

PROPOSED GALERIES TOWER MANILA

NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

ARCHITECTURAL SPECIFICATION 2024

GRAND TAIPAN LAND
DEVELOPMENT INC.

ASYA

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REG. NO. 0023165
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DATE. 01.03.2024

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

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SECTION 00020

SCOPE OF CONTRACT

1. DIVISION SCR-101 SCOPE

- 1.1 These specifications together with the plans and other related Contract Documents cover the work required for the Construction of this Proposed **GALERIES GALERIES TOWER MANILA..**
- 1.2 The Contractor shall be held responsible in the provision of all the items, articles, labor, equipment, appliances, methods, & materials together with the performance of all operations necessary, proper and incidental to complete the said project.

II. DIVISION SCR-102 BREAKDOWN OF WORK

- 2.1 All risk insurance, Contractor's tax, Performance Bond and Building Permit/ Occupancy Permit.
- 2.2 Water, Electric consumption & connection
- 2.3 Temporary Facilities
 - a. Temporary fence - Provide Ga 26 G.I. sheet on wooden or G.I. pipe frame with canopy on the entire length of the road side as per building code with a height of at least 2.4 Meters.
 - b. Sufficient access provisions - Provide and maintain temporary access elements which may be reasonably required in the construction site.
 - c. Temporary sufficient toilets, one toilet with one lavatory.
 - d. Comfortable field office, quarters and storages.
 - e. Temporary enough lights and safe outlets (any Type). Provision of main entrance line required for simultaneous use of different fields of work during roughing works. Bulbs, fluorescent lights and extension lines to be provided by the respective contractors.
 - f. Temporary telephone, immediately available within one month from the start of construction.
 - g. One security guard and one warehouseman.
 - h. Fire Extinguisher (2 units).
 - i. First Aid kit
 - j. Billboards for safety precautions.
 - k. Others as required by the National Building Code.
- 2.4 Complete Site Preparation
 - a. Mobilization & clearing
 - b. Filling and grading
 - c. Survey & building lay-out-sign and seal
 - d. Excavation & backfilling
 - e. Cleaning & hauling

- 2.5 Form works and Scaffoldings using 112mm thk. form plywood and coco lumber or combination of steel.
- 2.6 Soil & concrete poisoning works
- 2.7 Installation of doorjamb
- 2.8 Structural steel works
- 2.9 Complete Plumbing Works
- 2.10 Complete Electrical Works
- 2.11 Complete Waterproofing Works

III. DIVISION SCR 103- OTHER REQUIREMENTS

- 3.1 One set of clean plans and specifications and one set of Building Permit approved plans shall always be kept at the job site to be available to the Architect or his representative upon his request during the construction period.
- 3.2 Project Engineer and /or Architect

The Contractor shall be engaged under him, a registered Engineer to supervise his work during the first stage of construction, and a registered Architect during the preparation of the finishing works. He they shall remain at all times at the construction site.
- 3.3 Triplicate copies of AS-BUILT plans shall be submitted to the Architect upon completion of the project.
- 3.4 The General Contractor's and Sub- Contractor's duly representative is required to attend efficiently the weekly job-site meeting.

3.5 All commitments for the major works as per agreed during weekly meeting shall have a penalty of P250.00 per day of delay. All commitments for minor works (paper works) shall have a penalty of P100.00 per day of delay.

These penalties shall be collected during the meeting not later than one week after, by the Supervising Architect/Engineer then submitted to the Elected treasurer.

IV. OTHER MATERIALS

- 4.1 Other materials not mentioned in this specification or shown on the drawings but are necessary for the proper completion of the work must be provided by the Contractor.

END OF SECTION

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIWAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA
SUBJECT : INSTRUCTION TO BIDDERS

1. DATE & PLACE FOR SUBMISSION OF PROPOSALS

1.1 Submission of proposals shall be stated in the Invitation to Bid

2. PARTIES WHO MAY BID

2.1 By invitation only, Competency of bidders shall be selected by the Architect, the engineer and the Owner.

3. PREPARATION OF BID

3.1 Bids must be prepared without the assistance from any staff of the Architect, the engineer and the Owner.

3.2 Proposals shall be submitted on forms furnished and attached hereto, in strict compliance with requirements of the invitation to bid and these instructions. Special care should be exercised in the preparation of bids. All designations and prices in the proposal forms shall be suitably filled in.

3.3 Bidders or their authorized agents expected to examine the maps, drawings and specifications furnished by the Architect and the Engineer, and to visit the locality of the work. Bidders must make their own estimates of the facilities and difficulties attending the execution of the proposed contract including local conditions, uncertainty and all other contingencies.

3.4 Erasures or other changes in the proposal must be explained or authenticated with the signature or initial of the bidder.

4. SIGNATURE TO BID

4.1 Each proposal must give the full name and full business address of the bidder. A proposal submitted by individual must be signed by the said individual with signature. The proposal submitted by a partnership must be signed with partnership(s) name, followed by the signature and designation of the President, Secretary or other person authorized by the corporation by laws. Names of person signing the proposals must be typed or printed below the signatures.

4.2 A bid by a person who affixes to his signature the word "President", "Secretary", "agent" or other designations without disclosing may be held to be the bid of individual signing. When requested by the Architect, the Engineer or the Owner, satisfactory evidence of authority of the person signing in behalf of the corporation shall be furnished.

5.0 OMISSION AND DISCREPANCIES

5.1 Should a bidder find discrepancies or omission in the drawings or other contract documents, or should he be in doubt as to their meaning, he should prior to date he set for submission of proposals, notify in writing the Architect or the Engineer who may then issue a clarifying bulletin to all bidders.

5.2 Except during a pre-bidding conference, no oral interpretation shall be made to any of the bidder as to the meaning of the drawings or of the contract documents, or be effective to modify any of the provision of the contract documents. Any bulletin issued during the bidding period is to be covered in the proposal. and in closing the proposed contract, it will become a part thereof.

6.0 PROPOSALS TO BE DELIVERED ON TIME

6.1 Proposals with their guarantees shall be sealed in suitable envelopes and properly addressed. All proposals must be submitted on or before the scheduled time of submission of the proposals. No proposal received after the time set will be considered.

- 6.2 No responsibility shall be attached to the Architect, the Engineer and/or the Owner or its representatives for premature opening of any bid not properly addressed as required. Unless specifically authorized, telegraphic bids will not be considered, but modifications by telegraph of bids already submitted shall be considered, if received prior to the time set.

7.0 POSTPONEMENT OF OPENING THE BIDS

- 7.1 The Architect, the Engineer and/or the Owner reserve the right to postpone the date for the prosecution and opening of bid proposals.

- 7.2 Written notice of any such postponement shall be given to each prospective bidder.

8.0 WITHDRAWAL OF BID

- 8.1 If the bidder wishes to withdraw his bid before the time set, he may do so without prejudice to himself by communicating his purposes in writing to the Architect, the Engineer and/or the Owner. And his bid, when reached, shall be handed to him or his authorized representative, unopened. Negligence on the part of the bidder in preparing the bid confer no rights for the Architect, the Engineer and/or the Owner.

9.0 BIDDERS INTERESTED IN MORE THAN ONE BID

- 9.1 If the Architect, the Engineer and/or the Owner finds reasonable grounds to believe that any bidder is interested in more than one bid for the proposed work under this bonding, it may reject any or all bids in which he is interested.

10.0 PRICES IN THE PROPOSAL

- 10.1 In the event of discrepancy between prices quoted in the proposal in words and those quoted in figures, the words shall prevail. However, inconsistent or Irregular bids shall constitute a rejection of the proposal.

11.0 ACCEPTANCE OR REJECTION OF PROPOSALS

- 11.1 The contract will be awarded to the bidder whose proposal appears to be the most advantageous to the Owner in accordance with its exclusive judgement and discretion, and it is in no way bound to accept the highest or lowest proposal as the case maybe. The Owner, however, reserves the right to reject any and all proposals. Without limiting the generality of the foregoing, any proposal which is incomplete, vague, or irregular may be rejected. Omission of any or more items in the prices schedule maybe rejected.
- 11.2 The Owner also reserves the right to waive any defect of informality in the proposals received or to disregard any proposal, which is obviously unbalanced or patently too low, compared to the Owner's estimates.
- 11.3 The Owner also reserves the right to reject the proposal of the previously failed to perform properly or complete on time any contract of similar nature, or the proposal of bidder who is clearly not in a position to perform the work stipulated in the proposed contract.
- 11.4 Where bids are not qualified by specified limitations, the Owner reserves the right of awarding all or any of the items according to its interest, in accordance with its exclusive judgement and discretion. Unless otherwise required in the specifications, bids for suppliers shall be submitted in accordance with the numbered item or items given in the schedule.
- 11.5 The acceptance of the proposal will be through a notice in writing signed by the owner and no other shall constitute the acceptance of the Owner and no other shall constitute the acceptance of the proposal. The acceptance of the proposal shall be bind the successful bidder to execute the contract and should he fail or neglect to do so, he shall be liable on his bond as provide in these instructions. The rights and obligations provided in the contract shall become effective and binding upon the parties only with its formal execution.

- 11.6 Any action required or permitted to be taken, and any document required or permitted to be executed, under the contract documents on behalf of the owner can be taken or executed only by the person duly authorized in writing by them.

12. EXECUTION OF THE CONTRACT AND DAMAGES FOR FAILURE TO EXECUTE

- 12.1 The bidder whose proposal is accepted will be required to appear at the Office of the Owner in person or, if a firm or corporation, through a duly authorized representative in order to execute the contract, on a date fixed by the Owner. The bidder whose proposal is accepted shall have no more than 7 days to examine and review the contract. In the event of his failure or neglect to sign and execute the contract on or before the date fixed for any reason whatsoever, the Owner may at its option consider the proposal and acceptance null and void.

13.0 COST BREAKDOWN

- 13.1 The contractor shall, within ten (10) days after signing the contract submit in a form acceptable to the Architect, the Engineer, the Works Engineer and/or the Owner, a schedule showing the breakdown of its contract, taking into consideration its various parts, stating quantities and prices, to be made as basis for checking or computing estimates for payment only. The schedule shall include cost of each item. No payments will be made to Contractor until such schedule has been submitted to and approved by the Works Engineer, the Architect or the Owner.

14.0 MATERIALS GUARANTY

- 14.1 After the contract is signed, the bidder will be required to furnish a complete statement of origin, composition and manufacture of any or all materials to be used in the construction of the work, together with the samples, which samples maybe subjected to the test provided for in these specifications to determine their quality and fitness for work.

15.0 TIME FOR BEGINNING AND COMPLETION OF THE WORK

- 15.1 The Contractor shall commence the work within 15 days from the date of executions of the contract unless otherwise notified in writing by the Owner to commence work, and he shall complete the work specified in the contract.

16.0 EXCEPTIONALLY LOW BID

- 16.1 A bidder who submits an exceptionally low bid may be awarded the contract, but the owner shall have the right to increase the performance bond to an amount as may deem proper to protect the interest of the Owner and of persons supplying labor or materials in the prosecution of the work contemplated in the contract.

17.0 TEMPORARY CONSTRUCTION FACILITIES

- 17.1 The Contractor shall provide his own temporary construction facilities in coordination with the general contractor on site.

18.0 INSPECTION OF EXISTING CONDITIONS

- 18.1 All bidders are requested to visit and inspect the actual conditions of the project site. Upon examination of the locality and premises, bidders should make estimates of the facilities and difficulties attending the execution of the proposed work including uncertainty and all other contingencies.

19.0 OWNER SUPPLIED MATERIALS

- 19.1 The Owner reserves the right to furnish or supply any item or materials, which according to his judgement and discretion could be advantageous to the Owner's exclusive interest.

20.0 PERFORMANCE BOND AND PAYMENT GUARANTEE BOND

- 20.1 Prior to the execution of the contract, the Contractor shall execute and deliver in favor of the Owner a performance bond equivalent to the downpayment or an amount specified by the Owner to secure complete and faithful performance of its obligations under this agreement. The bond shall be acceptable to the Owner and in effect for the duration of the construction.
- 20.2 At approximately 50% completion of the project, the contractor shall execute and deliver in favor of the Owner a Payment Guarantee Bond equivalent to 10% of the contract price to guarantee payment of materials and wages, respectively provided, however, the said bond shall continue remain in force and effect for one year after final acceptance of the work by the Owner. The bond shall have the prior acceptance of the Owner.

21.0 ADDITIONAL SECURITY

- 21.1 Should any bond for the performance of this contract become unacceptable to the Owner, the Contractor must promptly furnish additional security as may be required from time to time, to protect the interest of the Owner and/or persons supplying labor and materials in the prosecution of the work contemplated by the Contractor.

END OF SECTION

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA
SUBJECT : INSTRUCTIONS TO BIDDERS ON GENERAL CONSTRUCTION WORKS

These instructions to bidders are hereby made part of the proposal and contract documents and the bidders are hereby advised to consider the same in the preparation of their bid:

1.0 RESPONSIBILITIES

In the event that the Plumbing and Electrical works and other specialty trades are awarded separately from the General contractor's contract, the following stipulations shall be considered:

- 1.1 The General Contractor shall provide storage facilities for Owner furnished materials and shall be responsible for the storage and safekeeping of Owner-supplied items duly turned over by the Owner.
- 1.2 The cost of providing overall security and storage facilities for the project shall be considered by the General Contractor in his bid. However, individual Contractors in direct contract with the Owner shall remain responsible for the storage and safekeeping for owner-furnished materials turnover to them until final completion and turnover of the project.
- 1.3 Cost of testing for concrete, steel bars, CHB and other material samples required for the project shall be paid by the Contractor. Testing shall be done by a testing laboratory acceptable to the Owner.
- 1.4 The General Contractor shall be responsible for maintaining the general cleanliness and sanitation of the site and shall under take clearing of site and removal of construction debris during the entire contract period, including incidental debris brought about by the Contractor in direct contact with the Owner.
- 1.5 The General Contractor shall coordinate with the Contractors of other builder trades to keep the work without delay.
- 1.6 The temporary water power facilities shall be provided by the General Contractor and cost of water power consumption for the entire project including use by parties in direct contract with the Owner shall be considered by the General Contractor in the bid.
- 1.7 The General Contractor shall at all times provide and maintain adequate watertight temporary office with water light, telephone and toilet facilities for the use of the Owner/ his representative the Architect and the Construction Manager.
- 1.8 Concrete works for the concrete envelope of entrance conduits, service entrance pole, mechanical equipment foundation and concrete manhole shall be done by the General Contractor.
- 1.9 All excavation, concrete and metal works for water tanks, catch basins and covers, trench and gratings shall be undertaken by the General Contractor.
- 1.10 The General Contractor shall be responsible for securing building permits & occupancy permit. It is understood that the fees will be shouldered by the General Contractor.

2.0 CONSTRUCTION PERIOD

- 2.1 Completion of structural shell shall be _____
calendar days after signing of Contract.



2.2 Total completion and turn-over of contract works shall be _____ calendar days after signing of contract.

3.0 PARTIAL RELEASE OF RETENTION / LIQUIDATED DAMAGES

3.1 Ten percent (10%) of each monthly progress payment shall be retained by the Owner until completion of concreting. Fifty percent (50%) of the total contract amount retained shall be released to the General Contractor upon completion and acceptance of the concreting works. Thereafter, the total retention shall be equivalent to five percent (5%) of the total completed work.

In case of delay, the Contractor shall pay the Owner liquidated damages in the following amount:

- a. For failure to complete the structural shell at specified _____ calendar days contract period General Contractor shall pay the Owner liquidated damages equivalent to Five Hundredths of One Percent (0.005%) of total contract amount per calendar days of delay.
- b. For failure to complete the total contract works at the specified _____ calendar days contract period, the General
- c. Contractor shall pay the Owner liquidated damages equivalent to tenth of One Percent (0.01%) of the contract amount per calendar day of delays.

4.0 BONDS AND INSURANCE

4.1 Performance Bond

Upon signing of contract, the Contractor shall secure at its own expenses and deliver to the Owner a Performance Bond posted by a domestic bonding company duly

licensed in the Philippines in the amount equivalent to twenty Percent (20%) of the total contract amount or equivalent to downpayment given by the Owner whichever is higher.

4.2 All-Risk Insurance

The Contractor shall secure at its own expense within Twenty days (20) after signing of contract a Contractor's all-risk insurance by a company acceptable to the Owner in the amount equivalent to its total contract price.

4.3 Guarantee Bond

The Contractor shall upon Owner's acceptance of the works and prior to final payment, obtain at its own expense a guarantee bond equivalent to ten (10%) of the total contract amount from a surety company acceptable to the Owner.

5.0 The Bidders are required to submit unit costs for extras and credits in accordance with the form herein attached.

Unit costs for extras and credits shall be subject to review and confirmation by the Owner separate from the Construction Agreement which may be concluded by the Owner with the Contractor unless said unit costs are duly confirm therein.

In case a specific work item called for in a change order required by the Owner is not included in the submitted table for extras and credits or cost indicated therein is not acceptable to the Owner, the cost of revision shall be computed as follows:

5.1 Additions



Total cost of additional work shall be based on the bare cost of materials and labor plus 15% mark-up to cover overhead and profit plus 10% VAT on top of labor and overhead profit. Prices of materials shall be based at the time the change was made by the Owner.

5.2 Deletions

Total cost of deleted work shall be the summation of bare cost of materials and labor plus 12% mark-up corresponding to the reduction in overhead, profit and tax.

Prices of materials and labor shall be based at the time the bid submitted by the Contractor.

6.0 Bids shall be fixed and shall not be subject to escalation regardless of increase in price of fuel, devaluation and other causes except due to an official increase in minimum wage or allowances as indicated in the proposal form.

7.0 MISCELLANEOUS

7.1 The Contractor shall undertake the securing and payment of building permit and final occupancy permit.

7.2 Owner-supplied plumbing fixtures shall be installed by the Plumbing Contractor. However, owner-supplied toilet accessories such as soap holder shall be installed by the General Contractor.

7.3 Prior to acceptance of concreting works and release of the 50% retention. The General Contractor shall submit to the Owner the following:

- a. Summary of concrete and steel bar test result.
Please attached official copy of test results issued by the testing laboratory.
- b. Foundation and floor framing plans which will serve as key reference plan showing in color code the pouring zones indicating the following
 - Construction Joints;
 - Date of Concreting; and
 - Concrete sample reference numbers taken from the particular operation.

7.4 The Contractor shall provide a minimum slope of 1/2% towards drains of floor slabs, roof slabs, canopies, gutters and wherever floor drains are required.

7.5 The General Contractor shall operate and maintain at the building the temporary sump pumps or adequate capacity during the entire contract period.

7.6 The contractor shall provide lintel beams for all door, window and window type a/c openings. Submit shop drawings for approval.

7.7 The Contractor shall provide "BASYADA" for window openings. The Contractor shall submit shop drawing incorporating approved window section for Architect's approval.

PROPOSAL FORM : GENERAL CONSTRUCTION WORKS

SUBMITTED BY : _____

DATE : _____

APPROVED BY:

DATE : _____



ASYA FILE

ASYA
FOR CONSTRUCTION
Date: _____ By: _____

SECTION 00050

GENERAL CONDITIONS

PART 1.0 DEFINITIONS

- 1.1 PROJECT shall mean **PROPOSED GALERIES TOWER MANILA** located **NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA.**
- 1.2 Project Manager (PM) shall mean the primary authorized representative of the Owner and is Responsible to him. Construction Manager (CM) shall mean _____ who is he secondary authorized representative of the Owner to over see the prosecution of this contract work, starting either directly or thru properly authorized agents, such agents acting within the scope of the particular duties assigned to them. He will be responsible to the Owner thru the Project Manager / Architect.
- 1.3 Project Technical Group (PTG) shall mean the Management Group composed of the PM, the Architects, the Engineers, and the Consultants. They shall be responsible to the Owner.
- 1.4 The Contractor shall mean the person, company or firm whose proposal has been accepted by the Owner and includes his personally authorized representative, successors or permitted assignees. He is responsible to the Owner thru Architect / Project Manager.
- 1.5 Sub-Contractor or supplier shall mean any person, firm or corporation entering into agreement with the Contractor for the performance of the Contractor's obligation or any part thereof under the contract. He is responsible to the Owner thru the Architects / Project Manager.
- 1.6 Contract shall mean the written agreement entered into by the Owner and the Contractor for the performance of work shown on the drawings and as described in the Specifications including the information for bidders, the proposal, and all bid documents issued by the Owner prior to the opening of bids.
- 1.7 Specifications shall mean written or printed description of work to be done describing qualities of materials and mode of construction.
- 1.8 Drawings shall mean the drawings issued together with specifications to prospective bidders, showing the location, characteristics, extent, form and details of the work to be done under the contract.
- 1.9 Approved means approval in writing including subsequent written information of previous verbal approval. "Approval" shall also mean the same thing above mentioned.

PART 2.0 INTENT OF SPECIFICATION AND DRAWINGS

- 2.1 It is the intent of the specifications and drawings that all materials, labor, tools, equipment, and plant and services, supervision which are required to fully complete the work as shown and specified therein are to be done so by the Contractor.
- 2.2 Bidders shall examine the plans very carefully, the contractor will be not be given any extra payment in case he will discover any discrepancy on the plan during the progress of the work.
- 2.3 Should anything be omitted from the drawings necessary for the proper construction of the work herein described, it shall be the duty of the Contractor to notify the Project Manager (PM) or (CM) before he signs the Contract.

However, in the event the Contractor fails to give such notices, he shall make good any defect or damages in his work called thereby by such failure without extra charge.

PART 3.0 RELATIONSHIPS BETWEEN THE SPECIFICATIONS AND DRAWINGS

- 3.1 The Specifications and drawings are mutually complementary. What is noted in one although not shown in the others shall be considered contained in all. In case of conflict, the Specification shall prevail over drawings.

PART 4.0 REFERENCE LINES AND ELEVATIONS

- 4.1 The Contractor shall establish stakes, making lines and elevations required for constructions work, referred from reference points and elevations pointed out by Engineer / Architect. The Contractor shall be responsible for maintaining the correct alignment and position of these stakes as required by the Engineer throughout the life of the Contract. The Contractor shall use surveyor transit in determining all control lines and elevations required for the construction work.

PART 5.0 MATERIALS AND EQUIPMENT INCORPORATED IN THE WORK

- 5.1 All materials and equipment to be incorporated in the work shall be new, of current manufacture and conforming to the requirements of the drawings and the specifications. The Project Manager may require presentation by the Contractor of the manufacturer certificate prior to its incorporation into the work.
- 5.2 Mere Inspection, acceptance and certification for payment of any equipment or materials as part of the work which are found defective or non-comply after inspection does not release the Contractor from the responsibility of replacing or repairing it at his own expense.

PART 6.0 CONTRACTOR'S RESPONSIBILITY OF CONTRACT WORK

- 6.1 The Contractor shall be responsible for the complete work or portion thereof until that it is wholly turned-over and accepted by the Owner through the Project Manager or CM. He shall repair or restore and rebuild at his own expense any damage thereto due to his faults and action of elements, or other causes except damages due to unforeseeable or cataclysmic natural phenomena.
- 6.2 For Accidents :
- 6.2.1 The Contractor shall bear all losses or damages from accidents, which may occur to a person or persons on account of the prosecution of work until possession is taken over by the Owner.
- 6.2.2 The Contractor shall hold himself solely responsible for all liabilities under the existing compensation laws regarding injuries and/or death of workmen connected with this work.

PART 7.0 LAWS, RULES AND REGULATIONS

- 7.1 The Contractor shall comply with all national and local laws, rules and regulations regarding the health and safety of workmen, wages, labor codes, tax laws, buildings and construction rules and regulations and shall save the Owner, Architects, Engineers and the Project Manager or CM harmless in connection with the third party claims and liabilities resulting from Contractor's non-compliance therewith.

PART 8.0 PERMITS AND LICENSES

- 8.1 All necessary permits and licenses and charges, taxes, and fees for the lawful prosecution of the Contract shall be obtained by the Contractor at his expense.

PART 9.0 CONTRACT TIME

- 9.1 The work to be done under this contract shall consist of furnishing of all labor, materials (except those furnished by the Owner or by others) equipment, supervision, facilities, and performing all other related works necessary for the contract construction within the time specified in the Proposed Time Schedule attached in strict compliance with the contract drawings, specifications and other related documents. Bidders shall examine the site drawings, specification schedules and all instructions. Failure to do so will be at the bidder's that is aware of any concurrence with all of the requirements or conditions incorporated in the invitation to bid.

PART 10.0 PROGRESS SCHEDULES

- 10.1 The Contractor shall submit progress schedules showing the order of his proposed work sequences complete with the dates within which such work sequences will be started and completed. Such schedules shall be submitted within seven (7) calendar days after receipt of Notice Award / To Proceed and subject to the approval of the Project Manager or CM and Owner. The Contractor shall also submit their S-curve for the project. This should follow the prescribed form.

PART 11.0 FAILURE TO COMPLETE WORK ON TIME

For failure to complete the work on the stipulated Contract time, the Owner shall charge the Contractor penalty in the form of liquidated damages amounting to one-tenth (1/10) of one (1%) percent of the total contract amount for the added cost incurred by the Owner for such delay and also for the inconvenience caused the users of this utility. It is understood that this is not penalty but is a fixed sum representing the liquidated damages for each calendar day of delay. Delay shall be counted from the agreed completion date considering further time extension approved by the Project Manager or CM to the date the Owner accepted the completed work.

PART 12.0 SANITARY PROVISIONS, CANTEEN AND FIRE PROTECTION

- 12.1 The Contractor's employees and men shall use designated comfort rooms within the construction site and he shall be responsible for clean up of such comfort rooms upon leaving the place of work each day and after completion of the project.
- 12.2 The Contractor shall provide as many portable fire extinguishers deemed necessary while performing the work.
- 12.3 The Contractor shall take extra care in the storage of flammable materials.
- 12.3 There shall not be smoking, cooking nor eating allowed at the jobsite. Eating and smoking shall only be allowed at a designated area, and the Contractor shall be responsible for proper clean up thereafter.
- 12.5 The Contractor shall be responsible in putting up and maintaining canteen for his personnel.

PART 13.0 AUTHORITY OF THE PROJECT MANAGER/CONSTRUCTION MANAGER

- 13.1 The Project Manager / Construction Manager shall decide on any and all questions, which may arise as to the quality and acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of work, and shall decide on all questions which may arise as to the acceptable fulfillment of the terms of the Contract.

PART 14.0 ADJUSTMENTS OF DISPUTES

- 14.1 Claims for adjustments of disputed must be made and submitted in writing by the Contractor within ten (10) calendar days after the date of issue of the order dealing therewith, and any disagreement with the interpretation of the plans and/or the specifications, made by the Engineer/Architect, must likewise be asserted and submitted in writing by the Contractor within ten (10) days from the date of such interpretation.

PART 15.0 CONFORMITY WITH PLAN AND ALLOWABLE DEVIATIONS

- 15.1 Finished surfaces in all cases shall conform with lines, grades, dimensions and adjustments shown on the approved plans, except as modified by written orders. Any deviations from the plans, specifications and approved working drawings that may be required by the exigencies of construction or otherwise, will in all cases be determined by the Architect/Engineer and in writing with the approval of the Owner.

PART 16.0 INSPECTION

- 16.1 The Project Manager / Construction Manager shall be allowed access to all parts of the work at all times and shall be furnished such information and assistance by the Contractor as may be required to make a complete and detailed inspection.

PART 17.0 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

- 17.1 Any defective work whether the result of poor workmanship of defective materials, damages through carelessness, or of other cause, found to exist prior to acceptance of or final payment for the work, shall be removed immediately, replaced by work and materials conforming to the specifications, or shall be remedied otherwise in an acceptable manner.
- 17.2 Work done contrary to or regardless of the instructions of the Project Manager or Construction Manager work done beyond the lines shown on the plans or as given, except as therein provided, or extra work done without authority will be considered as unauthorized and will not paid for. All correction work of any description and removal and replacement of unsatisfactory materials shall be done at the Contractor's expense.

PART 18.0 FINAL INSPECTION

- 18.1 Upon due notice from the Contractor of presumptive completion of the entire project, the Project Manager or Construction Manager shall make a semi-final inspection, and if all construction contemplated by the Contract is found

completed to his satisfaction, such inspection shall constitute final acceptance and the Contractor shall be notified of such acceptance in writing ten (10) days or as soon as thereafter as practicable.

- 18.2 If, however, at any semi-final inspection, any work in whole or in part is found unsatisfactory, the Project Manager or Construction Manager shall give the Contractor instructions, which he shall forthwith comply with and execute. Another inspection shall be made which shall constitute the final inspection if the work has been found to be completed satisfactorily.

