contractor shall be in compliance with all laws, City Ordinances, and all Government Regulation and with the following regulatory requirements, in so far as they are binding upon or affect the portion of the work thereto. The Contractor of thoseengaged shall obtain all necessary licenses and permits and shall be responsible for all damages to persons or property, which may occur in connection with the execution of the work.

1. National Building Code of the Philippines.
2. Handicapped Law to Enhance Mobility of Disabled Persons.
3. National Structural Code of the Philippines.
4. Philippine Electrical Code (National Electrical Code).
5. Philippine Plumbing Code (Uniform Plumbing Code).
6. Philippine Society of Mechanical Engineers Code (Uniform Mechanical Code).
7. NFPA 101, Life Safety Code.
8. NFPA, Fire Protection Code.

B. RA 9266: All drawings and specifications acting as an instrument of service is the property of **DEVELOPMENT ACADEMY OF THE PHILIPPPNES** and cannot be reproduced without written consent.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 1.2 – ALTERNATES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 SUMMARY

Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if **DAP** decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. **Coordination:** Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. **Notification:** Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

* * * END OF SECTION * * *

SECTION 1.3 – EXECUTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction/Renovation layout.
2. Installation of the Work.
3. Progress cleaning.
4. Starting and adjusting.
5. Protection of installed construction.
6. Correction of the Work.

B. Related Requirements:

1. Section "Summary" for limits on use of Project site.
2. Section "Submittal Procedures" for submitting surveys.
3. Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 INFORMATIONAL SUBMITTALS

Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.4 QUALITY ASSURANCE

Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.5 WARRANTY

Existing warranties: Remove, replace, patch and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 EXAMINATION

A. **Existing Conditions:** The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. **Examination and Acceptance of Conditions:** Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. **Written Report:** Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. **Existing Conditions:** The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

B. **Field Measurements:** Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. **Space Requirements:** Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. **Review of Contract Documents and Field Conditions**: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 1.

3.3 CONSTRUCTION LAYOUT

A. **Verification:** Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. **General:** Engage a professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.

6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. **Site** Improvements**:** Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. **Building Lines and Levels:** Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use withcontrol lines and levels. Level foundations and piers from two or more locations.

E. **Record Log:** Maintain a log of layout control work. Record 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. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

A. **Identification:** Owner will identify existing benchmarks, control points, and property corners.

B. **Reference Points:** Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager. Report lost or destroyed permanent benchmarks orcontrol points promptly. Report the need to relocate permanent benchmarks or control pointsto Architect and Construction Manager before proceeding.

C. **Benchmarks:** Establish and maintain a minimum of two (2) permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. **Certified Survey:** On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and site works.

E. **Final Property Survey:** Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. **General:** Locate the **Work** and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. **Tools and Equipment:** Do not use tools or equipment that produce harmful noise levels.

G. **Templates:** Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. **Attachment:** Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately locatedand aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount componentsat heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. **Joints:** Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. **Hazardous Materials:** Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

A. **General:** Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

B. **Site:** Maintain Project site free of waste materials and debris.

C. **Work Areas:** Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

D. **Installed Work:** Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. **Concealed Spaces:** Remove debris from concealed spaces before enclosing the space.

F. **Exposed Surfaces in Finished Areas:** Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. **Waste Disposal:** Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. **Limiting Exposures:** Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Coordinate start up and adjusting of equipment and operating components with requirements specified in other Sections of specifications.

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

* * * END OF SECTION * * *

SECTION 1.4 – CLOSEOUT PROCEDURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Requirements**:**

1. Section "Execution" for progress cleaning of Project site.
2. Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. **Contractor's List of Incomplete Items:** Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. **Submittals Prior to Substantial Completion:** Complete the following a minimum of ten (10 calendar days prior to requesting inspection for determining date of SubstantialCompletion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Sections, including project record documents, operation and maintenance manuals, final completion construction

photographic documentation, damage or settlement and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

   Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

Submit test/adjust/balance records.

Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. **Procedures Prior to Substantial Completion:** Complete the following a minimum of three (3) working days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete start-up and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Advise Owner of changeover in heat and other utilities.
6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. **Inspection:** Submit a written request for inspection to determine Substantial Completion a minimum of three (3) working days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. **Re-inspection:** Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION PROCEDURES

A. **Submittals Prior to Final Completion:** Before requesting final inspection for determining final completion, complete the following:

- Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. **Inspection:** Submit a written request for final inspection to determine acceptance a minimum of three (3) calendar days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that mustbe completed or corrected before certificate will be issued.

- Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (BALANCE OF WORKS & PUNCH LIST)

Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

- Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
- Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.6 SUBMITTAL OF PROJECT WARRANTIES

A **Time of Submittal:** Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receivepaper size to match existing file.
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 of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- **Cleaning Agents:** Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
- Use cleaning products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

1. **General:** Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws, ordinances, local environmental and antipollution regulations.
2. **Cleaning:** Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   - Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   - Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   - Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   - Remove tools, construction equipment, machinery, and surplus material from Project site.
   - Remove snow and ice to provide safe access to building.
   - Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   - Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   - Sweep concrete floors broom clean in unoccupied spaces.
   - Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   - Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.

- Remove labels that are not permanent.
- Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
    i. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective fixtures to comply with requirements for new fixtures.

* * * END OF SECTION * * *

SECTION 1.5 – OPERATION AND MAINTENANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.3 CLOSEOUT SUBMITTALS

A. **Format:** Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
   - Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   - Enable inserted reviewer comments on draft submittals.
2. Three (3) paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two (2) copies.

B. **Initial Manual Submittal:** Submit draft copy of each manual at least five (5) calendar days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

C. **Final Manual Submittal:** Submit each manual in final form prior to requesting inspection for Substantial Completion and at least fifteen (15) calendar days before commencing demonstration and training. Architect will return copy with comments.

D. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within fifteen (15) calendar days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 – PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. **Directory:** Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

a. List of documents.

b. List of systems.

c. List of equipment.

d. Table of contents.

B. **List of Systems and Subsystems:** List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. **List of Equipment:** List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. **Tables of Contents:** Include a table of contents for each emergency, operation, and maintenance manual.

E. **Identification:** In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. **Organization:** Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. **Title Page:** Include the following information:

1. Subject matter included in manual.

2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Cross-reference to related systems in other operation and maintenance manuals.

C. **Table of Contents:** List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. **Manual Contents:** Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. **Manuals,** Paper **Copy:** Submit manuals in the form of hard copy, bound and labeled volumes.

1. **Binders**: Heavy-duty three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to match existing paper size; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   - Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. **Dividers:** Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate **contents**. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. **Protective Plastic Sleeves:** Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. **Supplementary Text:** Prepared on paper size same as existing.
5. **Drawings:** Attach reinforced, punched binder tabs on drawings and bind with text.
   - If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

- If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. **Content:** Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. **Type of Emergency: Where** applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. **Emergency Instructions:** Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. **Emergency Procedures:** Include the following, as applicable:

Instructions on stopping.

Shutdown instructions for each type of emergency.

Operating instructions for conditions outside normal operating limits.

Required sequences for electric or electronic systems.

Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In **addition** to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Operating standards.
3. Operating procedures.
4. Operating logs.
5. Wiring diagrams.
6. Control diagrams.
7. License requirements including inspection and renewal dates.

B. **Descriptions:** Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. **Operating Procedures:** Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. **Systems and Equipment Controls:** Describe the sequence of operation, and diagram controls as installed.

E. **Piped Systems:** Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. **Content:** Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. **Source Information:** List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. **Product Information:** Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. **Maintenance Procedures:** Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. **Repair Materials and Sources:** Include lists of materials and local sources of materials and related services.

F. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. **Content:** For each system, subsystem, and piece of equipment not part of a system,include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. **Source Information:** List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. **Manufacturers' Maintenance Documentation:** Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. **Maintenance Procedures:** Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semi-annual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. **Maintenance Service Contracts**: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

- Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION (Not Used)

3.1 MANUAL PREPARATION

A. **Operation and Maintenance Documentation Directory:** Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. **Emergency Manual:** Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. **Product Maintenance Manual:** Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. **Operation and Maintenance Manuals:** Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. **Manufacturers' Data:** Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. **Drawings:** Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

G. Comply with Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

* * * END OF SECTION * * *

DIVISION 02

ARCHITECTURAL

SECTION 2.1 – MODIFICATION

PART 1 – GENERAL

1.0 CHANGES IN THE WORK

A. Refer to General Conditions, Changes in the Work.

B. Minor Changes in the Work: In giving instructions, the Architect shall have the authority to make minor changes in the work, not involving extra cost, and not inconsistent with the design concept of the building.

1.1 CHANGE ORDER PROPOSALS

A. Owner-Initiated Change Order Proposal Requests: The Owner may at any time, without invalidating the Contract and without notice to the sureties, order extra work or make changes by altering, adding to or deducting from the Work, as covered by the Drawings and Specifications of this Contract and the general scope thereof. Such changes shall be ordered by the Owner in writing, and no change or omissions fromthe Drawings and Specifications shall be considered to have been authorized without written instructions by the Owner.

   1. Proposal requests are for information only. They are not instructions to stop work nor to execute the proposed change.
   2. Within 20 days of receipt, submit an estimated cost necessary to execute the change for the Owner's review. The following items must be included:
      a. An itemized list of products required and unit costs, with total amount of purchases.
      b. Taxes, delivery charges, equipment rental.
      c. The effect the change will have on the Contract Time.

B. Contractor-Initiated Proposals: When unforeseen conditions require modifications, the Contractor may submit a request for change to the Architect.

   1. Describe the proposed change. Indicate reasons for the change and the effect of the change on the Contract Sum, and Time.
   2. Include an itemized list of products required and unit costs, with the total amount of purchases.
   3. Indicate taxes, delivery charges, equipment rental, and amounts of trade dis

1.3 TERMS AND PROCEDURES

A. Proposal Request Form: The written request of the Contractor to submit a proposal for a proposed modification.

B. Construction Change Directive: When the Owner and Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive instructing the Contractor to proceed with a change. The Directive must contain a description of the change and must indicate the method to be followed to determine the change in the Contract Sum or Time.

C. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. After completing the change, submit an itemized account and supporting data to substantiate Contract adjustment.

D. Change Order Procedure: Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order.

* * * END OF SECTION * * *

SECTION 2.2 – TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and services to erect and maintain temporary facilities and controls required in this Work but not limited to:
   1. Temporary utilities such as gas, water, electricity and telephone.
   2. Field offices and sheds
   3. Sanitary facilities
   4. Storage facilities for materials
   5. Enclosures such as tarpaulins, barricades and canopies
   6. Project sign
   7. Fencing of the construction area
   8. Fire Protection
   9. Permits and Licenses – occupancy, building, connections for telephone, water and electrical. (Unless previously agreed upon to be Owner obtained).

1.2 RELATED WORK DESCRIBED ELSEWHERE

A. Compliance with all requirements of pertinent regulations as described in the General Conditions of the Contract.

B. Sub-contractor equipment: All the equipment furnished shall comply with all requirements of safety regulations, the ladders, hoists, planks and similar items normally furnished by individual trades in execution of their own portions of these Specifications.

C. Utility hook-up: Installation and hook-up of the various utility lines are described in other pertinent Sections of these Specifications.

1.3 PRODUCT HANDLING

A. Protection: Use all means necessary to maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

B. Replacements: In the event of loss or damage, immediately make all repairs and replacement necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCT

2.1 UTILITIES

A. Temporary Utilities:
   1. Owner shall provide and pay all costs for all gas, water, and electricity required for the performance of the work.
   2. Temporary water: Furnish and install all necessary temporary piping and, upon completion of the work, remove all such temporary piping. Consider all water consumption for the entire project including use by parties in direct contact with the Owner.
   3. Temporary electricity:
      a. Furnish and install all necessary temporary wiring. Provide temporary power, 100 KVA, single phase or as designated in the Electrical Specifications to be used during the construction of the entire building.
      b. Furnish and install area distribution boxes so located that the individual trades may use their own construction-type extension cords to obtain adequate power and artificial lighting at all points where required by inspectors and for safety. Subcontractors who would require unusual power consumption may be provided by the General Contractor with a separate sub-meter on which billings shall be based. However, in the absence of a sub-meter, the billingfor power consumption shall be proportionate to their respective contract amount.

B. Telephone: Maintain in the job office a telephone for the use of the Architect.

2.2 FIELD OFFICE

Furnish and install a field office building adequate in size and accommodation for all Contractor's offices, Superintendent's Office, Supply and Tool Room; make the field office available to the Owner/his representative, the Architect and the Construction Manger throughout the entire construction period. Provide an adequate watertight office with water, light, telephone and toilet facilities.

A. Provide and install one room cooling unit with all necessary wiring at the Superintendent's office.
B. Provide one standard computer with printer approved for use by the Site Clerk.
C. Provide all the necessary furniture at the Superintendent' office.

2.3 SANITARY FACILITIES

Furnish and install all required temporary toilet buildings with sanitary toilets for use of all workmen; comply with all minimum requirements of the Health Department or other public agency having jurisdiction; maintain in a sanitary condition at all times. Provide and install toilet facilities for the exclusive use of the Construction Superintendent.

2.4 STORAGE FACILITIES

Provide storage facilities for Owner-furnished materials. The Contractor shall be responsible for the storage and safekeeping of Owner-supplied items duly turned-over by the Owner.

2.5 ENCLOSURES

Furnish, install, and maintain for the duration of construction all required scaffolds, tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.

2.6 PROJECT SIGN

Furnish and install a project sign as indicated on the Drawings; allow no other sign or advertising of any type on the job site except as specifically approved by the Architect.

2.7 FENCING OF THE CONSTRUCTION AREA

A. General: Furnish and install a temporary fence around the entire construction area as indicated on the Drawings.

B. Construction: The temporary fence shall consist of board up fence not less than six feet in height, complete with metal or wood posts and all required bracing, and pedestrian gates as indicated on the Drawings.

PART 3 – EXECUTION

3.1 CLEANING UP

The premises shall be kept at all times free from accumulations of waste materials or rubbish caused by the operation for the completion of work. Maintain the general cleanliness and sanitation of the site. The General Contractor shall undertake clearing of

site and removal of construction debris brought about by contractors in direct contact with the Owner.

3.2 REMOVAL

Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work; remove all such temporary facilities and controls as rapidly as progress of the Work will permit or as directed by the Architect; include making good disrupted surfaces.

* * * END OF SECTION * * *

SECTION 2.3 – STAKING AND COORDINATION

PART 1 – GENERAL

1.1 STAKING

A. Refer also to General Conditions.

B. Prior to the staking work or start of construction, the Contractor shall submit actual grade elevations and necessary information to the Architect who shall confirm actual floor levels.

C. Before commencement of the Project, verify all property monuments. The Contractor shall pay for the services of a licensed surveyor to confirm and certify the location of monuments, culvert work, utility line and work of similar nature required by the Contract. All information relevant to the Project shall be relayed to the Architect.

D. The Architect shall submit initial or base staking plan for columns only. Succeeding staking plan for all levels showing location of columns, beams, slabs, black outs, pipe sleeves, pipe chases, elevator shafts, walls and partitions shall be done by the Contractor and submitted to the Architect prior to actual construction.

E. Staking of columns, beams and slabs shall be coordinated and verified with architectural plans and details. Construction layouts should follow architectural alignments. Should there be any discrepancy, the matter must be referred to the Architect for final decision and approval.

1.2 COORDINATION

A. If there exist any discrepancy among the documents or in reference to actual site conditions, the matter must immediately be reported to the Architect for clarification. It is assumed that the more expensive execution shall govern.

B. Coordinate construction to assure efficient and orderly installation of each part of the Work. Coordinate operations that depend on each other for proper installation, connection and operation.

C. Where necessary, prepare memoranda for distribution to each party involved, outlining procedures required for coordination. Include such items as required notices, reports and attendance at meetings.

* * * END OF SECTION * * *

SECTION 2.4 – MASONRY

PART 1 – GENERAL

1.1 SCOPE

The contents of this section apply to all sections of this Division unless otherwise specified or modified.

1.2 SOURCE QUALITY CONTROL

Errors of Shop Drawings, Manufacture, Correct Fitting, etc. of the various items and/or components of the Masonry Systems shall be the responsibility of the General Contractor.

1.3 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Handle and store in such manner as to prevent damage or disfigurement. Store items and components subject to environmental damage above ground and pallets, platforms or other supports and protect from elements and physical damage by adequate cover.

B. Deliver mortar materials in original unopened containers bearing label identifying manufacturer's name and brand.

1.4 PROTECTION

A. The Contractor shall protect any existing work subject to damage during installation of specified work and shall adequately protect specified work during installation. Finished work that is readily subject to damage by subsequent work or environmental conditions shall be protected by the Contractor immediately following the installation thereof.

B. Cover the top of unit masonry or stone walls exposed to the weather at the end of each day of shut-down period with a non-staining, waterproof cover. Similarly, protect partially completed walls not being worked. Overhang cover at least two (2) feet on each side of walls and securely anchor. Brace or otherwise protect walls during erection as required to protect work from damage due to high winds or other causes.

1.5 FIELD MEASUREMENTS

Contractor shall make measurements in field to verify or supplement dimensions indicated and be responsible for accurate fit of specified work.

1.6 FIELD QUALITY CONTROL

Facilities shall be provided by the Contractor as needed for the proper inspection of the specified work. Improper workmanship, as determined by the Architect, shall be corrected and/or replaced, at no additional cost to the Owner.

1.7 CONDITIONS OF WORK-IN-PLACE

Examine work-in-place on which specified work is in any way dependent. Report in writing, to the Architect any defects which may influence satisfactory completion and performance of specified work. The absence of such notification shall be construed as acceptance of work-in-place.

* * * END OF SECTION * * *

SECTION 2.5 – MORTAR

PART 1 – GENERAL

1.1 SCOPE

A. These specifications cover mortars for use in the construction of unit masonry structures.

1. Property Specifications in which the acceptability of the mortar is based on the properties (water retention and compressive strength) of samples of the mortar is based on the properties of the ingredients (materials) and the properties (water retention and compressive strength) of samples of the mortar mixed and tested in the laboratory.
2. Proportion Specifications in which the acceptability of the mortar is based on the properties of the ingredients, and the water retention of samples of the mortar mixed and tested in the laboratory.

B. Unless data are presented to show that the mortar meets the requirements of the property specifications, the proportion specifications shall govern. Mortar shall be accepted under only one set of specifications.

1.2 QUALITY ASSURANCE

The Contractor shall ascertain that the preparation, mixing and application of mortar were done in accordance with the Specifications herein and the manufacturer's recommendations.

1.3 TESTING COSTS

A. Unless otherwise specified in the purchase order, the cost of tests shall be borne as follows:

1. If the results of the tests show that the mortar does not conform to the requirements of this specification, the costs shall be borne by the Manufacturer.
2. If the results of the tests show that the mortar does conform to the requirements of this specifications, the cost shall be borne by the purchaser.

1.4 REFERENCE STANDARDS

1. C9 SPECIFICATION FOR MASONRY CEMENT

2. C144 SPECIFICATION FOR AGGREGATE FOR MASONRY MORTAR
3. C150 SPECIFICATION FOR PORTLAND CEMENT

PART 2 – PRODUCTS

2.1 MATERIALS

A. PORTLAND CEMENT: Portland Cement to be used for mortar shall be either of the following types: Type I, IA, II, IIA, III, IIIA of Specification C 150.

B. AGGREGATE: Aggregate shall be clean, sharp and well graded, and free from injurious amounts of duct, lumps, shale, alkali, surface coatings and organic matter. Aggregate for mortar shall conform to ASTM C 144.

C. ADMIXTURES OR MORTAR COLORS: The use of admixtures or mortar colors shall not be permitted in mortar or grout unless substantiating data is submitted to and approved by the Contractor or the Architect. The use of admixtures shall not be permitted in mortar without reducing the lime content. Proportions of admixture shall be as approved by the Contractor or Architect. Inert coloring pigments may be added but not to exceed six percent (6%) by weight of the cement. The formula shall be approved by the Contractor or the Architect. The use of uncontrolled fire clay,dirt and other deleterious materials is prohibited.

D. WATER: Water to be used shall be free from deleterious quantities of acids, alkalis and organic materials.

2.2 MEASUREMENT OF MORTAR MATERIALS

A. MEASUREMENTS OF MATERIALS - The method of measuring materials for the mortar used in construction shall be such that the specified proportions of the mortar materials can be controlled and accurately maintained.

Note: The weights per cubic foot of the materials are considered to be as follows: Material Weight, lb/sq.ft. (kg./sqm.)

Portland Cement	94 (1505)
Sand damp and loose	80 lb. (1200 kg) of dry sand

Note: All quick lime should be slaked according to the manufacturer’s directions. All quicklime putty, except pulverized quicklime putty, should be sieved through a No. 20 (850 mu) sieve and allow to cool until it has reached a temperature of 80 F (26.7

C). Quicklime putty should weigh at least 80 lb/sq. ft. (1280 kg./ sqm.). Putty that weighs less than this may be used in the proportion specifications if the required quantity of extra putty added to meet the minimum weight requirement.

2.3 PROPERTY SPECIFICATIONS

A. MORTAR

1. Mortar conforming to the property specification shall consist of a mixture of cementitious material and aggregate.
2. No change in proportions established for mortar accepted under the property specifications shall be made nor shall materials with different physical characteristics be utilized in mortar used in the work unless compliance with the requirements of the property specifications is re-established.

B. AGGREGATE RATIO

The damp, loose volume of aggregate in the mortar shall be not less than two and one-fourth times nor more than three and one-half times the total separate volumes of cementitious materials used.

C. WATER RETENTION

Mortar of the materials and proportions to be used in the construction, mixed to an initial flow of 100 to 115, shall have a flow after suction of not less than 75 percent.

D. COMPRESSIVE STRENGTH

The average compressive strength of three 2-in. (50.8mm) cubes of laboratory prepared mortar shall be not less than the strength given in Table 2 for the mortar type specified. Mortar mixed to a flow suitable for use in laying masonry units shall not be required to meet the strength given in Table 2 for the mortar specified.

PART 3 – EXECUTION

3.1 MIXING MORTAR

A. MIXING MORTARS: All cementitious materials and aggregate shall be mixed for at least 3 minutes with the maximum amount of water to produce a workable consistency in a mechanical batch mixer.