PART 19.0 SUPERINTENDENCE AND SUPERVISION

- 19.1 The Contractor shall assign a competent Project Engineer and necessary assistance satisfactory to the Project Manager / Construction Manager and Project Technical Group. The Superintendent shall represent the Contractor at his absence, and all directions given to him by the Project Manager / Construction Manager shall be as binding as if given to the Contractor.

PART 20.0 CONTRACTOR'S LIABILITY INSURANCE

- 20.1 The Contractor shall acquire such insurance as will protect him from claims under Workmen's Compensation Act and from any other claims for damages for personal injury, including death, operations be by himself or by any sub-contractor or anyone directly or indirectly employed by either of them. Certificates of such insurance shall be filed with the Owner, for approval as to adequacy or protection. Such policy shall be secured from the Insurance Company designated by the Owner.

PART 21.0 PERFORMANCE BONDS AND PAYMENT GUARANTEE BONDS

- 21.1 The Contractor shall deliver to the Owner a Performance Bond and a Payment Guarantee Bond one-(1) week after signing the Contract in the sum equivalent to the amount of the payment as security for the performance by the Contractor of its obligations herein for payment(s) of all losses or damages which the Owner may incur as a result of the Contractor's failure to faithfully comply with the provisions of this Contract and to protect the Owner from the Contractor's possible failure to pay its just labor wages and cost of materials applied in the project.
- 21.2 Such Performance and Payment Guarantee Bonds shall be from the PRUDENTIAL GUARANTY AND ASSURANCE INC.

PART 22.0 RELEASE OF PERFORMANCE AND PAYMENT GUARANTEE BONDS

- 22.1 The Contractor's Performance and Payment Guarantee Bonds will be released by the Owner after the expiration of one (1) year from the final acceptance of the work.

PART 23.0 INDEMNITY

- 23.1 The Contractor shall indemnify and save harmless the Owner from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgements of every nature and description brought or recovered against him, by reason or any act of omission of said contract, his agents or employees, in the execution of the work or the guarding of it.

PART 24.0 PAYMENTS

- 24.1 The Contractor shall be paid on partial amount(s) based on actual percentage of accomplishment accepted by the Owner.
- 24.2 All billing shall be submitted to the Project Manager / Construction Manager once a month at specified date.

- 24.3 Payments shall be made by the Owner fifteen (15) days after evaluation of the billings by the Project Manager / Construction Manager and recommended for payment by the Project Technical Group of the Owner.

PART 25.0 WARRANTY

- 25.1 The Contractor guaranteed the workmanship and the materials supplied by him for a period of one (1) year counted from date of completion and acceptance by the Owner of all works.
- 25.2 Any defect to work contemplated in this Contract which may arise during the one (1) year warranty period shall be for the account of the Contractor.

PART 26.0 RETENTION

- 26.1 The Owner shall retain ten (10%) percent of the Contractor's Billings until the expiry of the one (1) year warranty period.

PART 27.0 RELEASE OF RETENTION

- 27.1 The Owner may, upon representation by the Contractor, release said percentages before expiry of the one (1) year warranty period, provided the Contractor submits a guarantee bond from the FGU Insurance Corporation in favor of the Owner for an amount equivalent to the retention to be released. Such guarantee bond shall be enforced during the warranty period and shall be cancelled upon advice by the Owner.

PART 28.0 COMPREHENSIVE GENERAL LIABILITY (CONTRACTOR'S ALL RISK)

- 28.1 The Contractor shall hold the Owner free and harmless from any claim for injury or damages caused by third parties and for this purpose he shall secure at his own expense a comprehensive general liability policy in the amount of one hundred (100%) percent of the contract cost, in the name of the Owner. This policy shall be secured from the Insurance Company accredited by the Owner.

PART 29.0 AS-BUILT DRAWINGS

- 29.1 The Contractor shall maintain at the job site two sets of full sized contract drawings showing any deviation which have been made from the contract drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the contract drawings. These drawings shall be available for review by the Project Manager / Construction Manager at all times. Upon completion of the work the marked prints are not kept current, and request for final payment will not be approved until the marked prints are delivered to the Project Manager / Construction Manager.

PART 30.0 UAP DOCUMENT 301

All applicable articles and clauses of the general conditions, which are not in conflict with the conditions therein stated, shall form part of this document.

END OF SECTION

SECTION 00070

INSTRUCTION TO BIDDERS ON PLUMBING WORKS

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

These Instructions to Bidders are hereby made part of the proposal and contract documents and Bidders are advised to consider the same in the preparation for their bid.

1.0 TEMPORARY POWER:

The General Contractor shall provide the temporary power to be used during the construction of the entire building.

The General Contractor shall allow the specialty contractor of other trades directly hired by the Owner to connect to the General Contractor's temporary power connection. The General Contractor in his bid shall consider cost of temporary power.

2.0 The Plumbing Contractor shall assist the General Contractor in securing and payment of plumbing permit and other government fees.

3.0 Plumbing Contractor shall be responsible for the safekeeping and storage of owner-supplied items turned-over by the Owner.

The General Contractor in his bid shall consider the cost of providing overall security and storage facilities. However, individual contractor shall remain responsible for the storage and safekeeping of owner-furnished materials turned-over by the Owner until final completion and turn-over of the project.

4.0 Overall the Construction Manager shall do coordination. The General Contractor shall not supervise the work of other trades in direct contract with the Owner. However, the General Contractor shall coordinate with contractors of other building trades to keep the work in all aspects under control and proceeding without delay.

5.0 Temporary water facilities shall be provided by the General Contractor and the cost of water consumption for the entire project including use of parties in direct contract with the Owner shall be considered by the General Contractor in his bid.

6.0 In general, all materials to be used shall be of first class quality the Contractor shall be required within Thirty (30) days after signing of contract to submit samples of materials that they intend to use for approval.

7.0 Bids shall be fixed and shall not be subject to escalation regardless of increase in price of fuel, devaluation and other causes except due to an official increase in minimum wage as indicated in the proposal.

8.0 BONDS AND INSURANCES:

a. Performance Bond:

Upon signing of contract, the Contractor shall secure at its own expense and deliver to the Owner a Performance Bond in the form of a Surety Bond posted by a domestic bonding company, duly licensed in the Philippines in the amount equivalent to Twenty Percent (20%) of the total contract price.

b. All-Risk Insurance:

The Contractor shall secure at its own expense within Twenty (20) calendar days after signing

contract a Contractor's All-Risk Insurance from a Surety Company acceptable to the Owner in the amount equivalent to its total contract price.

c. Guarantee Bond:

The Contractor shall upon Owner's acceptance of the work and prior to final payment, obtain at its own expense a Guarantee Bond equivalent to Ten Percent (10%) of the total contract price from a Surety Company acceptable to the Owner to cover a period of One (1) year after completion and acceptance of work.

9.0 MISCELLANEOUS:

- a. The Plumbing Contractor shall undertake excavation, supply and installation of necessary materials in connection with the drainage and sewer piping connection including back filling and disposal of excess soil materials including the cost of permits and other government fees.
- b. A downpayment equivalent to Twenty (20%) Percent of the contract amount shall be made to the Contractor upon signing of contract.
- c. Fifty Percent (50%) of the amount retained shall be released upon completion of sewer, drainage and permanent water connection.
- d. Cost of water connection from MWSS line to the system including excavation and permits shall be included in this proposal.

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

1.0 SCOPE OF WORK:

Lump sum proposal for the supply of labor, materials, tools and equipment and supervision for the complete plumbing, roughing-ins excluding owner-supplied items listed herein for Proposed **GALERIES TOWER MANILA** in accordance with specifications and other related contract documents as Prepared by ASYA DESIGN PARTNER.

2.0 BID AMOUNT:

	Material	Labor	Total
A. Sanitary & Vent System			
B. Water distribution system including main water meter and sub-water meters piping system			
C. Storm Drainage system, downspouts, strainers, catch basins, drain junction boxes, manholes and covers, and all miscellaneous drains			
D. Installation of toilet fixtures			
E. Installation of Individual water heaters			

F. Hangers, support & miscellaneous materials

G. Permits, licenses, bonds, insurance, MWSS expenses, etc

TOTAL BID AMOUNT: _____

AMOUNT IN WORDS: _____

3.0 CONSTRUCTION PERIOD:

Completion and turn-over of contract works shall be within _____ calendar days after signing of contract.

4.0 LIST OF OWNER-SUPPLIED & EXCLUDED ITEMS :

4.1 Supply of plumbing fixtures, i.e., kitchen sink , water closet, lavatory urinal and accessories shall be by Owner. However, installation shall be by the Plumbing Contractor.

4.2 Supply of sanitary pumps shall be by others. However, installation including the supply of necessary, connecting pipes, valves, flexible connectors and fittings shall be Plumbing Contractor.

It is understood that any item required to complete the subject project mentioned in either plans, specifications and other related contract documents but not specifically included in the above list shall be deemed covered by this proposal.

5.0 ADJUSTMENT IN LABOR COST :

Bids shall be based on current labor wages. In the event of an official increase in minimum wage or compulsory allowances during the construction period. The contract price shall be adjusted accordingly.

If there shall be such an increase prior to start of work, the total increase in the contract price for every One Pesos (P1.00) increase in minimum wage or allowances shall be fixed amount as indicated below :

"Total Labor Adjustment for
Plumbing Works per One
Pesos (P1.00) increase in minimum
wage or allowance."

P _____

If there shall be an increase in minimum wage or allowances at anytime during the construction period, the adjustment in labor cost shall be made in proportion to the remaining contract period.

SUBMITTED BY :

FIRM : _____
BY : _____
TITLE : _____
SIGNATURE : _____
DATE : _____

END OF SECTION

SECTION 00080

INSTRUCTION TO BIDDERS ON MECHANICAL WORKS

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

These Instructions to Bidders are hereby made part of the proposal and contract documents and Bidders are advised to consider the same in the preparation for their bid.

1.0 TEMPORARY POWER:

The General Contractor shall provide the temporary power to be used during the construction of the entire building.

The General Contractor shall allow the specialty contractor of other trades directly hired by the Owner to connect to the General Contractor's temporary power connections. The General Contractor in his bid shall consider cost of power consumption.

2.0 The Mechanical Contractor shall undertake the securing and payment of mechanical permit and other government fees.

3.0 Mechanical Contractor shall be responsible for the safekeeping and storage of owner-supplied items turned-over by the Owner.

The General Contractor in his bid shall consider the cost of providing overall security and storage facilities. However, individual contractor shall remain responsible for the storage and safekeeping of owner-furnished materials turned-over by the Owner until final completion and turn-over of the project.

4.0 Overall the Construction Manager shall do coordination. The General Contractor shall not supervise the work of other trades in direct contract with the Owner. However, the General Contractor shall coordinate with contractors of other building trades to keep the work in all aspects under control and proceeding without delay.

5.0 Temporary water facilities shall be provided by the General Contractor and the cost of water consumption for the entire project including use of parties in direct contract with the Owner shall be considered by the General Contractor in his bid.

6.0 In general, all materials to be used shall be of first class quality. the Contractor shall be required within Thirty (30) days after signing of contract to submit samples of materials that they intend to use for approval.

7.0 Bids shall be fixed and shall not be subject to escalation regardless of increase in price of fuel, devaluation and other causes except due to an official increase in minimum wage as indicated in the proposal.

8.0 BONDS AND INSURANCES:

a. Performance Bond:

Upon signing of contract, the Contractor shall secure at its own expense and deliver to the Owner a Performance Bond in the form of a Surety Bond posted by a domestic bonding company, duly licensed in the Philippines in the amount equivalent to Twenty Percent (20%) of the total contract price.

b. All-Risk Insurance:

The Contractor shall secure at its own expense within Twenty (20) calendar days after signing contract a Contractor's All-Risk Insurance from a Surety Company acceptable to the Owner in the amount equivalent to its total contract price.

c. Guarantee Bond:

The Contractor shall upon Owner's acceptance of the work and prior to final payment, obtain at its own expense a Guarantee Bond equivalent to Ten Percent (10%) of the total contract price from a Surety Company acceptable to the Owner to cover a period of One (1) year after completion and acceptance of work.

9.0 MISCELLANEOUS:

- a. A down payment equivalent to Twenty (20%) Percent of the contract amount shall be made to the Contractor upon signing of contract.

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

1.0 SCOPE OF WORK:

Lump sum proposal for the supply of labor, materials, tools and equipment and supervision for the complete mechanical, roughing-ins excluding owner-supplied items listed herein for Proposed **GALERIES TOWER MANILA** in accordance with specifications and other related contract documents as Prepared by ASYA DESIGN PARTNER.

2.0 BID AMOUNT:

	Material	Labor	Total
A. Mechanical equipment			
1. PAHU / ACCU			
2. FANS			
3. WAC			
B. Ventilation System			
C. Refrigerant System			
D. Electrical System & controls			
E. Hangers, supports, drains & miscellaneous materials			
F. Permits, licenses, bonds, insurance, etc.			
TOTAL BID AMOUNT	:		
AMOUNT IN WORDS	:		

3.0 CONSTRUCTION PERIOD:

Completion and turn-over of contract works shall be within _____ calendar days after signing of contract.

4.0 ADJUSTMENT IN LABOR COST:

Bids shall be based on current labor wages. In the event of an official increase in minimum wage or compulsory allowances during the construction period. The contract price shall be adjusted accordingly.

If there shall be such an increase prior to start of work, the total increase in the contract price for every One Pesos (P1.00) increase in minimum wage or allowances shall be fixed amount as indicated below :

"Total Labor Adjustment for
Mechanical Works per One
Pesos (P1.00) increase in minimum
wage or allowance."

P _____

If there shall be an increase in minimum wage or allowances at anytime during the construction period, the adjustment in labor cost shall be made in proportion to the remaining contract period.

SUBMITTED BY :
FIRM : _____
BY : _____
TITLE : _____
SIGNATURE : _____
DATE : _____

END OF SECTION

SECTION 00090

INSTRUCTION TO BIDDERS ON ELECTRICAL WORKS

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

These Instructions to Bidders are hereby made part of the proposal and contract documents. Bidders are hereby advised to consider the same in the preparation of their bid:

1.0 The Electrical Contractor shall undertake the securing and payment of electrical permits and other government fees.

2.0 TEMPORARY POWER:

The Bidder for General Constructions shall include in their bid cost the provision of temporary power to be used during the construction of the entire building. The General Contractor shall pay deposits and meter costs.

The General Contractor shall allow the Specialty Contractor of other trades, directly hired by the Owner to connect to the General Contractor's temporary connections. Cost of temporary power shall be billed by the General Contractor to the Specialty Contractor.

In this connection, the General Contractor shall provide panel boxes where the other contractors may tap for their specific use. For use of temporary power, the sub-contractors who would require unusual power consumption shall be in proportion to their respective contract amount.

3.0 The General Contractor shall provide temporary water facilities and cost of water consumption for the entire project including use by parties in direct contract with the Owner shall be considered by the General Contractor in his bid.

4.0 The General Contractor shall provide temporary toilet facilities.

5.0 Electrical Contractor shall remain responsible for the storage and safekeeping of owner-supplied materials turned-over to them until final completion and turnover of the project.

6.0 The Bidders are required to submit unit costs of extras and credits in accordance with the actual change and conditions.

Units costs for extras and credits shall be subject to review and confirmation by the Owner separate from the General Contractor which may be concluded by the Owner with the Contractor unless said unit prices are duly confirmed herein.

7.0 Bids shall be fixed and shall not be subject to escalation regardless of increase in the price of fuel, devaluation and other causes except due to an official increase in minimum wage as indicated in the proposal form.

8.0 PARTIAL RELEASE OF RETENTION/LIQUIDATED DAMAGES

8.1 Ten Percent (10%) of each monthly progress payment shall be retained by the Owner until completion of electrical works, Fifty Percent (50%) of the total amount retained shall be released to the Electrical Contractor upon connection of permanent power by Meralco. Thereafter, the total retention shall be equivalent to Five Percent (5%) of the total completed work.

9.0 CONSTRUCTION PERIOD

Completion and turnover of contract works shall be completed within _____ calendar days after signing of contract.

10.0 For failure to complete the total contract works at the specified _____ calendar day contract period, the Electrical Contractor shall pay to the Owner an amount equivalent to One Tenth of One Percent (0.1%) of the contract amount per calendar day of delay as liquidated damages.

11.0 **BONDS AND INSURANCES**

11.1 **PERFORMANCE BOND**

Upon signing of contract, the Contractor shall secure at its own expense and deliver to the Owner a Performance Bond in the form of a Surety Bond posted by a domestic bonding company acceptable to the Owner duly licensed in the Philippines in the amount equivalent to Twenty Percent (20%) of the total contract amount.

11.2 **ALL RISK INSURANCE**

The Contractor shall secure at its own expense within Twenty (20) calendar days after signing of contract a Contractor's All-Risk Insurance from a company acceptable to the Owner in the amount equivalent to its total contract price.

11.3 **GUARANTEE BOND**

The Electrical Contractor shall upon Owner's acceptance of the work and prior to final payment, obtain at its own expense a Guarantee Bond equivalent to Ten Percent (10%) of the total contract amount from a Surety Company acceptable to the Owner.

12.0 **MISCELLANEOUS**

12.1 All roughing-ins of the auxiliary systems, i.e. Intercom, MATV system shall be by the Electrical Contractor.

12.2 In general, all materials to be used shall be of first class quality. The Contractor shall be required within Thirty (30) calendar days after signing of contract to submit samples of materials that they intend to use for approval.

12.3 A downpayment equivalent to Fifteen Percent (15%) of the contract amount shall be made to the Contractor upon signing of contract.

12.4 Preparation of "As-Built" plans with three (3) sets blue print, testing and adjustments of the entire electrical system shall be included in the proposal.

PROPOSAL FORM : ELECTRICAL WORKS

SUBMITTED BY : _____

DATE : _____

APPROVED BY:

DATE : _____

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

1.0 SCOPE OF WORK:

Work shall include supply of labor, materials, tools an equipment and supervision to complete the electrical works of the Proposed **GALERIES TOWER MANILA** located at Taft Avenue, Manila in accordance with the plans and the specifications and other related contract documents as prepared by ASYA DESIGN PARTNER.

1.1 Roughing-ins:

Work shall include supply of labor, materials, tools, equipment, supervision and installation to complete the conduit runs from the Meralco terminal pole up to and including all power, lighting, security, MATC, Intercom/Entryphone, Fire Alarm System, Telephone, Air-conditioning and convenience outlets and other auxiliary outlets including bus gutters, splice boxes, telephone cabinets and wooden backboards.

1.2 Wires and Cables:

Furnishing and installation of all wires and cables for lighting, power convenience outlets, telephone communications and telephone house cable.

1.3 Panelboards, Circuit Breakers and Safety Switches:

Furnishing and installation of main panelboards, distributions/lighting panelboard and safety switches.

1.4 Wiring Devices:

Furnishing and installation of all wiring devices, including telephone outlets and intercom outlet.

1.5 Meter Center:

Furnishing and installation of Meter Center.

1.6 Miscellaneous:

Installation of lighting fixtures and diffusers, furnishings and installation of pull-wires in raceways, all items required by Meralco for transformer vault consultations, verifications and compliance with the requirements of the local electric power and telephone connections. Preparation of "As-Built" plans, with three (3) sets blue print and testing and adjustments of the entire electrical system. Supply and installation of other materials required to complete the system not included under Items 1.1 to 1.5 shall be considered included in this item.

2.0 OWNER-SUPPLIED ITEMS :

1. All lighting fixtures
2. Water Heater
3. Telephone
4. Video Phone
5. CCTV
6. _____
7. _____
8. _____

3.0 BID AMOUNT:

3.1 PROPOSAL "A":

I. Supply of Materials

1.0 Conduit works, boxes,
fittings & hangers P _____

2.0 Wires & Cable _____

3.0 Wiring Devices _____

4.0 Panelboards, circuit breakers
& safety switches _____

5.0 Meter Center _____

6.0 Telephone House Cable _____

7.0 Miscellaneous _____

TOTAL FOR MATERIALS: P _____

II. Labor, supervision, tools & equipment,
overhead, profit & tax. P _____

III. Permits & Certificates P _____

LUMP SUM TOTAL FOR BID ITEMS I, II & III: P _____

AMOUNT IN WORDS : _____

4.0 CONTRACT PERIOD :

The Contractor shall keep pace with the civil works, and shall complete all works under this proposal within _____ calendar days after signing of contract.

5.0 ADJUSTMENT IN LABOR COST :

Bids shall be based on current labor wages. In the event of an official increase in minimum wage or compulsory allowances during the construction period, the contract price shall be adjusted accordingly.

If there shall be such an increase prior to start of work, the total increase in contract price for every One Peso (P 1.00) increase in minimum wage or allowances shall be a fixed amount as indicated below :

"Total Labor Cost Adjustment
for (Electrical works) per One
Peso (P1.00) increase in mini-
mum wage or allowances."

P _____

If there shall be an increase in minimum wage or allowance at anytime during the construction period, the adjustment in labor cost shall be made in proportion to the remaining contract period.

We (or I) make this proposal with full knowledge of the kind, quantity and quality of the

articles and services required and if the proposal is accepted, undersigned agrees to enter into a formal agreement and start the work within Ten (10) calendar days upon receipt of letter of award.

PROPOSAL FORM : ELECTRICAL WORKS

SUBMITTED BY : _____

DATE : _____

APPROVED BY:

DATE : _____

END OF SECTION

SECTION 00100

INSTRUCTION TO BIDDERS ON FIRE PROTECTION WORKS

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA

These Instructions to Bidders are hereby made part of the proposal and contract documents and Bidders are advised to consider the same in the preparation for their bid.

1.0 TEMPORARY POWER:

The General Contractor shall provide the temporary power to be used during the construction of the entire building.

The General Contractor shall allow the specialty contractor of other trades directly hired by the Owner to connect to the General Contractor's temporary power connections. The General Contractor in his bid shall consider cost of power consumption.

2.0 The Fire Protection Contractor shall assist General Contractor in securing of fire protection permit and other government fees. All fees by General Contractor.

3.0 Fire Protection Contractor shall be responsible for the safekeeping and storage of owner-supplied items turned-over by the Owner.

The General Contractor in his bid shall consider the cost of providing overall security and storage facilities. However, individual contractor shall remain responsible for the storage and safekeeping of owner-furnished materials turned-over by the Owner until final completion and turn-over of the project.

4.0 Overall the Construction Manager shall do co-ordination. The General Contractor shall not supervise the work of other trades in direct contract with the Owner. However, the General Contractor shall coordinate with contractors of other building trades to keep the work in all aspects under control and proceeding without delay.

5.0 Temporary water facilities shall be provided by the General Contractor and the cost of water consumption for the entire project including use of parties in direct contract with the Owner shall be considered by the General Contractor in his bid.

6.0 In general, all materials to be used shall be of first class quality. the Contractor shall be required within Thirty (30) days after signing of contract to submit samples of materials that they intend to use for approval.

7.0 Bids shall be fixed and shall not be subject to escalation regardless of increase in price of fuel, devaluation and other causes except due to an official increase in minimum wage as indicated in the proposal.

8.0 BONDS AND INSURANCES:

a. Performance Bond:

Upon signing of contract, the Contractor shall secure at its own expense and delivery to the Owner a Performance Bond in the form of a Surety Bond posted by a domestic bonding company, duly licensed in the Philippines in the amount equivalent to Twenty Percent (20%) of the total contract price.

b. All-Risk Insurance:

The Contractor shall secure at its own expense within Twenty (20) calendar days after signing contract a Contractor's All-Risk Insurance from a Surety Company acceptable to the Owner in the amount equivalent to its total contract price.

c. Guarantee Bond:

The Contractor shall upon Owner's acceptance of the work and prior to final payment, obtain at its own expense a Guarantee Bond equivalent to Ten Percent (10%) of the total contract price from a Surety Company acceptable to the Owner to cover a period of One (1) year after completion and acceptance of work.

9.0 MISCELLANEOUS:

- a. A down payment equivalent to Twenty (20%) Percent of the contract amount shall be made to the Contractor upon signing of contract.

PROJECT : PROPOSED GALERIES TOWER MANILA
OWNER : GRAND TAIPAN LAND DEVELOPMENT INC.
LOCATION : NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA
SUBJECT : PROPOSAL FORM ON FIRE PROTECTION WORKS

1.0 SCOPE OF WORK:

Lump sum proposal for the supply of labor, materials, tools and equipment and supervision for the complete fire protection, roughing-ins excluding owner-supplied items listed herein for the Proposed **GALERIES TOWER MANILA** in accordance with specifications and other related contract documents as Prepared by ASYA DESIGN PARTNER.

2.0 BID AMOUNT:

	Material	Labor	Total
A. Sprinklers, ACV, motor gong, WFD, monitor switches, sight glasses & accessories			
B. Control valves, check valve, drain valves, FDC, FHV & flexible couplings			
C. Fire Hose cabinets & accessories			
D. Wet Pipe sprinkler system			
E. SACP & elect. system			
F. Installation of pumps			
G. Hangers, support & miscellaneous materials			
H. Permits, licenses, bonds, insurance etc.			

TOTAL BID AMOUNT : _____

AMOUNT IN WORDS : _____

3.0 CONSTRUCTION PERIOD:

Completion and turn-over of contract works shall be within _____ calendar days after signing of contract.

4.0 LIST OF OWNER-SUPPLIED & EXCLUDED TERMS:

- 4.1 Supply of fire / jockey pumps including controllers and accessories shall be by others. However, installation including the supply of necessary, connecting pipes, valves, flexible connectors and fittings shall be by Fire Protection Contractor.

It is understood that any item required to complete the subject project mentioned in either plans, specifications and other related contract documents but not specifically included in the above list shall be deemed covered by this proposal.

4.0 ADJUSTMENT IN LABOR COST:

Bids shall be based on current labor wages. In the event of an official increase in minimum wage or compulsory allowances during the construction period. The contract price shall be adjusted accordingly.

If there shall be such an increase prior to start of work, the total increase in the contract price for every One Pesos (P1.00) increase in minimum wage or allowances shall be fixed amount as indicated below :

"Total Labor Adjustment for
Fire Protection Works per One
Pesos (P1.00) increase in minimum
wage or allowance."

P _____

If there shall be an increase in minimum wage or allowances at anytime during the construction period, the adjustment in labor cost shall be made in proportion to the remaining contract period.

SUBMITTED BY :
FIRM : _____
BY : _____
TITLE : _____
SIGNATURE : _____
DATE : _____

END OF SECTION

SECTION 01110

SUMMARY OF WORK

PART 1 - GENERAL

1.1 PROJECT IDENTIFICATION

- A. Land Owner : **GRAND TAIWAN LAND DEVELOPMENT INC.**
- B. Architect : **ASYA DESIGN PARTNER**
- C. Project Managers :
- D. Project Address and Location : **NATIVIDAD LOPEZ ST. COR. CABRAL ST. MANILA**
- E. Total Land Area : **964.50 sqm (verify plan)**
- F. Total Gross Floor Area : **25,212.25 sqm (verify plan)**

1.2 ARCHITECTURAL DOCUMENTS - As prepared for the project by ASYA DESIGN PARTNER

1.3 PROJECT COMPOSITION

- A. Construction of:
1. 1 towers; 20 floors
 2. Parking at 1st floor – 6th floor
 3. Amenity at 7th floor
 4. 3 units of elevator
 5. Adequate provision for air-conditioning
 6. Well planned residential units
 7. Standby generators
 8. 24-hours security services/paging system
 9. Fire protection system

1.4 CONTRACTS

- A. Prime Contracts are separate contracts that represent significant construction activities performed concurrently with and closely coordinated with construction activities performed on the Project under other prime Contracts. Prime Contracts for this Project include:

1. General Construction Contract
2. Plumbing Contract
3. Mechanical
4. Electrical Contract
5. Fire protection contract
6. Landscape Contract

- B. Definition of the extent of Prime Contract Work: The extent of each prime Contract is indicated in the Contract Documents. Except where no other more specific description is contained in

the Contract Documents, general names and terminology on the Drawings and in Specification Sections determines which prime Contract includes a specific element of Work.

1.5 WORK UNDER OTHER CONTRACTS

- A. A separate Contract has been issued to Sub-Contractors listing to be furnished by the Project Manager to perform certain construction operations at the site. Those operations precede and are scheduled to be substantially completed prior to construction operations under these prime Contracts. That separate Contract can be summarised as follows:

1. Provide survey of Site. Identify all topographical levels and locations of any utilities.
2. Site perimeter fence and gates.
3. Underground power cable, telephone cable.
4. Deep well and temporary waters service.

1.6 WORK SEQUENCE

- A. The work will be conducted in phases to provide the least possible interference to the activities of the Owner's personnel and to permit an orderly transfer of personnel and equipment to the new facilities. Phasing of Work to be confirmed by the Project Manager / Owner.