Note: Hand mixing of the mortar may be permitted on small jobs, with the written approval of the purchaser outlining hand mixing procedure.

B. Mortars that have stiffened because of evaporation of water from the mortar shall be re-tempered by adding water as frequently as needed to restore the required

consistency. Mortars shall be used and placed in final position within 2-1/2 hour after mixing.

3.2 METHODS OF TEST

A. WATER RETENTION: Determine water retention in accordance with the requirements of the latest revision of Specification C 91, except as noted in Article 2.03-C and Article 2.04-B.

B. COMPRESSIVE STRENGTH TEST: Determine compressive strength in accordance with the latest Specification C 91, with the following exceptions:

1. The mortar shall be of the materials and proportions intended for use in the construction, mixed to a flow of 100 to 115.
2. Keep mortar cubes for compressive strength test of mortars of Types N and O inthe molds on plane plates in a damp closet, maintained at a relative humidity of 90% or more, for 48 to 52 h in such a manner that the upper surfaces shall be exposed to the moist air. Remove them from the molds and place in a damp closet until tested. Keep the cube for compressive strength test of Type K mortar inthe laboratory air at a temperature of 70 + - 5 deg. F (21.1 + - 2.8 deg. C) for the entire curing period.

Table 2. Compressive Strength of Cubes for Mortar Types

Mortar Type	Average Compressive Strength at 28 days, psi (Mpa)
M	2500 (17.2)
S	1800 (12.4)
N	750 (5.2)
O	350 (2.4)
K	75 (0.5)

3.3 APPLICATION OF MORATAR OVER JOINTS

A. The starting joint on foundations shall be laid with full mortar coverage on the bed joint except on the area where grout occurs free from mortar so that the grout will be directly in contact with the foundation.

B. Mortar joints shall be straight, clean and uniform in thickness and shall be tooledas shown on the plans.

C. All walls shall have joints tooled with a round bar (or V-shaped bar) to produce a dense slightly concave surface well bonded to the block at the edges, unless specifically detailed.

D. Tooling shall be done when the mortar is partially set but still sufficiently plasticto bond. All tooling shall be done with a tool which compacts the mortar, pressing the excess mortar out of the joint rather than dragging it out.

E. Where walls are to receive plaster, the joints shall be struck flush.

F. Where joints are to be concealed under paint, these joints shall be filled flush and then sacked to produce a dense surface without seen.

G. Unless otherwise specified or detailed on the plans, in hollow unit masonry, the horizontal and vertical mortar joints shall be 3/8" thick with full mortar coverage on the face shells and on the webs surrounding cells to be filled.

H. Vertical head joints shall be battered well for a thickness equal to the face shell of the unit and these joints shall be shoved tightly so that the mortar bonds well to both units. Joints shall be soundly filled from the face of the block to at least the depth of the face shell.

I. If it is necessary to move a unit after it has been once set in place, the unit shall be removed from the wall, cleaned and set in fresh mortar.

J. Lintels, capping units and all bearing plates set by the mason shall be set in a full bed of mortar.

K. All joints shall be checked for tightness and where cracks are visible on exposed walls above grade, mortar shall be clipped out, tuck pointed and tooled.

3.4 BONDING

A. Concrete masonry units should be laid with a thicker edge of the shell up to provide a wider mortar bed.

B. Both face shell and ends of all blocks should receive a full bed of mortar.

C. Cross webs should be mortared.

3.5 WALL CLEANING AND PROTECTION

A. Concrete scum and grout or mortar stains on the wall shall be removed immediately. The finish surface of all internal and external walls and partitions shall be kept clean from mortar smears.

B. In desert areas and where the atmosphere is dry, the wall shall have its surface dampened with spray during a curing period for the mortar of three days.

C. At the conclusion of the masonry work, the contractor shall clean all masonry, remove scaffolding and equipment used in the work and remove all debris, refuse and surplus masonry materials and remove them from the premises.

* * * END OF SECTION * * *

SECTION 2.6 – TILES

PART 1 – GENERAL

1.1 SCOPE

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install tile works as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the contract Documents.

The work shall not be started until the roughing-in for plumbing and electrical work has been completed and tested. The work of all other trades in the area where tile work is to be done shall be protected from damage in a skillfully manner and as directed.

1.2 REFERENCES STANDARDS

Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions. Reference the following standards as applicable:

A. American National Standards Specifications (ANSI), Standards for Tile Installation: ANSI 108, ANSI 118, ANSI 136.1, ANSI A 137.1
B. American Society for the Testing of Materials (ASTM), ASTM C 270, Standard Specification of Mortar for Unit Masonry

1.3 SUBMITTALS

GENERAL: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

MANUFACTURER'S LITERATURE: Product data sheets, brochures, catalogs for all tile materials used for the work.

CERTIFICATIONS: Prior to delivery, submit certificates to the Architect attesting to compliance with the applicable Specifications herein.

MANUFACTURER'S GROUT COLOR CHARTS. Sample of grout: Cured sample, 2 x 2 inches of selected colors.

TILE SAMPLES of the actual tile to be provided shall be submitted for approval before tile work is started. The finish work shall match the approved samples in sizes, color patter, finish and texture.

TILE ADHESIVE: product catalog and methodology of installing tiles.

1.4 SOURCE QUALITY CONTROL

A. Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.
B. **Source Limitations:** Obtain all tiles of same type and color or finish tile from one source or producer. Materials shall be of the same production run and of consistent quality in appearance and physical properties for each contiguous area.
C. Setting materials such as mortar, adhesive and grout components shall be of uniform quality from a single manufacturer as well as finish treatments for nosing, stone thresholds and metal strips.

1.5 MOCKUPS

Build mock-ups to verify selection made under sample submittal and to demonstrate aesthetic effects. When completed and approved by the Architect, the mock-up shall be incorporated into the finished Work and become the Standard of quality for the remainder of the Project.

1.6 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.
B. Manufactured materials shall be delivered in the original unbroken packages or containers that are labeled plainly with the manufacturer's name and brands. Containers for tiles shall be grade sealed.
C. Store all materials off ground to prevent contamination by mud, dust, or materials likely to cause staining or other defects. Cover material to protect from elements and neglect.

1.7 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/ Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

1.8 PROJECT CONDITIONS

A. Comply with field examination requirements under General Conditions of the Contract Documents and Manufactures instructions.
B. Verify dimensions of concrete substrate by accurate field measurement. Confirm concrete has been in place for at least 28 days prior to commencing tile installation. Do not begin work until deficiencies in the substrate are corrected. Commencement of tile installation indicate Contractor's acceptance of substrate.
C. Do not install until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and Manufacturer's instructions.

1.9 EXTRA MATERIALS

A. Comply with requirements under General Conditions of the Contract Documents and Manufacturer's instructions.
B. Furnish extra materials that match products installed and that are packaged with protective covering for storage with quantity of full size units for tile and trims units equal to two (2) percent of amount installed, for each type, composition, color, pattern and size indicated.

1.10 PERFORMANCE REQUIREMENTS

Materials are to be from an accredited company with accomplished projects similar to the quality of material as specified herein. The Contractor shall submit tile samples to the Architect for approval prior to any installation. Design including texture and pattern shall be kept minimal with neutral color assignment as per Architect's approved sample. Submit material test reports and certificates acquired by Manufacturer from reputable testing and accreditation agency.

PART 2 – PRODUCTS

2.1 MATERIALS

A. **TILE ADHESIVE:** Shall be cement-based adhesive formulated for installing and fixing ceramic Tiles on horizontal and vertical concrete surfaces for thin-bed or thick-bed application.

B. **TILE GROUT:** for grouting shall be high performance, waterproof, cement-based tile adhesive conforming to PNS 53 with early high-strength Characteristics. Color of grout shall match tile material as per Architect's approved sample.

C. **WATER:** shall be clean and free from injurious amount of oil, acids, alkali, organic materials or other substances that maybe deleterious to concrete or steel.

D. **POLISHED FINISH HOMOGENEOUS PORCELAIN TILES:** Shall be 10mm thick x 600mm x 600mm double polished finish anti-stain, non-skid, homogenous porcelain tiles with heavy resistance to abrasion Class AAA, 7.5 kgs., submit product catalog and sample for Architect's approval. Provide 2-3 mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to Architectural drawings for pattern, layout and details.

PART 3 – EXECUTION

3.1 Comply with Manufacturer's standard installation procedures and applicable codes. Verify design and layout approved from shop drawings submitted by Contractor in accordance to Drawings.

3.2 Examine surfaces to receive tile, before tile installation begins. Do not proceed with installation until adjoining work is satisfactorily protected. Correct the following conditions before proceeding with tile work.

A. Defects or conditions adversely affecting quality, execution and permanence of tile installation.

B. Maximum deviation of surfaces to receive tile:

Subfloor surface: ¼ inch in 10 feet

Vertical surface: ¼ inch in 8 feet

3.3 Condition of surfaces to receive tile shall be firm, dry, clean, and free of oily or waxy films. Grounds, anchors, lugs, hangers, recess frames, bucks, electrical and mechanical work in or behind tile to be installed prior to proceeding with tile installation.

3.4 **PREPARATION.** Use clean container and tools. Contamination may affect the setting time. Mix by hand or with a power mixer until a lump free homogeneous paste is reached. For best results, stand mixture for 2 minutes before use.

3.5 **INSTALLATION.**

A. Mix All-purpose Tile Adhesive 25-kilogram bag with six (6) liters of water
B. Stir with a mixing device until desirable consistency is attained
C. Stand for two (2) minutes prior to use
D. Wet substrate before application of tile adhesive
E. Use trowel to spread the adhesive per one (1) square meter at a time. Apply to desired level to smoothen the uneven surface of the flooring
F. Place and align tile by moving it back and forth
G. Adjust height accordingly by gently tapping the tiles using the handle of the trowel or hammer. Fix tiles immediately within fifteen (15) minutes open time.

3.6 **GROUTING AND POINTING.** The tiles shall be wetted, if they have become dry, before applying grout. Joints of 3mm or less in width shall be routed with a neat white Portland cement grout of the consistency of thick cream. Other joints shall be pointed with mortar consisting of white Portland cement and two parts pointing sand. The grout or mortar for joints floors, walls and other vertical surfaces shall contain white Portland cement. Grout and pointing mortar shall be forced into joints by using trowel, squeegee, brush, or finger application. Before the grout or mortar sets, the joints of cushion-edge tiles shall be struck or tooled to the depth of the cushion, filling all skips or gaps, and the joints of a square-edge tile shall be filled completely flush with their surface. Dark cement shall not show through grouted white joints. Care shall be taken to avoid scratching glazed finishes. All surplus mortar or grout shall be removed before it has set or hardened.

3.7 **CLEANING AND CURING.** Floors shall be covered with waterproofed paper with all joints lapped at least 100mm and the laps tape-sealed or held down with planks or other weights and allowed to damp-cure for at least 72 hours before foot traffic is permitted thereon. All completed tile work shall be thoroughly sponged and washed diagonally across joints, and finally polished with clean dry cloths. Acid cleaning unglazed tiles, when necessary, shall not be done within ten days after setting tiles. All metal shall be covered with approved grease and the tile wet with clean water before the tile is cleaned with a 10 percent

muriatic-acid solution. After acid cleaning, the tile shall be flushed with clean water, and grease coating on metal removed. Acid cleaners shall not be used on unglazed tiles.

3.8 **PROTECTION.** Finished tile floors shall be covered with clean building paper before foot traffic is permitted on them. Board walkways shall be placed on floors that are to be continuously used as passageways by workers.

* * * END OF SECTION * * *

SECTION 2.7 – METALS

PART 1 – GENERAL

1.1 SCOPE

The contents of this section apply to all sections of this division unless otherwise specified or modified.

1.2 REFERENCE STANDARDS

Comply with the latest edition of the following as applicable unless otherwise specified or modified:

A. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), 1978: Specification for the Design, Fabrication and Erection of Structural Steel for Building; Code of Standard Practice for Steel Buildings and Bridges; Specification for Architecturally Exposed Structural Steel.

B. AMERICAN WELDING SOCIETY (AWS): Standard Welding Symbols A2.0-68; Standard Welding Code D1.1-1973 (Rev. 1-73 & 2-74). (To govern if in conflict with AISC).

C. RESEARCH COUNCIL ON RIVETED AND BOLTED JOINTS OF THE ENGINEERING FOUNDATION (RCRBJ): Specification for Structural Joists Using ASTM A-325-76a Bolts.

D. STRUCTURAL STEEL PAINTING COUNCIL (SSPC): Painting Manual, Volume 1; Good Painting Practice, Painting Manual, Volume 2; Systems and Specifications.

E. STEEL JOIST INSTITUTE-AMERICAN INSTITUTE OF STEEL CONSTRUCTION (SJI-AISC): “Standard Specifications for Open Web Steel Joists”, and “Standard Specifications for Longspan Steel Joists,” 1978 Editions.

F. AMERICAN IRON AND STEEL INSTITUTE (AISI): “Specifications for the Design of Cold-Formed Steel Structural Members, 1974”.

1.3 SOURCE QUALITY CONTROL

Errors and Shop Drawings, fabrication, correct fitting and alignment of the various metal items or component members shall be the responsibility of the Contractor. However, the Contractor shall permit the Architect or an independent inspection agency, if engaged by the Owner, to inspect work in progress in his shop. Such inspection shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with the Contract Documents.

1.4 PRODUCT DELIVERY, HANDLING AND STORAGE

Handle and store in such manner as to prevent damage or disfigurement. Store finished items or components above ground on platforms, pallets, or other supports and protect from harmful elements.

1.5 PROTECTION

The Contractor shall protect any existing work subject to damage during the installation of specified work and shall adequately protect specified work during installation. Finished work that is readily subject to damage by subsequent work or environmental conditions shall be protected by the Contractor immediately following the installation thereof.

1.6 FIELD MEASUREMENTS

Contractor shall make measurements in field to verify or supplement dimensions indicated and be responsible for accurate fit of specified work.

1.7 FIELD QUALITY CONTROL

Facilities shall be provided by the Contractor as needed for the proper inspection of the specified work, including temporary platforms, hoists, protective devices, electric current, etc. Improper workmanship, as determined by the Architect shall be corrected and replaced, at no additional cost to the Owner.

1.8 CONDITIONS OF WORK-IN-PLACE

Examine work-in-place on which specified work ins in any way dependent. Report, in writing, to the Architect any defects which may influence satisfactory completion and performance of specified work. The absence of such notification shall be construed as acceptance of work-in-place.

1.9 CORROSION PROTECTION

Separate dissimilar metals, and metals from soil and other corrosion surfaces, with a 30- mil coating of bituminous compound, SPC Paint 12, unless permanent separation is provided.

* * * END OF SECTION * * *

SECTION 2.8 – LUMBER

PART 1 – GENERAL

1.1 SCOPE OF WORK

All wood, nails, bolts, screws, framing anchors and other rough hardware, and all other items needed for rough and finished carpentry in this Work but not specifically described in other Sections of these Specifications.

1.2 RELATED WORK DESCRIBED ELSEWHERE

A. Rough Carpentry
B. Finishing Carpentry
C. Flush Wood door

1.3 QUALITY ASSURANCE

A. STANDARDS: All lumber shall be well seasoned, free from loose knots and imperfections.
B. In addition to complying with all pertinent codes and regulations, all materials of this Section shall comply with pertinent provisions of:

ITEM	STANDARDS
Yakal	Standard Grading and Dressing Rules for Philippine Lumber
Narra Equivalent	Standard Specifications for Grades of Philippine Mahogany
Tanguile (termite proof)	Standard Grading Rules (provide 10 years warranty against termites, woodborers and fungal decay). Brand: Matimco-Matwood
Apitong	Standard Grading Rules
Imported Pine Wood (termite & weather proof)	Standard Grading Rules (provide 25 years warranty against termites, woodborers and fungal decay).
Plywood	Veneer Grade A
Rough Hardware	Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings.
Wood Preservative	Per wood supplier recommendation subject to Architects approval.
Other	Similar & pertinent reference standards for the products needed.

C. CONFLICTING REQUIREMENTS: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards of these Specifications, the provisions of the more stringent shall govern.

1.4 SUBMITTALS

Make all proposals of substitution in strict accordance with the provisions of Section of these Specifications.

1.5 PRODUCT HANDLING

A. PROTECTION

1. Use all means necessary to protect lumber materials before, during, and after delivery to the job site, and to protect the installed work and materials of all other trades.
2. Deliver the materials to the job site and store, all in a safe area, out of the way of traffic, and shored up off the ground surface.
3. Identify all framing lumber as to grades and store all grades separately from other grades.
4. Protect all metal products with adequate weather-proof outer wrappings.
5. Use extreme care in the off-loading of lumber to prevent damage, splitting, and breaking of materials.

B. REPLACEMENTS: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.1 GRADE STAMPS

A. FRAMING LUMBER: Identify all framing lumber by the grade stamp of the lumber inspection bureau.

B. PLYWOOD: Identify all plywood as to species, grade, and glue type by the stamp of the Philippines Plywood Association.

C. OTHERS: Identify all other materials of this Section by the appropriate stamp of the agency listed in the reference standards, or by such other means as are approved in advance by the Architect.

2.2 MATERIALS

All materials of this Section, unless specifically otherwise approved in advance by the Architect, shall meet or exceed the following:

ITEM	DESCRIPTION
Yakal/Guijo	For all door jambs, door heads, balusters, and other lumber in contact with concrete.
Narra Equivalent /Imported Pine Wood	For millworks coated with stain for decking, sidings/partition wall, handrails, railing and wood accents or as indicated on Drawings. Termite & weather proof. Use Matimco-Weatherwood
Tanguile	For interior door framing as indicated on Drawings, ceiling moulding, door framing and other framing lumber requirements. Termite proof. Use Matimco-Matwood
Wood Preservative	Solignum, 5% solution of pentachlorophenol or as per wood supplier recommendation subject to Architects approval.
Steel Hardware	A-7 or A-36 (use galvanized/stainless steel or non-corrosive materials).
Machine Bolts	ASTM A-307
Lag Bolts	As specified by the Architect.
Nails/Screws	Common wire nail (except as noted), use stainless steel).
Joist Hangers (interior)	Simpson (verify compatibility with wood manufacturer) or approved equivalent by the Architect
Plywood	19mm thick for cabinets/shelves. 12mm/6mm thick marine/tanguile plywood for door facing.

2.3 OTHER MATERIALS

All other materials not specifically described but required for a complete and proper installation as indicated on the Drawings, shall be new, suitable for the intended use, and subject to the approval of the Architect.

PART 3 – EXECUTION

3.1 DELIVERIES

A. STOCKPILING: Stockpile all materials sufficiently in advance of need to ensure their availability in a timely manner for this work.

B. DELIVERY SCHEDULES: Make as many trips to the job site as necessary to deliver all materials of this Section in a timely manner to ensure orderly progress of the total work.

3.2 COMPLIANCE

Do not permit materials not complying with the provisions of this Section of these Specifications to be brought onto or to be stored at the job site; immediately remove from the job site all non-complying materials and replace them with materials meeting the requirements of this Section. Follow wood supplier recommended method of installation subject to Architects approval. Submit warranty for items requiring warranty.

3.3 Follow manufacturer recommendation, subject to Architects approval.

* * * END OF SECTION * * *

SECTION 2.9 – WATERPROOFING AND MOISTURE PROTECTION

PART 1 – GENERAL

1.1 **The contents of this section apply to all sections concerning waterproofing and dampproofing of this Division unless otherwise specified or modified. All concrete works to** be waterproofed shall be made watertight and flood tested for one week prior to application of any waterproofing material. If water leaks occur, the same shall be repaired and flood tested again to the satisfaction of the Architect.

1.2 SCOPE

Furnish all labor, materials, services and equipment required in the application of the waterproofing/dampproofing as indicated in the plans.

1.3 QUALITY ASSURANCE

A. QUALIFICATIONS OF INSTALLERS: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly experienced in the installation of the specified products and shall direct all work performed under this Section.

B. MANUFACTURER'S CERTIFICATION: Prior to start of installation of the work of this Section, secure a visit to the jobsite by a representative of the manufacturer of the waterproofing materials used, who shall inspect and shall certify:

1. That the surface to which waterproofing was applied was in condition suitable for that application;
2. That the materials installed complied in all respects with the requirements of this Section of these Specifications.
3. That the materials were installed in complete accordance with the manufacturer's current recommendations.

C. The General Contractor and the supplier/installer shall submit a joint statement or declaration duly notarized stating that both parties will jointly work together to avoid leaks that may be due to construction joint, honeycombs, air spots, defective concrete, poor cement, cracks of architectural nature and all other items of similar nature which may nullify the warranty of the concerned product/s. Leaks appearing during the warranty period shall be corrected in accordance with the

manufacturer recommendations. The submission to the Architect and Owners of the notarized statement is a prerequisite before the start of waterproofing works.

1.4 SUBMITTALS

A. MATERIALS LIST: Before any waterproofing material is delivered to the jobsite, submit to the Architect a complete list of all materials proposed to be furnished and installed under this portion of the Work.

B. MANUFACTURER'S CERTIFICATION: Upon completion of the Work, and as a condition of its acceptance, deliver to the Architect two copies of thecertification described in Article 1.03-B & C above, each copy signed by an officer ofthe firm manufacturing the waterproofing materials used.

1.5 PRODUCTS HANDLING

A. PROTECTION: Use all means necessary to protect waterproofing materials before, during and after installation. Protect from rain and physical damages. Store all materials away from sparks and flames. Protect the installed work and materials of allother trades.

B. REPLACEMENTS: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

PART 2 – PRODUCTS

2.1 WATERPROOFING

Refer to related section for specific brand and type. Equivalent brand shall be as approved by the Architect.

2.2 OTHER MATERIALS

All other materials, including protective coverings shall be only those recommended by the manufacturer of the waterproofing materials used and shall be subject to the approval of the Architect.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. INSPECTION

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that waterproofing may be installed in strict accordance with the original design and the manufacturer's recommendations.

B. DISCREPANCIES: In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

A. PREPARATION: Properly and thoroughly prepare all surfaces to receive waterproofing, strictly complying with the manufacturer's recommendations.

B. INSTALLATION: Install the waterproofing in strict accordance with the manufacturer's recommendations, covering all surfaces where waterproofing will be required to prevent penetration of moisture through the building shell; install the required protective covering over the waterproofing to prevent damage during backfill operations.

* * * END OF SECTION * * *

SECTION 2.10 – FLUID APPLIED AFTER WATERPROOFING

PART 1 – GENERAL

1.1 **WORK INCLUDED** Work of this Section shall include labor, material and equipment necessary for the completion of the fluid applied waterproofing required for areas indicated in the drawings and/or as mentioned in the summary of waterproofing.

1.2 **QUALITY ASSURANCE** Refer to Section 2.11.

1.3 **SUBMITTAL** Refer to Section 2.11.

All manufacturers/suppliers of waterproofing must submit a joint declaration, duly notarized, from the General Contractor and Waterproofing Contractor/Supplier of waterproofing material. This joint declaration shall state that their teams will work together to avoid leaks that may be due to construction joints, honeycombs, air spots, defective concrete, poor cement, cracks of architectural nature and all other items of similar nature which may nullify the warranty of the waterproofing material.

1.4 **PRODUCT DELIVERY, HANDLING AND STORAGE**

A. Waterproofing shall be delivered to the site in the original sealed container or package bearing manufacturer's name and brand designation.
B. Materials stored on jobsite shall be protected from weather, moisture, and extreme temperature. Use all means necessary to protect waterproofing materials before, during and after installation and to protect the installed work and materials of all othertrades.
C. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.5 **GUARANTEE**

5 Years (without concrete toppings) or 10-15 years (with concrete toppings) against Failure of materials but not to include failure of substrate damages due to misuse or Abuse or force majeure.

A. The Contractor has properly applied waterproofing to prevent leaks at construction joints.

B. The Contractor shall repair all cracks of structural nature that may arise appearing within the warranty period.

C. The Contractor will chip off all honeycombed concrete, rout and replace these with sound concrete prior to the application of waterproofing.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. The drawings and specifications are based on catalog data, specifications and products of Castle Waterproofing.

B. AREAS OF APPLICATION: For areas above grade requiring waterproofing such as toilets and as indicated on the drawings.

C. SUBSTITUTION

1. Other brands and manufacturers are subject for written approval of the Architect.
2. Supporting technical data, samples, published specifications and the like must be submitted for comparison.
3. The Contractor shall warrant that proposed substitutions, if accepted, will provide performance equivalent to the materials specified herein.

2.2 MATERIALS

DESCRIPTION: Fluid applied waterproofing with excellent flexibility, strong cementing power and high-solid content. Alkaline resistance, non-toxic and non-flammable. Clogs micro pores of concrete surfaces. Castle Waterproofing.

PRODUCT PROPERTIES

Appearance and colour	: Cream-colored ropy liquid
Adhesion to surface	: 18kg/cm2
Pulling-resistant force	: 29kg/cm2
Tensibility ratio	: Above 450%
Permeability Test	: 13.7 mg/cm2
Main Content	: Multi-copolymerized resin
Viscosity (C.P.S.)	: 25,000
Odour Characteristic	: Mild Acrylic
Ph	: 5-6
Proportion	: 1.2

Electric Charge	: None Vapour
Melting Point	: ~0 Degree Celcius
Boiling Point	: ~100 Degree Celcius
Solubility in Water	: Dispersible
M.F.T.	: 1.2-2.0g/m

2.3 OTHER MATERIALS

Other materials not specifically mentioned but is necessary for the completion of the waterproofing system, including protective coverings, shall be only those recommended by the manufacturer of the waterproofing materials used and shall be subject to the approval of the Architect.

PART 3 – EXECUTION

3.1 Follow manufacturer's recommended surface preparation and method of installation.

3.2 SURFACE CONDITIONS: Refer to Section 2.11, Waterproofing

3.3 INSTALLATION: Refer to Section 2.11

3.4 BASIC REQUIREMENTS

A. Waterproofing material must be applied to a clean, dry, dust-free concrete surface.
B. All curing compounds must be removed prior to application.
C. Any material that retards penetration should be removed.
D. Do not apply in wet weather condition.
E. This material is suitable for (-) negative pressure applications (3 kg./cm2) And (+) Positive pressure application (5 kg./cm2) such as the inside face of a basement retaining wall.

3.5 RATES OF APPLICATION:

A. Normal: 1 gallon (PME-901) to 35 square meters on average (single coat) 1 gallon (PME-202) to 5 square meters on average (2 Coats)
B. Smooth, dense surface: 1 gallon (PME-901) to 40 square meters on average (single coat) 1 gallon (PME-202) to 6 square meters on average (2 Coats)

C. Rough, porous surfaces: 1 gallon (PME-901) to 30 square meters on average (single coat) 1 gallon (PME-202) to 4 square meters on average (2 Coats)

D. Cracked areas: Rectification of all cracks before application of single coat of primer.

E. Pme-901(Depends on porosity of the concrete) 2-3 coasts of top-coat Pme-202

3.6 METHOD OF APPLICATION:

A. Cleaning the area to be waterproof. Removed all traces of water, dirt, protruding materials, and other contaminants.

B. Areas to receive waterproofing should be dried prior to priming.

C. Application of PME 901 as primer, by paint brush or roller brush. Drying time would take 30-40mins., depending on the condition of the surface before applying the 1st coat of PME 202 (waterproofing film).

D. Application of PME 202 waterproofing film by paint or roller brush. 40mins-1hr. drying time before applying the 2nd coat of PME 202.

E. Application PME202 as 2nd coat. (Application of 3rd & 4th coat if necessary or if required).

F. After final coat of PME-202 Dried First (2-3 days).

G. Flood testing after the application of waterproofing for 24 hrs.

* * * END OF SECTION * * *

SECTION 2.11 – UNDERSLAB AND ROOF INSULATION

PART 1 – GENERAL

1.1 SCOPE

Furnish all labor, materials and equipment necessary for the completion of the underslab and roof insulation works as indicated in accordance with the drawings.

1.2 QUALITY ASSURANCE

A. QUALIFICATIONS OF INSTALLER: Provide at least one person who shall be present atall times during execution of this portion of the work and who shall be thoroughly experienced in the installation of the specified products and shall direct all work performed under this Section.

B. B. MANUFACTURER'S CERTIFICATION: Prior to start of installation of the work of this Section, secure a visit to the jobsite by a representative of the manufacturer of the underslab and roof insulating material used, who shall inspect and shall certify:
   1. That the surfaces to which the insulation was applied were in condition suitable for the application.
   2. That the materials installed complied in all respects with the requirements of this Section of these specifications.
   3. That the materials were installed in complete accordance with the manufacturer's current recommendations.

1.3 COMPLIANCES

A. ASTM C 177 (Thermal conductivity)
B. ASTM E8 (Fire rating)
C. ASTM C 384 (Sound absorption)
D. R-Value equivalent to (min) 0.676m² K/W – 2.70m² K/W

1.4 SUBMITTALS

A. SHOP DRAWINGS: Shop drawings shall include sections, details ad plan showing roof slopes, control joints, expansion joints, venting systems and supporting construction

for roof decks. Shop drawing shall be submitted and approved prior to delivery of materials to the project site.

B. INSTALLATION INSTRUCTIONS AND TECHNICAL LITERATURE: Underslab and roof insulating material manufacturer's installation instructions and technical literature on compressive strength, oven dry density and coefficient of heat transmission shall be submitted and approved.

C. MANUFACTURER'S CERTIFICATES OF CONFORMANCE OR COMPLIANCE: Furnish a written statement from the insulating material manufacturer certifying that materials for this project are chemically and physically compatible.

1.5 DELIVERY AND STORAGE

A. Deliver all materials to the building site in original unopened, undamaged packages or containers, or approved bulk handling equipment, with manufacturer's brand name and contents clearly identified.

B. Protect materials against dampness during shipment and after delivery. Store materials under cover and off the ground in well-ventilated areas where they will not be exposed to extreme changes of temperature and humidity and in a manner to prevent deterioration or intrusion of foreign substances. Keep all materials dry until ready for use. Metal components shall be protected from rusting.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. MANUFACTURER: Rockwool or approved equivalent.

B. SUBSTITUTION

1. Other brands and manufacturer are subject for written approval of the Architect.
2. Supporting technical data, samples, published specifications and the like must be submitted for comparison.
3. The Contractor shall warrant that proposed substitutions, if accepted, will provide performance equivalent to the materials specified herein.

2.2 INSULATION

A. DESCRIPTION: Lightweight, flexible and resilient insulation material, made of long- glass wool bonded with a thermosetting resin to form a semi-rigid fiberglass insulation. Insulation may be provided faced with a reflective aluminum foil vapour barrier.

B. USES: Use to insulate the underside of roof and concrete roofing decks.

C. DIMENSION

1. Width and Length: 1200mm x up to 30m.
2. Thickness 25mm, 50mm and 75mm. Refer to drawings for specific thickness used.
3. Density should 32 kg/m³ to 48 kg/m3.

D. PERFORMANCE CHARACTERISTICS

1. ABSORPTION: When a dry specimen is placed in conditions of 95% relative humidity at 50°C (120°F) for 96 hours, moisture absorption is less than 0.2% by volume.
2. ALKALINITY: pH9, slightly alkaline, (pH7 is neutral)
3. SOUND ABSORPTION COEFFICIENT: ASTM C 384-58.

THICKNESS FREQUENCY	25mm thk (1 inch)	50mm thk.(2 inches)
125 Hz	0.14	0.17
250 Hz	0.11	0.26
500 Hz	0.33	0.72
1000 Hz	0.58	0.85
2000 Hz	0.78	0.82

4. EARLY FIRE HAZARD: Early Fire Hazard test of AS.A30, Part III, 1970.

2.3 ACCESSORIES

A. HANGERS: Insulation hangers shall be manufactured of 1-1/2" x 1-1/2" mechanical clip of Ga. 26 galvanized iron plate and a 12 gauge wire spindle (3" long for 2" insulation; 4" long for 3" insulation). The self-locking washer shall be 1-1/8" diameter Ga. 26 galvanized iron plate.

B. ADHESIVE: Hanger adhesive shall be manufactured to meet requirements set forth in Commercial Standards CS 181-52.

C. TAPE: Insulation tape shall be manufactured of .002 inch thick aluminum foil 2" wide.

2.4 OTHER MATERIALS: Other materials not specifically mentioned but is necessary for the completion of the underslab insulation work system shall be provided by the Contractor with prior approval of the Architect.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. INSPECTION

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that all underslab insulation work may be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

B. DISCREPANCIES
1. In the event of discrepancies, immediately notify the Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 APPLICATION

A. Make sure the surface area is clean and dry.

B. Cut to shape with a sharp knife.

C. Apply spot of adhesive with putty approximately the size of a small egg directly on the concrete slabs and adhere mechanical pin or insulation hanger with a spindle longer than the insulation thickness at 600mm centers in both directions and 400mm from the perimeter of the batt or blanket.

D. Install mechanical clips at 100mm away from each corner of the insulating material. For the standard size of 1200mm x 1200mm, four (4) pieces of mechanical pins should be consumed. Impale the fiberglass insulation on mechanical pin and secure theinsulation with clips to the pins.

E. If fiberglass insulation is faced with reflective aluminum foil vapor barrier, seal all joints with 3” wide aluminum pressure sensitive tape to prevent transmission of water vapor.

F. Allow adhesive to dry at least 48 hours.

G. Apply insulation with aluminum vapor barrier exposed by directly impaling the insulation through the mechanical pin and securing the insulation with clips to the pins.

H. All vapor barrier edges shall be taped with a 2-inch thick pressure sensitive aluminum tape to prevent any incursion of moisture into the glass fiber insulation.

I. When pipes, conduits and ducts pass through under desks areas to be insulated, the insulation shall be cut with suitable trimming equipment to fit snugly around such obstruction.

* * * END OF SECTION * * *

SECTION 2.12 – CANOPY GLAZING

PART 1 – GENERAL

1.1 SCOPE

Section includes canopy glazing for Exterior Café.

1.2 REFERENCES

A. Aluminum Association (AA):

- AAM12C22A41 – Anodized Plush Finish
- AAM12C22A32/A34 – Color Anodized – Class II Color Anodic Finish'

B. ASTM International

- ASTM B209 – Standard Specification for Aluminum and Aluminum Alloy Sheet
- ASTM C1048 – Standard Specification for Heat-Treated Flat Glass Kind HS, Kind FT Coated and Uncoated Glass
- ASTM E331 – Standard Test Method for Water Penetration for Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- ASTM E773 – Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.
- ASTM E774 – Standard Specification for the Classification of the durability of Sealed Insulating Glass Units.

C. American Welding Society (AWS): AWS Structural Welding Code.

1.3 SUBMITTALS

A. **Product Data:** Manufacturer's data sheets on each product to be used, including

- Preparation of instructions and recommendations
- Storage and handling requirements and recommendations.
- Indicate materials, finishes and installation procedures recommended by manufacturer.
- Indicate compliance with specified design criteria.
- Indicate compliance with performance requirements
- Include product specific glazing details

A. **Shop Drawings:**

- Indicate material types, gauges and finishes, fabrication details and installation details.

B. Show glazing types, methods of attachment and thermal movement provisions.

C. Indicate compliance with specified structural design criteria.

- Submit design calculations shall bear seal of a professional engineer licensed in the country in which the skylight is to be installed.
- Certify that engineer has reviewed shop drawings.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150mm) square, representing actual product, color and patterns.

F. Provide field test for leaks.

1.4 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS: Canopy glazing manufacturer shall have a minimum of ten years-experiences in the design, fabrication and installation of custom aluminum canopy glazing systems.

B. INSTALLER QUALIFICATIONS:

- Installer shall be trained and approved by manufacturer.
- Installer shall have five years-experience with canopy glazing type, size and complexity.

C. MOCK-UP: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

- Finish areas designed by Architect.
- Do not proceed with remaining work until workmanship, color, and sheen are approved by the Architect.
- Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent–based materials, and materials used with solvent – based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PRODUCT CONDITIONS. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer's absolute limits.

1.7 WARRANTY

Performance Warranty: Provide manufacturer's written warranty covering skylight work. Warranty shall cover defective materials, workmanship and performance. Warranty shall be limited to repair or replacement of work described in this section and shall not provide for repair or replacement of work by others.

PART 2 – PRODUCTS

Note: Dimension, fabrication and installation of Skylight shall be based on the actual measurements and conditions of the site. Verify Manufacturer's standard details. Submit shop drawings and sample for Architect's approval.

2.1 CANOPY GLAZING. Shall be 12mm thick tempered glass with heat proof anti UV film.

2.2 Submit shop drawings, ACP sample swatches, paint swatches (as per Architect's specification) for Architect's approval. Refer to Structural Drawings and Architectural Details for required sizes, layout and design.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

Install in accordance with manufacturer's instructions.

3.4 CLEANING

A. **General Cleaning:** Installer shall remove all protective coverings from frames and domes and shall leave installation free from debris and sealant markings.

B. **Final Cleaning:** Final cleaning in accordance with manufacturer's recommendations. Cleaning instructions shall be located on manufacturer's label.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-ups repairs or replace damaged products before substantial completion.

3.6 FIELD WATER TEST

Field test for water leakage in accordance with AAMA 501.2, in areas as indicated on the contract drawings. There shall be no uncontrolled water leakage as defined in AAMA 501. Testing is to be performed by the manufacturer's authorized personnel. Water supply and pressure at the test specimen is to be provided by the General Contractor.

* * * END OF SECTION * * *

SECTION 2.13 – CAULKING AND SEALANT

PART 1 – GENERAL

1.1 SCOPE: Construction sealants as required for areas as indicated in the drawing.

1.2 RELATED WORK DESCRIBED ELSEWHERE

A. Glass and Glazing

B. Composite Building Panel

1.3 QUALIFICATIONS

A. Before specified material or system is installed, the manufacturer, or his authorized agent, shall inform the Architect in writing, that he has familiarized himself with the Contract Documents, environmental conditions, and intended occupancy for this specific project and that his material or system is appropriate to the conditions to be encountered therein.

B. Before specified material or system is installed, the manufacturer shall inform the Contractor, in writing, that he is familiar with the quality of workmanship of theinstaller and approves him as the installer of his material or system for this specific project.

1.4 SUBMITTALS

A. PROJECT DATA: Submit manufacturer's descriptive data which described materials, application and limitation of sealants.

B. JOINT DIMENSION RECOMMENDATION: Submit descriptive data describing joint dimension and limitations in size of joints.

C. BROCHURES: Submit Caulking and Sealant Manufacturer's Instructions for Application and Priming.

D. SAMPLES: Submit upon request from the Architect.

1. Cured sealant after color selection has been made from the Manufacturer's color range brochure.
2. Filler back-up material for sealant.
3. Caulking material after color selection has been made from the manufacturer's color range brochure.

E. TEST REPORTS: Submit the following test report from the sealant manufacturer before any actual application.
   1. Adhesion Test – to check whether the sealant will adhere to the substrates.
   2. Compatibility Test – to check whether the accessories like backing rod, gaskets, setting blocks, etc., are compatible with the sealant.
   3. Non staining Test – to check whether the sealant will stain sensitive substrates like granite, etc.

1.5 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Deliver materials to the Project Site with manufacturer's label intact and legible. Where materials are factory packaged, same shall be delivered in the original sealed containers.
B. Handle specific item and/or its components in such manner as to prevent damage or deformation. Properly protect same from harmful elements or damage by other work prior to its incorporation into the Project.
C. Store in a cool, dry place at room temperature, preferably at 75°F + - 5°F. Materials with expired shelf life shall not be used.

1.6 PROTECTION OF EXISTING WORK

A. Protect adjacent work against damage by specified work.
B. Work adjacent to joints shall be cleaned free of smears of caulking or sealant compound as work progresses. Surfaces that is difficult to clean shall be protected with masking tape.
C. Finished work that is readily subject to damage by subsequent work or environmental conditions shall be protected by the Installer immediately following the installation thereof.
D. Damaged work, as determined by the Architect, shall be repaired or replaced to the Architect's satisfaction.

1.7 WARRANTY

A. All caulking and sealant work shall be warranted, in writing, against all defects of materials and application for the period of ten (10) years after date of acceptance. A performance warranty should be submitted by sealant manufacturer upon completion of the project together with the warranty from the fabricator/applicators.

B. Any failure that may occur within this period due to defective materials and/or application shall, upon written notice of same, be repaired or replaced with proper materials and/or labor, as approved by the Architect at no additional cost to theOwner.

1.8 FIELD QUALITY CONTROL

A. Facilities shall be provided by the Contractor as needed for the proper inspection of specified work by the Manufacturer and the Architect.

B. Improper workmanship or selection of materials, as determined by the Manufacturer or the Architect shall be corrected and/or replaced at no additional cost to the Owner.

1.9 CONDITIONS OF WORK-IN-PLACE

Examine work-in-place on which specified work is in any way dependent. Report, in writing, to the Architect any defect which may influence satisfactory completion and performance of specified work. The absence of such notification shall be construed as acceptance of work-in-place.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Dow Corning or its approved equivalent.
   1. Glass and Glazing
      a. Dow Corning 791: Silicone weather proofing sealant – for general glazing.
      b. Dow Corning 790: Silicone Building Sealant – for use on masonry joints.
   2. Glazed Curtain Wall System
      a. Dow Corning 791: Silicone weather proofing sealant – for general glazing.
      b. Dow Corning 795: Silicone Building Sealant – for structural glazing applications.
   3. Composite Building Panels
      a. Dow Corning 791: Silicone building sealant – for general glazing.
      b. Dow Corning 991: High Performance Silicone Sealant – for applications requiring non staining characteristics on composite panels.

B. SUBSTITUTION
   1. Other brands and manufacturer are subject for written approval of the Architect.
   2. Supporting technical data, samples, published specifications and the like must be submitted for comparison.

3. The Contractor shall warrant that proposed substitution, if accepted, will provide performance equivalent to the materials specified herein.

PART 3 – EXECUTION

3.1 LOCATION

A. Caulking compound shall be installed in interior joints, including joints around pipes, conduits and ducts which penetrate interior walls and partitions and all other locations so indicated on the drawings.

B. Sealant compound shall be installed in the following locations:
   1. All exterior joints where air, water, or sound could penetrate.
   2. Control and expansion joints in interior or exterior masonry.
   3. All other locations indicated to be sealed.
   4. For joints on walls requiring fire-rating, sealant must be fire-rated.

3.2 APPLICATION: GENERAL

A. Do not delay exterior sealant in damp or rainy weather or until surfaces have thoroughly dried from the effects of such weather.

B. Install specified material only after preparatory work has been approved and when adjoining work is in proper condition to receive it. Apply to masonry joints before they have been treated with a water-repellant or masonry preservative.

C. FINISHING: Finish sealant in horizontal and vertical surfaces slightly concave, using tool to strike off excess material and properly shape bead.

3.3 JOINT PREPARATION

A. GENERAL: All joint surfaces must be dry and thoroughly clean. At Contractor's option, sealant filler back-up material may be placed in exterior joint flush with exposed surfaces to avoid early contamination of joint prior to proper scheduling for sealing of joint and as a temporary weather seal. When sealing of joint takes place, thefiller shall be recessed into the joint to the proper depth as herein specified. Any damaged back up material shall be replaced prior to sealing.

B. B. MASONRY, CONCRETE OR OTHER POROUS SURFACES: Remove all loose particles, dirt, paint, foreign matter, or curing compound by sand-blasting or other approved means and prime. Exposed aggregate of concrete surfaces to be sealed.

C. METAL OR OTHER SMOOTH SURFACES: Remove corrosion by wire brush or chemical cleaners or other approved method. Wipe surface with clean cloth soaked in solvent, such as Tuluol or Methyl-Ethyl-Kethone or other approved solvent, and then wipe surface dry with clean, dry cloth while surface is still wet with solvent.

D. PRIMING: Joint interfaces to which caulking and sealant compounds are applied shall be primed when recommended by the Compound Manufacturer. Primers shall be applied in strict accordance with the Caulking or Sealant Manufacturer's latest printed instructions and shall be allowed to cure before installation of caulking and sealant compound.