1.7 PRIME CONTRACTORS USE OF PREMISES

- A. General: During the construction period the prime Contractors jointly shall have full use of the premises for construction operations, including use of the site. The prime Contractor's use of the premises is limited only by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the Project.
 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
 2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
 3. Burial of Waste Materials: Prior to final grading and landscape development, existing grade depressions on the site, as indicated, may be used for the disposal of inert waste material from the construction process. Do not dispose of organic and hazardous material on site, either by burial or by burning.

1.8 OWNER OCCUPANCY

- A. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
 1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.
 2. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
 10. Prior to partial Owner occupancy, mechanical and electrical system shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

1.9 PRE-ORDERED PRODUCTS

- A. General: The Owner has negotiated purchase orders with suppliers of material and equipment to be incorporated into the Work. These purchase orders are assigned to the Contractor involved in installation of the material and equipment. Costs for receiving, handling, storage, if required, and installation of the material and equipment are included in the Contract Sums.
 1. Each prime Contractor's responsibilities are the same as if the prime Contractor had negotiated the purchase orders, including the responsibility to renegotiate purchase if necessary and to execute final purchase order agreements.

1.10 OWNER-FURNISHED ITEMS

- A. The Owner will provide the Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.
1. The Contractor for General Construction is responsible for designating the delivery dates of Owner furnished items in the Contractor's Construction Schedule, and for receiving unloading and handling Owner-furnished items at the site. The Contractor for General Construction is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements.
 2. Where Owner-furnished items are damaged as a result of a prime Contractor's operations that prime Contractor is responsible for repairing or replacing the Owner-furnished items.

1.11 MISCELLANEOUS PROVISIONS

- A. Environmental Performance: In order to secure approval to proceed with construction, the Owner committed to comply with terms of an "Environmental Certificate Clearance". A copy of this Statement shall be transmitted to each prime Contractor prior to execution of each Owner-Contractor Agreements. The Project has been designed and the Contract Documents prepared with the intention that the resulting Work will comply with terms of that statement.
1. Before Substantial Completion the performance of every system or facility of the Work shall be inspected, tested and adjusted by the prime Contractor responsible for installation to ensure that the overall performance is in compliance with terms of the Certificate Compliance
 2. No later than 300 days after the date of Substantial Completion, and after Owner occupancy and use of the Project, the prime Contractor responsible for installation shall return to the Project, and again inspect, test and adjust the systems or facilities of the Work.
 - a. Measure performance relative to terms of the DENR Environmental Impact Statement to demonstrate and record compliance.
 - b. Submit a report of results to the Owner.
 - c. Instruct the Owner's operating personnel on operational requirements needed to maintain compliance.
 - d. Report performance of completed installations after adjustment that appears unable to comply with the requirements of the Environmental Impact Statement.

PART 2 - OTHER MATERIALS

1. Other materials not mentioned in this specification or shown on the drawings but are necessary for the proper completion of the work must be provided by the Contractor.
2. The Contractor shall submit for approval by the Architect drawings showing in detail the proposed design fabrication & erection work. No work shall be started until these drawings have been duly approved.

NOTE:

Specification and drawings as instrument of service are property of ASYA DESIGN PARTNER must be returned when no longer required for the construction of the building, and must not be duplicated nor copied in any form without the permission of the said Architect.

END OF SECTION

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SECTION 01330

SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:
1. Contractor's construction schedule.
 2. Submittal schedule.
 3. Daily construction reports.
 4. Shop Drawings.
 5. Product Data.
 6. Samples.
- B. Administrative Submittals: Refer to other Division-1 Sections including Sections "Shop Drawings, Product Data, and Samples" and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
1. Permits.
 2. Applications for payment.
 3. Performance and payment bonds.
 4. Insurance certificates.
 5. List of Subcontractors.
- C. Inspection and test reports are included in Section "Quality Control".
- D. Submittal of Project photographs is included under Section "Construction Photographs."

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related elements of the

Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.
 - a. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect and Production Manager will advise the Contractor when a submittal being processed must be delayed for coordination.
 - b. If an intermediate submittal is necessary, process the same as the initial submittal.
 - c. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 100mm x 125mm on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of Project Manager.
 - d. Name and address of Architect.
 - e. Name and address of Contractor.
 - f. Name and address of subcontractor.
 - g. Name and address of supplier.
 - h. Name of manufacturer.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
1. On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar- chart type Contractor's construction schedule. Submit within 30 days of the date established for "Commencement of the Work".
1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
 2. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
 3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
 4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
 5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.
 6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
- B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.
- C. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

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- D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.
- E. Cost Correlation: At the head of the schedule, provide a two item cost correlation line, indicating "pre-calculated" and "actual" costs. On the line show peso-volume of Work performed as of the dates used for preparation of payment requests.
 - 1. Refer to contract document Section governing "Applications for Payment" for cost reporting and payment procedures.
- F. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with

scheduled dates. Post copies in the Project meeting room and temporary field office.
 - 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- G. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.5 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.
 - 1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
 - 2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number.
 - c. Submittal category.
 - d. Name of subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for re-submittal
 - g. Scheduled date the Architect's final release or approval.
- B. Distribution: Following response to initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
 - 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting. Refer to Sections "Schedules and Reports" for other detailed requirements.

1.6 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Architect at weekly intervals:
 - 1. List of subcontractors at the site.
 - 2. Approximate count of personnel at the site.
 - 3. High and low temperatures, general weather conditions.

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4. Accidents and unusual events.
5. Meetings and significant decisions.
6. Stoppages, delays, shortages, losses.
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change Orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and start-ups.
13. Partial Completions, occupancies.
14. Substantial Completions authorized.

1.7 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules patterns, templates and similar drawings. Include the following information:
 1. Dimensions.
 2. Identification of products and materials included.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
 6. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least A4 size but no larger than A1 size.
 7. Initial Submittal: Submit one correctable translucent reproducible print and one black-line print for the Architect's review; the reproducible print will be returned.
 8. Final Submittal: Submit 3 black-line prints, submit 5 prints where required for maintenance manuals. 2 prints will be retained; the remainder will be returned. Submit one set half size prints for Architects records only.
 - a. One of the prints returned shall be marked-up and maintained as a "Record Document".
 9. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
- C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
 1. Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
 2. Submit coordination Drawings for integration of different construction elements.
Show sequences and relationships of separate components to avoid conflicts in use of space.

1.8 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalogue cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.

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- c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
4. Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Architect will retain one, and will return the other marked with action taken and corrections or modifications required.
 - a. Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction

1.9 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample. Include the following:
 - a. Generic description of the Sample.
 - b. Sample source.
 - c. Product name or name of manufacturer.
 - d. Compliance with recognized standards.
 - e. Availability and delivery time.
 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
 - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
 3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

- a. Preliminary submittals will be reviewed and returned with the Architect's mark indicating selection and other action.
4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.
5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
 - a. Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
 1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.10 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return accordingly.
 1. Compliance with specified characteristics is the Contractor's responsibility.
 2. In instances where the Project Manager or Construction Manager are identified as the Owner's representatives responsible for contract administration, items for Architects Action received from parties other than the Project Manager or Construction Manager will receive no action and will not be returned. The Contractor is responsible for submittals to the Architect through the Project Manager or Construction Manager's office.
- B. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 1. Final Unrestricted Release: Where submittals are marked "Approved," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 2. Final-But-Restricted Release: When submittals are marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 3. Returned for Re-submittal: When submittal is marked "Not Approved, Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Not Approved, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

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4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION

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SECTION 01335

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittal of Shop Drawings, Product Data and Samples to verify that products, materials and systems proposed for use comply with provisions of the Contract Documents.
- B. Shop Drawings include, but are not limited to, the following:
1. Fabrication Drawings.
 2. Installation Drawings.
 3. Setting diagrams.
 4. Shopwork manufacturing instructions.
 5. Templates and patterns.
 6. Schedules.
 7. Design mix formulas.
- a. Standard information prepared without specific reference to the Project is not considered to be Shop Drawings.
8. Coordination Drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require close and careful coordination during fabrication or during installation to fit in the restricted space provided or to function as intended.
- a. Preparation of Coordination Drawings is specified in the "Project Coordination" Section and may include components previously shown in detail on Shop Drawings or Product Data.
- C. Product Data include, but are not limited to, the following:
1. Manufacturer's product Specifications.
 2. Manufacturer's installation instructions.
 3. Standard color charts.
 4. Catalog cuts.
 5. Roughing-in diagrams and templates.
 6. Standard wiring diagrams.
 7. Printed performance curves.
 8. Operational range diagrams.
 9. Mill reports.
 10. Standard product operating and maintenance manuals.
- D. Samples include, but are not limited to, the following:
1. Partial Sections of manufactured or fabricated components.
 2. Small cuts or containers of materials.
 3. Complete units of repetitively-used materials.
 4. Swatches showing color, texture and pattern.
 5. Color range sets.

6. Components used for independent inspection and testing.
 7. Field Samples are full-size physical examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 8. Mock-ups are full size assemblies for review of construction, coordination, testing, or operation; they are not Samples.
- E. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
1. Permits.
 2. Applications for payment.
 3. Performance and payment bonds.
 4. Insurance certificates.
 5. Listing of subcontractors.
- F. Project Photographs: Submittal of Project photographs is included under Section "Construction Photographs."
- G. Inspection and Test Reports: Submittal of inspection and test reports is included under Section "Quality Control Services."
- H. Mock-ups: Erection of mock-ups is included under Section "Quality Control Services." and "Mock-ups and Tests".

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of the Work. Transmit each submittal to the Architect sufficiently in advance of scheduled performance of related construction activities to avoid delay.
1. Coordinate each submittal with other submittals and related activities that require sequential activity including:
 - a. Testing.
 - b. Purchasing.
 - c. Fabrication.
 - d. Delivery.
 2. Coordinate transmittal of different types of submittals for the same element of the Work and different elements of related parts of the Work so that processing will not be delayed by the Architect's need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are forthcoming.
 3. Scheduling: The Submittal Schedule listing submittals and indicating time requirements for coordination of submittal activity with related construction operations is included under Section "Schedules and Reports."
 4. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
 - a. Allow two weeks for the Architect's initial review of each submittal. Where processing must be delayed to permit coordination with subsequent submittals, allow additional time. The Architect will advise the Contractor promptly when a submittal being processed must be delayed for coordination.
 - b. Where necessary to provide an intermediate submittal between the initial and final submittals, process the intermediate submittal in the same manner as the initial submittal.
 - c. Allow two weeks for reprocessing each submittal.

- d. Advise the Architect when processing time is critical to progress, and the Work would be expedited if processing time could be shortened.
 - e. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification.
1. Indicate the name of the firm or entity that prepared each submittal on the label or title block.
 2. Provide a space approximately 100mm x 125mm on the label or beside the title block to record the Contractor's review and approval markings and the action taken by the Architect.
 3. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of Construction Manager.
 - d. Name and address of Architect.
 - e. Name and address of Contractor.
 - f. Name and address of subcontractor.
 - g. Name and address of supplier.
 - h. Name of manufacturer.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Similar definitive information as necessary.
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor, to Construction Manager., Architect, and to other destinations, as indicated, by use of a transmittal form. Submittals received from sources other than the Contractor will be returned to the sender without action.
1. Record relevant information and requests for data on the transmittal form. On the form, or an attached separate sheet, record deviations from requirements of the Contract Documents, including minor variations and limitations.
 2. Include the Contractor's signed certification stating that information submitted complies with requirements of the Contract Documents.
 3. Transmittal Form.
 4. Prepare a draft of a transmittal based on following information for Architects Acceptance.
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Submittal and transmittal distribution record.
 - i. Remarks.
 - j. Signature of transmitter.

1.4 SPECIFIC SUBMITTAL REQUIREMENTS

- A. Shop Drawings: Submit newly prepared information, drawn to accurate scale. Do not reproduce Contract Documents or copy standard printed information as the basis of Shop Drawings.

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

1. Include the following information on Shop Drawings:
 - a. Dimensions.
 - b. Identification of products and materials included.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 2. Submit Coordination Drawings where required for integration of different construction elements. Show construction sequences and relationships of separate components where necessary to avoid conflicts in utilization of the space available.
 3. Highlight, encircle or otherwise indicate deviations from the Contract Documents on the Shop Drawings.
 4. Do not permit Shop Drawing copies without an appropriate final stamp or other marking indicating the action taken by the Architect to be used in connection with construction.
 5. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least A4 but no larger than A1 size. Sheet sizes are required to be the same for individual submittals. Indifferent sheet sizes in one package will be returned without action. Pre-submission meeting to be concluded with Architect to agree on principles.
 6. Initial Submittal: Submit one correctable translucent reproducible print and one black-line print for the Architect's review; the reproducible print will be returned.
 7. Final Submittal: Submit 3 black-line prints; submit 5 prints where prints are required for maintenance manuals. 2 prints will be retained; the remainder will be returned. Shop drawings relating to Architectural works require one half size reduced set for Architects records.
 - a. One of the prints returned shall be marked-up and maintained by the Contractor as a "Record Document".
- B. Product Data: Collect Product Data into a single submittal for each element of construction or system. Mark each copy to show which choices and options are applicable to the Project.
1. Where Product Data have been printed to include information on several similar products, some of which are not required for use on the Project, or are not included in this submittal, mark copies to clearly indicate which information is applicable.
 2. Where Product Data must be specially prepared for required products, materials or systems, because standard printed data are not suitable for use, submit as "Shop Drawings" not "Product Data".
 3. Include the following information in Product Data:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
 4. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
 5. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options by the Architect is required, and as directed by the Architect.

6. Submittals: Submit 2 copies of each required Product Data submittal; submit 2 additional copies where copies are required for maintenance manuals. The Architect will retain one copy, and will return the other marked with the action taken and corrections or modifications required.
 - a. Unless the Architect observes non-compliance with provisions of the Contract Documents, the submittal may serve as the final submittal.
 7. Distribution: Furnish copies of final Product Data submittal to manufacturers, subcontractors, suppliers, fabricators, installers, governing authorities and others as required for performance of the construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation of materials, products and systems until a copy of Product Data applicable to the installation is in the installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction.
- C. Samples: Submit Samples physically identical with the material or product proposed for use; submit full-size, fully fabricated Samples, cured and finished in the manner specified.
1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample where so indicated. Include the following information:
 - a. Generic description of the Sample.
 - b. Size limitations.
 - c. Sample source.
 - d. Product name or name of manufacturer.
 - e. Compliance with recognized standards.
 - f. Compliance with governing regulations.
 - g. Availability.
 - h. Delivery time.
 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variations in color, pattern, texture or other characteristics are inherent in the material or product represented by a Sample, submit sets of multiple units of the Sample (not less than 3 units), which show approximate limits of the variations.
 - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
 - c. Refer to other Specification Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be in an undamaged condition at time of use. On the transmittal form, indicate such special requests regarding disposition of Sample submittals.
 3. Preliminary Submittals: Where Samples are specified for selection of color, pattern, texture or similar characteristics from a manufacturer's range of standard choices, submit a single, full set of available choices for the material or product.
 - a. Preliminary submittals will be reviewed and returned with the Architect's marking indicating selection and other action taken.
 4. Submittals: Except for Samples intended to illustrate assembly details, workmanship, fabrication techniques, connections, operation and other characteristics, submit 3 sets of Samples; one set will be returned marked with the action taken.

- a. Maintain sets of Samples, as returned by the Architect, at the Project site, available for quality control comparisons throughout the course of construction activity.
 - b. Unless the Architect observes non-compliance with provisions of the Contract Documents, the submittal may serve as the final submittal.
 - c. Sample sets may be used to obtain final acceptance of the construction associated with each set.
5. Distribution of Samples: Prepare and distribute additional sets of Samples to subcontractors, suppliers, fabricators, manufacturers, installers, governing authorities, and others as required for performance of the Work. Show distribution on transmittal forms.
6. Field Samples specified in individual Specification Sections are special types of Samples. Comply with Sample submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.5 ARCHITECT'S ACTION

- A. Except for submittals for the record, for information and similar purposes, where action and return on submittals is required or requested, the Architect will review each submittal, mark to indicate the action taken, and return promptly.
 1. Compliance with specified characteristics is the Contractor's responsibility, and not considered part of the Architect's review and indication of action taken.
- B. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 1. Final Unrestricted Release: Where submittals are marked "Approved," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 2. Final-But-Restricted Release: When submittals are marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided it complies with both the Architect's notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 3. Returned for Resubmittal: When submittal is marked "Not Approved, Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the Architect's notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Not Approved, Revise and Resubmit" to be used at the Project site, or elsewhere where construction is in progress.
 4. Other Action: Where a submittal is primarily for information or record purposes, for special processing or other Contractor activity, the submittal will be returned, marked "Action Not Required".

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01620

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. This section describes basic requirements governing material and equipment including:
1. Workmanship.
 2. Manufacturers' instructions.
 3. Transportation and handling.
 4. Storage and protection.

1.2 RELATED REQUIREMENTS

- A. Section 01300: Submittal of manufacturers' certificates.
- B. Section 01630: Requirements for requesting substitution.
- C. Section 01700: Operation and maintenance data.

1.3 PRODUCTS

- A. General: Products include material, equipment, and systems.
1. Provide undamaged, unused, new materials except as specifically allowed by Contract Documents.
 2. Provide standard products of types used previously and successfully used on other projects in similar applications.
 3. Provide products complete with accessories, trim, finish, devices, and details needed for complete installation and for intended use and for intended use and effect.
 4. Do not provide products containing potentially hazardous materials such as asbestos.
- B. Minimum Requirements: Quality level shown or specified is intended to be the minimum. Work may either comply exactly with that minimum quality (within tolerances), or exceed that minimum quality.
- C. Availability: If possible, provide standard domestically produced products likely to be available to Owner at later date where additional amounts of product are likely to be needed for maintenance, repair, or replacement.
- D. Interchangeable Components: Components required to be supplied in quantity shall be the same and shall be interchangeable.
- E. Visual Matching: Where matching with an established sample is required, final judgment of acceptability will be made by Architect.
- F. Visual Selection: Where Specifications indicate selection from manufacturer's colors, finishes, or similar options, Architect selection will be from specified products standard options.
1. Custom Colors: Where custom colors, finishes, or similar options are specified, Architect reserves right to require special matching which may not be standard with specified products.
- G. Nameplates: Do not allow conspicuous trademarks on products in occupied spaces or on exterior of building.

1. Labels: Locate required labels and stamps on concealed surfaces; where required for observation after installation, locate on accessible surface which is not conspicuous in occupied spaces.
2. Equipment Nameplates: Provide permanent nameplate on each service-connected or power operated equipment.
 - a. Indicate manufacturer, product name, model number, serial number, and essential operating data.
 - b. Locate nameplates on easily accessible surface which is not conspicuous in occupied spaces.
- H. Extra Stock: Where extra stock is required in Specifications, provide transportation and handling to storage locations designated by Owner.
- I. Mechanical/Electrical Requirements of General Work:
 1. Comply with applicable requirements of Mechanical/ Plumbing/Fire Services sections for mechanical provisions within units of general Division 2-11 Work.
 2. Comply with applicable requirements of Electrical sections for electrical provisions within units of general Division 2-11 Work.
- J. Electrical Components: Comply with applicable, provisions of local Electrical Code for electrical components of general work.
 1. Provide Underwriters Laboratories listed and labelled products where applicable and available.

1.4 WORKMANSHIP

- A. Tolerances: Comply with industry standards except when more restrictive tolerances or requirements indicate more rigid standards or precise workmanship.
 1. Install products true to line and level, in correct relationship to adjacent materials, with uniform joint widths in exposed work, and organized for best possible visual effect.
 2. Refer questionable visual-effect choices to Architect.
- B. Personnel: Perform work by persons qualified to produce workmanship of specified quality.
- C. Anchorage: Secure products in place with positive anchorage devices designed for application indicated in Contract Documents and sized to withstand stresses, vibration, and racking.
 1. Allow for expansion and building movement.
- D. Conditions: Install products during conditions of temperature, humidity, exposure, weather, and status of Project completion which will ensure satisfactory results for each unit of work.
- E. Dissimilar Materials: Isolate each unit of work from non-compatible work, as required to prevent deterioration.

1.5 MANUFACTURERS' INSTRUCTIONS

- A. When work is specified to comply with manufacturers' recommendations or instructions, distribute copies to persons involved, and maintain one set in field office.
 1. Conform with requirements specified in Section 01300 for submittal of recommendations or instructions to Architect; submit only where specifically requested by Contract Documents or Architect.



- B. Perform work in accordance with details of manufacturers instructions and recommendations, and in accordance with specified requirements.
 - 1. Should a conflict exist between specifications and recommendations or instructions consult with Architect.

1.6 TRANSPORTATION AND HANDLING

- A. Transport products by methods to avoid product damage, deliver in undamaged condition in manufacturer's unopened containers or packaging.
 - 1. Comply with manufacturer's recommendations for transportation and handling.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.
- C. Promptly inspect shipments to assure products comply with requirements, quantities are correct, and products are undamaged.
 - 1. Reject damaged and defective items.
- D. Control delivery schedule to minimize long-term storage at site, particularly for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, loss, or damage.

1.7 STORAGE AND PROTECTION

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
- B. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- C. For exterior storage of fabricated products, place on sloped supports above ground.
 - 1. Cover products subject to deterioration with impervious sheet covering, provide ventilation to avoid condensation.
- D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- E. Arrange storage to provide access for inspection; periodically inspect to assure products are undamaged and are maintained under required conditions.
- F. After installation, provide coverings to protect products from damage from traffic and construction operations, remove when no longer needed.

END OF SECTION

SECTION 01630

SUBSTITUTIONS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Contract Amount: Base on construction methods, manufacturers and products name in Contract Documents, including addenda.
 - 1. Advise Architect where construction method is not feasible or named product may not be available for the Project prior to signing Contract.
- B. Substitutions: Procedures are described for requesting substitution of unlisted manufacturers or products in lieu of those named in Specifications or approved for use in addenda.
 - 1. Construction Methods: Request may also be made for substitution of methods of construction indicated on Drawings.

1.2 PRODUCTS LIST

- A. List: Submit to Architect a list of major products, which are proposed for installation, with name of manufacturer, product trade name, and model.
 - 1. Tabulate products by specification number and title.

1.3 CONTRACTOR'S LIST

- A. Reference Standards and Performance Requirements: For products specified only by reference standard or performance requirements, select product meeting referenced standard or performance requirements.
- B. Proprietary Specifications:
 - 1. For products specified by naming one or more manufacturers or products, select products of any named manufacturer meeting specifications. Product shall be at least same level of quality of listed product.
 - 2. For product or manufacturer which is not specifically named submit request for substitution.
 - 3. Where terms "or equal", "or approved equal", or similar references are made, submit request for substitution for manufacturer or product not specifically named in Specifications.
- C. Construction Methods: Comply with Drawings for configurations, locations, and relationships of materials, submit request for substitution for different construction methods.

1.4 REQUESTS FOR SUBSTITUTIONS

- A. Submit four copies of each request for substitution indicating compliance of substitution with Contract Documents. Use only standard form for SUBSTITUTION REQUEST provided at the end of this section.
 - 1. Substitutions will be considered when:
 - a. Changes are consistent with intent of Contract Documents.
 - b. Requests are fully documented and properly submitted.
 - c. Substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or similar valuable considerations, after deducting offsetting disadvantages.

- d. Required product or method cannot be provided within Contract Time, except where as result of Contractor's failure to pursue work promptly or failure to properly coordinate.
 - d. Required product or method cannot receive required approval by a governing authority and requested substitution can receive approval.
 - f. Potential problems can be identified with product or method, which can be overcome by specific substitution.
- B. Bidding Period: During bidding period, Architect will consider formal requests from manufacturer's representatives, suppliers, subcontractors and bidding contractors.
 - 1. Formal requests shall be in writing and shall provide sufficient information for review.
 - 2. Acceptable substitutions will be listed in addenda.
 - 3. Submit requests within 14 calendar days prior to date set for submission of proposals.
 - 4. Substitution Procedures: Request for substitutions shall contain sufficient information to assess acceptability of product or system, insufficient information shall be grounds for rejections.
 - a. Approved Substitutions: Listed in addenda.
 - b. Substitutions may be requested for any product specified unless otherwise noted.
 - c. Construction Period: Within a period of 35 days after award of contract, Architect will consider formal requests for substitutions only from Contractor.
 - 5. After initial period, requests will be considered only when a product becomes unavailable due to no fault of Contractor.
- C. Submit separate request for each product and support each request with:
 - 1. Product identification with manufacturer's literature and samples where applicable.
 - 2. Name and address of similar projects on which product has been used, and date of installation.
 - 3. Construction Methods: Provide detailed description of proposed methods and drawings illustrating proposed method.
- D. Where required, itemize comparison of proposed substitution with product specified and list significant variations.
- E. Submit data relating to changes in construction schedule.
- F. Note effect of substitution on other work, products, or separate contracts.
 - 1. Note if acceptance of substitution could require revision of drawings, details or specifications.
- G. Include accurate cost data comparing proposed substitution with product and amount of net change in Contract price.
 - 1. Include costs to other contractors and costs for revisions to drawings, details or specifications.
- I. Substitutions will not be considered for acceptance when:
 - 1. They are indicated or implied on submittals without a formal request from Contractor.
 - 2. They are requested directly by a subcontractor or supplier.
 - 3. Acceptance will require substantial revision of Contract Documents.
- J. Substitute products shall not be ordered without written acceptance of Architect.

1.5 CONTRACTOR'S REPRESENTATION

- A. Requests for "or equal" substitutions constitute a representation that Contractor:
1. Has investigated proposed substitution and determined it meets or exceeds, in all respects, Construction Documents requirements.
 2. Will provide same warranty for substitution as for specified product.
 3. Will coordinate installation and make other changes. which may be required for Work to be complete in all respects.
 4. Waives claims for additional costs which subsequently become apparent.

1.6 ARCHITECT'S DUTIES

- A. Review Contractor's requests for substitutions with reasonable promptness.
1. **Management** will provide cost for changes to drawings, details or specifications required for substitutions.
- B. Notify Contractor in writing of decision to accept or reject requested substitution.

END OF SECTION

SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

This Section includes the following :

- A. Protection of existing trees indicated to remain.
- B. Removal of trees and other vegetation.
- C. Topsoil stripping.
- D. Clearing and grubbing.

1.2 PROJECT CONDITIONS

- A. Traffic : Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements : Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on Owner's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property owners.
- C. Protection of Existing Trees and Vegetation : Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
- D. Historic or items of cultural value discovered during site clearing remain the property of the Owner. Take all necessary precautions to protect such items. Mark location found by coordinates and invert level. Notify Owner at once to establish extraction procedures jointly.

1.3 EXISTING SERVICES

- A. General : Indicated locations are approximate; determine exact locations before commencing Work.
 - 1. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.
 - 2. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SITE CLEARING

- A. General : Remove trees, shrubs, grass and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.
 - 1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.



- B. Topsoil : Topsoil is defined as friable clay loam surface soil found in a depth of not less than 100 mm. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 50 mm diameter, and without weeds, roots, and other objectionable material.
1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
 - a. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
- C. Clearing and Grubbing : Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.
1. Completely remove stumps, roots, and other debris protruding through ground surface.
 2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
 3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - a. Place fill material in horizontal layers not exceeding 150 mm loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.
- D. Removal of Improvements : Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
1. Abandonment or removal of certain underground pipe or conduits may be indicated on mechanical or electrical drawings and is included under work of related MEP Consultant specifications. Removing abandoned underground piping or conduit interfering with construction is included under this Section.

3.2 DISPOSAL OF WASTE MATERIALS

- A. Burning on Owner's Property : Burning is not permitted on Owner's property.
- B. Removal from Owner's Property : Remove waste materials and unsuitable or excess topsoil from Owner's property

END OF SECTION

SECTION 02060

BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section requires removal and disposal, off site, of the following:
 - 1. Fence structures and adjacent site improvements to limits indicated on drawings.
 - 2. Building foundations and supporting walls.

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Proposed schedule of operations coordination for shutoff, capping, and continuation of utility services as required.
 - 1. Provide a detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
- C. Photographs of existing adjacent structures and site improvements.

1.3 JOB CONDITIONS

- A. Occupancy: Structures to be demolished will be vacated and use discontinued prior to start of work.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner insofar as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work.
- C. Salvaged Materials: Items of salvable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
 - 1. Storage or sale of removed items will not be permitted on site.
- D. Explosives: Use of explosives will not be permitted.
- E. Explosives: Do not bring explosives to site or use explosives without written consent of authorities having jurisdiction. Such written consent will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Perform required blasting in compliance with governing regulations.
- F. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent damage to adjacent buildings, structures, and other facilities and injury to persons.

1. Erect temporary covered passageways as required by authorities having jurisdiction.
 2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain.
- H. Damages: Promptly repair damages caused to adjacent facilities by demolition operations.
- I. Utility Services: Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.
1. Do not interrupt existing utilities serving occupied or used facilities, except when authorised in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
 2. Owner will arrange for disconnecting and sealing utilities serving structures to be demolished, prior to start of demolition work, upon written request of Contractor.
 3. Owner will shut off utilities serving structures. Disconnecting and sealing indicated utilities before starting demolition operations is part of this work.
- J. Utility Services: Refer to Division 15 and 16 sections for disconnecting, removing, and capping of utility services. Do not start demolition work until utility disconnection have been completed and verified in writing.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 DEMOLITION

- A. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air. Comply with governing regulations pertaining to environmental protection.
1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
- B. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.
- C. Building Demolition: Demolish buildings completely and remove from site. Use such methods as required to complete work within limitations of governing regulations.
1. Small structures may be removed intact when acceptable to Architect and approved by authorities having jurisdiction.
 2. Proceed with demolition in systematic manner, from top of structure to ground. Complete demolition work above each floor or tier before disturbing supporting members on lower levels.
 3. Demolish concrete and masonry in small sections.
 4. Remove structural framing members and lower to ground by hoists, derricks, or other suitable methods.
 5. Break up and remove concrete slabs-on-grade, unless otherwise shown to remain.
 6. Locate demolition equipment throughout structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.
- D. Below-Grade Construction: Demolish foundation walls and other below-grade construction, including concrete slabs, to a depth of not less than 12 inches below lowest foundation level.
- E. Filling Basements and Voids: Completely fill below-grade areas and voids resulting from demolition of structures.

1. Use satisfactory soil materials as defined in ASTM D 2487, consisting of stone, gravel, and sand, free from debris, trash, frozen materials, roots, and other organic matter.
2. Prior to placement of fill materials, ensure that areas to be filled are free of standing water, frost, frozen material, trash, and debris.
3. Place fill materials in horizontal layers not exceeding 6 inches in loose depth. Compact each layer at optimum moisture content of fill material to a density equal to original adjacent ground, but not less than 90 percent density when tested in accordance with ASTM D 1556, unless subsequent excavation for new work is required.
4. After fill placement and compaction, grade surface to meet adjacent contours and to provide flow to surface drainage structures.

3.2 SALVAGED MATERIALS

- A. General: Remove carefully to avoid damages. Materials for reuse on this project (if any) are to be incorporated into new work as indicated.
 1. Except for items indicated to be retained as Owner's property, other removed and salvaged materials not indicated for reuse shall become Contractor's property and removed from site with further disposition at Contractor's option.
- B. Vermin Control: Employ a certified, licensed exterminator and treat entire area of building demolition and removal in accordance with governing health regulations for rodent and insect control

3.3 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Remove weekly from site accumulated debris, rubbish, and other materials resulting from demolition operations.
 1. Burning of combustible materials from demolished structures will not be permitted on site.
- B. Removal: Transport materials removed from demolished structures and dispose of at designated spoil areas on Owner's property.
- C. Removal: Transport materials removed from demolished structures and legally dispose off site.

END OF SECTION

SECTION 02315

EXCAVATION, FILLING AND BACKFILLING

PART 1 - GENERAL

1.1 SCOPE:

The work includes all operation in connection with excavation, filling, backfilling, and finish grading, complete.

1.2 EXCAVATION:

- A. Excavation shall be made to the depths indicated, reckoned from the natural ground line. The indicated depth is the minimum requirement for excavation. However, if in the opinion of the Engineer, the soil bearing pressure is not attained at the indicated depth, the Contractor shall extend the excavation until the required soil bearing pressure will be obtained. No extra excavations shall be done without the written approval of the Engineer. In no case shall footings rest on fill.
- B. All excavations shall extend to a sufficient distance from walls and footings to allow for the proper erection and dismantling of forms, installation of service lines and for inspection, unless firm rock is encountered wherein the Contractor shall have the option to pour against the excavation. In case suitable bearing materials are encountered at elevations other than those specified or shown on the drawings, the Engineer, at his discretion, may direct in writing the excavations above or below those indicated on the drawings. All excavations shall be inspected and approved by the Engineer before pouring any concrete, laying underground services or placing backfill materials. The Contractor shall control the grading in the vicinity of all excavated areas to prevent surface drainage running into excavations. Water which accumulates in excavated areas shall be removed by pumping or by other approved methods, before filling or pouring concrete. All necessary shoring, sheet piles, rock anchors, rock nails or bolts, and/or other protective works to protect banks and adjacent pavings, structures and utilities shall be installed by the Contractor at his own expense. If necessary, the Contractor shall apply reinforced mortar, with adequate thickness on banks which are susceptible to erosion during heavy rainfall.
- C. Excavation shall be shored and braced by members of suitable sizes where necessary to prevent danger to persons, injurious caving or erosions. Shoring bracing and sheathing shall be removed as the excavations are backfilled, in a manner such as to prevent injurious caving. The Contractor shall keep all excavations free from water while construction is in progress.

1.3 DESIGN OF PROTECTION FOR EXCAVATION:

- A. The Contractor shall be responsible of providing design of all protection works for excavation including protections of the existing adjacent buildings. The design shall be done by a qualified Geotechnical Engineer and submitted to the Structural Engineer-of-Record for review. However, review of the design shall not relieve the Contractor of his responsibility in case of any failure or damage to the adjacent structures and utilities.
- B. Indicated drawings for slope protection are for permit purposes only. The contractor must submit shop drawings showing construction methodology, slope protection design and details, etc. for Structural Engineers review and comments.
- C. The Contractor shall be responsible for the monitoring requirements of the adjacent buildings. Any signs of failures on defects must be reported immediately to the Structural Engineers. It is further required that a joint inspection to document all existing defects of adjacent buildings be done prior to start of excavation.

1.4 BACKFILLING:

- A. After the forms are removed, all trash, wood chips and other debris shall be removed from areas to be backfilled. Backfill materials shall consist of approved site excavated material and shall be free from brush, roots and other undesirable materials which would be detrimental to compaction requirements.
- B. No backfill shall be placed against walls or other vertical surfaces until they have been inspected and backfilling is authorized.
- C. Trenches shall not be backfilled until lines have been tested and approved by the Engineer. Material for backfill shall be approved as specified above and shall be carefully placed and compacted as to a

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density equal to the adjacent area. Approved portable tampers shall be used for compacting fill material in trenches and fill adjacent to walls.

1.5 PLACING AND COMPACTING FILL:

A. Materials

1. Common fill shall be approved materials free from roots and stumps. Earthfill shall be used if site excavated material is rejected or insufficient.
2. Selected Fill: Materials shall be placed where specified and indicated on the plan and shall consist of gravel, crushed gravel, crushed rock, crushed adobe, or combination thereof. The material shall be free from rocks larger than 100 mm in size, fine clays, vegetable matter or other undesirable matters and shall be thoroughly compacted after placing, as hereinafter specified.

B. Placing Fill: Before placing fill materials, the surface upon which it will be placed shall be cleared of all brushes, roots, vegetable matters and debris, scarified and thoroughly wetted to insure good bonding between the ground and the fill materials. Fill in contact with new concrete work shall not be placed until at least 48 hours after removal of forms.

C. Compaction: Fills shall be evenly spread in horizontal layers of not more than 200 mm in thickness. Each layer shall be wetted and compacted by approved mechanical compaction machine, roller or portable, to a density of at least 90 percent of its maximum density for cohesive soils and 95 percent of its maximum density for non-cohesive soils as determined by ASTM Method D-1557 or AASHTO Method T-180.

1.6 FINISH GRADING:

The Contractor shall fill and grade the whole area around the building to the indicated subgrade elevations as directed by the Architect or Engineer. The Contractor shall verify the finish grade elevations of the proposed pavements around the building. Prior to grading operations, the area shall be cleared of all heavy growth of vegetation stumps, roots, cables, wires, rocks and other debris. The finished sub-grade shall be reasonably smooth and compacted and ready to receive the base course for the proposed pavements.

1.7 DISPOSAL OF EXCESS MATERIALS:

Any excess materials resulting from the finish grading operations, not required or unsuitable for fill or backfill, shall be disposed of by the Contractor away from the project site, at his expense.

END OF SECTION

SECTION 02360

CHEMICAL SOIL TREATMENT

102.1 GENERAL

1. Summary

- A. Provide Anti-Termite Reticulation System based on the approved lay-out plan.
- B. Establish termite killing zones in the soil as herein specified.

2. Submittals

- A. Anti-termite Reticulation System.
 - 1. Layout plan
 - 2. Shop drawings
 - 3. Installation program
- B. Product Design and Application
 - 1. Technical brochure
 - 2. Material Safety Data Sheet (MSDS)
 - 3. FPA Certificate of product registration
 - 4. Intellectual Property office Certificate of Patent Registration Anti-termite Reticulation System.
- C. FPA License of Pest Control Operator
- D. Authority Issued by Patent Owner to use Anti-Termite Reticulation System.

3. Regulatory Requirements

4. Quality Assurance

- 4.1 In addition to requirements of these specifications, comply with the manufacturer's instruction and recommendations for soil treatment work.
- 4.2 Engage Julant Pest Control Systems, Inc. (Owner of Patented Anti-Termite Reticulation System and Licensed Pest Control Operator Contact) for the design supply and installation of Julant Anti-Termite Reticulation System and soil
- 4.3 Use only termiticides as herein specified that bears FPA approval number.

5. Specific Product and Service Commitment

- A. Furnish a written certification that:
 - 1. The Anti-termite Reticulation System have been installed in accordance with the approved lay-out plan and installation program.
 - 2. The soil treatment work was undertaken and completed as specified and in accordance with the application program as herein defined.
- B. Provide Post-Completion Service commitment for a period of three (3) years from date of project completion signed by the Pest Control Operator & General Contractor stating that:
 - 1. Comprehensive inspection and monitoring work will be undertaken every six (6) months until the end of three (3) year service commitment.
 - 2. In the event of any discovery of termite activity during the three (3) year warranty period, the contractor shall abate such termite infestation and re-treat the soil at no additional cost to the owner.

Delivery and Storage: Termiticides shall be delivered to project site in sealed and labeled containers as supplied by manufacturer or formulator. The label shall be complete with application instructions and bear the Fertilizer and Pesticide Authority's registration number. Temporary storage of insecticides utilized at the project site shall be allowed subject to the following: site safety requirements.

102.2 PRODUCTS/SERVICES

1. General

The general provision of the contract, general conditions and special conditions apply to all works specified herein.

2. Scope of Work Description

Supply of materials, labor, supervision, tools, equipment and such other items necessary in the effective implementation of on-construction termite control work activities.

- a. Installation of Anti-Termite Reticulation System
- b. Soil treatment work.

3. Materials

- A. Anti-termite reticulation system
 - 1. designed Reticulation pipes and related components.
 - 2. Filter point covers.
- B. Soil Treatment chemicals- Only FPA-approved chemicals will be used. Provide non-repellant chemical solution consisting only of one of the following.
 - 1. Premise SC 200 (Imidacloprid)
 - 2. Agenda 2.5 EC (Fipronil)

102.3 EXECUTION

1. Installation of Anti-termite Reticulation System

- 1.1 Use the approved lay-out plan and installation program. Any deviation there from must have prior approval of the Architects.
- 1.2 Conduct sample operation ability test on reticulated pipe segments before they are finally covered. The Construction Manager must certify the operation ability of the system installed before they are finally covered. The construction manager must certify that the test has been successfully undertaken.
- 1.3 Upon completion, submit an as-built plan and operating instructions of the system.
- 1.4 Ensure that all filler point covers are properly installed & that they conform with the designers specifications.

2. Soil Treatment Work

2.1 Initial soil treatment

- a. At the time of soil treatment, application on the soil shall be preferably in friable condition, which will allow uniform distribution of the treatment solution throughout the soil. Toxicant shall be applied as a coarse spray and in such a manner as to provide uniformity distribution of the chemicals on the soil. Do not apply toxicant during or immediately following heavy rains, or when conditions will cause runoff and create an environmental hazard.
- b. Apply toxicant solution to establish termite killing zones in the soil in accordance with the manufacturer's dilution and dosage rate.

2.2 Post-construction treatment

As soon as the buildings is substantially completed prior to final turn-over:

1. Toxicant solution is applied to establish termite killing zones, thru the installed anti-termite reticulation system, the chemical as herein specified.

2.3 Provide certification that the soil treatment work as undertaken as specified.

END OF SECTION

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SECTION 02760

PAVEMENT & ROADWAY MARKING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes the requirements for furnishing and applying painted pavement and roadway markings outside of building and in car park floors inside of building and as shown on the drawings.

1.2 RELATED WORK

- A. Division 9 - section headed "Painting".

1.3 PROTECTION

- A. Protect products from damage during transport, field handling, and installation.
- B. Protect adjacent existing and newly placed construction and finishes as necessary to prevent damage during installation of this Work.
- C. Protect applied pavement marking from traffic until thoroughly dry.

1.4 COORDINATION

- A. Do not apply pavement and roadway marking until after completion of Work under this Contract which could adversely affect durability or appearance of marking Work.
- B. Do not apply pavement and roadway markings until pavement, including seal coats when required, have cured for at least 30 days, or longer if necessary to assure that substrate materials or conditions will not adversely affect marking Work.

1.5 MEASUREMENT AND PAYMENT

- A. Contractor to determine to his own satisfaction by careful review of the contract documents all quantities required for this section and is to supply all labor materials and incidentals required to comply with the contract documents. The drawings show general traffic circulation plus typical details. The contractor shall combine the use of the drawings in preparing shop drawings for architect review and approval.

1.6 SUBMITTALS

- A. Product data covering proposed manufacturers literature for approval.
- B. Shop drawings showing locations, layouts and dimensions of pavement and roadway marking for approval.

PART 2 - PRODUCTS

2.1 PAINT

- A. Type:
 - 1) Boysen
 - 2) Davies
 - 3) H-Chem
 - 4) Or Approved equal

PART 3 - EXECUTION
3.1 INSPECTION

- A. Verify that conditions are satisfactory for the installation of pavement and roadway marking. If unsatisfactory conditions exist, do not commence installation until such conditions have been corrected.

3.2 PREPARATION

- A. Substrates shall be clean and dry, and free from dust, dirt and foreign matter.
- B. Provide measured layouts, temporary markings, templates, and other means necessary to provide painting.

3.3 PAVEMENT AND ROADWAY MARKING

- A. Prepare and apply paint in accordance with the manufacturer's printed installation instructions; paint may be applied either by brush or spray and shall achieve complete coverage free from voids and thin spots.
- B. Lines and symbols shall be accurately formed and true to line and form.
- C. Lines shall be straight and uniform in width.
- D. Painted edges shall be clean cut and free from raggedness, and corners shall be cut sharp and square.

3.4 COMPLETION

- A. When complete, pavement and roadway markings shall be accurately aligned, clean and free from stains, discoloration, and other defects and damage.
- B. Adjacent surfaces shall be free from marking paint spills, splatters, and over runs.

END OF SECTION

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SECTION 03330

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formworks, placement procedures, and finishes, which are primarily the concern of exposed Architectural Finishes.
- B. The Structural Engineer's specifications for concrete shall cover all other requirements.
- C. Pre-cast concrete is specified in other Division 3 Sections.

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, forming accessories, admixtures, patching compounds, waterstops, joint systems, dry-shake finish materials, and others as requested by Architect.
- C. Samples of each concrete finish in 600x 600mm panels as specified herein and as listed in Architects Finish Schedules.
- D. Shop drawings for formworks, prepared by a registered Professional Engineer for fabrication and erection of forms for each specified finished concrete surfaces as specified and shown on drawings and finishes schedules. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually as requested by Architect.
 - 1. Architect's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility and shall require review and approval by the Structural Engineer.
 - 2. Samples and catalogue data of materials as requested by Architect, including names, sources, and descriptions, as follows:
 - a. Normal weight aggregates.
 - b. Fibrous reinforcement.
 - c. Reglets.
 - d. Waterstops.
 - e. Vapor retarder.
 - f. Materials for wiring concrete.
 - g. Joint fillers.
 - h. Epoxy bonding agents.
 - 3. Minutes of pre-construction conference.
 - 4. Contractor to confirm and record locations and timing for mock-ups.
- E. Shop Drawings for Reinforcing Steel: ACI 315. The Contractor shall submit three (3) sets of shop drawings for review and approval by the Structural Engineer prior to any steel reinforcing bar fabrication and installations. Shop drawings shall be submitted at least seven (7) calendar days prior to any installations of reinforcing bars, depending on the number of drawings submitted, and shall be drawn on either 20" x 30" or 30" x 40" sheets. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. ACI 318, "Building Code Requirements for Reinforced Concrete."
 2. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces as specified. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- D. Forms for Cylindrical Columns and Supports: Metal, fiberglass-reinforced plastic, or paper or fiber tubes. Provide paper or fiber tubes of laminated plies with water-resistant adhesive and wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- E. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- F. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 38 mm to exposed surface.
1. Provide ties that, when removed, will leave holes not larger than 25-mm diameter in concrete surface.

2.2. REINFORCING MATERIALS

- A. Refer to Structural Engineers Specifications.

2.3. CONCRETE MATERIALS

- A. Unless otherwise specified all materials required to obtain concrete finishes as specified by Architect are included in the Structural Engineers Specifications.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain form work to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formworks so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
- D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Provisions for Other Trades: Provide openings in concrete form work to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required preventing mortar leaks and maintaining proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION

- A. General: Following levelling and tamping of granular base for slabs on grade, place vapor retarder/barrier sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 150mm and seal vapor barrier joints with manufacturers' recommended mastic and pressure-sensitive tape.
- B. After placement of vapor retarder/barrier, cover with sand cushion and compact to depth as shown on drawings, but no less than 50 mm.

3.4 PLACING REINFORCEMENT

- A. Refer to Structural Engineers Specifications.

3.5 JOINTS

- A. Construction Joints: Co-ordinate all joints with Structural Engineer. Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.
 - 1. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 - 2. If joint pattern not shown, provide joints not exceeding 4.5m in either direction and located to conform to bay spacing wherever possible (at column center lines, half bays, third bays).
 - 3. Joint sealant material is specified in Division 7 Sections of these specifications.

3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARATION OF FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before reinforcement is placed.
- B. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a non staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Comply with structural engineer's requirements where they exceed requirements below. Refer any conflicting requirements to Architect and Engineer for final decision.
- B. Inspection: Before placing concrete, inspect and complete form work installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.
- C. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
- D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
- E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 600mm and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to

rapidly penetrate placed layer and at least 150mm into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedding of reinforcement and other embedded items without causing segregation of mix.

- F. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position during concrete placement.
- H. Hot-Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embodiment in concrete.
 2. Fog spray forms, reinforcing steel, and sub grade just before concrete is placed.
 3. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Architect.

3.9 CONCRETE CURING AND PROTECTION

- A. General: Co-ordinate with Structural Engineer. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screening and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
- D. Provide moisture curing by following methods.
1. Keep concrete surface continuously wet by covering with water.
 2. Use continuous water-fog spray.
 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 100mm lap over adjacent absorptive covers.
- E. Provide moisture-cover curing as follows:
1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 75mm and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- F. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:
1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 2. Use membrane-curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.
- I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.
- J. Curing Period.

3.12 SHORES AND SUPPORT

- A. General: Co-ordinate and review with Structural Engineers requirements. Comply with ACI 347 for shoring and re-shoring in multi-story construction, and as herein specified.
- B. Extend shoring from ground to roof for structures 4 stories or less, unless otherwise permitted.
- C. Extend shoring at least 3 floors under floor or roof being placed for structures over 4 stories. Shore floor directly under floor or roof being placed, so that load from construction above will transfer directly to these shores. Spaces shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimum to ensure proper distribution of loads throughout structure.
- D. Remove shores and re-shore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate re-shoring to support work without excessive stress or deflection.
- E. Keep re-shores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.14 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, de-laminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

3.15 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure

concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-trowelling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
- D. Reinforced Masonry: Co-ordinate and review with Structural Engineers requirements. Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled & to comply with local codes and requirements. Maintain accurate location of reinforcing steel during concrete placement. Co-ordinate Reinforced Masonry with other Sections in Div. 4.

3.16 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
 - 1. Cut out honeycomb, rock pockets, voids over 6mm in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 25mm. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.
 - 2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or pre-cast cement cone plugs secured in place with bonding agent.
 - 1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
 - 1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.25mm wide or that penetrate to reinforcement or completely through non reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
 - 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 - 3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary under layment compounds may be used when acceptable to Architect.
 - 4. Repair defective areas, except random cracks and single holes not exceeding 25mm in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 19mm clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix

patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

- D. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- E. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- F. Repair methods not specified above may be used, subject to acceptance of Architect.

3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Owner will employ a testing laboratory to perform tests and to submit test reports. Unless otherwise stipulated in the Contract Documents wherein the Contractor will provide all such services described herein.
- B. All requirements for Quality Control Testing During Construction are contained in Structural Engineers Specifications.

END OF SECTION

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

SECTION 03450

ARCHITECTURAL PRECAST CONCRETE - PLANT CAST

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes architectural pre-cast concrete units. Architectural pre-cast concrete includes the following :
 - 1. Plain smooth-faced concrete units with finish on external surface.(verify schedule of finish)
- B. Provide unit rates for each of the following optional types of architectural pre-cast concrete for final selection and location by architect.
 - 1. Special formed and textured units.
- C. Related Sections ; The following sections contain requirements that relate to this section :
 - 1. Cast-in-place concrete (architectural reference section) is specified in another Division 3 Section.
 - 2. Pre-cast pre-stressed structural concrete units are specified in another Division 3 section.
 - 3. Caulking, sealants, and gaskets are specified in Division 7.
 - 4. Windows, glazing and other exterior wall related sections are specified in Division 8.
 - 5. Elastomeric paint is specified in Division 9.

1.2 SUBMITTALS

- A. Product data and instructions for manufactured materials and products. Include mix designs, certifications, and laboratory test reports as required.
 - 1. Include water absorption test reports for units with exterior exposure.
- B. Shop drawings prepared by or under supervision of a qualified professional engineer showing complete information for fabrication and installation of pre-cast concrete units. Indicate member dimensions and cross-section; fabrication tolerances; location, size, and type of reinforcement, Including special reinforcement; and lifting devices necessary for handling and erection.

1. Include erection procedure for pre-cast units, sequence of erection, and erection tolerances.
 2. Show layout, dimensions, and identification of each pre-cast unit corresponding to sequence and procedure of installation.
 3. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in pre-cast units.
 4. Show caulked joints, including expansion joints ("soft" type) and grouted joints ("rigid" type).
 5. Show location and details of anchorage devices to be embedded in other construction.
 6. Provide complete design calculations, including loads imposed on structure, prepared by a qualified professional engineer.
- D. Samples approximately 300 by 300 by 50 mm to illustrate quality, color, and texture of surface finish.
1. Submit samples of cast-in gaskets, anchorages, and other attachments and accessories as requested by Architect.

1.3 QUALITY ASSURANCE

- A. Codes and Standards : Comply with provisions of following codes, specifications, and standards, except as otherwise indicated :
1. ACI 318, "Building Code Requirements for Reinforced Concrete".
 2. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
 3. Pre-stressed Concrete Institute MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products".
 4. American Welding Society, "Structural Welding Code".
- B. Engineering Qualifications : A professional engineer legally authorized to practice in jurisdiction where project is located and experienced in providing engineering services that have resulted in successful installation of architectural pre-cast concrete units similar in material, design, and extent as required for this project.
- C. Mock-ups : Prepare full-size mock-up of each type (full size storey panels, spandrel panel, column cover, etc.) for architect's inspection at production plant and on site

prior to start of installation work and after Architect review of finish samples. Acceptable full-size mock-ups may be incorporated in job installation.

- D. Fabricator Qualifications : Firm having a minimum of 5 years successful experience in fabrication of architectural pre-cast concrete units, similar to members required for this project, will be acceptable. Fabricator must have sufficient production capacity to produce, transport, and deliver required units without causing delay in the work.
- E. Design modifications may be made only as necessary to meet field conditions and to ensure proper fitting of the work and only as acceptable to Architect. Maintain general design concept shown without increasing or decreasing sizes of members or altering profiles and alignment shown. Provide complete design calculations and drawings prepared by a licensed professional engineer, if design modifications are anticipated.
- F. Erector Qualifications : Minimum of 3 years successful experience in erection of architectural pre-cast concrete units similar to units required for this project.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pre-cast concrete units to project site in such quantities and at such times to assure continuity of installation. Store units at project site to prevent cracking, distorting, warping, staining, or other physical damage and so those markings are visible. Lift and support units only at designated lifting or supporting points as shown on final shop drawings.

PART 2 - PRODUCTS

2.1 THICKNESS: 125mm

2.2 AVAILABLE MANUFACTURERS:

Subject to compliance with requirements offering products which may be incorporated in the work included, but are not limited to:

- 1. Rockbuilt

2.3 FORMWORK

- A. Provide forms and , where required, form-facing materials of metal, plastic, wood, or other acceptable material that is non-reactive with concrete and will produce required finish surfaces.

- B. Unless forms for plant-manufactured pre-stressed concrete units are stripped prior to de-tensioning, design forms so that stresses are not induced in pre-cast units due to deformation of concrete under pre-stress or to movement during de-tensioning.

2.4 REINFORCING MATERIALS

- A. Reinforcing Bars : ASTM A 615, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars : ASTM A 775.
- C. Galvanized Reinforcing Bars : ASTM A 767, Class II (2.0 oz. zinc psf), hot-dip galvanized after fabrication and bending.
- D. Steel Wire : ASTM A 82, plain, cold-drawn, steel.
- E. Welded Wire Fabric : ASTM A 185.
- F. Welded Deformed Steel Wire Fabric : ASTM A 497.
- G. Supports for Reinforcement : Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing.
1. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.5 CONCRETE MATERIALS

- A. Portland Cement : ASTM C 150, Type I or Type III.
1. Use only one brand, type, and source of supply of cement throughout the project, unless otherwise acceptable to Architect.
2. Use white portland cement for facing concrete mix to match Architect's control sample.
3. Standard gray portland cement may be used for non-exposed backup concrete.
- B. Coarse Aggregate for Facing Mixes : ASTM C 33; hard, durable, selected, and graded; free of material that causes staining or reacting with cement.
1. Use aggregate from same source as those used in Architect's control sample.
- C. Fine Aggregate for Facing Mixes : ASTM C 33, manufactured sand of same material as coarse aggregate, unless otherwise acceptable to Architect.
- D. Pigments : Non-fading, resistant to lime and other alkalis.

- E. Air-Entraining Admixtures : ASTM C 260.
- F. Water-Reducing, Retarding, or Accelerating Admixtures : ASTM C 494, type as selected by Fabricator and containing not more than 0.1 percent chloride ions.

2.6 CONNECTION MATERIALS

- A. Steel Plates : Structural quality, hot-rolled carbon steel, ASTM A 283, Grade C.
- B. Steel Shapes : ASTM A 36.
- C. Stainless Steel Shapes : AISI Type 302/304.
- D. Anchor Bolts : ASTM A 307, low-carbon steel bolts, regular hexagon nuts and carbon steel washers.
- E. Electrodes for Welding : Comply with AWS Code.
- F. Finish of Steel Units : Exposed units, hot-dip galvanized after fabrication, ASTM A 153; inserts cast into pre-cast units, hot-dip galvanized, electro-galvanized, or cadmium coated; others shop painted with rust-inhibitive primer.

2.6 GROUT MATERIALS

- A. Cement Grout : Portland cement and clean, natural sand, ASTM C 404. Mix at ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.
- B. Non-metallic Shrinkage-Resistant Grout : Premixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, and plasticizing and water-reducing agents.

2.7 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type of concrete required.
- B. Design mixes may be prepared by independent testing facility or by qualified pre-cast manufacturing plant personnel, at pre-cast fabricator's option.
- C. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each type of concrete required, complying with ACI 318.
- D. Facing Mix : Standard-weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties :

1. Compressive Strength : 34.45 KPa minimum at 28 days.
 2. Total Air Content : Not less than 4 percent nor more than 6 percent.
 3. Water Absorption : Not to exceed 5 to 6 percent by weight, except between 3 to 4 percent for sloping surfaces (sills).
- E. Backup Concrete : Light weight concrete with 34.45 KPa compressive strength at 28 days, and air-dry density not less than 1,440 nor more than 1,840 kg/cubic metre.
- F. Submit written reports to Architect of proposed mix for each type of concrete at least 15 days prior to start of pre-cast unit production. Do not begin concrete production until Engineer has reviewed mixes and evaluations.
- G. Adjustment to Concrete Mixes : Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by Architect before using in the work.
- H. Admixtures : Use air-entraining admixture in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion or provide increased workability for low-slump concrete may be used subject to Architect's acceptance.
1. Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing . Adjust quantities of admixtures as required to maintain quality control.