3.4 JOINT DIMENSION

A. GENERAL: Install backing, of type and size specified, at proper depth in joint to provide specified joint dimension. Caulking or sealant compound shall not be applied without backing. Install bond-breaking tape where back-up is a solid material. Tubular or rod stock backing shall be rolled into the joint to avoid lengthwise stretching and shall not be twisted or braided.

B. CAULKING JOINTS: Depth of caulking compound shall be from 1 to 2 times joint width. Joint width shall be not less than ¼-inch nor more than ¾ inch.

C. SEALANT JOINTS: No sealant contacting surfaces shall be less than ¼-inch. Sealant shall be ¼-inch deep for ¼-inch wide joints, 3/8-inch deep for 3/8-inch to ½-inch wide joints, and ½-inch deep for ½-inch to 1-inch wide joints, unless indicated otherwise by the manufacturer. Force sealant into joint by tooling to insure full contact with side and backing of joint.

3.5 INSTALLATION

A. Installation shall be performed in strict accordance with the Manufacturer's latest printed instructions. Caulking or sealant compound shall be forced into opening with hand or air-powered caulking gun and tooled so as to fill void completely. Gun shall have nozzle of proper size to fit joint.

B. Take care not to smear adjoining surfaces with caulking or sealant compound. Finish exposed butt joint surfaces slightly concave by toning unless otherwise indicated or directed by the Architect.

C. Sealant shall not be allowed to remain on exposed face of surfaces.

3.6 REPAIR OF DEFECTIVE WORK

Restore all defective or damaged work to initial condition. Defective or damaged items and/or components which cannot be repaired or restored to initial condition shall be removed and replaced at no additional cost to the Owner.

3.7 CLEANING

A. At the end of each day, installer shall remove form the Project Site all accumulated trash generated by his work.

B. Upon completion of specified work, thoroughly clean all surfaces of sealing materials, masking tape, etc.

* * * END OF SECTION * * *

SECTION 2.14 – DOORS AND WINDOWS

PART 1 – GENERAL

1.1 **SCOPE:** The contents of this section apply to all sections of this Division unless otherwise specified or modified.

1.2 **QUALIFICATIONS**

A. Before specified material or system is installed, the manufacturer, or his authorized agent, shall inform the Architect, in writing, that he has familiarized himself with the Contract Documents, environmental conditions, and intended occupancy for this specific project and that his material or system is appropriate to the conditions to be encountered therein.

B. Before specified material or system is installed, the manufacturer shall inform the Architect, in writing, that he is familiar with the quality of workmanship of the Installer and approved him as the Installer of his material or system for his Specific Project.

1.3 **PRODUCT DELIVERY, HANDLING AND STORAGE**

A. Deliver materials to the Project Site with manufacturer's labels intact and legible.Where materials are factory-packaged, same shall be delivered in original sealed containers.

B. Handle specified item and/or its components in such manner as to prevent damage or deformation. Properly protect same from harmful elements or damage by Other Work prior to its incorporation into the Project.

C. Store in inside areas where products will not be subjected to moisture or to temperature or humidity extremes. Store doors upright, in a protected dry area, at least one inch off the ground and with at least ¼ inch air space between individual pieces. Protect all pre-finished and hardware surfaces as required.

1.4 **PROTECTION**

A. The Installer shall protect any existing work subject to damage during installation of specified work.

B. Finished work that is readily subject to damage by subsequent work or environmental conditions shall be protected by the Installer immediately following the installation thereof.

1.5 FIELD MEASUREMENTS

Fabricator of custom work shall make measurements in field to verify or supplement dimensions indicated and be responsible for accurate fit of specified work.

1.6 FIELD QUALITY CONTROL

A. Facilities shall be provided by the Contractor as needed for the proper inspection of all specified work.

B. Improper workmanship, as determined by the Architect shall be corrected and replaced at no additional cost to the Owner.

1.7 CONDITIONS OF WORK-IN-PLACE

Examine work-in-place on which specified work is in any way dependent. Report, inwriting, to the Architect any defect which may influence satisfactory completion and performance of specified work. The absence of such notification shall be construed as acceptance of work-in-place.

1.8 REPAIR OF DEFECTIVE WORK

Restore all defective or damaged work to initial conditions. Defective or damaged items and/or components which cannot be repaired or restored to initial condition shall be removed and replaced at no additional cost to the Owner.

1.9 CLEANING

A. At the end of each day, Installer shall remove from the Project Site all accumulated trash generated by his work.

B. Upon completion of specified work, thoroughly clean all surfaces of dirt or otherforeign materials in accordance with the manufacturer's latest printed directions.

1.10 SUBMITTALS

Submit shop drawings, brochures, and installation instructions. Clearly show details of each frame type, elevation of each door type, conditions at openings with various wall

thickness and materials, typical and special details of door construction, method of assembling section; location, reinforcement and installation requirements for hardware; size, shape and thickness of materials.

1.11 GENERAL REQUIREMENTS

A. WOODEN DOOR JAMBS: shall be treated and free from all wood defect. Finish

B. METAL DOOR JAMBS: shall be Ga. 16 galvanized iron in automotive lacquer paint finish

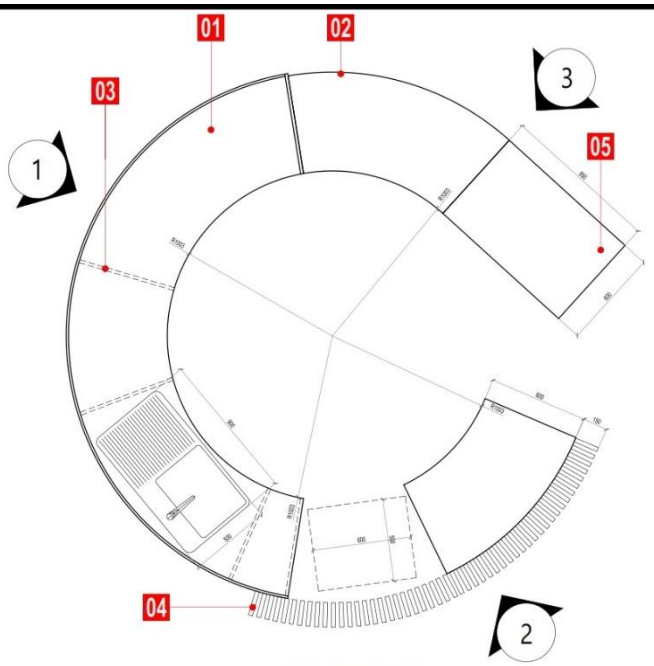
C. All exterior doors must be “Storm-Proof”, swing out and weather resistant. Sections of storm-proof doors must be submitted to the Architect for approval.

D. FIRE DOORS: All doors designated to be fire rated must conform to the provisions of the Fire Code of the Philippines. The fire protection rating of any fire door shall be as measured in accordance with the appropriate internationally accepted standard.

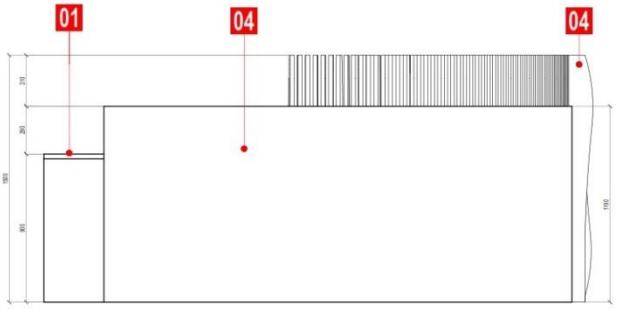
E. DIMENSIONS, SIZES & LOCATION: Refer to drawings.

* * * END OF SECTION * * *

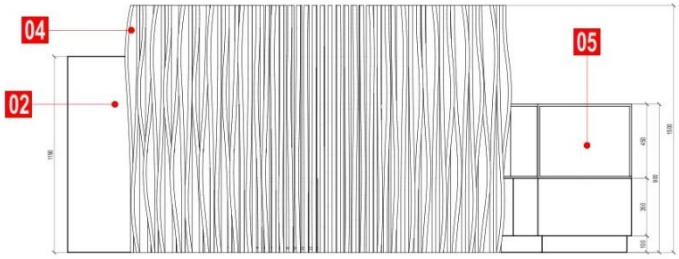
SECTION 2.15 – OPEN KITCHEN



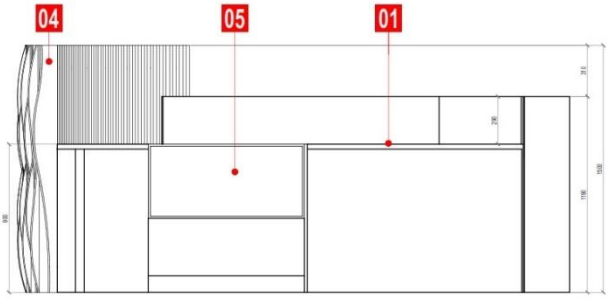
PLAN VIEW



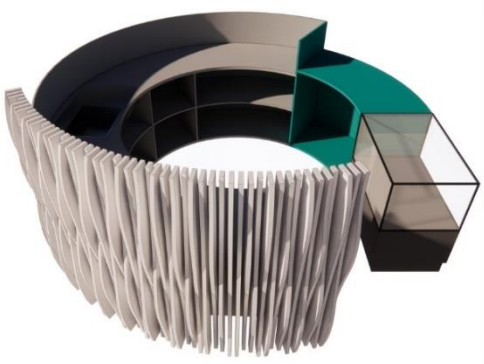
FRONT VIEW - 1

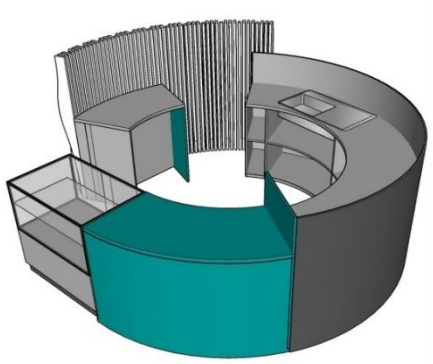


FRONT VIEW - 2



FRONT VIEW - 3





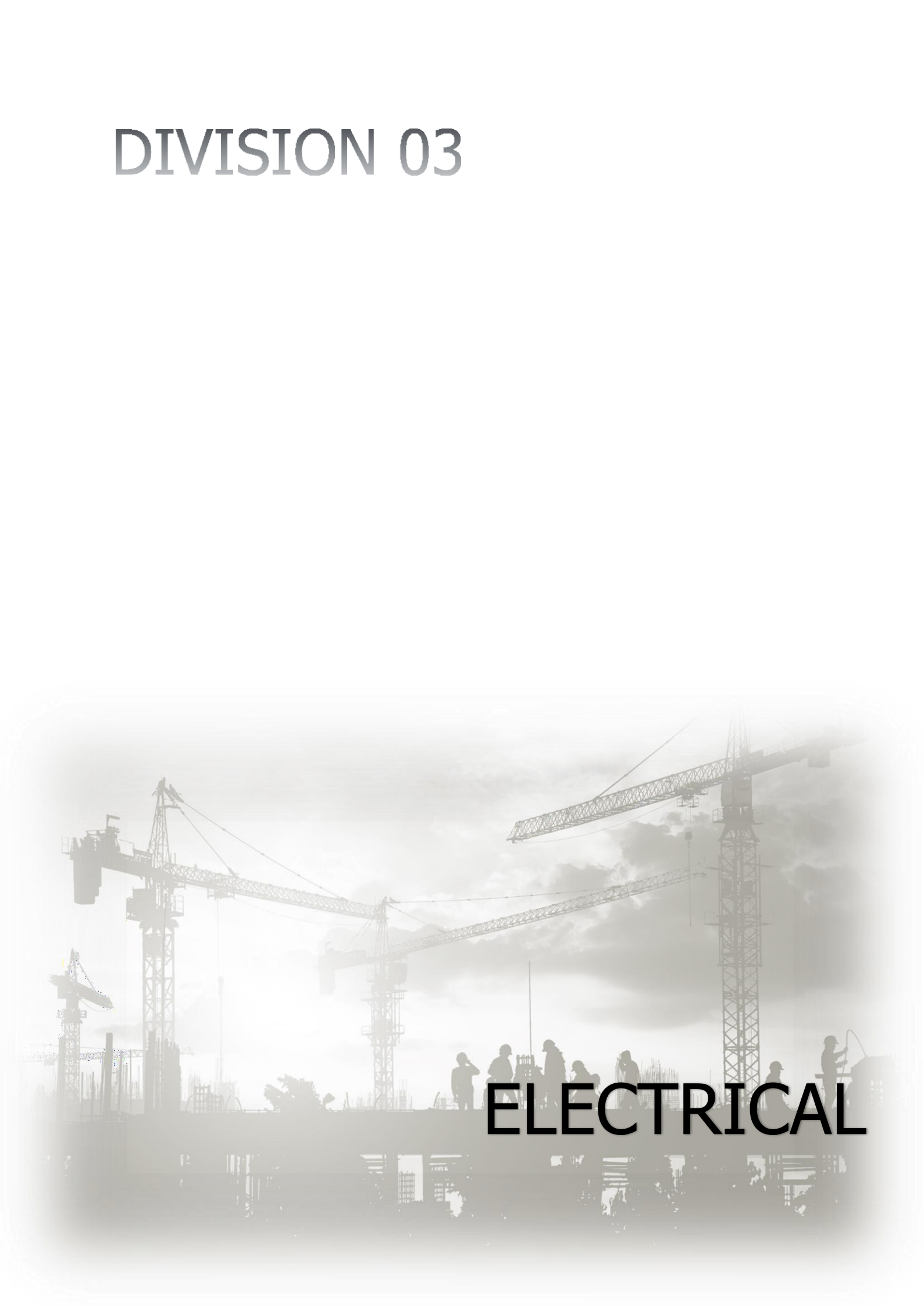
TECHNICAL SPECIFICATIONS

01 - 30mm THK. MARINE PLYWOOD COUNTER TOP IN LAMINATED FINISH
02 - ⅛" THK. PLYWOOD SIDINGS IN LAMINATED FINISH
03 - ¾" THK. PLYWOOD PARTITION IN LAMINATED FINISH
04 - 25mm THK. PLYWOOD FINS IN LAMINATED FINISH
05 - 600mm x 900mm CAKE DISPLAY GLASS SHELF

3 / A-9.03 DETAILED DESIGN OF OPEN KITCHEN
SCALE 1:15 M

* * * END OF SECTION * * *

DIVISION 03



ELECTRICAL

SECTION 3 – ELECTRICAL SYSTEM

PART 1 – GENERAL

1.1 Drawings and Specifications

A. The contract drawing and specifications are complementary to each other, any labor or materials called for by either, whether or not called for by both, if necessary for the successful operation of any of the particular type of equipment shall be furnished and installed without additional cost to the Owner.

B. All dimensional locations of equipment, boxes, outlets, risers and pipes chase shall be verified on the architectural drawings and manufacturer's catalogue.

1.2 Intent

A. It is not intended that the drawings shall show every pipe, fitting, boxes and equipment. All such items whether specifically mentioned or not, or indicated on the drawings, shall be furnished and installed if necessary to complete the system inaccordance with the best practice of the electrical trade and to the satisfaction of the Architect, the Engineer and the Owner.

1.3 Site Investigation

A. The Contractor is required to visit the site and to ascertain himself as to the local conditions and facilities that may affect his work. He will be deemed to have done this before preparing his proposal and any subsequent claims on the ground of inadequate or inaccurate information will not be entertained.

PART 2 – PRODUCTS

2.1 Conduit and Fittings

A. Intermediate Metallic Conduit (IMC) shall be NEMA Standard trade sizes, UL approved or equivalent to Smart tube/Panasonic Brands.

B. B. Polyvinyl Chloride Conduit (PVC) shall be standard trade size, heavy wall, manufactured to NEMA TC-2 type 40, rated 90 deg. Celsius cable as manufactured by Cron, Moldex or Atlanta Brands.

C. Electrical Metallic Tubing (EMT) shall be standard size, UL approved or equivalent to Panasonic/Smart tube Brands.

D. Flexible Galvanized Steel Conduit shall be standard sized, UL approved to Panasonic or approved equal.

E. Flexible liquid tight conduit shall be standard sizes, UL approved or equivalent.

F. Flexible conduit shall be hot-dip galvanized mild steel 1.80 meters in maximum length per run. Locally manufactured is not acceptable.

G. No conduits shall be used in any system smaller than 15 mm ø (½ inch ø) electric trade size, nor shall have more than four (4) 90 degree bends in any one run and where necessary, pull boxes of proper size shall be provided.

H. No wire shall be pulled into any conduit until the conduit system is completed in all details, in the case of concealed work until all rough masonry plastering has been completed, and in the case of exposed work until the conduit work has been completed in every detail.

I. All pipes and fittings on exposed work shall be IMC and be secured by means of malleable C-clamps or "C-channel" trapeze hanger with 10 mm ø round bars fastened to slab by stud and nut "Hilti". When running over concrete surface, the screws shall be held in place by means of expansion sleeves. All pipes on exposed work shall be runat right angles to and parallel with the surrounding walls. No diagonal runs shall be allowed. Where necessary conduit fittings shall be used. Conduits in all cases shall be run perfectly straight and true, satisfactory to the Engineer. Conduits shall be supported at 1.50 meter interval maximum.

2.2 Junction and Pull Boxes

A. Junction and pull boxes shall be gauge #16 steel, galvanized shall be provided asindicated or as required for facilitating the pulling of wires and cables. Pull boxes in finished places shall be located and installed with the permission and to the satisfaction of the Architect and Engineers.

B. All junction and pull boxes on exposed conduit work shall be provided with hubs for threaded pipe entry and covers provided with neoprene gaskets and as manufactured by "Fumaco" or " Anaco ".

2.3 Wires and Cables

A. All wires shall be copper, soft-drawn and annealed, shall be of 98% conductivity, shall be smooth and true of a cylindrical form and variation shall be within 1% of the actual size called for.

B. All wires and cables shall be as manufactured by “Phelps Dodge”, or “Philflex”.

C. Wires larger than 2.0 mm ø should be stranded.

D. Wires and cables shall be color coded. Color coding shall be provided for all feeders, branch and control wires. Colors shall be red for phase A, yellow for phase B, blue for phase C, white for neutral and green for grounding conductors.

2.4 Panels and Cabinets

A. Standard panels and cabinets, as much as possible shall be used and assembled on job. All panels shall be dead front construction, furnished with trims for flush or surface mounting as required. Cabinets shall be of code gauge steel with side gutter at least 100 mm wide and wider if necessary and has concealed hinges. The trim for all panels shall be finished in industrial gray enamel over a coat of rust inhibitor.

B. Panels and cabinets shall be as manufactured by “ GE ” or “LJ Industrial Fabrication”. Manufacturer’s shop drawings shall be submitted before manufacturing.

C. Lighting panels shall be equipped with branch air circuit breakers as required and mains as noted on plans or load schedule. All circuit breakers shall be “Square D”, “SCHNIEDER” or “GE”. Main circuit breaker shall be industrial type in center construction of the lighting panelboard.

D. Panelboard main bus work shall be ampacity rated to equal or exceed overcurrent protective device immediately ahead of it. All buswork shall be properly secured to withstand available short circuit forces at the location.

E. Distribution panels shall be equipped with two or three poles air circuit breakers of sizes, voltages ratings and interrupting capacity as called for on plans. All circuitbreakers shall be industrial type molded case circuit breakers.

F. All distribution and lighting panels shall be provided with permanent panel designation and directory. Submit sample for approval of Engineer/Architect prior to fabrication. Panel designation shall be similar to panelboard schedule and panel directory shall be provided with load designation, circuit number, breaker rating, sizeof wire and conduit.

2.5 Individual Breakers and Switches

A. Circuit breakers shall consist of a quick-make, quick-break type entirely trip-free operating mechanism with contacts, arc-interrupter, and thermal magnetic trip unit for each pole, all enclosed in a molded-phenolic case. The thermal-magnetic trip unit shall

provide time-delayed overload protection, and in case of overload or short circuit current in any one pole. Circuit breaker shall be trip indicating, with the tripped position of breaker handle midway between "ON" and "OFF" positions. A common internal trip mechanism shall be provided to all pole tripped operation of circuit breakers. Tie handle of circuit breakers for common trip is not acceptable.

B. Circuit breaker shall be molded case bolt-on type complying with Nema and UL standards. Plug-in type circuit breakers are not acceptable.

C. Circuit breaker shall be as manufactured by "Square D", Schneider" or "GE". All circuit breakers rated above 225 amperes shall have interchangeable trip units. Unless otherwise specified, minimum-interrupting capacity for all 230 volts circuit breakers shall be 10,000 amperes.

2.6 Panelboard buses

A. Support copper bus bars on bases independent of the circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping. Provide a separate multi-terminal ground bus marked with green strips along its front and bonded to the steel cabinet for connecting grounding conductors.

B. All busbar Shall be Tin plated with shrinkable color-coded tube. per phase

C. All Terminal Mechanical Terminal lugs shall be use 9AL/CU rated crimp type terminal.

2.7 Lighting Fixtures

A. The Contractor shall submit samples of all type of lighting fixtures for the approval of the Architect and the Engineer.

2.8 Wall Switches and Plates

A. Wall switches shall be rated with ampere and voltage ratings as required. Switches shall be flush mounting type and of the quiet type, spring operated. The type of switches shall be tumbler operation and the color, plating and appearance of wall plates shall be as selected by the Architect. Appropriate samples shall be submitted prior to the purchase of wall switches and faceplates. Switches and plates shall be as manufactured by "Panasonic" or "Bticino".

B. All utility boxes intended for switch devices shall be specially designed to receive the particular type of switch device to be mounted and should be deep enough to accept and fit the total number of conductors required as per drawings.

2.9 Wall Receptacles and Plates

A. Receptacle outlets shall be 16 Ampere, 250V, 3 prong, parallel grounding type. Locking type and other special purpose receptacle outlets shall be as indicated in the drawings. Wall receptacles and plates shall be as manufactured by “Panasonic” or “Bticino”.

B. Type and color of receptacle outlet and plates shall be as selected by the Architect. Appropriate samples of outlets and plates shall be submitted prior to purchase of devices.