2.8 FABRICATION

- A. General : Fabricate pre-cast concrete units complying with manufacturing and testing procedures, quality control recommendations, and following dimensions tolerances, unless otherwise indicated.
- B. Forms : Accurately construct forms mortar-tight and of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and , when pre-stressed, pre-tensioning and de-tensioning operations. Maintain form work to provide completed pre-cast concrete units of shapes, lines, and dimensions indicated, within specified fabrication tolerances.
- C. Dimensional Tolerances of Finished Units : Overall height and width measured at face adjacent to mold at time of casting :
1. 3.0 metres or less : Plus or minus 3.0 mm.
 2. 3.0 metres to 6.0 metres : Plus 3.0 mm, minus 4.68 mm.
 3. 6.0 metres to 9.0 metres : Plus 3.0 mm, minus 6.0 mm.

4. Each additional 10 feet : Plus or minus 1.5 mm per 3.0 metres.
 5. Angular deviation of plane of side mold : 0.75 mm per 75 mm depth or 1.5 mm total, whichever is greater.
 6. Openings within one unit : Plus or minus 6.0 mm, except plus or minus 3.0 mm for windows and door frames.
 7. Out of square (difference in length of two diagonal measurements) : 3.0 mm per 1.8 metres or 6.0 mm total, whichever is greater.
 8. Thickness : Minus 3.0 mm, plus 6.0 mm.
 9. Tolerances of other dimensions not otherwise indicated : Numerically greater of plus or minus 1.5 mm per 3.0 metres, or plus minus 3.0 mm.
- D. Position Tolerances : For cast-in items measured from datum line locations as shown on reviewed shop drawings :
1. Anchors and inserts : Within 9.0 mm of centerline location.
 2. Blockouts and reinforcements : Within 6.0 mm of position shown on shop drawings, where such positions have structural implications or affect concrete cover; otherwise within plus or minus 12.5 mm.
- E. Fabricate units straight, smooth, and true to size and shape, with exposed edges and corners precise and square unless otherwise indicated.
1. Pre-cast units that are warped, cracked, broken, spalled, stained, or otherwise defective will not be acceptable.
- F. Expansion Joints : Free of grout, mortar, or other obstructions to expansive movement, with expansion joint filler where indicated.
1. Sills : Midpoint between mullions, with expansions filler strip.
 2. Copings : Every joint between units, unless otherwise indicated. Align joints with vertical expansion joints in adjacent brick.
 3. Mullions : Provide for expansion at top connectors to rigid building structural membran
- G. Cast-In Items : Provide reglets, slots, holes, and other accessories in units to receive windows, cramps, dowels, reglets, waterstops, flashings, and other similar work as indicated.
1. Provide inserts and anchorages cast into units, for attachment of loose hardware as required.

2. Install windows, and louvres framed and glazed, prior to delivery to site as required.
- H. Anchorages : Provide loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other miscellaneous steel shapes not provided by other trades, necessary for securing precast units to supporting and adjacent members.
- I. Surface Finish : Fabricate pre-cast units and provide exposed surface finishes as follows :
 1. Smooth surface finish free of pockets, and sand streaks, and honeycomb, with uniform color and texture to match Architect's control sample ready to receive elastomeric paint finish application.
 2. As-cast or float finish for unexposed surfaces.
- J. Optional Surface Finishes: Fabricate pre-cast units and provide unit rates for exposed surface finish options as follows;
 1. Abrasive blast finish, using abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces, to match Architect's control sample.
 2. Textured surface finish imparted by form liners or inserts to provide surfaces free of pockets, streaks, and honeycomb, with uniform color and texture to match Architect's control sample.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General : Deliver anchorage items to be embedded in other construction before start of such work. Provide setting diagrams, templates, instructions, and directions as required for installation.
- B. Do not install pre-cast units until supporting concrete has attained minimum allowable design compressive strength.
- C. Install pre-cast concrete members plumb, level, and in alignment within PCI MNL-117 and specified limits of erection tolerances. Provide temporary supports and bracing as required maintaining position, stability, and alignment as members are being permanently connected.
 1. Maintain horizontal and vertical joint alignment and uniform joint with as erection progresses.
- D. Accessories : Install clips, hangers, and other accessories required for erection of precast units to supporting members and backup materials.

- E. Anchor units in final position by bolting, welding, grouting, or as otherwise indicated. Remove temporary shims, wedges, and spacers as soon as possible after anchoring and grouting are completed.
 - 1. At bolted connections use lock washers or other acceptable means to prevent loosening of nuts.
 - 2. At welded connections apply rust-inhibitive coating on damaged areas, same as shop-applied material. Use galvanizing repair coating on galvanized surfaces.
- F. Cleaning : Clean exposed facings to remove dirt and stains on units after erection and completion of joint treatments. Wash and rinse in accordance with pre-cast manufacturer's recommendations. Protect other work from damage due to cleaning operations. Do not use cleaning materials or processes that could change the character of exposed concrete finishes.

3.2 ERECTION TOLERANCES

- A. Coordination: Pre-cast units are to be delivered to the site with windows and glazing already factory installed. Contractor to ensure proper-engineered design incorporating tolerances between pre-cast units and window units. Coordinate with performance requirements of other sections.
- B. Warpage : Fabricate and install wall panels so that each panel after erection complies with following dimensional requirements :
 - 1. Bowing (concave or convex) of any part of a flat surface not to exceed length of bow/360, with a maximum of 18 mm up to 9.0 metres.
 - 2. Maximum warpage of one corner out of plane of other three, the greater of 1.5 mm per 300 mm distance from nearest adjacent corner, or 3.0 mm.
- C. Tolerances for location of Pre-cast Units : Fabricate and erect pre-cast units so that joints between panels meet the following :
 - 1. Face width of joints : Plus or minus 4.68 mm.
 - 2. Joint taper : 0.625 mm per 300 mm length, with maximum length of tapering in one direction of 10 feet.
 - 3. Step in face : 6 mm.
 - 4. Jog in alignment of edge : 6 mm.
 - 5. Alignment for exterior panels is outside face.
 - 6. Variation from plumb : Plus or minus 12.5 mm in any 12.0 metre run.

7. Variation from level : Plus or minus 12.5 mm in any 12.0 metre run.

3.3 PERFORMANCE REQUIREMENTS

- A. Conduct inspections, perform testing, and make repairs or replace unsatisfactory pre-cast units as required.
 1. Limitations as to amount of patching permitted are subject to acceptance by Architect.
- B. In addition to above, in-place pre-cast units may be rejected for the following :
 1. Exceeding specified installation tolerances.
 2. Damage during construction operations.
 3. Surface finish deficiencies in exposed-to-view surfaces.
 4. Other defects as listed in P C I M N L-117.

END OF SECTION

SECTION 04220

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Concrete masonry unit construction, complete with mortar, reinforcement and anchorage.
 - 1. Extent of work is shown on the drawings and partition schedule.
 - 2. Cutting and fitting for work of other trades is scheduled as work of this section.
- B. Products Installed not Furnished: Building in items supplied by other trades or suppliers.

1.2 REFERENCES

- A. Applicable Publications: The publications listed below form a part of this specification to the extent referenced.
 - ANSI A 41.2: Building Code Requirements for Reinforced Masonry.

1.4 QUALITY ASSURANCE

- A. Requirements: Perform concrete unit masonry work in accordance with requirements of ANSI A41.2, except as otherwise specified.
- B. Testing: Conform to requirements specified in Section 01450 - Quality Control; tests paid by Gen. Contractor.
 - 1. Provide as required indicating conformance with applicable codes.
- C. Inspections: Owner will provide special inspections where required by applicable codes.
- D. Fire Rated Materials: Provide materials and systems which have passed ASTM E119 tests or equal and are approved for fire ratings indicated on Drawings.

1.5 SUBMITTALS

- A. Shop Drawings: Provide for reinforcing; show bar schedules, diagrams of bent bars, ties and arrangements and assemblies. All reinforcing shall meet applicable local requirements, and engineering of same is the responsibility of the contractor.
- B. Product Data: Provide manufacturer's certificate concrete masonry units and reinforcing steel conform to specified standards.
- C. Certificate of Conformance: Submit certificates attesting that masonry cement, masonry units, aggregates and accessories meet the requirements specified herein.

1.6 SITE CONDITIONS

- A. Temperature: Maintain materials to maximum 35 degrees C prior to, during and 48 hours after completion of masonry work.

- B. Provide temporary bracing during erection of masonry work, maintain in place until building structure provides permanent bracing.
- C. **Delivery & Storage:** Delivery cement and other cementitious materials to the site in unbroken bags, barrels, or other approved containers, plainly, marked and labelled with manufacturer's names and brands. Store cementitious materials in dry, weathertight sheds or enclosures and handle so as to prevent entry of foreign materials and damaged by water or dampness. Handle masonry units with care to avoid chipping and breakage. Protect masonry material from damage, and except for sand, keep dry until use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Subsequent to compliance with requirements manufacturers offering products that may be incorporated in the work include the following:

- A. Rockbuilt
- B. Macro Industrial

2.2 MATERIALS

A. Masonry Units

1. **Concrete Masonry Units:** Units of modular dimensions and air, water, or steam cured. Store Type II units at the site before use a minimum of 28 days for units cured with steam at a pressure of 120 to 150 psi and at a temperature of 350 to 365 degrees F for at least 5 hours. Surfaces of units, which are to be plastered or stuccoed, shall be sufficiently brought to provide a suitable bond; elsewhere, exposed surfaces of units shall be comparatively smooth and or uniform texture.
 - a. **Hollow Load-Bearing Units:** ASTM C 90, Grand N-1 or N-II, made with normal weight aggregates and with ultimate compressive strength of 750 psi at 28 days as required.
 - b. **Hollow Non-Load Bearing Units:** ASTM C-129 made with normal weight aggregates, and with ultimate compressive strength of 600 psi at 28 days, as required.
 - c. **Special Shapes:** Provide special shapes as closures, header units, and jamb units as necessary to complete the work. Special shapes shall conform to the requirements for the units with which they are used.
2. **Pre-cast Concrete Lintels:** Same materials and surface texture as adjacent masonry units, with a 28-day compressive strength of not less than 2,000 psi. Provide reinforcing as indicated. Provide lintels of sized indicated, straight and true, with at least 200 mm of bearing at each end.

B. Mortar

1. **Portland Cement:** ASTM C 150, Type I, II, or III.
2. **Masonry Cement:** ASTM C 91, except that the air content of the mortar specimen shall be not more than 16 percent by volume in lieu of 22 percent. Containers shall bear complete instructions for proportioning and mixing to obtain the required types of mortar.
3. **Sand:** ASTM C 144
4. **Water:** Clean, potable, and free from substances, which could adversely affect the mortar.
5. **Mortar Types:** ASTM C 270, Type M for foundation walls, Type N or S for non-load bearing, non-shear wall interior concrete masonry work. If masonry cement is used, submit the manufacturer's printed instructions on proportions of water and aggregates and on mixing to obtain the type of mortar required.

C. Accessories

1. Horizontal Joint Reinforcement: Horizontal joint reinforcement shall be reinforcing bars, as indicated, or fabricated from cold drawn steel wire, conforming to ASTM A82. The wire shall be zinc-coated after fabrication by the hot-dip process in accordance with ASTM A 153 either bright steel, copper-clad steel, or zinc coated after fabrication. Reinforcement shall consist of two or more parallel longitudinal wires, not less than 34 mm (9-gage) in diameter. Cross wires shall be crimped to provide an effective moisture drip in wall cavity. The out-to-out spacing of the longitudinal wires shall be 40 to 45 mm less than the actual width of the masonry. The distance between welded contracts of cross wires with each longitudinal wire shall not exceed 400 mm. Joint reinforcement shall be provided in flat sections, not less than 3 meters in length, except that corner reinforcement and other special shapes may be less in length.
 2. Ties: Provide approved design of copper-clad steel, zinc coated steel, or non-corrosive metal having the equivalent total strength of steel types. Zinc coat items by the hot-dip process after fabrication to a minimum of 1.25 ounces of zinc per square foot of surface when tested in accordance with ASTM A 90.
 - a. Wire Mesh Ties: Wire not lighter than 20-gage, galvanized, 12 mm mesh with width of not less than the thickness of masonry.
 - b. Corrugated Metal Ties: Not less than 22 mm wide by approximately 150 mm long and not lighter than 22-gage.
 3. Fastenings: Provide suitable and approved bolts, metal wall plugs, or other approved metal fastenings for securing furring to masonry and elsewhere as necessary.
- D. Control Joints: Closed cell neoprene or PVC factory fabricated solid sections, resistant to oils and solvents, flexible at temperatures from 5 degree C after five hours exposure; ASTM D2240 minimum durometer 70.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Supply metal anchors to concrete and structural steel trades for placement; provide in sufficient quantity and direct placement.
- B. Ensure items built in by other trades are properly located and sized.
- C. Establish lines, levels and coursing, protect from disturbance.
- D. Clean surfaces to receive masonry free from dirt, debris, and laitance.

3.2 INSTALLATION

- A. Installation: Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Do not change source of supply materials after the work has started of the appearance of the finished work would be affected.
- B. Protection
 1. Stains: Protect-exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces from splash stains by covering adjacent ground with sand, or polythylene.
 2. Loads: Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed.

- C. Workmanship: Masonry wall shall be carried up level and plumb all around. One section of the walls shall not be carried up in advance of the others, unless specifically approved by the Engineers. Unfinished work shall be stepped back for joining with new work: toothing will not be permitted, except where specified. Heights of masonry shall be checked with an instrument at each floor, and at sills and heads of openings, to maintain the level of the walls. Door and window frames, louvered openings, anchors, pipes, products, conduits shall be built in carefully and neatly as the masonry work progresses. Spaces around metal doorframes shall be filled solidly with mortar. Masonry units shall be handled with care to avoid chipping, cracking and spalling of faces and edges. Drilling, cutting, fitting, and patching, to accommodate the work of the other, shall be performed by masonry mechanics. Masonry shall be cut with masonry saws in exposed work, where indicated by the Contracting Officer. Structural steel work, bolts, anchors, insets, plugs, ties, lintels, and miscellaneous metalwork specified elsewhere shall be placed in position as the work progresses. Chases of approved dimensions for pipes and other purposes shall be provided where indicated or necessary. Tops of exposed walls and partitions, not being worked on, shall be covered with a waterproof membrane, well secured in place. Unless indicated otherwise, partitions shall extend from floor to the bottom of the floor or roof construction above. Walls and partitions shall be structurally bonded or anchored to each other and to beams and columns. Non-load bearing partitions and interior walls shall be securely anchored to the construction above, in a manner that provides lateral stability while permitting unrestricted deflection of construction above. Scaffolding shall be inspected regularly, and shall be amply strong, well braced, and securely tied in position. Overloading of scaffolding will not be permitted.
- D. Mortar Mixing: Measure mortar materials in proper containers to maintain control and accuracy of proportions. Do not measure materials with shovels. Unless specified otherwise, mix mortar in proportions by volume. Introduce and mix aggregate in such a manner that the materials will be distributed uniformly throughout the mass. Add water gradually and mix not less than 3 minutes, until proper plasticity is obtained. Machine mix mortar, in mixers of the type in which the quantity of water can be controlled accurately and uniformly. Hand mixing may be used only when specifically approved. Keep mortar boxes, pans, and mixer drums clean and free of debris or dried mortar. Do not use re-tempered mortar which has not been placed in its final position within 1-1/2 hours after the initial mixing.
1. Mortar: Mix mortar at the site using materials conforming to ASTM C 270 to obtain type of mortar required. Measurement and mixing shall conform to ASTM C 270. When masonry cement is used, conform to printed mixing instructions of the masonry cement manufacturer.
 2. Grout: ASTM C 476. Provide fine grout in grout spaces less than 50 mm in any horizontal dimensions or in which clearance between reinforcing and masonry is less than 20 mm. Provide coarse grout in spaces 50 mm or greater in all horizontal dimensions, provided the clearance between reinforcing and masonry is not less than 20 mm.
- E. Mortar Joints: Uniform thickness of 95 mm unless otherwise indicated. Tool exposed joints slightly concave with a round or other suitable jointer slightly larger than the width of the joint so that complete contact is made along the edges of the units, compressing and sealing the surface of the joint. Strike flush joints that will not be exposed. Tool horizontal joints first. Brush joints to remove all loose and excess mortar. All horizontal joints shall be level; vertical joints shall be plumb and in alignment from top to bottom of wall within a tolerance of plus or minus 12 mm in 120 mm.
- F. Concrete Masonry Unit Work: Lay the first course in a full bed of mortar for the full width of the unit. Lay succeeding courses in running bond unless otherwise indicated. Form bed-joints by applying the mortar to the entire top surfaces of the inner and outer face shells. Form head joints by applying the mortar to a width of about one-inch to the end of the adjoining units laid previously. The mortar shall be smooth, not furrowed, and shall be of such thickness that it will be forced out of the joints as the units are being placed in position. Where anchors, bolts, and ties occur within the cells of the units, place metal lath in the joint at the bottom of such cells and fill the cells with mortar or grout as the work progresses. Use concrete brick for bonding walls, working out the coursing, topping out walls under sloping slabs, distributing concentrated loads, backing brick headers and elsewhere as required. Do not dampen concrete masonry units before or during laying.
1. Special Concrete Masonry Unit Work: Where exposed concrete masonry unit work. Select units for uniformity of size, texture, true plane, and undamaged edges and ends of the exposed surfaces. Place units plumb, parallel, and with properly tooled joints of maximum 9 mm

thickness. Keep exposed surfaces clean and free from blemishes or defects. Lay units in the bond pattern indicated.

2. Reinforced Concrete Masonry Unit Walls: Where vertical reinforcement occurs, fill cores solid with grout. Lay units in such a manner as to preserve the unobstructed vertical continuity of cores to be filled. Embed the adjacent webs in mortar to prevent leakage of grout. Remove mortar fins protruding from joints before grout is placed. Minimum clear dimensions of vertical cores shall be 50 by 75 mm. Position reinforcing accurately as indicated. As masonry work progresses, secure vertical reinforcing in place at vertical intervals not to exceed 160 bar diameters. Embed horizontal reinforcing in grout as grouting proceeds. Minimum clear distance between masonry and vertical reinforcement shall not be less than 12 mm. Unless indicated or specified otherwise, form splices by lapping bars not less than 40 bar diameters and wire tying them together.
- G. Bonding and Anchoring: Unless indicated otherwise, extend partitions from the floor to the bottom of the floor or roof construction above. Structurally bond or anchor walls and partitions to each other and to concrete walls, beams and columns. Securely anchor non-load bearing partitions and interior walls to the construction above as indicated. Completely embed anchors in mortar joints.
1. Corners of Load-Bearing Walls: Provide a true masonry bond in each course, except where indicated or specified otherwise.
 2. Intersections of Load-Bearing Walls: Provide a true masonry bond in each course or anchor with rigid steel anchors not more than 600 mm apart vertically, unless otherwise indicated.
 3. Intersections of Non-Load-Bearing Partitions with Other Walls or Partitions: tie wire mesh at vertical intervals of not more than 600 mm or with masonry bonding in alternate courses.
 4. Masonry Walls Facing or Abutting Concrete Members: Anchor masonry to the concrete with dovetail or wire-type anchors inserted in slots or inserts built into the concrete. Locate not more than 45 mm on centers vertically and not more than 60 mm on centers horizontally.
- H. Horizontal Joint Reinforcement: Provide reinforcement in every other course and in the first two courses above and below openings in walls and partitions of concrete masonry units. Reinforcement shall be continuous except at control joints and expansion joints. Reinforcement above and below openings shall extend not less than 60 mm beyond each side openings. Provide reinforcement in the longest available lengths, utilizing the minimum number of splices. Overlap ends not less than 300 mm. Provide welded L-shaped assemblies not less than 80 by 80 mm, both the same size members and the same construction as the straight reinforcement, at corners and intersections of the walls and partitions. Place the reinforcement and apply mortar so as to provide cover for the wire of at least 16 mm for exterior wall face and 12 mm for interior wall face.
- I. Concrete Masonry Unit Lintels and Bond Beams: Provide special units, fill cells solidly with grout of concrete, with a strength same as necessary or higher and provide not less than two No. 5 reinforcing bars, unless indicated otherwise. Reinforcing shall overlap a minimum of 40 bar diameters at splices. Terminate bond beams and reinforcing on each side of expansion joints (and control joints). Concrete masonry units used for lintels and bond beams shall have exposed surfaces of the same material and texture as the adjoining masonry units. Allow lintels to set at least 6 days before shoring is removed. Lintels shall be straight and true and shall have at least 20 mm of bearing at each end.
- J. Control Joints: Provide where indicated in concrete masonry unit walls. Provide control joints of the sawed type or the built-in type, as the case requires. Joints shall occur directly opposite each other on both faces of the wall and shall be filled with an approved non-staining elastic caulking compound.
- K. Grout Placement: Place grout from the interior side of walls, except as approved otherwise. Protect sills, ledges, offsets, and other surfaces and remove any excess grout immediately. Grout shall be well mixed to prevent segregation and shall be sufficiently fluid to flow into joints and around reinforcing without leaving voids. Place grout by pumping or pouring from buckets equipped with spouts in lifts not exceeding 1200 mm. Keep pours at 40 mm below the top of masonry units in top course, except at the finish course. Puddle or agitate grout thoroughly to eliminate voids. Do not displace masonry form its original position. Remove masonry displaced by grouting operation and relay in alignment with fresh mortar.

- L. Forms and Shoring: Construct to the shape, lines and dimensions of members indicated and make sufficiently rigid to prevent deflections which may result in cracking to other damage to supported masonry. Forms shall remain on girders and beams not less than 10 days after completion of the members. Not less than 16 hours shall elapse before uniformly distributed construction loads are applied to completed masonry members. Not less than 64 hours shall elapse before concentrated loads are applied.

3.3 CLEANING

- A. Remove excess mortar and smears upon completion of masonry work.
- B. Point or replace defective mortar, match adjacent work.
- C. Clean soiled surfaces using a non-acidic solution which will not harm masonry or adjacent materials, consult masonry manufacturer for acceptable cleaners.
- D. Use non-metallic tools in cleaning operations.
- D. Protection: Protect work which may be damaged, stained or discolored during cleaning operations.
- F. Pointing: Upon completion of masonry work, cut out defective mortar joints and tuck joints and all holes solidly with mortar.
- G. Cleaning: Clean exposed masonry surfaces with clear water and stiff fiber brushes and rinse with clear water. Where stains, mortar, or other soil remain, continue cleaning as follows: Clean masonry surfaces by scrubbing with warm water and soap and rinsing thoroughly with clean water. Restore damaged, stained, and discolored work to its original conditions or replace with new work.
- H. Maintain protective boards at exposed external corners which may be damaged by construction activities; protect without damaging completed work.

END OF SECTION

SECTION 05510

METAL FABRICATIONS AND ASSEMBLIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Stock and custom fabricated metal items Scheduled at end of this Section, complete in respect to function as intended.
- B. Metal fabrications includes items made from iron, steel, and aluminum shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or metal systems specified elsewhere

1.2 QUALITY ASSURANCE

- A. Field Measurement: Take field measurement prior to preparation of shop drawings and fabrication, where possible; do not delay job progress; allow for trimming and fitting where necessary.
- B. Structural Performance: Detail and provide assemblies which, when installed, comply with applicable code requirements for structural performance, unless more stringent requirements are specified.
- C. Railings: Design railings to support minimum lateral force of 50 lbs./lin.ft. (75 kg./lin. meter) uniform load and 250 lbs. (115 kg.) at any single point without permanent set or damage; ASTM E935.

1.3 REFERENCES

- A. American Welding Society (AWS): D1.1, Structural Welding Code.
- B. National Association of Architectural Metal Manufacturers (NAAMM):
 - 1. Pipe Rail Manual.
 - 2. Heavy Duty Metal Bar Grating Manual.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrication must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.5 SUBMITTALS

- A. Shop Drawings: Submit for fabrication and erection of metal fabrications, indicate profiles, sizes, connection, reinforcing and anchorage.
 - 1. Provide templates for anchor installation by others.
- B. Product Data: Submit manufacturer's literature for products used in metal fabrications, including paint, grout and pre-manufactured items.
- C. Railings: Provide certification signed by an Indonesia registered structural engineer or other as approved by Architect indicating compliance with specified requirements.
- D. Samples Representative of materials and finished products as may be requested by the Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Shapes, Plates and Bars: ASTM A36.



1. Steel Bar Grating: ASTM A36 or ASTM A569.
- B. Structural Steel Sheet: Hot rolled, ASTM A570; or cold rolled, ASTM A611, Class I; of grade required for design loading.
 1. Checker Plate Sills: Non-slip type.
- C. Steel Pipe: ASTM A53, Type S seamless, grade as selected by fabricator and as required for design loading; minimum standard weight, STD or Schedule 40.
- D. Steel Tubing: Cold formed ASTM A500; or hot rolled, ASTM A501; minimum Grade B; seamless where exposed.
- E. Stainless Steel: As follows:
 1. Bar Stock: ASTM A 276, Type 302, 304, or 316.
 2. Plate: ASTM A 167, Type 302, 304 or 316.
 3. Expanded Metal: ASTM F 1267, Class 3.
- F. Castings: Gray iron, ASTM A48, Class 30; malleable iron, ASTM A47.
- G. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron ASTM A47, or cast steel ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
- H. Grout: Non-shrink meeting ASTM E827, non-metallic, pre-mixed, factory-packaged, non-staining, non-corrosive; type specifically recommended by manufacturer as applicable to job condition.
 1. Master Builders/Masterflow 713.
 2. RC Chemical
 3. Philippine Chemical Corp.
 4. Rebrtrade International
- I. Fasteners and Rough Hardware: Type required for specific usage; provide zinc-coated fasteners for exterior use or where built into exterior walls.
- J. Welding Materials: AWS D1.1, type required for materials being welded.
- K. Paint: Provide primers as recommended by paint manufacturers for substrates and paints specified in Section 09900 - Painting.
 1. Galvanizing Repair Paint: High zinc-dust content paint for re-galvanizing welds in galvanized steel.

2.2 FABRICATION

- A. Fabricate items with joints neatly fitted and properly secured.
 1. Pre-assemble items in shop to greatest extent possible, minimize field splicing and assembly, disassemble units only as required for shipping and handling limitations; clearly mark for field assembly.
- B. Weld corners and seams continuously, comply with AWS recommendations; grind exposed welds continuous, smooth and flush with adjacent finished surfaces, and ease exposed edges to approximate 1mm uniform radius.

- C. Exposed Mechanical Fastenings: Flush countersunk fasteners unobtrusively located, consistent with design of Structure.
- D. Fit and shop assemble in largest practical sections for delivery.
- E. Make exposed joints flush butt type, hairline joints where mechanically fastened.
 - 1. Fabricate joints exposed to weather in manner to exclude water or provide weep holes where water could accumulate.
- F. Supply components required for proper anchorage of metal fabrications; fabricate anchorage and related components of same material and finish as metal fabrication.
- G. Railings: Welded construction.
 - 1. Pipe and Round Tube Railings: Comply with requirements of NAAMM "Pipe Railing Manual"; welded construction; cap exposed ends.
 - (a) Railings: ASTM A53, Type S seamless pipe, Grade A or B.
 - 2. Other Railings: Configurations indicated on Drawings.
- H. Ladders and Ships Ladders: Comply with requirements of ANSI A14.3 and local codes.
 - 1. Rungs: Fit in centerline of side rails, plug weld and grind smooth on outer rail faces; provide non-slip surface on top of rung, similar to epoxy resin and aluminium oxide granules surface.
- I. Steel Grating: Comply with requirements of NAAMM "Heavy Duty Metal Bar Grating Manual"; work to dimensions accepted on shop drawings, using proven details of fabrication or support.
 - 1. Standard Type: Welded with a plain traffic surface.
 - 2. Loads: Design for minimum 150 psf. (735 kg/sq. meter)
 - 3. Grating at Sidewalks: Special type with maximum 12mm opening in direction of travel, while providing air flow required.
 - 4. Catwalk Grating: IKG Industries/Type W194 with 18mm x 4.5mm bearing bar.
 - 5. Provide non-slip surfacing on top edges of grating.
 - 6. Provide intermediate structural steel support members as required for spans indicated.
- J. Elevator Pit Screens: Wire mesh screens with minimum 11 gage steel wire woven into 35mm approx. mesh, and minimum 16 gage channel frames with top and bottom bars.
- K. Steel Bollards: Minimum Schedule 40 seamless steel piping, filled with minimum 3000 psi concrete, as detailed on drawings.
- L. Checker Plate Thresholds: Fabricate from 6mm diamond patterned galvanized checker plate; non-slip finish.
- M. Cast Nosing: Carborundum type non-slip finished cast nosings, complete with anchors for casting into concrete.
- N. Trench Frames And Grated Covers: Provided heavy duty cast iron frames and covers with galvanized steel form pans as indicated.
- O. Finishes: Unless otherwise scheduled, galvanize and prime paint exterior work and prime paint interior work; comply with requirements of Section 09900 - Painting for preparation and priming.
 - 1. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to applying finish.