C. All utility boxes intended for receptacle outlet devices shall be specially designed to receive the particular type of receptacle outlet device to be mounted and should be deep enough to accept and fit the total number of conductors required as per drawings.

PART 3 – EXECUTION

3.1 Installation

A. Electrical installations shall conform to the requirements of the Code and to the requirements specified herein.

B. The work throughout shall be executed in the best and most thorough manner to the satisfaction of the Architect and the Engineers, who will jointly interpret the meaning of the drawings and specifications and shall have power to reject any work and materials which in their judgement, are not in full accordance therewith.

C. The Contractor shall assume unit responsibility and shall provide the services of a qualified Licensed Electrical Engineer to supervise the complete installation of equipment and systems and who shall be available for conducting the final acceptance tests.

3.2 Conduit Installation

A. Unless indicated otherwise, conceal conduit within finished walls and ceiling. Install conduit panel parallel with or at right angles to ceilings, walls and structural members where located above accessible ceilings and where conduit will be visible after completion of project.

B. Conduit Support:

Support conduit by pipe straps, wall brackets fastened by machine screws, or threaded studs on concrete work. Do not weld conduits or pipe straps to steel structures. In partitions of light steel construction, use sheet-metal screws.

C. Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends or offsets with a hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of all obstructions.

3.3 Mounting Heights

A. Mount panelboards, circuit breakers and disconnecting switches so the height of the operating handle at its highest position will not exceed 1.83m from the floor.

3.4 Splices

A. Branch circuit splices shall be soldered or joined by the use of insulated splicing device (wire nut). All soldered joints shall be made mechanically strong before soldering and shall be carefully soldered without the use of acid then taped with rubber tape to a thickness equal to that of the insulation and cover it with two layers of friction tape.

B. Plastic tape may be used in lieu of rubber and friction tapes. Unless otherwise indicated on the drawings or specified number of conductors constituting a single circuit branch shall be connected directly to devices without the use of lugs, such as termination at lighting switches and plug receptacles, the wires shall be formed into clockwise loop to fit around the screws.

3.5 Field Tests

A. The Contractor shall provide all test equipment and personnel and submit written copies of all test results.

B. B. Field test reports for the following:

1. Insulation resistance or IR test shall be a minimum of 500 Mega ohms result
2. Voltage level tests
3. Continuity test
4. Phase sequence

3.6 Submittals

A. The Contractor shall submit the required submittals prior to start of work, issuance of notice to proceed and/or upon completion of the work.

B. Materials and equipment requiring samples, catalogue, data, shop drawings and manufacturer’s certification shall be as indicated in the specifications.

C. Material samples shall be fixed on 6 mm (¼ inch) plywood of sufficient size and fully labeled.

D. The Contractor shall, in a neat and accurate manner, finalize drawings on tracing paper. These drawings shall be submitted to Building Electrical Engineer for approval. Final acceptance will be withheld until receipt of the approved record drawings showing circuit runs and pull boxes with sufficient information for future rewiring, maintenance and identification. The final submittal of record drawings shall be in original and three (3) sets blueprints of "As-Built" drawings duly signed and sealed by a registered Professional Electrical Engineer of the Contractor. These approved final submittals shall become the property of the Building Administrator

3.7 Permits

A. The Contractor shall be responsible for securing all the required construction and operation permits and pay all the necessary fees thereof. Copies of all the permits, together with certificate of inspections shall be submitted to the Owner.

B. Only fees for the deposit and other receipted expenses shall be by the Owner. All other expenses shall be borne by the Contractor.

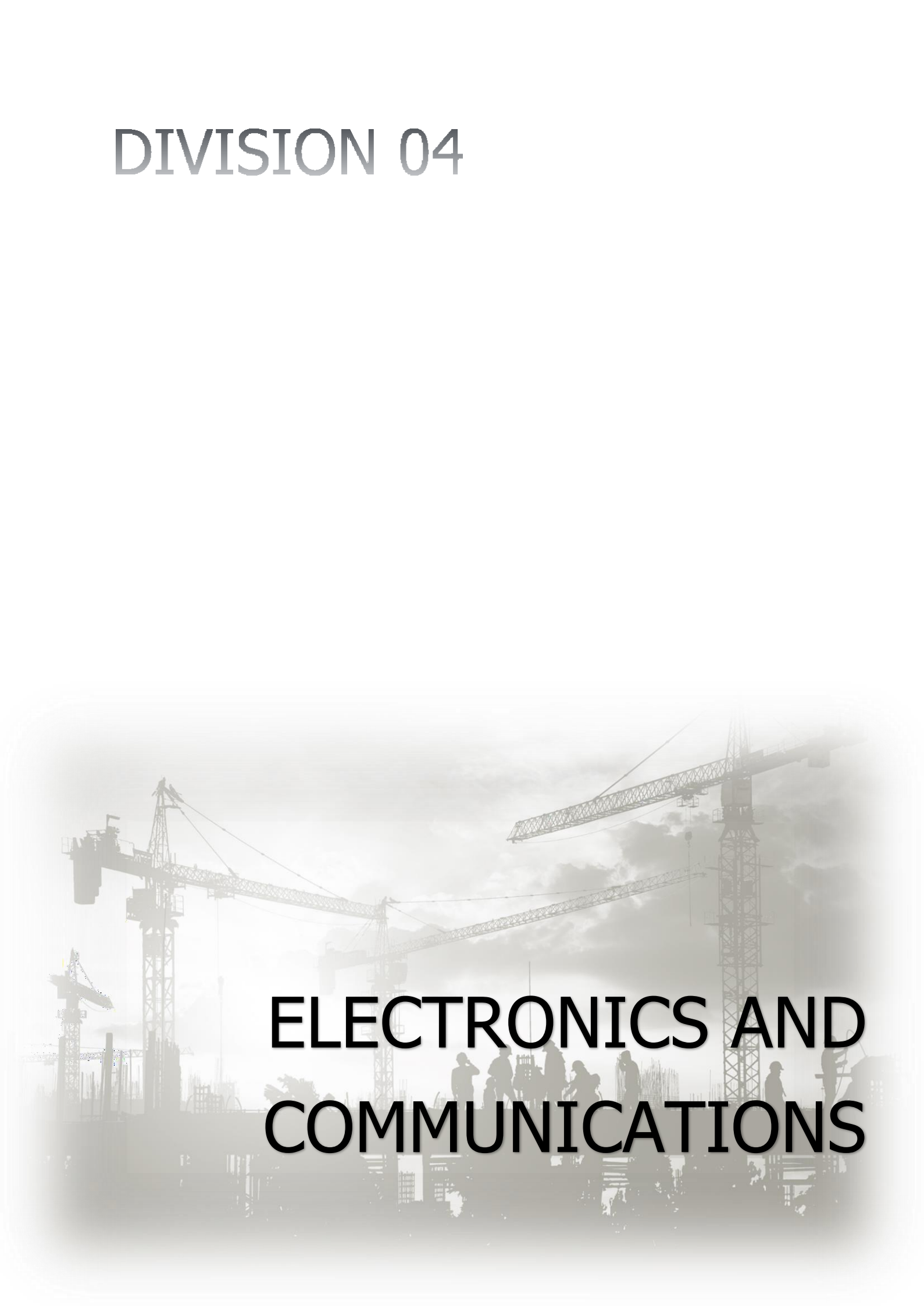
3.8 Materials

A. **Quality Assurance** – All materials to be used shall be new and shall conform to the reference codes and standards. Use of materials shall further be governed by other requirements, imposed on other sections of these specifications. Materials shall be subject to test necessary to their fitness if so requires.

B. **Alternate Materials** – Use of any material, not specified in these specifications may be allowed provided such alternate has been approved by the Architect and Engineer and provided further that a test, if required, shall be done by an approved agency in accordance with generally accepted standards.

* * * END OF SECTION * * *

DIVISION 04



ELECTRONICS AND COMMUNICATIONS

SECTION 4.1 – CATV SYSTEM

PART 1 – GENERAL

1.1 Description of Work

A. The work covered in this section shall include the supply, delivery, installation, testing, commissioning, and furnishing of all passive materials for the distribution and satisfactory operation of the cable TV system to be provided by a cable TV service Company.

B. The contractor shall provide the complete raceway system to include use of shared raceways complete with pull wires, junction boxes and other accessories.

C. The contractor shall construct the system following good engineering practices and in accordance with applicable codes and safety precautions.

D. Requirements under this section shall be coordinated with the Local CATV provider.

1.2 Quality Assurance

A. Comply with relevant portion of the PECE as applicable to cable TV systems.

B. Other requirements shall be coordinated with the CATV provider.

C. Engineer in-charge supervising the work shall be a duly Registered Electronics Engineer supervised by a Professional Electronics Engineer.

PART 2 – PRODUCTS

2.1 Submittals

A. Submit manufacturer's technical literature and samples, for all cables and components that compromise the cable TV system.

B. Shop drawings indicating the following:

1. Cable route
2. Cable installation details
3. Outlet mounting details

C. Submit as-built drawings to include the following:

1. Floor plan layouts, section view and installation details.
2. List of major components and their place in the system.

2.2 Acceptable Manufacturers

A. Cable TV system shall be from one of the following manufacturer

1. As recommended by the local CATV provider.

2.3 Cables

A. 75-ohm impedance coaxial copper cable specially designed for transmitting (UHF and VHF) signal shall be used.

B. The attenuation loss of the cable shall not exceed 6dB/100m for main drops and 12/100m for secondary runs.

C. The cable shall have polyethylene dielectric with single plain copper wire conductor and copper braid screen and outer PVC sheath for protection.

2.4 Coaxial Cable and TV Outlet

A. Coaxial cable TV outlet shall either be wall, floor, or ceiling mounted type depending on what is indicated on the plans.

B. Plates color, material and shall match the interior design of the area and shall be subject or Architect's approval.

C. Plate shall be in standard size and shall fits in standard size single gang electrical box.

D. It shall be capable to withstand abusive environments.

E. When floor-mounted, coaxial cable TV outlet shall be "pop-up" type, metal finished.

F. Co-axial cable TV outlet shall be 9.6mm knockout hole in F-type connector plan.

2.5 Raceway

A. Cable raceway shall be PVC conduits.

PART 3 – EXECUTION

3.1 Installation

A. Install the system in accordance with the plans and specification, all national and local applicable codes, PEC wiring criteria and the manufacturer's recommendation.

B. All wiring shall be run in PVC conduit, minimum size to be used shall be 20mm diameter.

C. All Conduits in risers and above false ceilings shall be surface mounted. Conduits installed in public areas shall be concealed.

D. Coaxial cable shall not be bent to a radius smaller than 15 times the diameter of the cable. Joints in cable run and looping of cable of outlet terminals shall not be allowed.

E. Installation of equipment and devices that pertain to other work in the contact shall be closely coordinated with the appropriate contractor(s).

F. Any tools ore equipment required for the installation shall be provided free of charge by the contractor and shall remain his property.

3.2 Testing and Commissioning

A. Contractor together with the cable TV signal provider shall carry out an output level measurement at each and every outlet. The exact method of measurement shall be proposed by the cable TV signal provider and agreed with the Consultant. All tests shall be witnessed by the Project manager and Consultant and copies of the test results submitted for record.

B. In the event of the component units and/or cables failure in such test s and/or system proposed cannot meet the requirements specified herein due to the usage of the inconsistent component unit or cables, the contractor shall re-design the system or replace with proper component units or cables and re-submit to the Project managerfor final approval before the installation is commenced. Any extra costs incurred by the contractor with no charge to the owner.

* * * END OF SECTION * * *

SECTION 4.2 – TELEPHONE SYSTEM

PART 1 – GENERAL

1.1 Description of Work

A. The work covered in this section shall include the supply, delivery, installation, testing, commissioning, and furnishing of all passive materials for the distribution and satisfactory operation of the Telephone system to be provided by a Telecommunications service Company.

B. The contractor shall provide the complete raceway system to include use of shared raceways complete with pull wires, junction boxes and other accessories.

C. The contractor shall construct the system following good engineering practices and in accordance with applicable codes and safety precautions.

D. Requirements under this section shall be coordinated with the Telecommunications provider.

1.2 Quality Assurance

A. Comply with relevant portion of the Philippine Electronic Code, PEC and as applicable to communications systems.

B. Comply with EIA/TIA-568-B, BICSI or ISO/IEC 11801 standards pertaining to cabling installation

C. Engineer in-charge supervising the work shall be a duly Registered Electronics Engineer/Registered Electrical Engineer supervised by a Professional Electronics Engineer.

1.3 Submittals

A. Submit manufacturer's technical literature and samples, for all cables and components that compromise the Telephone system.

B. Shop drawings indicating the following:

1. Cable route
2. Cable installation details
3. Outlet mounting details

C. Submit as-built drawings to include the following:

1. Floor plan layouts, section view and installation details.
2. List of major components and their place in the system.

1.4 Acceptable Manufacturers

A. Telephone system shall be from one of the following manufacturer
   1. As recommended by the local Telecommunications provider

1.5 Cables

A. All telecommunications system shall be installed in a raceway as indicated on the drawings.

1.6 Telephone outlet

A. Telephone outlet shall either be wall, floor, or ceiling mounted type depending on what is indicated on the plans.
B. Plates color, material and shall match the interior design of the area and shall be subject or Architect's approval.
C. Plate shall be in standard size and shall fits in standard size single gang electrical box.
D. It shall be capable to withstand abusive environments.
E. When floor-mounted, Telephone outlet shall be "pop-up" type, metal finished.
F. Telephone outlet shall be 9.6mm knockout hole in F-type connector plan.

1.7 Raceway

A. Cable raceway shall be PVC conduits.

PART 2 – PRODUCT (Not used)

PART 3 – EXECUTION

3.1 Installation

A. Install the system in accordance with the plans and specification, all national and local applicable codes, PEC wiring criteria and the manufacturer's recommendation.
B. All wiring shall be run in PVC conduit, minimum size to be used shall be 20mm diameter.
C. All Conduits in risers and above false ceilings shall be surface mounted. Conduits installed in public areas shall be concealed.
D. Cable shall not be bent to a radius smaller than 15 times the diameter of the cable. Joints in cable run and looping of cable of outlet terminals shall not be allowed.

E. Installation of equipment and devices that pertain to other work in the contact shall be closely coordinated with the appropriate contractor(s).

3.2 Bend Radius

A. The maximum cable bend radii shall not exceed manufacturer's specifications.

3.3 Grounding

A. All grounding/earthing and bonding shall be done in accordance with applicable codes and regulations

3.4 Workmanship

A. All work shall be done in workman like fashion on the highest standards in the telecommunications industry. All equipment and materials are to be installed in a neat and secure manner, while cables are to be properly dressed. Workers must clean and worksite from any debris or trash at the close of each workday.

* * * END OF SECTION * * *

SECTION 4.3 – ADDRESSABLE FIRE DETECTION & ALARM SYSTEM

PART 1 – GENERAL

1.1 Description of Work

A. The work includes furnishing of labor, materials, tools and equipment necessary for and incidental to the installation of a complete for operation and usable standard system conforming to the applicable requirements of NFPA except as modified herein. Materials and equipment to be furnished under this Contract shall be essentially the current design products of one manufacturer regularly engaged in the production of such equipment.

B. The system shall be a addressable closed circuit, Electronically-supervised, non-coded, Fire Detection and Alarm system capable of control and monitoring the required minimum addressable pts.

C. The system shall include but not limited to fire alarm control panel(FACP) with trouble buzzer and lights, manual stations, alarm speaker with strobe light, automatic detectors, interface addressable modules, stand-by batteries, telephone and emergency voice evacuation system.

D. The system shall be wired ad Class A throughout for the risers only preferably with two (2) pairs of wires.

E. The system comply with the applicable of NFPA, local building codes, and meet all requirements of the local code enforcing authorities. The system shall be listed, labeled or approved by Underwriter's Laboratories, Inc.

F. Installation of the system be governed by the provisions of the latest edition of the Philippine Electrical Code and existing rules and regulations of the locality and other governing agencies.

G. All Materials and equipment to be furnished shall be essentially the standard products of a single manufacturer regularly engaged in the production of such equipment.

1.2 Manufacturer

A. Acceptable fire manufacturers shall be include the Notifier, Edwards System technology (EST).

B. All equipment shall and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested by a nationally

recognized approvals agency for use as part of protected premises protective signaling (fire alarm) system.

C. The contractor shall provide, from the acceptable manufacturer's current productlines, equipment and components, which comply, with the requirements of these specifications. Equipment or component, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.

D. Heat Detectors (Rate of Rise) – Detectors shall be operate to cause an alarm when subjected to temperature greater than 135Deg.F or when the temperature rises at rate of 15Deg.F per minute. Detector shall be provided with red LED lamp to indicate detector is activated. Detector shall be ceiling type design for semi-flush mounting as indicated in the plans. Detectors shall be supported independently of wiring connections.

E. Smoke Detectors – Automatic smoke detectors shall be designed for detection of abnormal smoke densities by the photoelectric principle and shall have a time delay (to prevent false alarm), rate compensation circuit to increase detection sensitivity upon rapid build-up of smoke. The detector shall operate on a multiple cell concept using a light emitting diode light source. Failure of the LED shall not cause an alarm condition but shall operate the detector-indicating lamp. Detectors shall contain a red LED which glows when it is activated.

1.3 Qualifications of Installer

A. Prior to the installation, the Contractor shall submit data for the approval of theEngineer which will show that he has successfully install fire alarm systems of the sametype and design as specified herein, or that he has a firm contractual agreement with a sub-contractor having such required experience. The data shall include the names and the locations of at least two (2) installations where the Contractor or the sub- contractor referred to above, has installed such systems. The Contractor shall indicate the type and the design of these systems and certify that these systems have performed satisfactory in the manner intended for a period of not less than 18 months.

B. Manufacturer's representative or technician, experienced in the installations and operation of the type system being approved shall be furnished to supervise thetesting, including the final testing, adjustment of the system and instructions.

1.4 Quality Assurance

A. Comply with relevant portion of the Philippine Electronics Code, PEC and as applicable to Safety system.
B. Comply with Philippine Electronics Code standards pertaining to cabling installation
C. Engineer in-charge supervising the work shall be a duly Registered Electronics Engineer/Registered Electrical Engineer supervised by a Professional Electronics Engineer.

1.5 Submittals

A. Submit manufacturer's data and samples, for all cables and wiring devices components related in Fire Detection & Alarm system.
B. Shop drawings of point to point diagram showing the points connection and terminal used for all electrical field connection in the system.
C. As-built drawing shall show installed conduits and exact locations of all installed equipment.

1.6 Execution and Installation Sequence

A. Installation of conduit and wiring for complete notification circuit appliance installation throughout facility.
B. Pre-test the audible and visual notification appliance circuits.
C. All Conduits in risers and above false ceilings shall be surface mounted. Conduits installed in public areas shall be concealed.
D. Termination of between field devices and the associated control equipment.
E. Installation of equipment and devices that pertain to other work in the contact shall be closely coordinated with the appropriate contractor(s).

1.7 Test Upon Completion

A. Upon completion of the installation, the system shall be subjected to complete functional and operational test in place of each detector. When all required corrections have been accomplished, the system shall be re-tested and the Engineer notified of readiness of final inspection. At this time any and all required test shall be repeated and any defects corrected until the system is found to be acceptable. The Contractor shall furnish all instrument, labor and materials required for the test, and a qualified technician to conduct the test.

1.8 Grounding

A. All grounding/earthing and bonding shall be done in accordance with applicable codes and regulations.

1.9 Workmanship

A. All work shall be done in workman like fashion on the highest standards in the Fire Detection and Alarm System industry. All equipment and materials are to be installedin a neat and secure manner, while cables are to be properly dressed. Workers must clean and worksite from any debris or trash at the close of each workday.

PART 2 – PRODUCT (Not used)

PART 3 – EXECUTION (Not Used)

* * * END OF SECTION * * *

SECTION 4.4 – CLOSED CIRCUIT TELEVISION SYSTEM

PART 1 – GENERAL

A. All materials and equipment to be furnished shall be standard products of a single manufacturer regularly engaged in the production of such equipment and shall be listed by Underwriter's laboratories, Inc., CE, or shall be in accordance to established standards than those of the United States

B. Equipment presented list presented here shall be summarize the main content of the system and are not intended to be exhaustive. The Contractor shall be responsible for ensuring that a complete working system is provided.

C. All equipment must be propriety, generally available products. This is to ensure that the future extensions to the system may be carried out by any installing company extending the control by adding cards, cages, etc.

D. Color camera shall be of 1/3" CCD format with micro lens on each pixel for high sensitivity. Minimum illumination shall be 1 lux or better. Horizontal resolution shall be 330 lines or better. Lens shall be standard, wide angle, super wide, telephoto, motorized zoom lens. Lens shall be made of glass and shall be Cor CS mounted type and must be the same brand as the camera.

1.1 Performance Specifications

A. Digital Video Recorder – The Digital video management system will meet the following operating requirements or approved equivalent. Video format color (input and output) shall be NTSC, and includes programmable alarm input and output, motion detection and pre-alarm.

B. Display output shall available from the SVGA adapted at 16.7 million colors, mouse selectable buttons with indicator lights for display controls. Display shall be simultaneous multiple display corresponding to the maximum number of cameras.

C. Record options shall be selectable linear or Continuous. Record method can be selectable from either "Record all cameras all the time" or "User defined schedule of settings"

D. Digital Image/Zoom capability unit shall be operator selection and display of stop- action or frozen images of any stored image while in playback mode. As an option, the unit shall allow magnification of a display image up to a factor 16 times its original size.

E. Database browsing – images stored in the database shall be identified to allow search and retrieval by type of event or image. Searches shall be specified by alarm, camera number, date/time, event type (i.e, video loss) or filter (optional). Search result shall be provided in scrollable list to allow selection for display.

1.2 Qualifications of Installer

A. Prior to the installation, the Contractor shall submit data for the approval of theEngineer which will show that he has successfully install fire alarm systems of the sametype and design as specified herein, or that he has a firm contractual agreement with a sub-contractor having such required experience. The data shall include the names and the locations of at least two (2) installations where the Contractor or the sub- contractor referred to above, has installed such systems. The Contractor shall indicate the type and the design of these systems and certify that these systems have performed satisfactory in the manner intended for a period of not less than 18 months.

B. Manufacturer's representative or technician, experienced in the installations and operation of the type system being approved shall be furnished to supervise thetesting, including the final testing, adjustment of the system and instructions.

1.3 Quality Assurance

A. Comply with relevant portion of the Philippine Electronics Code, PEC and as applicable to Safety system.

B. Comply with Philippine Electronics Code standards pertaining to cabling installation

C. Engineer in-charge supervising the work shall be a duly Registered Electronics Engineer/Registered Electrical Engineer supervised by a Professional Electronics Engineer.

1.4 Submittals

A. Submit manufacturer's data and samples, for all cables and wiring devices components related in CCTV camera system.

B. As-built drawing shall show installed conduits and exact locations of all installed equipment.

1.5 Execution and Installation

A. Install the system in accordance with the plans and specification, all national and local applicable codes, PEC wiring criteria and the manufacturer's recommendation.
B. All wiring shall be run in PVC conduit, minimum size to be used shall be 20mm diameter.
C. All Conduits in risers and above false ceilings shall be surface mounted. Conduits installed in public areas shall be concealed.
D. Cable shall not be bent to a radius smaller than 15 times the diameter of the cable. Joints in cable run and looping of cable of outlet terminals shall not be allowed.
E. Installation of equipment and devices that pertain to other work in the contact shall be closely coordinated with the appropriate contractor(s).

1.6 Test Upon Completion

A. Upon completion of the installation, the system shall be subjected to complete functional and operational test in place of each detector. When all required corrections have been accomplished, the system shall be re-tested and the Engineer notified of readiness of final inspection. At this time any and all required test shall be repeated and any defects corrected until the system is found to be acceptable. The Contractor shall furnish all instrument, labor and materials required for the test, and a qualified technician to conduct the test.

1.7 Grounding

A. All grounding/earthing and bonding shall be done in accordance with applicable codes and regulations.

1.8 Workmanship

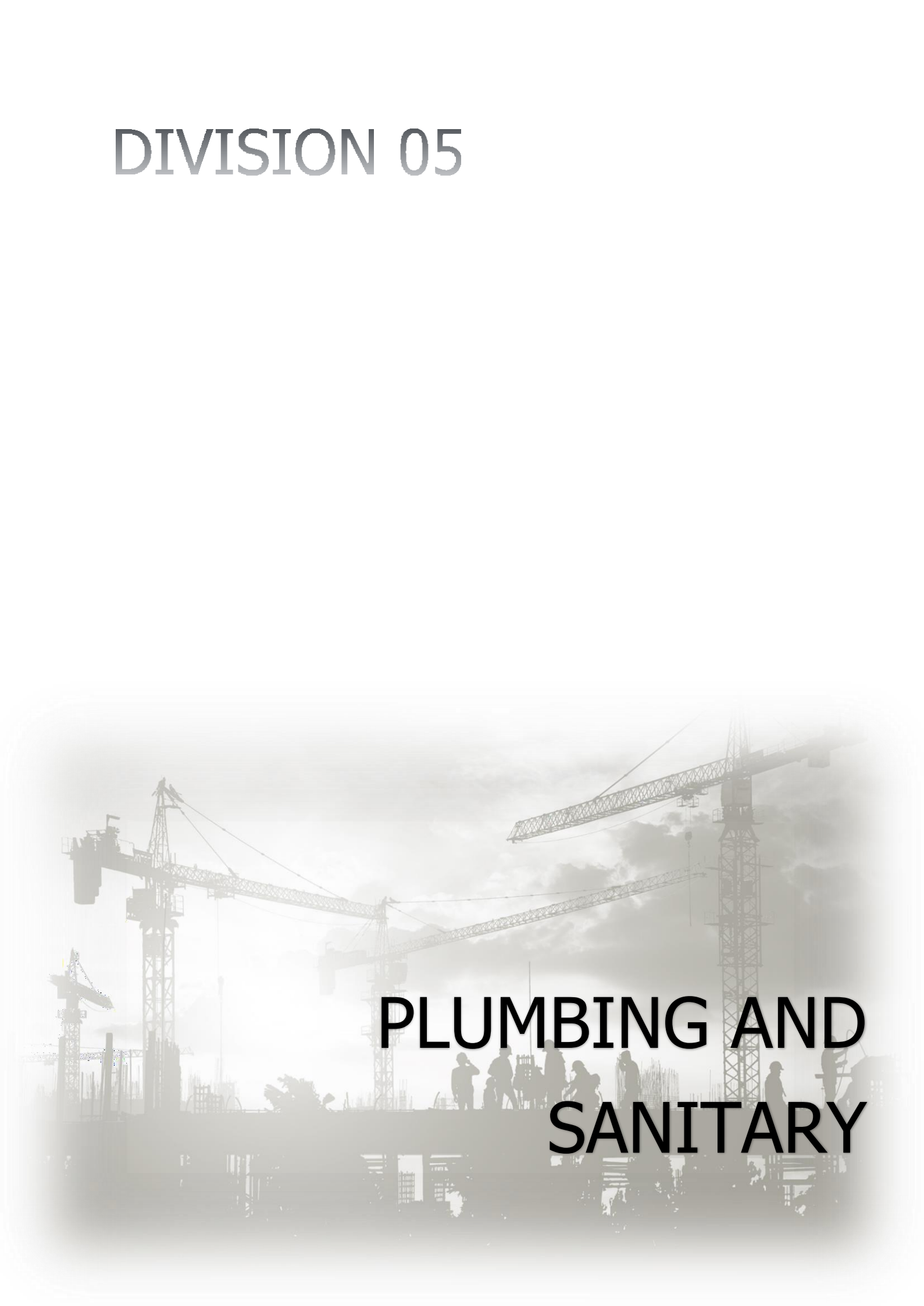
A. All work shall be done in workman like fashion on the highest standards in the CCTV camera System industry. All equipment and materials are to be installed in a neat and secure manner, while cables are to be properly dressed. Workers must clean and worksite from any debris or trash at the close of each workday.

PART 2 – PRODUCT (Not used)

PART 3 – EXECUTION (Not used)

* * * END OF SECTION * * *

DIVISION 05



PLUMBING AND SANITARY

SECTION 5.1 – PLUMBING FIXTURES AND TRIMS

PART 1 – GENERAL

1.1 Scope

A. WORK INCLUDED: This section includes specifications on toilet fixtures, fittings, trims and accessories necessary for the completion of the work.

B. The supplier shall give detail description of all accessories required such as clamps, bolts, anchors, screws, caps, handles, etc. Any items not stated by the supplier but are necessary for the installation are deemed to be included in the contract and no extra claims will be entertained.

C. Stainless steel bottle traps shall be included with the supply of lavatories.

1.2 Related Works Described Elsewhere

A. Toilet

1.3 Submittals

A. SAMPLES: Submit sample sections of materials, samples of finishes, each with color standards with specified manufactures, and samples of each type of accessory proposed for use as required by the Architect before starting. Only approved samples will be used.

B. BROCHURES: Submit manufacturer's latest manual describing materials, fabrication and methods of installation.

C. Before any accessories are purchased, Contractor shall verify and locate all items specified.

1.4 Examination and Acceptance of Work-in-Place

A. Examine work-in-place on which specified work is in any way dependent to insure that conditions are satisfactory for installation of specified work. Report, in writing, to the Contractor and the Architect any defect which may impair satisfactory completion and performance of included work.

PART 2 – PRODUCTS

2.1 Manufacturer

A. Manufacturer's catalogue numbers listed hereinafter establish standards of quality required, but are not restrictive. Products of other manufacturer's which are equal to those specified may be substituted.

B. Substitution

1. Other brands and manufacturer are subject for written approval of the Architect.
2. The contractor shall warrant that proposed substitutions, if accepted, will provide performance equivalent to the materials specified herein.

2.2 Types

A. It is the Contractor's responsibility to provide exact type of accessory by conditions of installation.

2.3 Plumbing Pipes, Lines and Terminations

A. Water Line:

1. Cold Water Line
    - From sub meter to distribution fixtures, use Polypropylene Pipes by Atlanta or Unitec or its approved equal. Jointing shall be by Socket Fusion.
2. Drains
    - All drains shall be stainless steel body with stainless steel top by Jaman by JPI Brand
3. Valves
    - All valves such as gate vales, angle valves, ball valves and check valve shall be made of hi grade material such as brass body and UL Approved. Nibco Kitz Honeywell or approved as equal.
4. Sanitary Sewer and Soil Pipe
    - Polyvinyl chloride (PVC) pipe and and fittings, Series 1000. Atalnta, Emerald Neltex or its approved equal. Jointing shall be by Solvent Cement Connection Forms with ASTM D2564.
5. Storm Drainage Collectors
    - Jointing shall be by Solvent Cement Connection Forms with ASTM D2564.
6. FCU/AHU/Refrigerant Drain Pipes
    - Polyvinyl chloride (PVC) blue pipe and and fittings, Atalnta, Emerald Neltex or its approved equal. For 38mm dia. and below

2.4 Location: Before any accessories are purchased, Contractor shall verify and locate all items specified.

2.5 Plumbing Fixtures

A. **Fixtures:** Refer to Summary of Plumbing Fixtures, Fittings and Accessories.

1. Water Closet
    - Use elongated flush valve type 6LPF vitreous china water closet with seat and cover; model New Linear as manufactured by American Standard, HCG or Pozzi or its approved equivalent, for Male and Female Toilets.
2. Lavatory
    - Use vitreous china, Basin type lavatory, American Standard, HCG, Pozzi or its approved equivalent, for Male and Female Toilets
3. Urinal
    - Wall hung vitreous china urinal manufactured by American Standard, HCG or Pozzi or its approved equivalent for Male Handicapped

B. **Color:** As selected by the Architect from the manufacturer's standard color range.

2.6 Faucets and Fittings

A. LAVATORY FITTINGS: Use Sefa, American Standard, grohe Sensor Type lavatory faucet or approved equivalent.

B. WATERCLOSET FLUSHOMETER: Use exposed diaphragm type, sensor operated, chrome plated watercloset flushometer, Sefa or its approved equivalent.

C. URINAL FLUSHOMETER: Exposed diaphragm type, manually operated chrome plated urinal flushometer, model: Royal180-1.5 as manufactured by Sloan or its approved equivalent.

D. LAVATORY AND SINK BOTTLE-TRAP: Use lavatory P trap with brass body, chrome finish by Hansgrohe, Grohe or approved equivalent.

E. LAVATORY AND SINK SUPPLY: Use stainless braided flexible supply hose, ½" x 3/8" with brass bodied angle valve, chrome finish, as manufactured by Parigi (flexible hose) and Schell (angle valve) or approved equivalent.

F. GREASE TRAP: Heavy gauge Stainless steel body and cover Baffles / Basket, locking / lift Inlet and outlet pipes with Rubber Gasket and Capacity of 4.0 GPM.

G. MAIN WATER METER & SUB METER: Arad, Asahi Ejet o MWSS approved.

H. Polyvinyl chloride (PVC) pipe and and fittings, Series 1000. Atalnta, Emerald Neltex or its approved equal.

PART 3 – EXECUTION

3.1 Installation: Furnish and install all toilet fixtures, fittings and accessories true in line, plane and level, in accordance with manufacturer's specifications.

* * * END OF SECTION * * *

SECTION 5.2 – SPECIALTIES

PART 1 – GENERAL

1.1 Scope

A. This section includes specifications on toilet and bath accessories. The supplier shall give detail descriptions on those accessories to the supply items such as clamps, bolts, anchors, screws, caps, handles, etc. Any items not stated by the supplier but are necessary for the installation are deemed to be included in the contract and no extra claims will be entertained.

1.2 Submittals: (As applicable)

A. SAMPLES: Submit samples of each type of accessory proposed for use as required by the Architect before starting. Only approved samples and color may be used.

B. BROCHURES: Submit manufacturer's latest manual describing materials, fabrication and methods of installation.

1.3 Examination and Acceptance of Work-in-Place

A. Examine work-in-place on which specified work is in any way dependent to insure that conditions are satisfactory for installation of specified work. Report, in writing, to the Contractor and the Architect any defect which may impair satisfactory completion and performance of included work.

PART 2 – PRODUCT

2.1 Manufacturers

A. Manufacturer's catalogue numbers listed herein after establish standards of quality required, but are not restrictive. Products of other Manufacturers which are equal to those specified may be substituted.

2.2 Types

A. It is the Contractor's responsibility to provide exact type of accessory by conditions of installation.

2.3 Before any accessories are purchased, Contractor shall verify and locate all items specified.

2.4 Accessories: Refer to Summary of Plumbing Fixtures, Fittings and Accessories

A. **GRAB RAIL**: 38mm stainless steel by Bobrick or approved equivalent

B. **PAPER HOLDER**: For Male and Female Toilets and Toilet for the Handicapped, use surface mounted bright polished stainless steel finished toilet tissue dispenser by Kasch, Kohler or approved equivalent.

C. **TISSUE DISPENSER**: For Male and Female Toilets and Toilet for the Handicapped, use surface mounted bright polished stainless steel finished toilet tissue dispenser by Kasch, Pizzi or approved equivalent.

D. **SOAP DISPENSER**: Automatic Dispenser from Kasch, Sefa or its approved equivalent

E. **FACIAL MIRROR**: 6mm thk. imported glass mirror electrolytically copper-plated and guaranteed against silver spoilage for 10 years. Mirror edges protected with plastic filler strips to prevent chipping. Provide 12mm thk. marine plywood backing and powder coated aluminum frames.

F. **TILE TRIMS**: for end finish of ceramic or porcelain tiles: a high impact PVC strip as manufactured by Homelux or approved equivalenmt. Submit color sample for Architect's approval.

G. **TILE SPACERS**: 2mm hard PVC virgin plastic.

H. **SEALSTRIP**: a high grade PVC extrusion with flexible fins at top and bottom as manufactured by Homelux or approved equivalent. Submit color sample for Architect's approval.

I. **TOILET BOWL FLOOR FLANGE** – made of ABS (acrylonitite butadiene styrene), complete with screws, bolt end cap and gasket sealants. For use in installation of all toilet bowls. Similar to San-ei or its approved equivalent.

J. **HAND DRYER**: Surface mounted, autopilot, no touch, with white vitreous enamel or satin Satinless finish cover by Kasch or its approved equivalent.

K. **EMERGENCY INTERCOM**: Surface mounted, Single station by Aiphone or its approved as equal.

L. **EXHAUST FAN**: Ceiling Mounted recessed type 24CUF by KDK in White Vitreous F

PART 3 – EXECUTION

3.1 Installation: Furnish and install all toilet fittings and accessories true in line, plane and level, in accordance with manufacturer's specifications.

* * * END OF SECTION * * *

DIVISION 06

MECHANICAL

SECTION 6 – AIR CONDITIONING AND MECHANICAL VENTILATION SYSTEM (ACMV)

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Comply with the Agreement between the Construction Manager and Trade Sub-Contractor and all other documents referred to therein.

B. Provide all services, materials and labor required to fully commission the mechanical systems in accordance with this Section of the Specification.

1.2 COORDINATION

A. Meet the requirements of the General Instructions.

B. Coordinate the work of this Section with all other Divisions to ensure complete and operational mechanical systems at completion of this work.

C. Appoint a single person as Commissioning Coordinator who shall be responsible for progressing the commissioning activities of each Division trade. The Commissioning Coordinator shall report to the Commissioning Manager.

D. Review the design intent of the project and the intended operation of systems with the Consultant before proceeding with commissioning.

1.3 RELATED WORK

A. Mechanical General Provisions

B. Testing, Adjusting and Balancing

1.4 QUALITY ASSURANCE

A. Comply with CIBSE CODES (Chartered Institution For Building Services Engineers). Refer to Section: Testing, Adjusting and Balancing for more detailed requirements on testing, adjusting, and balancing.

B. The “Employers Representative” may elect to source start-up and handover by a specialist commissioning company. This commissioning specialists is to be employed by the Contractor. Supply to the Commissioning Manager, the following details regarding the proposed firm:

1. Principle representative and qualifications
2. Proposed personnel and relevant project experience
3. Previous similar assignments and references

4. Scope of work to be undertaken
5. Company resources and equipment

PART 2 – PRODUCTS

2.1 SCHEDULES AND COMPLETION OF INSTALLATION OF SYSTEMS

A. Submit to the Consultant, 60 days prior to the scheduled Substantial Performance, a detailed and comprehensive installation completion/startup/testing schedule, identifying all trades and suppliers to be involved. Update the schedule and resubmit for review, on a biweekly basis, during the course of commissioning. If found to be unacceptable, revise the schedule and the construction forces to suit the reviewed schedule. This schedule shall include, but is not limited to the following items:

1. Installation and testing of Refrigerant Piping systems. Very strict compliance to manufacturer's recommendations is required with regards to quality of workmanship and testing procedures for refrigerant piping works such as pipe covering, flushing, air-tightness of soldered, flared and flanged joints, vacuum drying and nitrogen replacement. This is to ensure that no moisture and dirt is left inside the pipe and guarantee no refrigerant leaks.
2. Installation, leak testing and cleaning of duct systems.
3. Control system wiring
4. Air balancing
5. Electrical service connections
6. Equipment suppliers pre-start checkout of the equipment installations, including controls.
7. Start-up of various pieces of equipment and systems.
8. Operational testing of system components.
9. Performance testing of equipment and systems.
10. Acceptance testing of equipment installations and system, by authorities having jurisdiction and Contractor's insurance company
11. Troubleshooting
12. Calibration of controls and point checkout
13. Control software set-up and checkout including seasonal and response checkout of operating sequences, PID optimization
14. Emergency system checkout
15. Fire alarm and control system interfacing

16. Submittal of completed equipment and system checkout sheets
17. Demonstration of systems and equipment
18. Maintenance manual preparation and submittal
19. Operator training program
20. Record documentation submittal

2.2 RECORD DOCUMENTATION

A. Prepare record documentation for each equipment installation covering:
   1. Equipment identification and supplier
   2. Shop Drawing submittal, review, production release, and delivery dates
   3. Dates for completion of all work required to prepare for equipment installation
   4. Dates for equipment installation, supplier pre-start checkout and system availability for start-up
   5. Dates for equipment start-up, performance testing, proposal for temporary use, acceptance testing, demonstration, turnover and warranty start/finish

B. Submit proposed record sheets and procedures to Consultant for review, when requested by the Contractor.

C. List all specialist personnel and equipment required for the test and ensure that these are available by the test date.

D. Provide documentation of the commissioning process for inclusion into the maintenance manuals. These are to include checkout sheets, equipment data sheets, start-up certificates from suppliers involved in start-up, documentation concerning demonstration to the Contractor. Include all record and result sheets form commissioning tests.

E. Maintain a log of key operating parameters, problems encountered, solutions employed and verification of effectiveness of solutions. Include log in maintenance manuals.

F. Refer to example documentation available from Construction manager's representative. Meet or exceed this level of reporting.

2.3 STARTUP

A. Coordinate and supervise the start-up of the various pieces of equipment and systems. Utilize the start-up services of the manufacturer's representative. Ensure that the

equipment is operating in a satisfactory manner. Including, but not necessary limited to the following:

1. Direction of rotation
2. Grease and lubricants
3. Noise, if deemed to be a problem
4. Seals
5. Alignment of fan drives by a millwright
6. Piping connections and safeties
7. Electrical amp draw, starting inrush current and trip/heater settings

B. Refer to Mechanical General Provision requirements for Temporary Services and Temporary and Trial Use.

2.4 TROUBLESHOOTING

A. Resolve inter Division coordination problems.

B. Where problems become apparent during the commissioning process, identify and resolve these problems. The basic functions in troubleshooting are:

1. What - identification and definition of the problem
2. Why - determination and evaluation of the causes
3. When - determine the time available to resolve the problem
4. Involve the designing authority in the review of the problem and proposed resolution
5. Coordinate remedial action with the appropriate parties
6. Evaluate the effectiveness of the remedial action
7. Record the problem, cause, remedial action and result

2.5 OPERATION AND TESTING

A. Refer to Mechanical General Provision for Inspection, Testing and Certificates.

B. Test the operation of the individual components and systems. Go through each step of the sequence of operation and verify that each component operates correctly. Direct and ensure that all trades involved make the required changes and adjustments to effect the proper operation of all components and systems. Meet commissioning test requirements.

C. Document operation and testing.

D. Carry out operational tests for the current season and simulate operation of summer, winter and intermediate seasons.

2.6 DEMONSTRATION

A. Demonstrate to the Contractor the proper operation of all equipment and systems supplied under this Division. Demonstrations shall occur only after the operation and testing has been successfully completed. Ensure that Trade Sub-Contractor and equipment suppliers participate in the demonstration as required.

B. Refer to Mechanical General Provision for Instruction to Contractors.

2.7 OPERATING AND MAINTENANCE MANUALS

A. Refer to Mechanical General Provision.

B. Coordinate the manual provision with Consultant prepared Operation and Maintenance Manual, if available.

2.8 RECORD DRAWINGS

A. Refer to Mechanical General Provision.

2.9 COMPLETION

A. Refer to Mechanical General Provision.

2.10 SPARE PARTS

A. Provide a list of spare parts, special tools, lubricants, etc. for each item of equipment which has been purchased as part of the Contract.

B. Provide a listing of recommended spare parts for all equipment installed under Mechanical Division, to cover a period from Substantial Completion to Warranty end.

C. Provide at minimum, the following information for recommended spare parts:

1. Manufacturer's name, address, phone and fax numbers
2. Manufacturer's part name, part number, unit price, lead time, shelf life
3. Quantity recommended for 1 year
4. Alternative suppliers of compatible parts, including local supplier name, address, phone and fax numbers

D. Submit preliminary list of spare parts and tools to Contractor at least 30 days prior to intended system handover to Contractor. The Contractor reserves the right to add to, reduce or omit entirely, the recommendations contained on these lists.