2. Do not shop prime surfaces in contact with concrete or requiring field welding; shop prime in one coat.
2. Provide minimum ASTM A123 or A525 G90 coating, 0.90 oz/ft galvanized coating (formerly 1.25 Commercial Class); iron and steel hardware galvanized conforming with ASTM A153.
 - a. Preparation: SSPC-SP3, Power Tool Cleaning.

PART 3 - EXECUTION

3.1 ERECTION

- A. Obtain Architect's review prior to site cutting or making adjustments which are not part of scheduled work.
 1. Perform cutting, drilling, and fitting required for installation. Set units accurately in location, with edges and surfaces level, plum, and true.
- B. Install items square and level, accurately fitted and free from distortion or defects detrimental to appearance or performance.
 1. Supply items requiring be casting into or embedding in other materials to appropriate trades.
 2. Ensure alignment with adjacent construction; coordinate with related work to ensure no interruption in installation.
- C. Make provision for erection stresses by temporary bracing; keep work in alignment.
- D. Field bolt and weld to match standard of shop bolting and welding; hide bolts and screws whenever possible, where not hidden, use flush countersunk fastenings.
 1. Perform field welding in accordance with AWS D1.1.
- E. After installation, touch-up field welds and scratched and damaged surfaces; use primer consistent with shop coat or recommended for galvanized surfaces, as applicable.
- F. Replace items damaged in course of installation and construction.

3.2 SCHEDULE

- A. Supply and install metal fabrications listed in Schedule complete with anchorage and attachments necessary for installation.
 1. Schedule lists principal items only, refer to Drawing details for items not listed.
- B. Schedule:
 1. Miscellaneous angles, plates and attachments to be set in concrete or masonry for anchorage of other items.
 2. Iron and steel shapes, sleeves, anchors, connectors and fastenings required to complete construction work, and which are not provided in other specification sections.
 - a. Rough hardware, including bolts, fabricated plates, anchors, hangers, dowels and miscellaneous metals.
 - 1) Steel cover plates at planters.

- b. Ledge and shelf angles, channels and plates not attached to structural steel, and for support of metal decking.
 - 1) Curb angles.
 - c. Angle and channel frames for doors and wall openings.
3. Guard rails and handrails except steel stair railings.
 4. Steel ladders and ship's ladders.
 5. Steel bar gratings at plenums, platforms, and other locations as indicated.
 6. Elevator sill support angles and necessary connections not attached to structural steel.
 7. Cast nosings and thresholds.
 8. Metal gates and grilles with required frames.
 9. Elevator pit screens/ladder
 10. Steel bollards/plunger
 11. Checker plate thresholds.
 12. Manhole covers.
 13. Metal Louver
 14. Skylight frame supports.
 15. Trench frames and covers.
 16. Pit covers and frames.
 17. Loose steel lintels (if required).
 18. Supports for lavatory and other countertops and other built-in furniture.
 19. Corner guards.
 20. Water tank (overhead) stainless steel (By Sunstar)
 21. Decorative spire
 22. Stainless Steel ladder Rung for Fire/Domestic Tank
 23. Steel Door Jamb Product: Metro Shutters

Note:

Other materials not mention in this Specification or shown on the drawings but are necessary for the proper completion of the work must be provided by the Contractor.

END OF SECTION

SECTION 05520

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Stainless steel pipes and tube handrails and railing systems.
 - 2. Steel pipe and tube handrails and railing systems.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 7 for Sealants Requirements
 - 2. Division 8 Glazing for Exterior Balustrade Assembly.

1.2 SUBMITTALS

- A. Definitions in ASTM E 985 for railing-related terms apply to this section.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: In engineering handrail and railing systems to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. For cold-formed structural steel: AISI "Specification for Design of Cold-Formed Steel Structural Members".
 - 2. For stainless steel: AISI "Stainless Steel Cold-Formed Structural Design Manual".
 - 3. For aluminium: AA "Specifications for Aluminum Structures".
- B. Structural Performance of Handrails and Railing Systems : Engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.
 - 1. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf per linear ft. applied horizontally and concurrently with uniform load of 100 lbf per linear ft. applied vertically downward.
 - c. Concentrated load need not be assumed to act concurrently with uniform loads.

1.4 SUBMITTALS

- A. Product Data for each type of product specified.
- B. Shop drawings showing fabrication and installation of handrails and railings including plans, elevations, sections, details of components, and attachments to other units of work.

1. Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional engineer responsible for their preparation.
- C. Samples for verification purposes of each type of exposed finish required, prepared on components indicated below that are of the same thickness and metal indicated for final unit of work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.
 1. 150 mm long sections of each distinctly different linear railing member including handrails, top rails, posts, and balusters.
 2. Fittings and brackets.
 3. Welded connections.
- D. Product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of railing components and systems with requirements based on comprehensive testing of current products.
- E. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility : Obtain handrails and railing systems of each type and material from a single manufacturer.
- B. Engineering Responsibility : Engineer handrails and railing systems by qualified professional engineer.

1.6 STORAGE

- A. Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage of any kind. Cover with waterproof paper, tarpaulin, or polyethylene sheeting; allow for air circulation inside the covering.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Where handrails and railing are indicated to fit to other construction, check actual field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence and coordinate installation of wall handrails as follows:
 1. Mount handrails only on completed walls and balcony slabs. Do not support handrails temporarily by any means not satisfying structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS

- A. General: Provide metal forms and types that comply with requirements of reference standards and that are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view

surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

- B. Aluminum : Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required :
1. Extruded Bar and Tube : ASTM B 221, alloy 6063T5/T52.
 2. Extruded Structural Pipe and Tube : ASTM B 429, 6063-T5/T52.
 3. Drawn Seamless Tube : ASTM B 210, 6063-T832.
 4. Plate and Sheet : ASTM B 209, 6061 - T6.
 5. Die and Hand Forgings : ASTM B 247, 6061 - T6.
 6. Castings : ASTM B 26, A356 - T6.
- C. Stainless Steel : Austenitic stainless steel grade and type designated below for each form required:
1. Tubing : ASTM A 554, grade as follows :
Grade MT 304.
 2. Castings : ASTM A 743, Grade CF 8 or CF 20.
 3. Plate : ASTM A 167, Type as follows :
Type 304.
- D. Steel Pipe : ASTM A 53; finish, type, and weight class as follows :
1. Galvanized finish for exterior installations and throughout project.
 2. Gype F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.
- E. Steel Tubing : Product type (manufacturing method) and other requirements as follows :
1. Cold-Formed Round Steel Tubing : ASTM A 500, grade as indicated below :
 - a. Grade A, unless otherwise indicated or required by structural loads.
 2. Hot-Formed Round Steel Tubing : ASTM A 501.
 3. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.
- F. Steel Plates, Shapes, and Bars : ASTM A 36.
- G. Gray Iron Castings : ASTM A 48, Class 30.
- H. Malleable Iron Castings ASTM A 47, grade 32510.
- I. Brackets, Flanges, and Anchors : Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
- J. Glazing: Tempered Glass Railing: Refer to Div. 8 Specifications.

2.3 GROUT AND ANCHORING CEMENT

- A. Non-shrink, Non-metallic Grout : Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- B. Erosion-Resistant Anchoring Cement : Factory-pre-packaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water at project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by asealer or waterproof coating and is recommended for exterior use by manufacturer.

2.4 PAINT

- A. Galvanizing Repair Paint : High-zinc-dust-content paint for re-galvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.
- B. Bituminous Paint : Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.
- C. Zinc Chromate Primer : FS TT-P-645.

2.5 WELDING MATERIALS, FASTNERS, AND ANCHORS

- A. Welding Electrodes and Filler Metal : Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Fasteners for Anchoring Railings to Other Construction : Select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loadings.
 - 1. For steel railings and fittings use plated fasteners complying with ASTM B633, Class Fe/Zn 25 for electro-deposited zinc coating or ASTM B 696, class 12 for cadmium plating.
 - 2. For aluminum railings provide fasteners fabricated from type 304 stainless steel.
 - 3. For stainless steel railings provide fasteners fabricated from type 304 stainless steel.
- C. Fasteners for Interconnecting Railing Components : Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 - 1. Provide concealed fasteners for inter-connection of handrail and railing components and for their attachment to other work, except where otherwise indicated.
- D. Cast-In-Place and Post-Installed Anchors in Concrete : Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, load imposed within a safety factor of 4, (as verified by Structural Engineering consultant), as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.
 - 1. Cast-in-place anchors.
 - 2. Chemical anchors.
 - 3. Expansion anchors.
 - 4. Undercut anchors.
 - 5. Above anchors must receive approval of project structural engineer before proceeding.

2.6 FABRICATION

- A. General : Fabricate handrails and railing systems and glazing assembly to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacings, and anchorage, but not less than those required to support structural loads.
- B. Pre-assemble railing systems in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation. Use connections that maintain structural value of joined pieces. Clearly mark units for re-assembly and coordinated installation.
- C. Form changes in direction of railing members as follows :
1. By radius bends of radius indicated.
 2. By bending.
 3. By any method indicated above, applicable to change of direction involved.
- D. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- E. Welded Connections : Fabricate railing systems and handrails for connection of members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
 5. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- F. Nonweld Connections : Fabricate railings systems and handrails for connection of members by means of railing manufacturer's standard concealed mechanical fasteners and fittings unless otherwise indicated . Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
1. Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.
- G. Welded Connections for Aluminum Pipe : Fabricate pipe handrails and railing systems for connection of members by concealed internal welds, which eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- H. Brackets, Flanges, Fittings, and Anchors : Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors for interconnection of handrail and railing member to other construction.
- I. Provide inserts and other anchorage devices for connecting handrails and railing system to concrete or masonry work. Fabricate anchorage devices capable of withstanding loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.

- J. For railing posts set in concrete, provide pre-set sleeves of steel, not less than 150 mm long and inside dimensions not less than 12.5 mm greater than outside dimensions of post, with steel plate forming bottom closure.
- K. For removable railing posts, fabricate slip-fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgement.
 - 1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
- L. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- M. Ease exposed edges to a radius of approximately 0.75 mm, unless otherwise indicated. Form bent-metal corner not smaller radius possible without causing grain separation or otherwise impairing work.
- N. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.
- O. For handrails and railing systems that are exposed to exterior or to moisture from condensation or other sources, provide weepholes or other means for evacuation of entrapped water in hollow sections of railing members.
- P. Fabricate joints that will be exposed to weather in a manner to exclude water.
- Q. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
- R. Toe Boards : Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated for connection to , and centered between , each railing post.
- S. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses to produce adequate bearing to prevent bracket rotation and over-stressing of substrate.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.
- C. Appearance of Finished Work : Variations in appearance of abutting or adjacent pieces are acceptable if they are within 1/2 of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples and they are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

- A. Finish designations prefixed by "AA conform to the system established by the Aluminum Association for designating aluminum finishes.

2.9 STAINLESS STEEL FINISHES

- A. Remove or blend tool and die marks and stretch lines into finish.
- B. Grind and polish surfaces to produce uniform directional textured polished indicated, free of cross scratches. Run grain with long dimension of each piece.

- C. 180-Grit Polished Finish : Oil ground, uniform 180-grit textured finish.
- D. 320-Grit Polished Finish: Oil ground, smooth uniform 320-grit finish.
- E. Bright, Directional Polish : AISI No. 4 finish.
- F. Non Directional Polish : AISI No. 7 finish
- G. Mirror Polish : AISI No. 8 finish
- H. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.10 GALVANIZED FINISH

- A. General : Hot-dip galvanize items indicated to be galvanized to comply with applicable standard listed below :
 - 1. ASTM A 153 for galvanizing iron and steel hardware.
 - 2. ASTM A 123 for galvanizing iron and steel products made from rolled, pressed, and forged steel shapes, castings, plate bars, and strips.
- B. For exterior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves and other ferrous components.
- C. For interior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete as masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections accurately together to form tight, hairline joints.
- B. Cutting, Fitting, and Placement : Perform cutting, drilling, and fitting required for installation of handrails and railings and glazing. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
 - 1. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 6 mm in 3.6 metres.
 - 3. Align rails so that variations from level for horizontal members and parallel with rake of steps and ramps for sloping members and from parallel with rake of steps and ramps for sloping members do not exceed 6mm in 3.6 metres.
- C. Field Welding : Comply with the following requirements :

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- D. Corrosion Protection : Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.
- E. Fastening to In-Place Construction : Provide anchorage devices and fasteners where necessary for securing handrails and railings to in-place construction.

3.3 ANCHORING POSTS

- A. Adjust handrails and railing system prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by design loadings.
- B. Anchor posts in concrete by means of pipe sleeves pre-set and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.
- C. Anchor posts in concrete by core drilling holes not less than 125 mm deep and 18 mm greater than outside diameter of post. Clean holes of all loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.
1. Non-shrink, non-metallic grout or anchoring cement.
- D. Cover anchorage joint with a round steel flange attached to post as follows :
1. Welded to post after placement of anchoring material.
- E. Anchor posts to metal surfaces with oval flanges, angle type or floor type as required by conditions, connected to posts and to metal supporting members as follows :
1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
 2. For stainless steel pipe railings , weld flanges to post and bolt to metal supporting surfaces.
 3. For aluminum pipe railings, attach posts as indicated using manufacturer's standard fittings designed and engineered for this purpose.

3.4 RAILING CONNECTIONS

- A. Welded Connections : Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.
- B. Expansion Joints : Install expansion joints at locations indicated but not further apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 50 mm beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 150 mm of post.

3.5 ANCHORING RAIL ENDS

- A. Anchor rail ends into concrete and masonry with round flanges connected to rail ends and anchored into wall construction with post-installed anchors and bolts.

- B. Anchor rail end to metal surfaces with oval or round flanges.
 - 1. Weld flanges to rail ends
- C. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately located sockets to match post spacing.

3.6 ATTACHMENT OF HANDRAILS TO WALLS AND SLABS

- A. Attach handrails to wall with wall brackets and end fittings. Provide bracket with not less than 38 mm clearance from inside face of handrail and finished wall surface.
- B. Locate brackets as indicated or, if not indicated, at spacing required supporting structural loads.
- C. Secure wall brackets and wall return fittings to building construction as follows :
 - 1. Use type of bracket with predrilled hole for exposed bolt anchorage.
 - 2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
 - 3. For hollow masonry anchorage, use toggle bolts with square heads.
 - 4. For steel-framed gypsum board assemblies, fastener brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

3.7 ADJUSTING AND CLEANING

- A. Touch-up Painting : Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material
- B. For galvanized surfaces : Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A780.
- C. Clean the following metals by washing thoroughly with clean water and soap, following by rinsing with clean water.
 - 1. Aluminum
 - 2. Stainless steel
- D. Refer to Division 8 Glazing for the protection and cleaning of glazed railing.

3.8 PROTECTION

- A. Protect finishes of railing systems and handrails from damage during construction period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION

SECTION 05800

EXPANSION JOINT COVER SYSTEMS CONTROL

PART 1 – GENERAL

1.01 RELATED WORK

- A. Requirements: Provide all labor, materials, equipment and services, and perform all operations required for complete installation of Expansion Control and related work in accordance with the Contract Documents.
- B. Work Included: The work of this section shall include, but not limited to the following:
 - 1. Floor expansion joint cover assemblies.
 - 2. Wall/ceiling expansion joint cover assemblies.
 - 3. Exterior expansion joint seals
- C. Related Work Specified Elsewhere:
 - 1. Section 03300 – Cast-in Place concrete.
 - 2. Section 04220 – Concrete Unit Masonry
 - 3. Section 05500 – Metal Fabrications
 - 4. Section 05990 – Miscellaneous Metals
 - 5. Section 07900 – Sealants and Caulking

1.02 QUALITY ASSURANCE

- A. Materials and work shall conform to the latest edition of reference specifications specified herein and to applicable codes and requirements of local authorities having jurisdiction.
- B. Fire Performance Characteristics:
 - 1. Fire Resistance: Where indicated provide expansion joint cover assemblies tested by Underwriter's Laboratories, in accordance with [ANSI/U.L. NO. 263 and ASTM E 119/E 814] [UL 2079] [including hose stream test at full rated period]. Underwriter's Laboratories shall classify assemblies. Fire rating shall be 2 hours or not less than the fire rating of the adjacent construction.
- C. Loading Characteristics:
 - 1. Standard Floor Covers: Shall be designed to withstand [50] [100] [200] psf uniform load and [300 pounds concentrated load] [2,000 pounds concentrated load for heavy duty with maximum 12,000 psi stress (6063-T5 aluminum extrusions) or 28,000 psi stress (6061-T6 aluminum plate) or 16,000 psi stress (5052-H32 aluminum sheet) or 36,000 psi stress (stainless steel plate) at full open position.
- D. Single –Source Responsibility: Obtain expansion joint cover assemblies from one source from a single manufacturer.

1.03 REFERENCES

- A. Where the Specifications refer to a specific standard, other authoritative standards which ensure an equal or higher quality than the standards mentioned will also be acceptable. It will be incumbent on the Main Contractor to verify the equal or higher quality and submit comparative standards (both specified and proposed standards) for review.
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM B 221, Standard Specifications for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.

1.04 SUBMITTALS

- A. Product Data: Submit copies of manufacturer's latest published literature for materials specified herein for approval, and obtain approval before materials are fabricated and delivered to the site.
- B. Certificates: Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.
- C. Shop Drawings
 - a. Submit shop drawings for work specified herein for approval and obtain approval prior to fabrication and shipment of materials to the job site.
 - b. Shop drawings showing full extent of expansion joint cover assemblies; including large scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joinery with other types, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes. Include description of materials and finishes and installation instructions.
- D. Samples
 - a. Samples of materials specified herein and shall be submitted for approval, and approval obtained before materials are delivered to the site.
 - b. Include samples of each type of metal finish indicated on metal of same thickness and alloy to be used in work. Where normal and texture variations are to be expected, include two or more units in each set of samples showing limits of such variations.
 - c. Samples of each type of flexible seal to be used in work with color samples as above.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Exercise proper care in the handling of work so as not to injure the finished surfaces, and take proper precautions to protect the work from damage after it is in place.
- B. Deliver materials to the job site ready for use, and fabricated in as large sections and assemblies as practical. Assemblies shall be identical to submitted and reviewed shop drawings, samples and certificates.
- C. Store materials under cover in a dry and clean location off the ground. Remove materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials at no additional cost.

1.06 PROJECT CONDITIONS

- A. Check actual locations of walls and other construction to which work must fit, by accurate field measurements before fabrication. Show recorded measurements on final shop drawings and coordinate fabrication schedule with construction progress to avoid delay of Work.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Expansion joint cover assemblies specified herein and indicated on the drawings shall be manufactured by "JointMaster / InPro Corporation" or other manufacturers with prior or written approval.

2.02 MATERIALS

- A. Aluminum: ASTM B 221, alloy 6063-T6

- B. Stainless Steel Frame Caps and Plates (optional): SS304
- C. Stainless Steel Caps (optional): SS316
- D. Brass Cap (optional): CZ108
- E. Vinyl gasket: Flexible thermoplastic or equal. Color – Black.
- F. Vapor Barrier: 40 mils thick PVC or 30 mils thick EPDM.
- G. Fire Barrier: Reactofire 900 Blanket System to UL2079 with hose stream test to walls required for indicated fire resistance rating.
- H. Roof Bellows: EPDM Bellows with galvanized flanges. [Neoprene Bellows] [Aluminum Flanges] [Stainless Steel Flanges] [Copper Flanges]
- I. Elastomeric Seal: Single or dual durometer Santoprene or equal. Colors to be selected from manufacturer's standard range – Black, Gray, Beige, Off-White and Bright-White. Custom colors available.
- J. Silicone Seal: Secure approval for color.
- K. Centering bars on systems shall have semi-spheres which engage in the frame.
- L. Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible vapor seals, drain tubes, adhesive and other accessories compatible with material in contact, as indicated or required for complete installations.

2.03 FABRICATION

- A. Provide expansion joint cover assemblies of design, basic profile, materials, and operation indicated. Select units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and structural movement. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.
- B. Aluminum Joint Cover Assemblies: Provide continuous extruded aluminum frames of profile indicated with seating surface and raised floor rim to accommodate flooring and concealed bolt and steel anchors for embedment in concrete. Provide assemblies formed to receive cover plates of design indicated and to receive sealant materials (if any) between raised rim of frame and edge of plate. furnish depth and configuration to suit type of construction and to produce a continuous flush wearing surface with adjoining finish floor surface.
 - 1. Flat Cover Plates: Provide cover plates of profile and wearing surface indicated. Extend flat plates to lap each side of joint. If edge of cover plate and raised rim of frame. Secure the cover plate in or on top of frames in such a manner as to have free movement on both sides.
 - 2. Provide manufacturer's continuous EPDM vapor barriers under all external covers and all floor covers, interior and exterior.
 - 3. Floor-to-Floor Joints
 - a. Partially Concealed Cover: Provide on frame on each side of joint, designed to cover floor plate and filler with an extruded vinyl bumper to prevent rattle.
 - b. Exposed Cover: Provide one frame on each side of joint designed to support floor plate and filler with extruded vinyl bumpers to prevent rattle where design allows.
 - c. Floor Cover Plate Wearing Surfaces: Provide cover plates with plain or hatched wearing surface. Recess to receive full thickness of flooring material.
 - 4. Floor-to-Wall Joints

- a. Provide one frame on floor side of joint only. Provide wall side frame where required by manufacturer's design.
 - b. Provide extruded vinyl bumper between frame and cover plate to prevent rattle.
 - c. Angled Cover Plates: Attach angled cover plates for floor-to-wall joints to wall with countersunk, flat-head exposed fasteners secured to drilled-in-place anchor shields, unless otherwise indicated, at spacing recommended by joint cover manufacturer.
 5. Wall, Ceiling, Roof and Soffit Joint Cover Assemblies
 - a. Fixed Metal Cover Plates: Provide on one side of the joint a concealed, continuously anchored frame fastened to wall, ceiling, or soffit only on one side of joint. Extend cover to lap each side of joint and to permit free movement on one side. Attach cover to frame with cover in close contact with adjacent finished surfaces. Extruded vinyl bumpers should be installed where moving aluminum frames and plates come into contact.
 - b. Floating Metal Cover Plates: Secure the cover plate in or on top of frames in such a manner as to have free movement on both sides.
 - c. Flexible Sealant: Apply an approved single component elastomeric polyurethane sealant between joint cover assemblies and finished surfaces.
 - d. Provide manufacturer's continuous EPDM rubber vapor barrier for joint covers on exterior and/or on interior of exterior walls and all floor applications.
 6. Joint Cover Assembly with Santoprene Seal
 - a. Provide joint cover assemblies consisting of continuously anchored aluminum extrusions and continuous extruded preformed santoprene seals of profile indicated in colors specified to suit types of installation conditions shown. Santoprene seals should be available in colors of design choices.
 - b. Santoprene seal should press in from the front of the extruded frames, forming a watertight seal.
- D. Metal Finishes should comply with NAAMM "Metal finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are fabricated. Protect finishes on exposed surfaces with protective covering before shipment.
1. Floors: Mill Finish Aluminum or 2B Finish – Stainless Steel
 2. Interior Walls, Ceilings and Soffits: 204-R1 Clear Anodized Aluminum or No. 4 Brushed Finish – Stainless Steel
 3. Exterior Walls and Roofs: Mill Finish Aluminum
 4. Elastomeric Seals: Black, Gray, Beige Off-White, Bright White, Custom - Santoprene

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine conditions at the job site where work of this section is to be performed to insure proper arrangement and fit of the work. Start of work implies acceptance of job site conditions.
- B. Insure substrate is sound; gap is consistent and is ready to accept installation of frames.

3.02 PREPARATION

- A. Examine the Contract Drawings and specifications in order to insure the completeness of the work required under this Section.
- B. Verify all measurements and dimensions at the job site and cooperate in the coordination and scheduling of the work of this Section with the work of related trades, with particular attention given to the installation of items embedded in concrete and masonry so as not to delay job progress.

- C. Provide templates as required to related trade for location of support and anchorage items.

3.03 INSTALLATION

- A. Installation must be provided by factory-trained installers directly employed by the product provider. Subcontracted installers are not allowed.
- B. In addition to requirements of these specifications, comply with manufacturer's instructions recommendations for phases of work, including preparation of substrate, applying materials, and protection of installed units.
- C. Provide anchorage devices and fasteners where necessary for securing threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.
- D. Perform cutting, drilling and fitting required for installation of expansion joint covers. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels.
- E. Allow adequate free movement for thermal expansion and contraction of metal to avoid bucking.
- F. Set floor covers at elevations to be flush with adjacent finished floor materials.
- H. Interior and exterior floor covers must be provided with an underlying continuous vapor barrier.
- I. All exterior joint covers must be provided with an underlying vapor barrier.
- J. All backfill for recessed floor covers must be high quality flexible epoxy grout.
- K. Locate wall, ceiling, roof, and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories.
- L. Locate anchors at interval recommended by manufacturer, but not less than 75mm from each end and not more than 600mm on centers.
- M. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid bucking of frames.
- N. Provide a bead of one component elastomeric polyurethane sealant in manufacturer's extruded aluminum recesses between all profiles and profile frames and adjacent finished surfaces.
- O. Roof Bellows should be installed on waterproof concrete upstand as recommended by manufacturer.
6. Installation of Roof Bellows: Install bellows to comply with manufacturer's instructions and with minimum number of end joints.
7. For straight sections provide bellows in continuous lengths.
8. Vulcanize splice joints in bellows to provide watertight joints using manufacturer's recommended procedures.
9. Provide continuous underlying vapor barrier.
- P. Installation of Santoprene Seal joint assemblies

1. Seal end joints within continuous runs and joints at transitions in accordance with manufacturer's directions to provide a watertight seamless installation.
2. Install exterior flexible seal in standard lengths.
3. Seal transitions and butt joints in accordance with manufacturer's instructions.

Q. Installation of Fire Barriers

1. Install fire barriers in accordance with building codes using manufacturer's recommended procedures.
2. Install transition splices and end joints to provide continuous fire resistance in accordance with manufacturer's instructions.

3.04 CLEANING AND PROTECTION

- A. Do not remove strippable protective material until finish work in adjacent areas is complete. When protective material is removed, clean exposed metal surfaces to comply with manufacturer's instructions.
- C. Install external santoprene seal once finish work in adjacent areas is complete.
- D. Ordinary dirt and smudges on metal components and seals can be removed with a water based cleaner such as Fantastik. Wipe clean with a sponge or soft cloth.
- D. Not recommended for cleaning are steel wool or powdered abrasive cleaners, because they mar the surface leaving an unsightly appearance. Do not use active solvent-type cleaning preparations, such as nail polish remover, tar and bug removers, etc.

END OF SECTION

SECTION 06100

MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This Section includes the following:
1. Miscellaneous wood sheathing.
 2. Behind wall wood blocking.
 3. Plywood panel boards.
 4. Preservative treatment of wood members.
 5. Blocking for all mirrors, and other fixed millwork.

1.2 QUALITY ASSURANCE

- A. Lumber: Provide visible grade stamp of an agency certified by NFPA.
- B. Lumber Standard: Comply with US Product Standard PS20 for each indicated use, including moisture content and actual sizes related to indicated nominal sizes.
- C. Plywood Standard: Comply with PSI.

1.3 SUBMITTALS

- A. Product Data: Wood treatment certification and instructions for proper use of each type of treated material.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber: Graded in accordance with NFPA Grading Rulers; Construction Grade, any species; moisture content 19% maximum.
- B. Plywood:
1. Exterior Plywood: Exterior type, C-C grade.
 2. Interior Plywood: Interior type, standard grade.
 3. Panel Boards: For electrical and communication panel boards; C-D plugged, interior type plywood with exterior glue, fire retardant treated; minimum 12mm thick.
- C. Nails, Spikes and Staples: Galvanized for exterior locations, high humidity locations, and treated wood; size and type to suit application.
- D. Bolts, Nuts, Washers, Lags, Pins and Screws: Medium carbon steel; sized to suit application; galvanized for exterior locations, high humidity locations, and treated wood, size and type to suit application.
- E. Fasteners: Provide fasteners as required for complete, secure installation of miscellaneous rough carpentry.
1. Solid Masonry or Concrete: Expansion shield and lag bolt type.
 2. Steel: Bolts or powder activated type.