PART 3 – EXECUTION

3.1 COMMISSIONING TESTS

A. Refer to Testing, Adjusting, and Balancing.

3.2 ACMV SYSTEM

A. Verify readings, calibration and set-up of sensors and equipment, including, but not necessary limited to checking the following:
   1. Temperature sensors
   2. Air flow switches
   3. Status switches
   4. Pressure gauges and gauge connection utilization
   5. Control damper positioning, including tightness when closed and full open/balance position
   6. Alarm contacts

B. Verify correct sensors are reporting accurately to the distributed field panels and operator workstation.

C. Operate each major equipment. Verify and correct the following if required:
   1. Start/stop from the terminal
   2. Correct open/close and modulation procedures with valves and dampers
   3. Stable operation of controls under normal conditions and with changes in air/refrigerant/on/off conditions
   4. Trend logs operation indication
   5. Piping, sensor and unit installation
   6. Filters for return air.
   7. Drain pan operation and trap priming

D. Verify duct cleaning, air balancing and air pattern adjustments.

E. Verify access to each fire damper.

F. Verify that all cooling coil drain pans and condensate piping operate

3.3 OTHER SERVICES

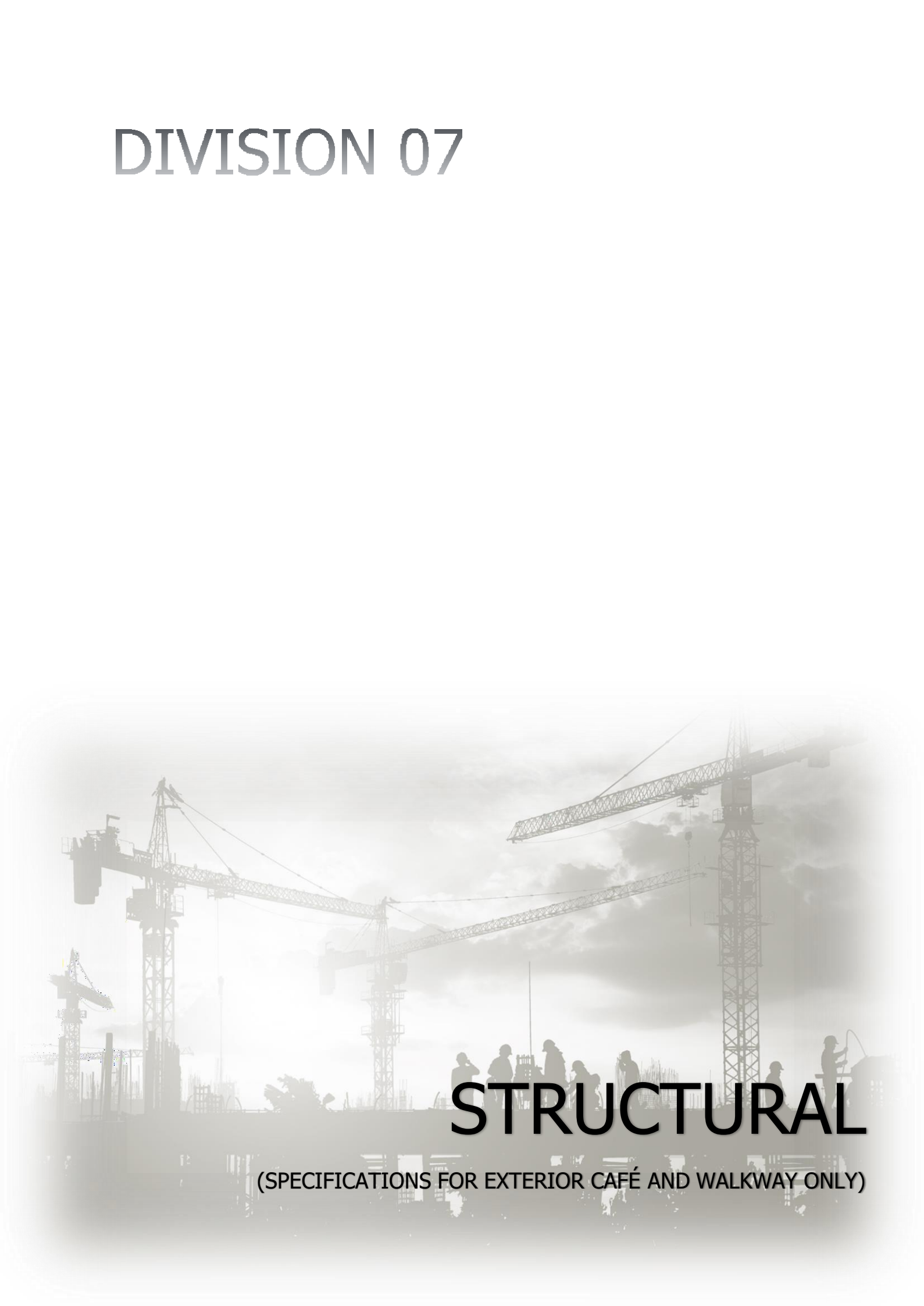
A. Demonstrate access to all valves, equipment and components for servicing.
B. Coordinate for a power failure test with emergency generator start-up.
C. Verify the operation of all other equipment provided.
D. Verify that interfacing to the work of other Divisions results in complete and operational systems.

3.4 POST SUBSTANTIAL PERFORMANCE VISITS

A. Visit the site and the Contractor's representative each month after Substantial Performance for a minimum period of two days until the end of the project warranty period.
B. Review the operation of the system.
C. Correct any operating problems, if problem is related to warranty issues.
D. Prepare a report for the Consultant and Construction Manager for inclusion in the Operating Manuals of the problems and issues that have arisen and the corrective action(s) recommended and implement.

* * * END OF SECTION * * *

DIVISION 07



STRUCTURAL

(SPECIFICATIONS FOR EXTERIOR CAFÉ AND WALKWAY ONLY)

SECTION 7.1 – PAINTING/COATING

PART 1 – GENERAL

1.1 GENERAL

A. SCOPE: This specification covers the general philosophy for coating external surfaces of structural steel.

1.2 COATING PHILOSOPHY

A. GENERAL

1. All applicable national and local code sand regulations on surface preparation, coating application, storage, handling, and safety shall be complied with. All paint manufacturer's safety instructions and requirements contained within the Material Safety Data Sheets shall be followed.
2. The coating contractor responsible for the coating work shall ensure that the latest issues of the product data sheets are available.
3. All coating materials shall be delivered and stored in the manufacturer's original sealed containers. The contractor shall provide storage to protect materials from damage due to contamination, rain and adverse high and low temperatures. Outdoor storage of coating materials and solvents is not acceptable.
4. The coating contractor shall be responsible for the proper disposal of all surplus, spent, and waste coating materials, solvents, and thinners, including containers and solvent wipe rags.

B. SURFACE PREPARATION

1. Mill scale, rust and foreign matter shall be removed to the extent that the only traces remaining are slight stains in the form of spots or stripes. The surface shall be cleaned with a vacuum cleaner, clean dry compressed air or a clean brush.
2. Prior to cleaning, all visible oil and grease shall be removed by means of a suitable solvent by high-pressure water jetting or steam cleaning with, if necessary, an alkaline cleaning agent. Surfaces, which have been exposed to a polluted or salt-laden atmosphere, shall be washed down with clean potable water.
3. All welds shall be smooth and free of all weld slag and weld spatter.
4. Power and/or hand tool cleaning shall only be used for field repair and touch ups, where abrasive blasting is not permitted or is impractical.
5. for surface preparation of Work Site itself:

a. Thorough scraping and wire brushing machine brushing grinding, etc. The treatment shall remove loose mill scale, rust and foreign matter. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air, or a clean brush. It should then have a faint metallic sheen.
b. Very thorough scraping and wire brushing machine brushing-grinding, etc. Surface preparation same as St2, but much more thorough. After removal of dust, the surface shall have a pronounced metallic sheen.

6. Prior to application of final coat in field, the contractor shall prepare surface of previous coats by clean water rinse, light abrading by sand paper or hand wire brush, followed by solvent cleaning.

C. APPLICATION

1. Coatings shall be applied within 4 hours after surface preparation and before rust bloom occurs. Coatings shall not be applied when the ambient temperature, steel substrate temperature, or coating material temperatures are outside the range recommended by the coating manufacturer. Coatings shall not take place under adverse weather conditions, rain, fog, etc., or when such conditions are likely to occur before the paint has become dry.
2. Surface coated shall be free of all visible dust, oil grease, and other surface contaminants. All surfaces shall be thoroughly dry prior to painting.
3. Before application of the first coat, all areas such as corners, edges welds, small brackets, bolts, nuts and interstices shall be stripe coated to ensure that these areas have at least the minimum specified dry film thickness. Application of stripe coat shall be by brushing. The brushing technique shall be to brush out and not to flow on the coating material. Stripe coat material may be sprayed if followed immediately by brushing.
4. Each coat shall be allowed to cure sufficiently, prior to application of any subsequent coat.

1.3 MATERIALS

A. GENERAL

1. Contractor shall submit recommendations from paint manufacturer as to the particular name of the paint proposed.
2. Products from a single paint manufacturer shall be used for site painting.

3. When a single coating supplier has been specified only material from that manufacturer shall be used.
4. Any thinning of coating materials shall be in strict accordance with the coating manufacturer's product data sheets and application instructions. Only solvent recommended by the coating manufacturer shall be used for thinning.

1.4 INSPECTION

A. GENERAL

All materials, equipment and work shall be available to the Project manager, including the coating manufacturer's representative at all times. Contractor shall employ specialist paint and coating inspectors.

B. INSPECTION REQUIREMENTS

1. The following inspection functions shall be performed:
   a. Materials
      - Inspect coating and blasting materials upon receipt of materials.
      - Verify that the storage condition for the materials is adequate and properly maintained.
      - Verify that the shelf life of coating materials has not been exceeded.
      - Verify that materials are stored safely and that all waste is disposed of promptly and safely.

   b. Equipment
      - Verify adequacy of coating, cleaning, and sandblasting equipment.
      - Verify that air supplies for blast cleaning, pneumatic tools, and spray equipment are free of moisture and oil.

   c. Surface Preparation
      - Confirm that surface preparation takes place when atmospheric conditions are as specified.
      - Inspect correctness of surface preparation for specified cleanliness and anchor profile.

   d. Application
      - Verify that correctness of mixing; including screening of inorganic zinc rich primers and any required induction time is complied with.
      - Verify that application takes place during proper specified atmospheric conditions.

- Verify that inorganic zinc rich paint pot is continuously agitated.
- Verify that "pot life" is not exceeded.
- Verify that methods of application are as specified and of satisfactory standard.

e. Adhesion

- Verify that primer is sufficiently cured before application of the subsequent coats.
- Inspect surface between the prime and finish coats to assure bonding between coats.

f. Repairs

- Verify that all repairs have been made. Defective work shall be corrected at no cost to the Owner.

g. Cure

- Verify that the coating is cured as specified by coating manufacturer's instruction for re-coat intervals.

h. Visual

- The finished coating work shall pass visual inspection by the Project manager. The final coating shall be uniform color and smooth. Coating work indicating defects, improper application, runs, sags, damages, and excessive repairs, incomplete curing or excessive thickness is subject to rejection. It is the coating contractor's responsibility to correct work found by these inspections including conditions discovered after acceptance, which are not in compliance with these requirements.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

* * * END OF SECTION * * *

SECTION 7.2 – FABRICATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. SCOPE: This section covers technical requirements for delivery of raw materials, mark for identification, packing, crating or otherwise proper preparation for shipment, and shipping to project site of all structural steel indicated, or otherwise required for proper completion of the project.

1.2 QUALITY ASSURANCE

A. Codes and Standards

1. Applicable standards

   Unless otherwise specified or shown the following codes and standards of the latest issue shall apply:

   - ASTM A 992 Rolled Steel for General Structures
   - ASTM A 992 Structural Steel
   - ASTM A325M High Strength Bolts
   - ASTM A 307 Mild Steel Bolts
   - ASTM A 563 Nuts
   - ASTM F 844 Washer
   - AWS D 1.1 Structural Welding Code
   - AISC Manual of Steel Construction
   - AWS A 5.1 Covered Carbon Steel Arc-Welding Electrodes

1.3 SUBMITTALS

A. Product Data

After the award of the contract, the contractor shall submit the following to the Project manager in timely accordance with the project requirements:

a. Material specification - Producer or manufacturer's specifications for:

   - Structural steel
   - High strength bolts (each type) including nuts and washers
   - Mild steel bolts and nuts
   - Structural steel primer paint

- Grating type treads for stairs and their fasteners.

b. Material Certificates

Certificates verifying that materials or items used in the fabrication comply with the project's requirements.

B. Welding Submittals

1. General: All welding procedure specifications for each consumable, preparation, and changes in essential variables shall be submitted to the Project Manager for approval.
2. Qualification- The following shall be submitted:
    - Welding procedure specifications
    - Welding procedure qualification test record
    - A list of welding personnel with their respective qualification records attached.

C. Testing and Inspection Submittals- Submit the following:

1. Testing and Inspection Procedure
2. Dimensional Inspection Records
3. Visual inspection of welds (records)
4. Non-destructive test records
5. Visual inspection of surface preparation (records)
6. Test records of dry film thickness of paint

D. Drawings and schedules

Prepare the following drawing sand data and submit to the Project Manager for approval.

1. Shop drawings
2. Erection plans
3. Summary sheets

1.4 DETAILED REQUIREMENTS FOR DRAWINGS

The contractor shall give the following minimum requirements for shop drawings, Erection plans, Field Bolt Lists, and any drawings deemed necessary by the Project Manager.

A. General

1. All shop drawings, erection plans, field bolt lists, and other drawings shall follow the design drawings of these specifications. Any deviation there from shall requirethe written approval of the Project Manager.
2. All drawings produced by the contractor shall, be drawn to a scale such that all information and lettering is legible.

B. Reference to Design Drawings

1. **General:** Design drawings provide information that is required for the detailing of the structure. Detailing on shop drawings, plans shall at all times follow what is the essence of the Design Drawings together with all requirements herein. Show all appropriate details on the shop drawings, erection plans, and other approved drawings to ensure accurate and timely execution of the work. If a discrepancy on the Design Drawings is found by the contractor, the Project Manager shall be immediately informed, in writing, prior to the preparation of shop drawings.

   The contractor shall ensure that he is familiar with all relative information. If there is doubt regarding any aspect of the Design Drawings then he shall inform the Project manager in writing without delay, prior to preparation of shop drawings.
2. **Connections:** Detail connections and joints shall follow the Design Drawings, and the specifications.

C. Shop Drawings

1. Shop drawings shall give complete detailed information to enable all component parts to be fabricated for the project. Information given shall include:
   a. Identification marks for members, component parts of members, and all individual pieces.
   b. Relevant dimensions of items, including cut length.
   c. Locations of all steel parts by means of key plans, levels, grids, etc.
   d. Bolt holes and full connection details.
   e. Details of cuts, cope, notches, and chamfers.
   f. Detail of camber
   g. Offset dimensions from center of columns or center supporting beams to center of bolt holes of supported beams.
   h. Working point to working point dimensions including inclinations and angles.
   i. Direction marks
   j. Surface treatment requirements

2. Shop drawings shall specify all procedures necessary for shop and site assembly.
3. Applicable welding symbols shall be used in every case and on no occasion shall they be omitted.
4. The size of fillet weld shall be given together with the symbol.

1.5 PRODUCT HANDLING

A. Delivery and Storage

1. Deliver all materials to jobsite properly marked to identify the structure for which it is intended. Marking shall correspond to that indicated on the shop drawings.
2. Prepare delivery list showing:
   a. All members' identification marks and quantity
   b. Quantity of fasteners
   c. Other necessary information
3. Fasteners: All fasteners shall be delivered in boxes or kegs marked with labels to the requirements of these specifications.

PART 2 – PRODUCT (Not used)

PART 3 – EXECUTION

3.1 FABRICATION

Execution in this section covers workshop fabrication of the various members, components, frames, units, and parts that make up the required steel structures.

A. General: The workmanship and finish shall conform to this specification.

B. Straightening: Before marking-off, steel, which enters the shop for fabrication, shall be checked for conformity with the standards. Any damaged or distorted material shall be replaced. The method of repair or correction shall be submitted to the Project manager for approval. Approval will only be given if it can be shown that the proposed repair will not reduce the properties of the steel below those specified.

C. Marking-off

1. The marking-off of steel work including the location holes may be done manually from what is shown on the shop drawings, or where a large number of identical items are required, by the use of previously prepared templates.
2. The use of chisels or center punches for marking on materials and those parts of the work, which are prone to defects by such action, is not permitted.

D. Bending

1. Bending of steel shall be done by a cold process.
2. The minimum inside bending radius of steel plate shall be 2.5 times the plate thickness.

E. Cutting

1. Cut dimensions shall be decided by the contractor with due consideration given to allowance for finishing, shrinkage which may occur during fabrication.
2. Steel shall be cut by friction sawing, cold sawing, band sawing or mechanically guided flame cutting.
3. The cut edges of member shall be free of gouges, notches, burrs, and other defects.

F. Holing

1. All bolt-holes shall be drilled or otherwise by machine perpendicular to steel surfaces.

G. Assembling

1. The component parts shall be assembled in such a manner that they are neither twisted nor otherwise damaged.
2. All tubular members shall be seal welded to prevent the access of moisture to the inside of the members. Sealing plate thickness shall be 6 mm minimum.

3.2 WELDING

A. Edge Preparation

1. Edge preparation of the weld groove shall be conducted by machine cutting or mechanically guided flame cutting.
2. Surfaces and edges to be welded shall be smooth, uniform, and free from fins, tears, cracks, and other discontinuities that would adversely affect the quality or strength of the weld. Surfaces to be welded and surfaces adjacent to the weld shallbe free from loose or thick scale, slag, moisture, grease, rust, paint, and foreign material that invalidate the welding procedure qualification.

B. Weld Termination

1. Welds shall be terminated at the end of a joint in a manner that will ensure sound welds.

C. Control of Distortion and Shrinkage

1. In assembling and joining parts of a member or built-up members and in welding reinforcing parts to members, the procedure and sequence shall be so as to minimize distortion and shrinkage.
2. In so far as practicable, all welds shall be made in a sequence that will balance the applied heat of welding while the welding progresses.

D. Execution of Welding

1. Welding electrodes shall be properly handled at all times. Electrodes that possess defects such as peeling of coating materials, stains, degradation, and humidity, rust shall be discarded.
2. Back-gouging as necessary shall be made on the first layer in the groove root such that welding defects are removed with minimum loss of sound metal.
3. At corners and edges of a fillet weld or partial penetration weld, welding shall be made continuously around the corner without cessation of arc generation.

E. Weld Cleaning

1. In-process Cleaning: Before welding over previously deposited metal, all slag shall be removed and the weld and adjacent base metal shall be brushed clean. This requirement shall apply not only to successive layers but also to successive beads and the crater when welding is resumed after any interruption.
2. Cleaning of Completed Welds: Slag shall be removed from all completed welds. The weld and adjacent base metal shall be cleaned by mechanical wire brushing or other approved method. Spatter remaining after the cleaning operations shall be removed by chipping.

F. Repairs

1. Before any attempt is made to straighten or correct distorted steel, contractorshall submit a detailed procedure or work method to the Project Manager for approval.
2. Removal of weld metal or portions of the base metal may be by machining, grinding, chipping, or air carbon arc gouging.
3. Unacceptable portions of the weld shall be removed without substantial removal of the base metal.
4. Additional weld metal to compensate for any deficiency in size shall be deposited using an electrode smaller than that used for making original weld, and not more than 4 mm in diameter.
5. Overlay or excessive convexity shall be removed.

6. For excessive concavity of weld or crater, undersize welds, and undercutting, additional weld metal shall be deposited after cleaning the surfaces.
7. For excessive weld porosity, excessive slag inclusions and incomplete fusion, unacceptable portions shall be removed and the area re-welded.
8. For cracks in weld or base metal, the extent of the crack shall be ascertained by use of acid etching, magnetic particle inspection, dye penetrant inspection, or other equally positive means. The crack and sound metal 50 mm beyond each end of the crack shall be removed and the area re-welded.
9. Members distorted by welding shall be straightened by mechanical means or by carefully controlled application of a limited amount of located heat.

* * * END OF SECTION * * *

SECTION 7.3 – STEEL ERECTION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope: This section gives the requirements for erection and inspection of steel structures of the project.

1.2 QUALITY ASSURANCE

A. Qualification of Welding

1. All qualification test records and qualified welder's list are not to be confirmed by the designated inspector.
2. Welders who make any defective weld during the work are not to be allowed to continue welding.
3. Before welding, verify welding procedures, welding operations and welder's certificates of qualification.

B. Surveying and Setting Out

1. Survey elevations and locations of base plates and anchor bolts to receive structural steel.
2. Survey structural members concurrently with the erection progress.
3. Show final elevation and location of all major members.
4. Show all discrepancies between actual installation and the shop and design drawings.
5. Take field measurements and examine related work that may affect erection.

1.3 SUBMITTALS

A. Product Data

1. Submit complete material list of items proposed to be furnished and installed under this section.
2. Submit manufacturer's data on proposed shrinkage-resistant grout.

B. Erection Procedure

1. Descriptive data to illustrate the structural steel erection procedure shall be submitted to the Project manager including the sequence of erection and temporary staying and bracing.

C. Reports and Records

Submit reports on the following:

1. Concrete base check
2. Bolt tightening inspection
3. Welding procedures specifications
4. Welder qualification test record
5. List of welders
6. Tightness of anchor bolts
7. Overall dimensional inspection

D. Erection data and Procedures

1. To allow proper scheduling of inspection and testing, provide an erection schedule to the Project manager in ample time prior to commencement of field steel erection work.
2. Report daily all activities and work progress to the Project Manager.

1.4 MATERIAL HANDLING

A. Delivery

1. Take delivery of structural steel to be erected and inspect for damage.

B. Checking

1. Any movement of materials shall be under control at all times.
2. Unload and load trucks by use of cranes or forklifts, do not unload materials by free fall from trailers or trucks.
3. Do not drag or tow materials along the ground.
4. Handle structural elements and other materials utilizing tools and equipment of adequate safe capacity.
5. Use hoisting tools.
6. Handle structural elements using installed lifting hooks or other appropriate means.