2.2 WOOD PRESERVATIVE

- A. Treat lumber and plywood to comply with applicable requirement of American Wood Preservers Bureau, available from AWPI and the product standards agency, Dept. of Trade and Industry.
- B. Pressure treat the following items with water-borne preservatives for above ground use, with AWPB LP-2.
 - 1. Wood members in contact with masonry, concrete, or below grade.
 - 2. Kiln-dry wood to a maximum moisture content of 15% after treatment with water-borne preservative.
- C. Fire Retardant Treatment: Comply with AWPA standards for pressure impregnation with fire-retardant chemicals to achieve flame-spread rating of not more than 25 in accordance with ASTM E84 or UL Test 723.
 - 1. Treat interior wood and plywood, and wood concealed within construction.
 - 2. Kiln-dry treated items to maximum moisture content of 15%.
- D. Complete fabrication of treated items prior to treatment, wherever possible; if cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment.
- E. Inspect each piece after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. Place miscellaneous rough carpentry true to lines and levels.
- B. Correlate location so attached work will comply with design requirements and be properly located.
- C. Construct members of continuous pieces of longest possible length.
- D. Fit carpentry work to other work; scribe and cope as required for accurate fit.
- E. Shim with metal or slate for bearing on concrete and masonry.
- F. Securely attach carpentry work to substrates by anchoring and fastening as required by recognized standards.
 - 1. Provide washers under bolt heads and nuts in contact with wood.
- G. Wood Blocking: Provide blocking of S4S lumber not less than 40mm (nom.) wide and of thickness required to provide adequate support or to properly locate attached material.
 - 1. Provide attachment to other work; form to shapes shown.
 - 2. Countersink bolts and nuts flush with surfaces.
 - 3. Remove temporary blocking when no longer needed.
 - 4. Anchor to formwork before concrete placement.
 - 5. Build into masonry as work progresses, cutting to fit masonry unit size involved.
- H. Plywood: Comply with recommendations of American Plywood Association (APA) for fabrication and installation of plywood work.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 - SUBMITTALS

1.1 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of factory-fabricated product and process specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.
- C. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:
 - 1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - 2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to Project site.
 - 3. For fire-retardant-treated wood products include certification by treating plant that treated materials comply with specified standard and other requirements.
 - 4. Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.
 - 5. Warranty of chemical treatment manufacturer for each type of treatment.
- D. Samples for initial selection purposes of the following in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of material indicated.
 - 1. Each type of paneling specified.
 - 2. Each type of siding specified.
- E. Samples for verification purposes of the following:
 - 1. Lumber and panel products for non-factory-applied finish, 50 square inches for lumber and 8-1/2 inches by 11 inches for panels for each species and cut, finished on one side and one edge, with one-half of exposed surface finished.
 - 2. Lumber and panel products with factory-applied finish, 50 square inches for lumber and 8-1/2 inches by 11 inches for panels for each finish system and color.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for installation of finish carpentry by a firm that can demonstrate successful experience in installing finish carpentry items similar in type and quality to those required for this Project.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels. Provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
- B. Do not deliver interior finish carpentry until environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified for installation areas.

1.4 PROJECT CONDITIONS

- A. Environmental Conditions: Obtain and comply with finish carpentry manufacturer's and installer's coordinated advice for optimum temperature and humidity conditions for finish carpentry during its storage and installation.
- B. Weather Conditions: Proceed with finish carpentry only when existing and forecasted weather conditions will permit exterior finish carpentry to be installed in compliance with manufacturer's recommendations and when substrate is completely dry.

1.5 WARRANTY

- A. Special Project Warranty for Siding: Submit a written warranty, executed by manufacturer, agreeing to repair or replace siding that fails in materials or workmanship within the specified warranty period. Failures include, but are not limited to, deformation or deterioration of siding beyond normal weathering. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.
 - 1. Warranty period for factory-applied finish is 5 years after date of Substantial Completion.
 - 2. Warranty period for siding (excluding finish) is 25 years after date of Substantial Completion.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not

proceed with installation until unsatisfactory conditions have been corrected.

2.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation for a minimum of 24 hours unless longer conditioning recommended by manufacturer.
- C. Backprime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Section "Painting."

2.3 INSTALLATION, GENERAL

- A. Do not use finish carpentry materials that are unsound, warped, bowed, twisted, improperly treated or finished, not adequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install finish carpentry plumbs, level, true, and aligned with adjacent materials. Use concealed shims where required for alignment.
 - 1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Install to tolerance of 1/8 inch in 8 feet for plumb and level. Install adjoining finish carpentry with 1/16 inch maximum offset for flush installation and 1/8 inch maximum offset for reveal installation.
 - 3. Coordinate finish carpentry with materials and systems that may be in or adjacent to standing and running trim and rails. Provide cut-outs for mechanical and electrical items that penetrate exposed surfaces of trim and rails.
- C. Finish in accordance with specified requirements.
- D. Refer to Division 9 Sections for final finishing of finish carpentry.

2.4 STANDING AND RUNNING TRIM AND RAILS

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Stagger joints in adjacent and related standing and running trim and rails. Cope at returns and mitre at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints

for end-to-end joints. Plane back of casings to provide uniform thickness across joints if required.

1. Match color and grain pattern across joints.
2. Install trim after drywall joint finishing operations are completed.
3. Drill pilot holes in hardwood prior to nailing or fastening to prevent splitting. Fasten to prevent movement or warping. Countersink nailheads on exposed carpentry work and fill holes.
4. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

2.4 ADJUSTING

Repair damaged or defective finishes carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

2.5 CLEANING

- A. Clean finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

2.6 PROTECTION

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

END OF SECTION

SECTION 07120

EPOXY PORCELAIN LINING NON-TOXIC WATERPROOFING

PART 1- SPECIFICATIONS FOR CISTERN WATERTANKS AND OVERHEAD WATERTANK COATINGS:

1.1 Method of Application of Epoxy Porcelain Lining Non-Toxic Waterproofing

- A. All surfaces must be smooth, firm, dry, clean and free of rubbish, loose or foreign materials.
- B. Concrete surface shall be fully cured and acid etched with neutraliser and washed with clean water.
- C. Application of four (4) mils coats of CORD / HIBOND Epoxy White, non-toxic porcelain finish.
- D. Cure finished waterproofed areas by forty-eight (48) hours.
- E. During the forty-eight (48) hours of curing time, test waterproofed areas if seepage is still present.
- F. If no seepage is present, protect the finished waterproofed areas by filling-in with water to avoid any hydrostatic water from damaging the works.

1.2 GUARANTEE:

- A. The contractor shall guarantee that the work specified in this division shall be free from defects of materials and workmanship.
- B. The contractor shall make good all damages or failures resulting from the use of defective materials and poor workmanship.
- C. The following failures will be considered as defective works:
 - 1) Leakages
 - 2) Peeling of waterproofing materials
 - 3) De-lamination of piles
 - 4) Air bubbles

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Performance Requirements, General: Provide Epoxy Porcelain Lining non-toxic waterproofing membrane system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a

nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated.

1.4 SUBMITTALS

- A. Product data for each type of Epoxy Porcelain Lining non-toxic waterproofing specified, including data substantiating that materials comply with specified requirements.

- B. Samples, 75 mm by 150 mm. minimum size, of each Epoxy Porcelain Lining non-toxic waterproofing material specified for Project.

C. Manufacturers Contact Information

1. Cord

Company : Cord Chemicals
Contact Person : Dennis Pangan
Address : Mandaluyong City
Contact Number : 5314436 / 5311175

2. Hibond

Company : Sealbond Chemical
Contact Person : Gigi Sambrano
Address : Brgy. Ibayo, Tipas, Taguig City
Contact Number : 881-8813 / 881-1477
Email Address : jhelet_01@yahoo.com

1.5 **QUALITY ASSURANCE**

Installer Qualifications: Engage an experienced Installer who has completed Epoxy Porcelain Lining non-toxic waterproofing applications similar in material, design, and extent to that indicated for Project and that resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of Epoxy Porcelain Lining non-toxic waterproofing, for single undivided responsibility.

1.6 **DELIVERY, STORAGE, AND HANDLING**

Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:

1. Product name
2. Product description (generic product classification).
3. Batch number under which product was produced
4. National Standards with which the products complies
5. Application instructions.

1.7 **PROJECT CONDITIONS**

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather : Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.8 **WARRANTY**

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace Epoxy Porcelain Lining non-toxic waterproofing, including making good all adjacent work disrupted as a result, that fails in materials and workmanship within the specified warranty period. This Warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

Warranty period is 10years after date of substantial completion.

PART 2-PRODUCT-APPLICATOR (JAN OWEN MARTIN CONSTRUCTION CORP.)

PART 3-EXECUTION

3.1 INSTALLATION/TESTING

- A. Permit membrane to cure conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.
- B. Install protection course on cured membrane (after testing, if required) without delay to minimize period of membrane exposure.

END OF SECTION

SECTION 07120

EPOXY PORCELAIN LINING NON-TOXIC WATERPROOFING

PART 1- SPECIFICATIONS FOR CISTERN WATERTANKS AND OVERHEAD WATERTANK COATINGS:

1.1 Method of Application of Epoxy Porcelain Lining Non-Toxic Waterproofing

- A. All surfaces must be smooth, firm, dry, clean and free of rubbish, loose or foreign materials.
- B. Concrete surface shall be fully cured and acid etched with neutraliser and washed with clean water.
- C. Application of four (4) coats of Twinkote / Sealbond Epoxy White, non-toxic porcelain finish. Reinforced with Kavron Fiberglass Mesh.
- D. Cure finished waterproofed areas by forty-eight (48) hours.
- E. During the forty-eight (48) hours of curing time, test waterproofed areas if seepage is still present.
- F. If no seepage is present, protect the finished waterproofed areas by filling-in with water to avoid any hydrostatic water from damaging the works.

1.2 GUARANTEE:

- A. The contractor shall guarantee that the work specified in this division shall be free from defects of materials and workmanship.
- B. The contractor shall make good all damages or failures resulting from the use of defective materials and poor workmanship.
- C. The following failures will be considered as defective works:
 - 1) Leakages
 - 2) Peeling of waterproofing materials
 - 3) Delamination of
 - 4) Air bubbles

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Performance Requirements, General: Provide Epoxy Porcelain Lining non-toxic waterproofing membrane system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated.

1.4 SUBMITTALS

- A. Product data for each type of Epoxy Porcelain Lining non-toxic waterproofing specified, including data substantiating that materials comply with specified requirements.
- B. Samples, 75 mm by 150 mm. minimum size, of each Epoxy Porcelain Lining non-toxic waterproofing material specified for Project.
- C. Manufacturers Contact Information

1. Twin kote

Company	:	Twin Aces Industries
Contact Person	:	
Address	:	Judge Juan Luna, SFDM, Q.C.
Contact Number	:	

2. Sealbond

Company	:	Sealbond Chemical
Contact Person	:	Gigi Sambrano
Address	:	Brgy. Ibayo, Tipas, Taguig City
Contact Number	:	881-8813 / 881-1477
Email Address	:	jhelet_01@yahoo.com

1.5 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced Installer who has completed Epoxy Porcelain Lining non-toxic waterproofing applications similar in material, design, and extent to that indicated for Project and that resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of Epoxy Porcelain Lining non-toxic waterproofing, for single undivided responsibility.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:

1. Product name
2. Product description (generic product classification).
3. Batch number under which product was produced
4. National Standards with which the products complies
5. Application instructions.

1.7 PROJECT CONDITIONS

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather : Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.8 WARRANTY

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace Epoxy Porcelain Lining non-toxic waterproofing, including making good all adjacent work disrupted as a result, that fails in

materials and workmanship within the specified warranty period. This Warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

Warranty period is 10years after date of substantial completion.

PART 2- PRODUCT- APPLICATOR (NICEMAN WATERPROOFING)

Company	:	Niceman Incorporated
Contact Person	:	Eric Nicerio
Address	:	Dela Paz, Pasig City
Contact Number	:	8645-1548 / 7501-4682 09228515261 to 63
Email Address	:	nicemanwaterproofing@yahoo.com nicemanwaterproofing@gmail.com

PART 3-EXECUTION

3.1 INSTALLATION/TESTING

- A. Permit epoxy tanklining to cure conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.
- B. Install protection course on cured membrane (after testing, if required) without delay to minimize period of membrane exposure.

END OF SECTION

ASYA FILE

ASYA
FOR CONSTRUCTION
Date: _____ By: _____

SECTION 07140

ELASTOCOLOR / DERMACRYL ELASTOMERIC WATERPROOFING CHEMICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Specification for Perimeter Fire Walls and all exposed Deck Wall (refer plan)
1. Using ordinary paint brush or roller, apply first coat of ELASTOCOLOR ELASTOMERIC WATERPROOFING COATING on the entire area to be Waterproofed observing proper termination. Allow the entire primer coating to dry completely.
 2. Installation of Fiberglass Mesh shall follow. Starting from the horizontal top of wall, lay the Fiberglass Mesh vertically downward, simultaneous with application of the second coating. Allow the entire coating to dry completely.
 3. With the second coating thoroughly dry; apply the third coat of ELASTOCOLOR / DERMACRYL ELASTOMERIC WATERPROOFING. Allow to dry thoroughly.
 4. When the third coating is thoroughly dry, check the whole area for any pinholes present before applying fourth coating, making sure that the entire area is now completely sealed. Allow to dry thoroughly.
 5. With the fourth coating thoroughly dry, applying the fifth and final coating. Allow to dry completely.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

Performance Requirements, General: Provide elastomeric waterproofing system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated. Fiberglass reinforcement is required to all substrates except on precast concrete. All joints must have the reinforcement.

1.3 SUBMITTALS

- A. Product data for each type of waterproofing specified, including data substantiating that materials comply with specified requirements.
- B. Samples, 75 mm by 150-mm. minimum size.
- C. Manufacturers Contact Information
1. Elastocolor Elastomeric
Company : Mapei Far East Pte Ltd
Contact Person : Zack Woo
Address : 28 Tuas West Road Singapore
Contact Number : 68623488
Email Address : zackwoo@mapei.com.sg
 2. Dermacryl Elastomeric
Company : Sealbond Chemical

ELASTOCOLOR / DERMACRYL ELASTOMERIC WATERPROOFING
07140 - PAGE 1 OF 2

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

Contact Person : Gigi Sambrano
Address : Brgy. Ibayo, Tipas, Taguig City
Contact Number : 881-8813 / 881-1477
Email Address : jhelet_01@yahoo.com

1.4 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced Installer who has completed elastomeric waterproofing applications similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of elastomeric waterproofing, for single, undivided responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:

0. Product name.
1. Product description (generic product classification)
2. Batch number under which product was produced
3. National standards with which the product complies
4. Application instructions

1.6 PROJECT CONDITIONS

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather: Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.7 WARRANTY

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace elastomeric waterproofing, including making good all adjacent work disrupted as a result, that fails in materials and workmanship within the specified warranty period. This Warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

Warranty period is 5 years after date of substantial completion.

PART 2 - PRODUCTS/APPLICATOR – (JAN OWEN MARTIN CONSTRUCTION CORP.)

PART 3 – EXECUTION

3.1 INSTALLATION/TESTING

- A. Material must be installed in accordance to manufacturers standard.
- B. Permit membrane to cure under conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.

END OF SECTION

SECTION 07140

STYROZIL / ELASTIKOTE / SUN & RAIN ELASTOMERIC WATERPROOFING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Specification for Exterior walls, Light court walls, parapet walls, Perimeter Fire Walls and all exposed Wall (refer plan)
1. Repair all cracks, construction joints and other protrusions using structural epoxy and/or polyurethane sealant.
 2. Using ordinary paint brush or roller, apply first coat of STYROZIL ELASTOMERIC WATERPROOFING PRIMER on the entire area to be waterproofed observing proper termination. Allow the entire primer coating to dry completely.
 3. Installation of Kavron Fiberglass Mesh. Starting from the horizontal top of wall, lay the Fiberglass Mesh vertically downward, simultaneous with application of the second and third coating of STYROZIL ELASTOMERIC BASECOAT WHITE. Allow the entire coating to dry completely.
 4. When the third coating is thoroughly dry, check the whole area for any pinholes present before applying fourth coating, making sure that the entire area is now completely sealed. Allow to dry thoroughly.
 5. With the third coating thoroughly dry; apply the fourth coat of ELASTIKOTE / SUN & RAIN ELASTOMERIC WATERPROOFING TOPCOAT COLORED. Allow to dry thoroughly.
 6. With the fourth coating thoroughly dry, applying the fifth and final coating of ELASTIKOTE ELASTOMERIC WATERPROOFING TOPCOAT COLORED. Allow to dry completely.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

Performance Requirements, General: Provide elastomeric waterproofing system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated. Fiberglass reinforcement is required to all substrates. All joints must have the reinforcement.

1.3 SUBMITTALS

- A. Product data for each type of waterproofing specified, including data substantiating that materials comply with specified requirements.
- B. Samples, 75 mm by 150-mm. minimum size.
- C. Manufacturers Contact Information
1. Elastikote Elastomeric
 - a) Company : Pacific Paint (Boysen)
 - b) Contact Person : Bobby Chua
 - c) Address : 276 D. Tuazon st., Quezon City
 - d) Contact Number : 09178989163
 - e) Email Address : marketing@boysen.com.ph
 2. Sun & Rain Elastomeric
 - a) Company : Davies Paints
 - b) Contact Person : Kerwin Lee
 - c) Address : Sandoval Ave., San Miguel, Pasig City
 - d) Contact Number : 86417101
 - e) Email Address : customercare@daviespaints.com.ph

1.4 QUALITY ASSURANCE

Installer Qualifications: Engage an experienced Installer who has completed elastomeric waterproofing applications similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of elastomeric waterproofing, for single, undivided responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:

0. Product name.
1. Product description (generic product classification)
2. Batch number under which product was produced
3. National standards with which the product complies
4. Application instructions

1.6 PROJECT CONDITIONS

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather: Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.7 WARRANTY

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace elastomeric waterproofing, including making good all adjacent work disrupted as a result, that fails in materials and workmanship within the specified warranty period. This Warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents. Warranty period is 5 years after date of substantial completion.

PART 2 - PRODUCTS/APPLICATOR – (NICEMAN WATERPROOFING)

Company	:	Niceman Incorporated
Contact Person	:	Eric Nicerio
Address	:	Dela Paz, Pasig City
Contact Number	:	8645-1548 / 7501-4682
		09228515261 to 63
Email Address	:	nicemanwaterproofing@yahoo.com
		nicemanwaterproofing@gmail.com

PART 3 – EXECUTION

3.1 INSTALLATION/TESTING

- A. Material must be installed in accordance to manufacturers standard.
- B. Permit elastomeric to cure under conditions that will not contaminate or deteriorate waterproofing material.

END OF SECTION

SECTION 07145

MASTERSEAL 530 – THOROSEAL SLX CAPILLARY TYPE OF WATERPROOFING

PART 1

1.1 Specifications for Sumpit/Freight Pit; Escalator Pit; Domestic /Fire Watertank, Pump Room, Sewerage Treatment Plants, Basement Retaining Walls and Floors and other areas below grade

1.2 PROCEDURE:

- a. Concrete to receive Masterseal 530 – Thoroseal SLX treatment must have a clean surface and an open capillary system to ensure proper chemical penetration and maximum bonding. Surfaces to be waterproofed should be examined for structural defects, and unacceptable conditions.
- b. Remove all protrusions. Chiselling out any honeycombed or damaged areas.
- c. Clean all chiselled out areas, form-tie holes etc. and rinse carefully all the surfaces to be waterproofed. Prewater several times till the concrete is thoroughly saturated. When Masterseal 530 – Thoroseal SLX is applied, the surface should be damp but not wet. Any surface water on horizontal surface must be removed.

Moisture must be present in the concrete strata to achieve maximum initial penetration of the activating chemicals. Surfaces shall be moist only (not wet) when coatings are applied.

- d. Apply first coat of Masterseal 530 – Thoroseal SLX at the rate of 1 kg/m²
- e. Apply second and final coatings of Masterseal 530 – Thoroseal SLX at the rate of 1 kg/m² per square meter and let it dry prior as curing.
- f. The day following the last and final coating of Masterseal 530 – Thoroseal SLX the entire surface should be dampened out with clean water in order to cure the surface. This curing must be carried out by means of clean water only. The surface should be kept damp for at least five (5) days to ensure that the activating materials will reach its maximum penetration depth.

1.3 TESTING:

Testing of Masterseal 530 – Thoroseal SLX applied areas is done by observing the area for visible signs of seepage of water from the negative side. Remedy leakages if present.

1.4 APPLICATION:

Masterseal 530 – Thoroseal SLX is applicable only to reinforced concrete structures and not on any porous wall and slab like concrete hollow blocks or plastered wall.

PART 2:

2.1 GENERAL:

This specification covers the requirements relating to the installation of capillary waterproofing on concrete structures

2.2 MATERIALS:

1. Masterseal 530 – Thoroseal SLX Capillary waterproofing material is a surface applied waterproofing compound, free from calcium chloride and iron oxide, consisting of a combination of rapid hardening Portland cement, specially treated quartz sand and a compound of active chemicals.
2. When is Masterseal 530 – Thoroseal SLX applied to a concrete surface the activating chemicals combine with the free lime and moisture present to form insoluble chemical complexes. These complexes block the capillaries and minor shrinkage cracks in the concrete to prevent any further water ingress (even under pressure.)

2.3 Masterseal 530 – Thoroseal

Apply in slurry consistency on concrete surfaces as specified to prevent the passage of water under pressure.

2.4 STORAGE OF MATERIALS

Store materials in original and undamaged containers with manufacturer's labels and seals intact, in a dry enclosed area off the ground. Prevent damages to materials during handling and storage.

2.5 SURFACE PREPARATION

1. Examine concrete surfaces to be waterproofed for visible structural defects. Report unacceptable surface conditions. Commencement of work shall imply acceptance for application.
2. Surfaces and surrounding air temperature shall not be less than 5 C (41 F) for a minimum period of 48 hours before, during and after the application. Ensure that concrete surfaces are free of foreign materials, clean and absorbent for the treatment as specified.

2.6 HORIZONTAL SURFACES

1. Slab surfaces to receive slurry application shall have a wood float finish only. Concrete surfaces to be treated with floor hardener or curing agents prior to the application should be compatible with Thoroseal SLX products. Consults manufacturer.
2. Rout out minimum 20 mm (3/4") in depth construction joints and visible cracks exceeding 0.3 mm (0.01") in size. Remove all laitance (cement scum), dirt, dust and thoroughly rinse all concrete slab surfaces with water. Concrete surfaces shall have a damp appearance only at the time the slurry coating is applied.

2.7 VERTICAL SURFACES

1. Surface shall have an open capillary system to ensure maximum penetration of the activating chemicals.
2. Remove all form scale oil, form release agents and any other foreign materials likely to affect bonding, penetration and performance of the waterproofing treatment.
3. Form tie holes shall be opened approximately 25 mm (1") back of surface. Honeycombed pockets and faulty construction joints shall be routed out to sound and solid concrete.

Construction joints and visible cracks in concrete surfaces exceeding hairline size larger than 0.3 mm (0.01") shall be routed out to 20 mm (3/4") deep. Construction joints shall be formed by using a reglet 25 mm x 20 mm (1" x 3/4").

4. Rinse all surfaces to be waterproofed thoroughly with water the day prior to the application. Moisture must be present in the concrete strata to achieve maximum initial penetration of the activated chemicals. Surfaces shall be moist only (not wet) when coatings are applied. Check by rubbing hand over the surface.

2.8 MIXING OF THOROSEAL SLX CAPILLARY WATERPROOFING MATERIALS:

1. Separate containers shall be used for measuring by volume the powdery Thoroseal SLX and water. Water shall be free from matter deleterious to the materials. Add water to the material (not vice versa) and mix thoroughly.

MASTERSEAL 530 – THOROSEAL SLX CAPILLARY TYPE OF WATERPROOFING
07145 – PAGE 2 OF 7

2. Prepare only as much slurry mixture as can be applied within 20 to 30 minutes. Do not add more water when mixture starts to thicken. Stir frequently.

2.9 HORIZONTAL CONCRETE SURFACES:

1. Apply Thoroseal SLX 1.00 kg/m² (2.0 lbs/sq. yd) in slurry consistency. Coating shall be uniformly applied in quantities specified. All vertical construction joints shall be treated with Thoroseal SLX 1.00 kg/m² (Two successive coatings) in slurry consistency on wetted surfaces immediately prior to pouring of concrete.

2.10 VERTICAL CONCRETE SURFACES:

1. Routed out honeycombed areas, faulty construction joints, crack and form tie holes-apply slurry coatings of Thoroseal SLX 1.00 kg/m² and fill with sand cement mortar.
2. Apply to exterior and/or interior surfaces on concrete walls, Thoroseal SLX 1.00 kg/m² in slurry consistency in 2 coats. Slurry coatings shall be uniformly applied in quantities specified (two coats). The second slurry coatings of Thoroseal SLX shall be applied while the first coat is still green, but after it has reached an initial set.

2.11 PROTECTION AND CURING:

Protect the freshly treated surfaces from rain for a minimum period of 24 hours. Moisture cure all treated areas for a maximum period of five days, starting with a fine water fog spraying the day following completion of the application.

2.12 SAFETY

Thoroseal SLX products contain cement and are highly alkaline. Use rubber gloves and goggles during mixing and application. Upon contact with skin wash immediately with plenty water.

2.13 REMEDIAL WORK:

Should any leakage occur due to negligence in the application during the construction and maintenance period of the project, the applicator shall take immediate remedial measures to stop all water infiltration. This work shall be carried out in the strictest compliance of the manufacturer's written instruction at no additional cost.

2.14 CURING:

The day following the Thoroseal SLX application the slab should be dampened once or twice by fog spraying the surface, and within the following 24 hours the slab should be wetted down in order to cure the surface. This curing must be carried out by means of water, and cannot be done by using a curing compound. The surface should be kept damp for at least 5 days.

PART 3:

3.1 QUALITY ASSURANCE

- A. Qualification of Installer: Minimum five years successful experience in projects of similar scope and acceptable to material manufacturer.
- B. Inspection: Manufacturer's representative shall inspect work of Project on regular basis and provide certification water proofing has been installed in accordance with manufacturer's recommendations.
 - 1. Visibly check coated surfaces with strong light to assure surfaces are completely covered, with no damage points, misses, holidays or air pockets in evidence.
 - 2. Recoat areas found to be insufficiently coated by initial coating prior to Owner's testing.
- C. Owner Representative: Independent testing engineer will observe installation of work as Owner's representative, paid for by Owner.
 - 1. Observations do not relieve installer of responsibility for exercising controls and inspections to assure proper installation.
 - 2. Notify Owner and Architect minimum 7 days prior to date waterproofing work is to begin.
 - 3. Recoat areas where test samples have been removed and restore sample areas to specified thickness.

3.2 SUBMITTALS

- A. Product Data: Manufacturer's recommendations for surface conditioner, elastic flashing, joint cover sheet and crack sealant, and temperature range for application of waterproofing.
- B. Certification: Manufacturer's certification installer is acceptable and manufacturer's representative's certification work has been installed in accordance with manufacturer's recommendations.

Provide record of required wet mil thickness tests.

- C. Samples 300 x 300 min. size on simulated substrate.
- D. Warranty: Submit sample of warranty at time of bid.
- E. Manufacturers Contact Information

Contact Person : Haziel Carpio
Address : Canlubang, Calamba Laguna
Contact Number : 049-5490001 / 049-889-4321

3.3 SITE CONDITIONS

- A. Do not apply waterproofing to damp, dirty, dusty or otherwise unsuitable surfaces.

Allow concrete surfaces to cure minimum 28 days.

- B. Provide positive ventilation within water tanks to remove toxic fumes.

3.4 WARRANTY

- A. Provide for correcting failures of waterproofing to resist water penetration, except where failures are result of structural failures of building.

Hairline cracking of concrete due to temperature or shrinkage is not considered structural failure.

MASTERSEAL 530 – THOROSEAL SLX CAPILLARY TYPE OF WATERPROOFING
07145 – PAGE 4 OF 7

- B. Repair waterproofing and pay for or replace damaged materials and surfaces
- C. Warranty Period: Five years from Date of Substantial Completion.

Liability: No monetary limit.

PART 4 - PRODUCTS/APPLICATOR (JAN OWEN MARTIN CONSTRUCTION CORP.)

4.1 ACCEPTABLE MANUFACTURERS

MASTERSEAL 530 – THOROSEAL SLX

4.2 MATERIALS

- A. Water Tank Waterproofing: Crystalline type cementitious type to substrates, free of asphaltic and coal tar products; fast setting, self-bonding to substrates, non-shrinking.

Provide materials compound specifically for water tank lining.

- B. Surface Conditioner: Primer compatible with membrane compound; as recommended by waterproofing manufacturer.
- C. Joint and Crack Sealant: As recommended by waterproofing manufacturer.
- D. Accessories: As recommended by waterproofing manufacturer for system specified.