C. Storage

1. Storage areas are to be properly graded, flattened and made free from water.
2. Secure all materials to prevent loss or damage.
3. Keep all areas designated for storage clean and easy access should be maintained for handling, identification, and inventory.
4. Separately store materials found to be damaged or defective. Store at designated location all items, which cannot be repaired.
5. Store materials according to respective item classification.

6. Stack steel members on wooden planks, platforms, skids or other supports and keep completely clear from the ground and water.
7. Store materials in sheltered areas.
8. High strength bolts; mild steel bolts and electrodes are to be stored in watertight and dry places.

D. Protection

1. Use all means to protect steel members and packaged materials from corrosion and deterioration.
2. Protect the work and materials from damage by all other trades.
3. The threaded portion of anchor bolts shall be cleaned and greased, and shall be protected from damage by means of hard type covering.

PART 2 – PRODUCT

2.1 MATERIALS

A. Provide all other materials required for completion of erected structural steel and ensure that a material to be procured in the field is as follows:

1. Old material having any loss of the effective thickness due to rust or pockmark on the surface shall not be used.
2. All distortions of un-worked steel materials and those caused during transportation of handling shall be corrected by approved methods.

PART 3 – EXECUTION

3.1 ERECTION

A. General

1. Prior to starting erection works, the foundations to be used for the steel structures shall be checked to confirm their location, orientation, and elevation, also thestate of the anchor bolts is to be checked.
2. Report serious bends, twists, or other damage in erection work, in writing to the Project Manager.

B. Temporary Support and Staging

1. Provide temporary support and bracing.
2. Design, supply and erect necessary false work and staging.
3. Provide temporary planking and working platforms as required.

4. Provide temporary guy lines to achieve proper alignment of structural members.
5. Do not remove staging or platforms before the work is inspected and approved.

C. Setting Bases and Bearing Plates

1. Clean concrete and masonry bearing surfaces free from bond-reducing materials, and then roughen to improve bond to surface.
2. Set loose and attach base plates and bearing plates for structural members with steel wedges or other adjusting devices.
3. Clean bottom surface of bearing plates and then roughen to improve bonding and set and shim the plates utilizing steel wedges to achieve correct positions and elevations.
4. Before members are assembled, thoroughly clean all bearing surfaces.
5. Tighten anchor bolts after the supported members have been positioned and plumbed.
6. Tolerances in leveling column bases shall be 5 mm.
7. Application of grout.
8. Roughening surface of the foundation top shall be made after all laitance has been removed, in addition oil, grease, dust, sand and other foreign matter shall be thoroughly removed.
9. After steel structural frames have been installed on foundations, grouting works shall be carefully carried out in and around the base plates and the foundation top surface by acceptable established methods so as to leave no air pockets.
10. Grouting work shall not be carried out during heavy rains.
11. Upon completion of padding or grouting, mortar shall be properly cured for three days or longer by covering it with mats or sprinkling with water according to the weather condition.
12. No load shall be applied for at least three days after padding or grouting.

D. Field Assembly

1. Clean concrete surface of bond-reducing materials and then roughen to improve bond to surface.
2. Accurately assemble structural steel frames to the lines and elevations indicated and within the specified erection tolerances.
3. Align and adjust accurately before fastening the various members of a complete frame or structure.

4. Repair or replace members which are damaged during erection do not secure damaged members in position.
5. Level and plumb individual members of the structure within tolerances.
6. Fasten splices of compression members only after the abutting surfaces have been brought completely into contact.
7. Perform necessary adjustments to compensate for discrepancies in elevation and alignment.
8. Establish required leveling and plumbing measurements on the mean operating temperature of the structure.
9. Do not use gas cutting torches in the field for correcting fabricating errors in the structural framing.
10. Where field welding is employed with a high strength bolt joint for compression, the high strength bolts shall be securely tightened prior to welding.
11. Temporary connections
    a. Temporary connections for assembling shall be made using temporary bolts.
    b. The quality of temporary bolts for each connection shall be at least two (2) or one-third (1/3) of the required number of the bolts for each connection.
    c. Replacement of temporary bolts shall be made only after corrections of deviation to the structural steel frames have been made.
12. Final bolt tightening shall be made only after checking the accuracy of the assembled frames.

3.2 WELDING

A. Welders

1. Welders shall have sufficient qualifications that have been certified by means of tests.

B. Welding Equipment

1. To obtain stable welds, welding equipment to be used for erection work shall have suitable performance for the materials, sizes of steel members and the shapes of joints.
2. Welding equipment shall always be electrically grounded when in use.

C. Welding Conditions

1. When wind velocity exceeds 2 m/sec for gas shielded welding and 10 m/sec for manual arc welding, sufficient screening shall be provided to protect the welding areas from wind and rains.
2. Those portions of structural steel members to be welded shall be completely dry prior to starting.

D. Preparations for Welding

1. Prior to welding, the welding surface of the base metal shall be cleaned of rust, slag, oil, and other foreign matter, which will cause defects in the welding.
2. Electrodes having any defects such as peeling of coating materials, strains, degradation, humidity, rust, etc., shall not be used.
3. Welding electrodes shall be handled and stored carefully in order to prevent moisture absorption.

E. Welding Procedure

1. Welding shall be carried out in accordance with the specified type of welds shown on the design drawings.
2. Welding position shall be flat where possible.
3. Erectors shall follow a welding sequence that avoids deformation of structural members and restrictions to other trades.
4. All slag per each welding layer shall be carefully removed upon completion of individual welds.
5. Extension bars or run-off plates shall be cut off min. 3-5 mm from edges, and shall be ground smooth avoiding damage to the base metal.
6. In a full penetration weld, backing strips or back gouging shall be used where the intention is to attain sufficient penetration. Back gouging shall always be sufficient, with care taken on the first layer of the welding root to avoid welding defects.
7. At corners and edges of fillet welds or partial penetration welds, the welding shall be made continuously without the ceasing of arc penetration.

F. Repair of Weld Defects

1. Welds having inadequate fusion, insufficient penetration, slag inclusion, porosity, shall be removed and re-welded.
2. Where cracks have been found in the course of inspection, cracked portion(s) and any surrounding area 50 mm from each end of the crack(s) shall be removed and re-welded.

3. Undercut, crater, depression, short reinforcement, insufficient leg length and weld length shall be repaired.
4. Overlap, excessive reinforcement, and other defective welding shall be removed.

3.3 BOLTING

A. Contact Surfaces

1. Contact surfaces including filler plates and splice plates shall be free from paint, scales, burrs, dirt, oil, grease, loose rust and other foreign matter except tight mill scales.
2. Shim plates or filler plates having a suitable thickness for the erector shall furnish joints using high strength bolts where the gap of the contact surface exceeds 1mm.
3. Where there is a gradient of 1/20 or larger on the contact surface tapered washers for bolting shall be provided.

B. Tightening Bolts

1. The “turn-of-nut” method shall be employed for bolt tightening of high strength bolts.
2. Calibrated bolt tightening may be used only when installation procedures are calibrated on a daily basis.
3. Tightening high strength bolts shall not be carried out on a rainy day, weather protection shall always be provided for this operation.
4. For length of bolts, a projection of two full threads beyond the units is to be ensured, when in position.
5. The tightening order of high strength bolts shall be done from the center outwards.

3.4 INSPECTION

A. Advance Inspection

1. Steel Materials Check
    a. For fabricated steel members, grating treads and all other components of erection work, the following inspection points shall be investigated immediately after arrival on site.
        - Quantities
        - Identification marks
        - Existence of defects

- Dimensions and sizes including material grade of bolts.

2. Concrete Base Check

a. Prior to erection work, the concrete base to be used for steel structures shall be checked to confirm the following points:

- Alignment, levelness and orientation in relation to approved benchmarks and reference points.
- The state of anchor bolt threads.
- Position, center to center distance, size and projecting length of anchor bolts.
- Levelness of padding/ grouting to column bases.

3. Embedded Plate Check

-Where embedded plates or other embedded steel for structural members is required all components shall be checked to confirm the position, dimensions and fitting of the item prior to starting work.

4. High strength bolt inspection

-Prior to starting erection work, the quality, quantity, size, and grip length of all high strength bolts shall be inspected to ensure no failures and shortage, defective bolts shall be reported for replacement.

B. Inspection of Erection Work

1. Erection
   a. Before erection, a check for damage in shipment so that damaged or defective pieces may be repaired or replaced.
   b. Check anchor bolts as to size, location, elevation, and for plumb.
   c. Check base plates and grillages for correct assembly work, levelness, and proper grouping.
   d. Check that columns are plumb and to specified tolerances before any permanent bolting or welding.
   e. As erection proceeds, match pieces against erection plan to ensure that steelwork is fixed in the correct position.
2. Bolting
   a. Check contact surface of all joints prior to bolting.
   b. Check alignment of holes and bolt size.
   c. The use of filler plates shall be checked to confirm if they are as specified.
   d. Inspect bolted connections for tightness

e. The tightening of bolts shall be visually inspected.

3. Welding

   -Checklist of items that influence weld quality before, during and after welding (please refer to the following pages)

   -Ultrasonic Acceptance-Rejection Criteria Ultrasonic acceptance-rejection criteria shall be based on the on the attached specifications entitles "ULTRASONIC INSPECTION OF WELDMENTS.

4. Testing Requirements of Structural Members

   -Testing requirements for particular members of steel structures shall be based on the preceding table with heading Testing Requirements for Structural Members.

5. Erection Inspection

   a. Overall Dimensional Inspection

      - After erection, completed steel structure, prior to welding and final bolting, shall be totally inspected for accuracy of construction and to ensure all dimensions are as specified.
      - Inspection records shall be prepared by the contractor and shall be submitted for approval.

3.5 LAP WELDED SPLICE

A. Lap Welded Splice

1. Lap welded splices, when used, shall develop a resistance equal to at least 125 percent of the tensile capacity of the bar being spliced.

B. Butt-Welded Splice

1. Butt-welded splice, when used, shall be considered 75% efficient. The remaining 50% capacity to develop 125 percent of the tensile capacity of the bar shall be provided for by an additional welded lap splice connection on the same joint.

C. Details / Requirements

1. Details of all welded splices shall be submitted by the Contractor for approval by the Structural Engineer.
2. Only certified welders shall be allowed to perform welding operations. These welders shall be subject to the approval of the Project Manager.

D. Testing of Welds

1. Welds shall be considered satisfactory if 9 out of 10 random samples passed the requirements, otherwise, welding procedures shall be corrected to attain better quality welds. Unsatisfactory welds shall be remedied subject to the approval by the Structural Engineer.
2. Testing of welds shall be by Dye Penetration Test (non-destructive tests) unless otherwise directed by the Structural Engineer.

E. Connection

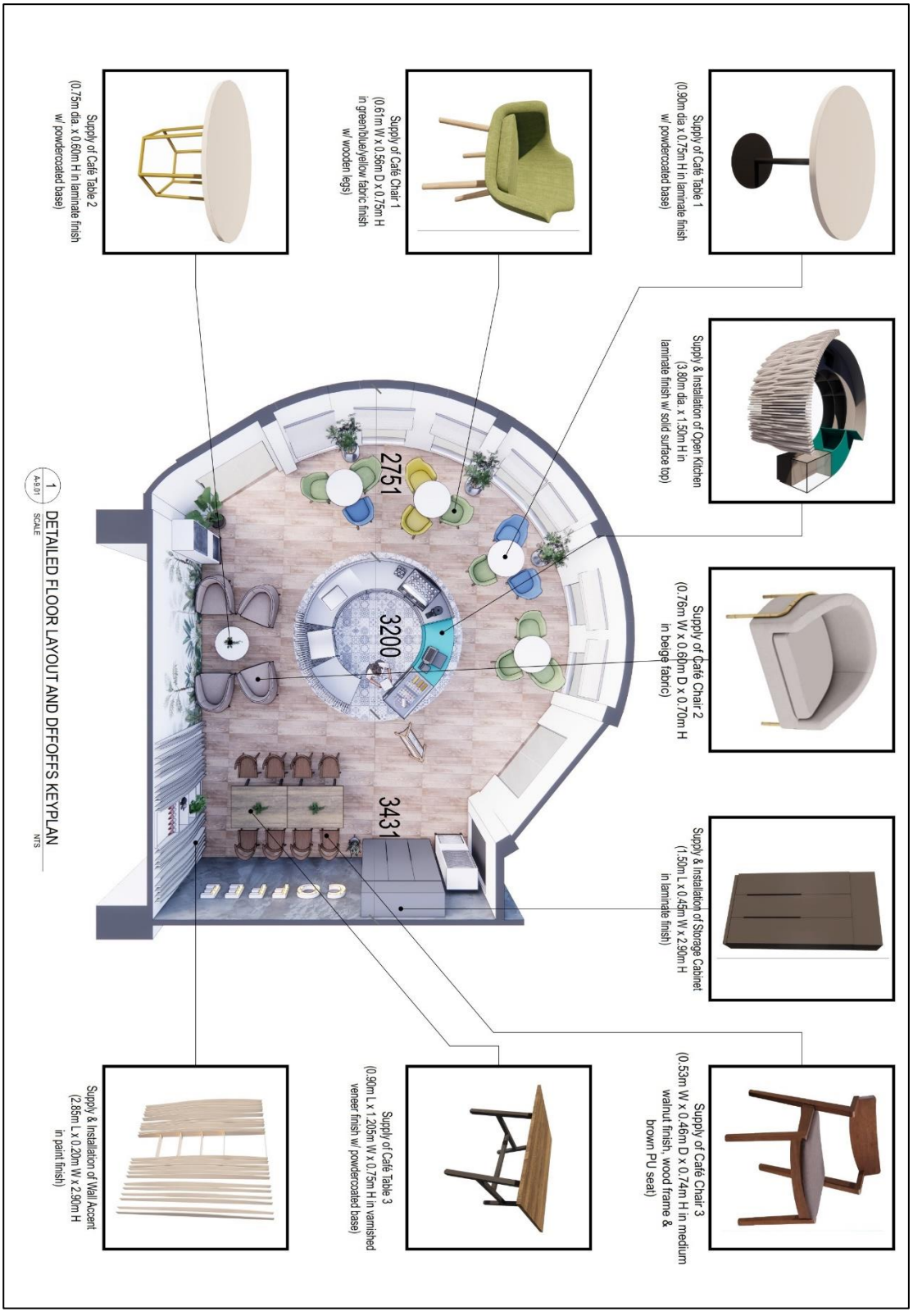
1. Connection of crossing bars by tack welding is not permitted.

* * * END OF SECTION * * *

DIVISION 08

DESIGN FIT-OUTS, FURNISHINGS AND FIXTURES (DFOFFs)

SECTION 8.1 – DFOFFs KEYPLAN



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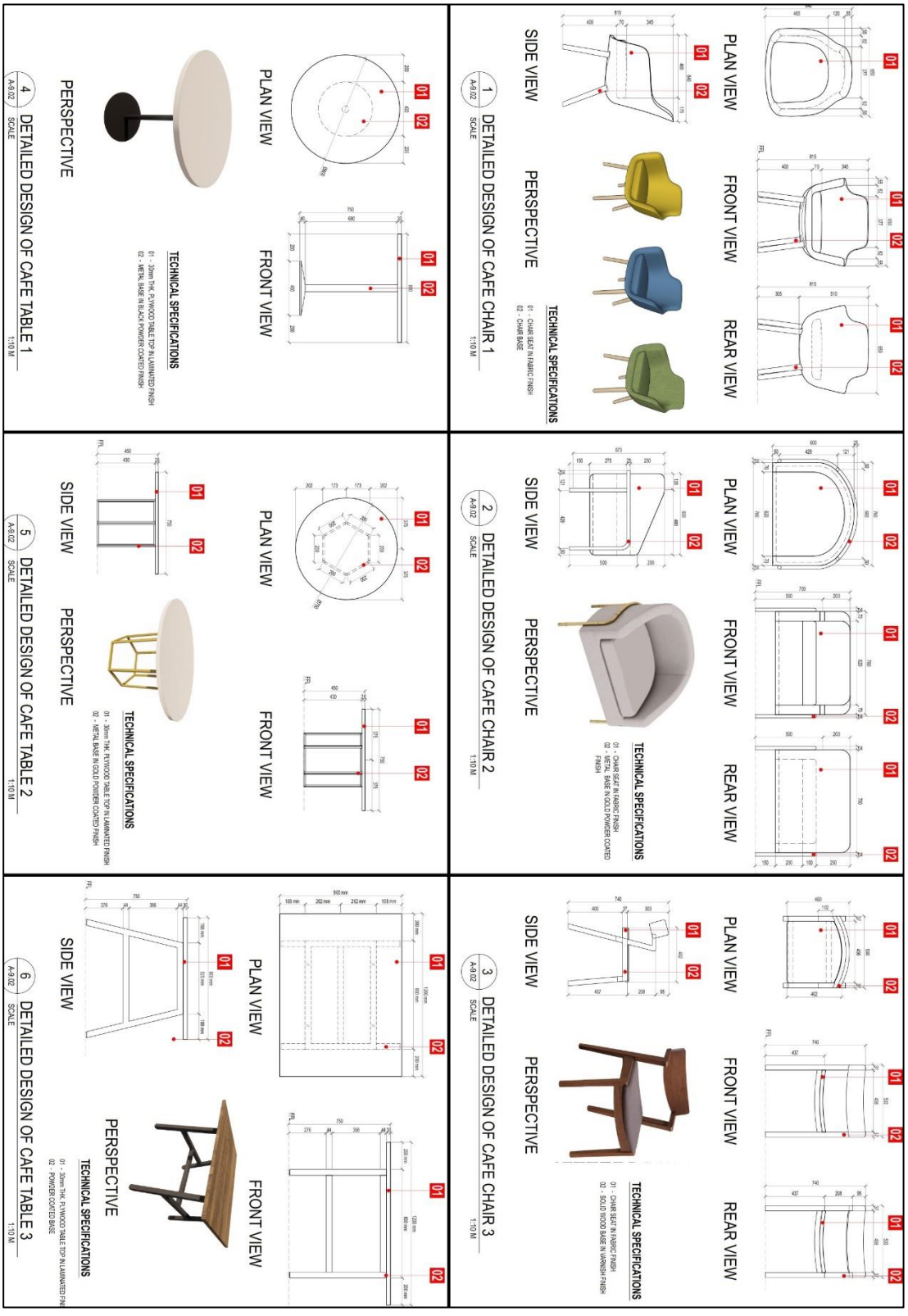
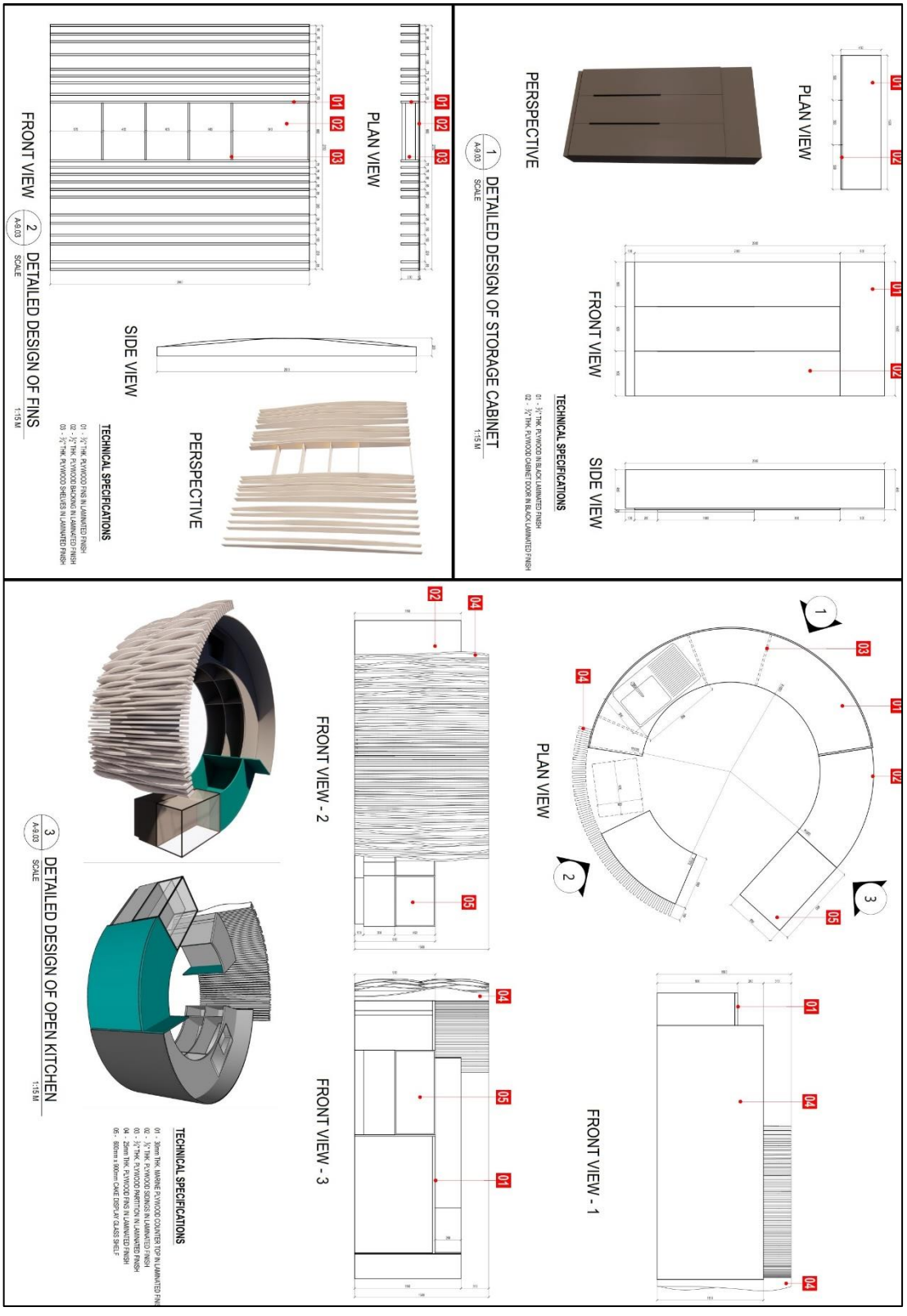
SECTION 8.2 – DFOFFs DETAILED DESIGN





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