PART 5 - EXECUTION

5.1 INSPECTION

Examine substrate and conditions for application of waterproofing; beginning waterproofing work signifies acceptance of substrate and conditions.

5.2 PREPARATION

- A. Ensure drains, sleeves, curbs and projections which pass through waterproofing are properly and rigidly installed.
- B. Ensure surfaces are free of cracks, depressions, waves or projections which may be detrimental to proper installation of waterproofing.

Repair surfaces as required by manufacturer's recommendations.

- C. Seal cracks and joints with recommended backup material and sealant. Ensure proper depth-width ratio as recommended by sealant manufacturer.

Rout or sawcut cracks exceeding 1.5mm in width and fill with sealant.

- D. Clean surfaces of dust, dirt and foreign matter detrimental to proper installation of waterproofing
- E. Metal Surfaces: Remove contaminants which may adversely affect adhesion or performance of waterproofing and sand blast metal surfaces in tank to white metal; apply metal primer.
- F. Vacuum clean tank before coating.

5.3 APPLICATION

- A. Apply waterproofing in accordance with manufacturer's recommendations.
- B. Apply minimum 20 mil coat of waterproofing over cracks and joints minimum 50mm on either side in addition to application of complete waterproofing system.
- C. Apply and spread waterproofing to minimum 2 kg/m² thickness as recommended by manufacturer.

Record wet thickness measurements at representative points during application and indicate on Project Record Documents.

D. Seal items projecting through waterproofing.

5.4 FIELD QUALITY CONTROL

Review initial filling of tanks with water and observe for minimum 24 hours; where leaks are revealed, empty tank and repair leaks revealed by examination of structure.

Where leakage was observed, repeat observation and repair until no leaks are observed.

END OF SECTION

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

SECTION 07145

VANDEX SUPER CRYSTALLINE / CAPILLARY TYPE OF WATERPROOFING

PART 1

1.1 Specifications for Sumpit/Freight Pit; Escalator Pit; Domestic /Fire Water tank, Pump Room, Sewerage Treatment Plants, Basement Retaining Walls and Floors and other areas below grade.

1.2 PROCEDURE:

- a. Substrate to receive Vandex Super treatment must be sound and even, roughened to open capillary tracts, and its surface free from voids, large cracks or ridges. Any adhesion reducing substances like bitumen, oil, grease remains of paint or laitance have to be removed by suitable means.
- b. Water leaks must be stopped using DSP Waterplug.
- c. Remove all protrusions. Chiselling out any honeycombed or damaged areas.
- d. Clean all chiselled out areas, form-tie holes etc. and rinse carefully all the surfaces to be waterproofed. Prewater several times till the concrete is thoroughly saturated. When Vandex Super is applied, the surface should be damp but not wet. Any surface water on horizontal surface must be removed. Moisture must be present in the concrete strata to achieve maximum initial penetration of the activating chemicals. Surfaces shall be moist only (not wet) when coatings are applied.
- e. Apply first coat of Vandex Super at the rate of 1 kg/m²
- f. Apply second and final coatings of Vandex Super at the rate of 1 kg/m² per square meter preferably perpendicular to the previous coat.
- g. The day following the last and final coating of Vandex Super the entire surface should be dampened out with clean water in order to cure the surface. This curing must be carried out by means of clean water only. The surface should be kept damp for at least five (5) days to ensure that the activating materials will reach its maximum penetration depth.
- h. For straight to finish basement flooring, "Dry Shake / Dry Sprinkle" method of application should be implemented. Vandex Super will be applied simultaneous to concrete pouring.

1.3 TESTING:

Testing of Vandex Super applied areas is done by observing the area for visible signs of seepage of water from the negative side. Remedy leakages if present.

1.4 APPLICATION:

Vandex Super is applicable only to reinforced concrete structures and not on any porous wall and slab like concrete hollow blocks or plastered wall.

PART 2:

2.1 GENERAL:

This specification covers the requirements relating to the installation of crystalline capillary waterproofing on concrete structures

2.2 MATERIALS:

1. Vandex Super Crystalline waterproofing material is a surface applied waterproofing compound, consisting of grey Portland cement, specially treated quartz sand and a compound of active chemicals.
2. When Vandex Super is applied to a concrete surface the active chemicals combine with the free lime and moisture present in the capillary tract, to form insoluble crystalline complexes. These crystals block the capillaries and minor shrinkage cracks in the concrete to prevent any further water ingress (even under pressure.)
3. Vandex Super protects concrete against sea water, waste water, aggressive ground water and certain chemical solutions.

2.3 APPLICATION

Vandex Super is applied with brush, suitable spray equipment or by dry sprinkling.

2.4 STORAGE OF MATERIALS

Store materials in original and undamaged containers with manufacturer's labels and seals intact, in a dry enclosed area off the ground. Prevent damages to materials during handling and storage.

2.5 SURFACE PREPARATION

1. Examine concrete surfaces to be waterproofed for visible structural defects. Report unacceptable surface conditions. Commencement of work shall imply acceptance for application.
2. Surfaces and surrounding air temperature shall not be less than 5 C (41 F) for a minimum period of 48 hours before, during and after the application. Ensure that concrete surfaces are free of foreign materials, clean and absorbent for the treatment as specified.

2.6 HORIZONTAL SURFACES

1. Concrete surfaces to be treated with floor hardener or curing agents prior to the application should be compatible with Vandex Super products. Consult manufacturer.
2. Rout out minimum 20 mm (3/4") in depth construction joints and visible cracks exceeding 0.3 mm (0.01") in size. Remove all laitance (cement scum), dirt, dust and thoroughly rinse all concrete slab surfaces with water. Concrete surfaces shall have a damp appearance only at the time the slurry coating is applied.

2.7 VERTICAL SURFACES

1. Surface shall have an open capillary system to ensure maximum penetration of the activating chemicals.
2. Remove all form oil, form release agents and any other foreign materials likely to affect bonding, penetration and performance of the waterproofing treatment.
3. Rinse all surfaces to be waterproofed thoroughly with water the day prior to the application. Moisture must be present in the concrete strata to achieve maximum initial penetration of the activated chemicals. Surfaces shall be moist only (not wet) when coatings are applied. Check by rubbing hand over the surface.

2.8 MIXING OF VANDEX SUPER CRYSTALLINE CAPILLARY WATERPROOFING MATERIALS:

1. Separate containers shall be used for measuring by volume the powdery Vandex Super and water. Water shall be free from matter deleterious to the materials. Add water to the material (not vice versa) and mix thoroughly.
2. Prepare only as much slurry mixture as can be applied within 30 minutes. Do not add more water when mixture starts to thicken. Stir frequently.

2.9 PROTECTION AND CURING:

Protect the freshly treated surfaces from rain for a minimum period of 24 hours. Moisture cure all treated areas for a maximum period of five days, starting with a fine water fog spraying the day following completion of the application.

2.10 SAFETY

Vandex Super products contain cement and are highly alkaline. Use rubber gloves and goggles during mixing and application. Upon contact with skin wash immediately with plenty of water. Please refer to safety data sheet on www.vandex.com

2.11 REMEDIAL WORK:

Should any leakage occur due to negligence in the application during the construction and maintenance period of the project, the applicator shall take immediate remedial measures to stop all water infiltration. This work shall be carried out in the strictest compliance of the manufacturer's written instruction at no additional cost.

2.12 CURING:

The day following the Vandex Super application the slab should be dampened once or twice by fog spraying the surface, and within the following 24 hours the slab should be wetted down in order to cure the surface. This curing must be carried out by means of water, and cannot be done by using a curing compound. The surface should be kept damp for at least 5 days.

PART 3:

3.1 QUALITY ASSURANCE

- A. Qualification of Installer: Minimum five years successful experience in projects of similar scope and acceptable to material manufacturer.
- B. Inspection: Manufacturer's representative shall inspect work of Project on regular basis and provide certification water proofing has been installed in accordance with manufacturer's recommendations.
 - 1. Visibly check coated surfaces with strong light to assure surfaces are completely covered, with no damage points.
 - 2. Recoat areas found to be insufficiently coated by initial coating prior to Owner's testing.
- C. Owner Representative: Independent testing engineer will observe installation of work as Owner's representative, paid for by Owner.
 - 1. Observations do not relieve installers of responsibility for exercising controls and inspections to assure proper installation.
 - 2. Notify Owner and Architect minimum 7 days prior to date waterproofing work is to begin.
 - 3. Recoat areas where test samples have been removed and restore sample areas to specified thickness.

3.2 SUBMITTALS

- A. Product Data: Manufacturer's recommendations for surface conditioner, and temperature range for application of waterproofing.
- B. Certification: Manufacturer's certification installer is acceptable and manufacturer's representative's certification work has been installed in accordance with manufacturer's recommendations. Provide record of required wet mil thickness tests.
- C. Samples 300 x 300 min. size on simulated substrate.
- D. Warranty: Submit sample of warranty at time of bid.
- E. Manufacturers Contact Information

Manufacturer	:	Tremco Construction Products Group
Contact Person	:	Edgar Chua (Country Manager)
Address	:	10 ^F The Luxe Residences, 28 th st cor 4 th Ave., Bonifacio Global City
Contact Number	:	76182156

3.3 SITE CONDITIONS

- A. Do not apply waterproofing to dirty, dusty or otherwise unsuitable surfaces. Allow concrete surfaces to cure minimum 28 days.
- B. Provide positive ventilation within water tanks to remove toxic fumes.

3.4 WARRANTY

- A. Provide for correcting failures of waterproofing to resist water penetration, except where failures are result of structural failures of building.
Hairline cracking of concrete due to temperature or shrinkage is not considered structural failure.
- B. Repair waterproofing and pay for or replace damaged materials and surfaces
- C. Warranty Period: Five years from Date of Substantial Completion.

PART 4 - PRODUCTS/APPLICATOR (NICEMAN WATERPROOFING)

Company	:	Niceman Incorporated
Contact Person	:	Eric Nicerio
Address	:	Dela Paz, Pasig City
Contact Number	:	8645-1548 / 7501-4682 09228515261 to 63
Email Address	:	nicemanwaterproofing@yahoo.com nicemanwaterproofing@gmail.com

END OF SECTION

**SECTION 07150
POLYGLASS POLYBOND P – ITALY 3mm SANDED
TORCH ON WATERPROOFING MEMBRANE**

PART 1: SPECIFICATIONS FOR ALL MAIDS ROOM, WALK IN CLOSET, PUBLIC & RES'L T&B, DRIVERS T&B, KITCHEN AND OTHER SMALL INTERIOR AREAS

**1.1 METHOD OF APPLICATION OF POLYGLASS POLYBOND 3.0mm SANDED
TORCH ON WATERPROOFING MEMBRANE:**

1. All areas to be waterproofed shall be wood-trowelled smooth , firm , dry and clean of rubbish , loose or foreign materials and obstruction , bumps flattened and holes filled and levelled. Installation of cants in the angle formed by the horizontal and vertical surfaces , as well as the installation of metal fittings and similar work shall be in place and/or completed.
2. Coat entire area with primer around the perimeter extending 0.20 cm. on the vertical walls and the base of all raised elements, then let primer dry well.
3. Align rolls with a 100 mm (4") side overlaps , starting from the drain towards the roof center.
4. Re-roll and then torch apply with a 150 mm (6 ") end overlap and 100 mm (4") side lap and make sure each sheet is carefully and completely bonded to the surface.
5. Re-check all seams and smooth edges with a pre-heated trowel.

1.2 TOPPING:

Finished waterproofing works shall be protected with 2" lean concrete topping (slope towards the drain) reinforced with welded wire mesh on the flooring of the waterproofed surface. These shall be done by others under waterproofing installer's supervision in order to avoid damage on the waterproofing.

1.3 SYSTEM PERFORMANCE REQUIREMENTS:

Performance Requirements, General: Provide Polyglass Polybond P 3.0mm Sanded Torch on Waterproofing membrane system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated.

**POLYGLASS POLYBOND P 3.0mm SANDED
TORCH ON WATERPROOFING MEMBRANE
07150 – PAGE 10F 3**

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

1.4 SUBMITTALS:

- A. Product data for each type of Polyglass Polybond P 3.0mm Sanded Torch on Waterproofing membrane specified including data substantiating that materials comply with specified requirements.

Thickness	: 3mm
Dimensions	: 1 x 10
Tensile Strength Max	
Longitudinal	: 750 (-20%)
Transversal	: 550 (-20%)
Elongation at Break	
Longitudinal	: 40 (-15)
Transversal	: 40 (-15)
Blow Resistance	: 700
Resistance to Static Load	: 10
Resistance to Laceration	
Longitudinal	: 150 (-30%)
Transversal	: 150 (-30%)
Dimension Stability	: 0.3
Low Temperature Flexibility	: 5
Shift Resistance at High Temp.	: 110
Water Vapour Transmission	
Property	: 20000

- B. Samples 75 mm by 150 mm. Minimum size, of each Polyglass Polybond 3.0Kg Sanded Torch on Waterproofing membrane application similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of torch-applied waterproofing, for single, undivided responsibility.

- C. Manufacturers Contact Information

Company	:	Polyglass Italy
Contact Person	:	Andrea Storani Export Manager
Address	:	Via dell'Artigianato, 34 31047 PONTE DI PIAVE (TV) – ITALY
Contact Number	:	+39 04227547 - Telefax +39 0422/854118
Email Address	:	andrea.storani@polyglass.it

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Bitumen Primer
Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:

1. Product name
2. Product description (generic product classification)
3. Batch number which product was produced

**POLYGLASS POLYBOND P 3.0mm SANDED
TORCH ON WATERPROOFING MEMBRANE
07150 – PAGE 10F 3**

4. National standards with which the product complies
5. Application instructions

B. Waterproofing membrane must bear Polyglass mark on the roll with plastic wrap

1.6 PROJECT CONDITIONS

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather: Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.7 WARRANTY

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace Polyglass Polybond 3.0Kg Sanded Torch on Waterproofing membrane, including making good all adjacent work disrupted as a result, that fails in materials and workmanship within the specified warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

Warranty period is 10 years after date of substantial completion.

PART 2-PRODUCTS -APPLICATOR (JAN OWEN MARTIN CONSTRUCTION CORP.)

PART 3-EXECUTION

3.1 INSTALLATION/TESTING

- A. Permit membrane to conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.
- B. Install protection course on membrane (after testing, if required) without delay to minimize period of membrane exposure.
- C. Flood -testing with a minimum depth of 2" on the entire waterproofed areas for a period of twenty four (24) hours by main contractor under supervision of waterproofing installer.

END OF SECTION

**POLYGLASS POLYBOND P 3.0mm SANDED
TORCH ON WATERPROOFING MEMBRANE
07150 – PAGE 1 OF 3**

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

SECTION 07150

TECHNOBIT 3mm SANDED TORCH ON WATERPROOFING MEMBRANE

PART 1: SPECIFICATIONS FOR ALL TOILETS, WALK IN CLOSET, KITCHEN, AHU ROOM AND OTHER SMALL INTERIOR AREAS

1.1 METHOD OF APPLICATION OF TECHNOBIT 3.0mm SANDED TORCH ON WATERPROOFING MEMBRANE:

1. All areas to be waterproofed shall be wood-trowelled smooth, firm, dry and clean of rubbish, loose or foreign materials and obstruction, bumps flattened and holes filled and levelled. Installation of cants in the angle formed by the horizontal and vertical surfaces, as well as the installation of metal fittings and similar work shall be in place and/or completed.
2. Coat the entire area with primer around the perimeter extending 0.20 cm. on the vertical walls and the base of all raised elements, then let primer dry well.
3. Align rolls with a 100 mm (4") side overlaps, starting from the drain towards the roof center.
4. Re-roll and then torch apply with a 150 mm (6 ") end overlap and 100 mm (4") side lap and make sure each sheet is carefully and completely bonded to the surface.
5. Re-check all seams and smooth edges with a pre-heated trowel.

1.2 TOPPING:

Finished waterproofing works shall be protected with 2" concrete topping (slope towards the drain). These shall be done by competent masonry contractor under the supervision of waterproofing contractor's representative to ensure the integrity of the waterproofing installations.

1.3 SYSTEM PERFORMANCE REQUIREMENTS:

Performance Requirements, General: Provide Technobit 3.0mm Sanded Torch on waterproofing membrane system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by an internationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated.

1.4 SUBMITTALS:

- A. Product data for each type of Technobit 3.0mm Sanded Torch on Waterproofing membrane specified including data substantiating that materials comply with specified requirements.

Thickness	: 3mm
Dimensions	: 1 x 10
Tensile Strength Max	
Longitudinal	: 650 N/5cm
Transversal	: 450 N/5cm
Elongation at Break	
Longitudinal	: 35 %
Transversal	: 30 %
Flow Resistance	: 120°C (+/- 10)
Resistance to Static Load	: 15 kg
Tensile-Tear Resistance	
Longitudinal	: 600 N
Transversal	: 500 N
Dimension Stability	: 0.4
Softening Point	: 150°C
Adhesion to Concrete	: 20 N/5cm
Water Vapour Permeability	: 40000

- B. Samples 75 mm by 150 mm. Minimum size, of each Technobit Sanded Torch on Waterproofing membrane application similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of torch-applied waterproofing, for single, undivided responsibility.

C. Manufacturers Contact Information

Company	:	Technobit Egypt
Contact Person	:	Khaled Elnezami Export Manager
Address	:	60 Mahmasha st., Al-Shrabya, Cairo, Egypt
Contact Number	:	+20 222 394 167 / +2 010 0691 9330
Email Address	:	sales@technogroup-egypt.com

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Bitumen Primer
Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:
1. Product name
 2. Product description (generic product classification)
 3. Batch number which product was produced
 4. National standards with which the product complies
 5. Application instructions
- B. Waterproofing membrane must bear Technobit mark on the roll with plastic wrap

1.6 PROJECT CONDITIONS

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather: Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.7 WARRANTY

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace Technobit 3.0mm Sanded Torch on Waterproofing membrane, including making good all adjacent work disrupted as a result, that fails in materials and workmanship within the specified warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

Warranty period is 5 years after date of substantial completion.

PART 2-PRODUCTS -APPLICATOR (NICEMAN WATERPROOFING)

Company	:	Niceman Incorporated
Contact Person	:	Eric Nicerio
Address	:	Dela Paz, Pasig City
Contact Number	:	8645-1548 / 7501-4682 09228515261 to 63
Email Address	:	nicemanwaterproofing@yahoo.com nicemanwaterproofing@gmail.com

PART 3-EXECUTION

3.1 INSTALLATION / TESTING

- A. Permit membrane to conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.
- B. Install protection course on membrane (after testing, if required) without delay to minimize period of membrane exposure.
- C. Flood -testing with a minimum depth of 2" on the entire waterproofed areas for a period of twenty four (24) hours by main contractor under supervision of waterproofing installer.

END OF SECTION

**SECTION 07155
POLYGLASS POLYBOND P Italy 4.5KG MINERAL
TORCH ON WATERPROOFING MEMBRANE**

PART 1: SPECIFICATIONS FOR ROOFDECK, ELEVATOR MACHINE ROOM DECK, LEDGES, OVERHEAD TANK, TRANSFORMER VAULT, GENSET RM, ALL OPEN DECK INCLUDING UTILITY RM, AIRCON LEDGES, AMENITY DECK, DRIVEWAY & PARKING LEVEL CONCRETE GUTTERS, STAIR DECK, PLANTBOXES, CARPARKS, HELIPAD, BALCONIES, AND OTHER LARGE EXTERIOR AREAS

**1.1 METHOD OF APPLICATION OF POLYGLASS POLYBOND 4.5 KG MINERAL
TORCH ON WATERPROOFING MEMBRANE:**

1. All areas to be waterproofed shall be wood-trowelled smooth , firm , dry and clean of rubbish , loose or foreign materials and obstruction , bumps flattened and holes filled and levelled. Installation of cants in the angle formed by the horizontal and vertical surfaces , as well as the installation of metal fittings and similar work shall be installed in place and/or completed.
2. Coat of entire area with primer around the perimeter extending 0.30 cm. On the vertical walls and the base of all raised elements, then let primer dry well.
3. Align rolls with a 100 mm (4") side overlaps , starting from the drain towards the roof center.
4. Re-roll and then torch apply with a 150 mm (6 ") end overlap and 100 mm (4") side lap sheet is carefully and completely bonded to the surface.
5. 4.5kg MINERAL POLYBOND when used, should be given particular attention to the head overlapping to avoid direct flame on the mineral chippings side so as not to discolour the cap sheet membrane.
6. Re-check all seams and smooth edges with a pre-heated towel

1.2 TOPPING:

Finished waterproofing works shall be protected with 2" lean concrete topping (slope towards the drain) reinforced with welded wire mesh on the flooring of the waterproofed surface. These shall be done by others under waterproofing installer's supervision in order to avoid damage on the waterproofing.

1.3 SYSTEM PERFORMANCE REQUIREMENTS:

Performance Requirements, General: Provide Polyglass Polybond 4.5kG Mineral Torch on Waterproofing membrane system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated.

**SECTION 07150
POLYGLASS POLYBOND 4.5KG MINERAL TORCH ON WATERPROOFING MEMBRANE**

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ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

1.4 SUBMITTALS:

- A. Product data for each type of Polyglass Polybond 4.5Kg Mineral Torch on Waterproofing membrane specified including data substantiating that materials comply with specified requirements.

Thickness	: 4 (±.5)
Dimensions	: 1 x 10
Tensile Strength Max	
Longitudinal	: 750 (-20%)
Transversal	: 550 (-20%)
Elongation at Break	
Longitudinal	: 40 (-15)
Transversal	: 40 (-15)
Blow Resistance	: 700
Resistance to Static Load	: 10
Resistance to Laceration	
Longitudinal	: 150 (-30%)
Transversal	: 150 (-30%)
Dimension Stability	: 0.3
Low Temperature Flexibility	: 5
Shift Resistance at High Temp.	: 110
Water Vapour Transmission	
Property	: 20000

- B. Samples 75 mm by 150 mm. Minimum size, of each Polyglass Polybond 4.5 Kg Torch on Waterproofing membrane application similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of torch-applied waterproofing, for single, undivided responsibility.

- C. Manufacturers Contact Information

Company	:	Polyglass - Italy
Contact Person	:	Andrea Storani Export Manager
Address	:	Via dell'Artigianato, 34 31047 PONTE DI PIAVE (TV) – ITALY
Contact Number	:	+39 04227547 - Telefax +39 0422/854118
Email Address	:	andrea.storani@polyglass.it

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Bitumen Primer
Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:
1. Product name
 2. Product description (generic product classification)
 3. Batch number which product was produced

SECTION 07150

POLYGLASS POLYBOND 4.5KG MINERAL TORCH ON WATERPROOFING MEMBRANE

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4. National standards with which the product complies
5. Application instructions

B. Waterproofing membrane must bear Polyglass mark on the roll with plastic wrap

1.6 PROJECT CONDITIONS

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather: Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.7 WARRANTY

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace Polyglass Polybond 4.5 Kg Sanded Torch on Waterproofing membrane, including making good all adjacent work disrupted as a result, that fails in materials and workmanship within the specified warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

Warranty period is 10 years after date of substantial completion.

PART 2-PRODUCTS -APPLICATOR (JAN OWEN MARTIN CONSTRUCTION CORP.)

PART 3-EXECUTION

3.1 INSTALLATION/TESTING

- A. Permit membrane to conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.
- B. Install protection course on membrane (after testing, if required) without delay to minimize period of membrane exposure.
- C. Flood -testing with a minimum depth of 2" on the entire waterproofed areas for a period of twenty four (24) hours by main contractor under supervision of waterproofing installer.

END OF SECTION

SECTION 07150

POLYGLASS POLYBOND 4.5KG MINERAL TORCH ON WATERPROOFING MEMBRANE

07150 – 3

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

**SECTION 07155
TECHNOBIT 4.5KG MINERAL
TORCH ON WATERPROOFING MEMBRANE**

PART 1: SPECIFICATIONS FOR ROOFDECK, ELEVATOR MACHINE ROOM DECK, LEDGES, OVERHEAD TANK, TRANSFORMER VAULT, GENSET RM, ALL OPEN DECK INCLUDING UTILITY RM, AIRCON LEDGES, AMENITY DECK, DRIVEWAY & PARKING LEVEL CONCRETE GUTTERS, STAIR DECK, PLANTBOXES, CARPARKS, HELIPAD, BALCONIES, AND OTHER LARGE EXTERIOR AREAS

1.1 METHOD OF APPLICATION OF TECHNOBIT 4.5 KG MINERAL TORCH ON WATERPROOFING MEMBRANE:

1. All areas to be waterproofed shall be wood-trowelled smooth, firm, dry and clean of rubbish, loose or foreign materials and obstruction, bumps flattened and holes filled and levelled. Installation of cants in the angle formed by the horizontal and vertical surfaces, as well as the installation of metal fittings and similar work shall be installed in place and/or completed.
2. Coat the entire area with primer around the perimeter extending 0.30 cm. On the vertical walls and the base of all raised elements, then let primer dry well.
3. Align rolls with a 100 mm (4") side overlaps, starting from the drain towards the roof center.
4. Re-roll and then torch apply with a 150 mm (6 ") end overlap and 100 mm (4") side lap sheet is carefully and completely bonded to the surface.
5. 4.5kg MINERAL TECHNOBIT when used, should be given particular attention to the head overlapping to avoid direct flame on the mineral chippings side so as not to discolour the cap sheet membrane.
6. Re-check all seams and smooth edges with a pre-heated towel

1.2 TOPPING:

Finished waterproofing works shall be protected with 2" concrete topping (slope towards the drain) reinforced with welded wire mesh or 8mm temperature bars spaced at 60cm o.c. These shall be done by competent masonry contractor under the supervision of waterproofing contractor's representative to ensure the integrity of the waterproofing installations.

1.3 SYSTEM PERFORMANCE REQUIREMENTS:

Performance Requirements, General: Provide Technobit 4.5kg Mineral Torch on waterproofing membrane system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated.

1.4 SUBMITTALS:

- A. Product data for each type of Technobit 4.5Kg Mineral Torch on Waterproofing membrane specified including data substantiating that materials comply with specified requirements.

Thickness	: 4 (±.5)
Dimensions	: 1 x 10
Tensile Strength Max	
Longitudinal	: 650 N/5cm
Transversal	: 450 N/5cm
Elongation at Break	
Longitudinal	: 35 %
Transversal	: 30 %
Flow Resistance	: 120°C (+/- 10)
Resistance to Static Load	: 15 kg
Tensile-Tear Resistance	
Longitudinal	: 600 N
Transversal	: 500 N
Dimension Stability	: 0.4
Softening Point	: 150°C
Adhesion to Concrete	: 20 N/5cm

Water Vapour Permeability : 40000

- B. Samples 75 mm by 150 mm. Minimum size, of each Technobit 4.5 Kg Torch on Waterproofing membrane application similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashing used in conjunction with waterproofing, expansion joints in membrane, insulation, and protection course on membrane, to Installer of torch-applied waterproofing, for single, undivided responsibility.

- C. Manufacturers Contact Information

Company	:	Technobit Egypt
Contact Person	:	Khaled Elnezami
		Export Manager
Address	:	60 Mahmasha st., Al-Shrabya, Cairo, Egypt
Contact Number	:	+20 222 394 167 / +2 010 0691 9330
Email Address	:	sales@technogroup-egypt.com

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Bitumen Primer
Deliver primary waterproofing materials to job site in manufacturer's original, unopened containers, bearing manufacturer's name and label and the following information:
1. Product name
 2. Product description (generic product classification)
 3. Batch number which product was produced
 4. National standards with which the product complies
 5. Application instructions
- B. Waterproofing membrane must bear Technobit mark on the roll with plastic wrap

1.6 PROJECT CONDITIONS

- A. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed.
- B. Weather: Proceed with waterproofing operations only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

1.7 WARRANTY

Special Project Warranty: Submit a written warranty executed by manufacturer, agreeing to repair or replace Technobit 4.5 Kg Mineral Torch on Waterproofing membrane, including making good all adjacent work disrupted as a result, that fails in materials and workmanship within the specified warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

Warranty period is 5 years after date of substantial completion.

PART 2-PRODUCTS -APPLICATOR (NICEMAN WATERPROOFING)

Company	:	Niceman Incorporated
Contact Person	:	Eric Nicerio
Address	:	Dela Paz, Pasig City
Contact Number	:	8645-1548 / 7501-4682
		09228515261 to 63
Email Address	:	nicemanwaterproofing@yahoo.com
		nicemanwaterproofing@gmail.com

PART 3-EXECUTION

3.1 INSTALLATION/TESTING

- A. Permit membrane to conditions that will not contaminate or deteriorate waterproofing material. Block off traffic and protect membrane from physical damage.
- B. Install protection course on membrane (after testing, if required) without delay to minimize period of membrane exposure.
- C. Flood -testing with a minimum depth of 2" on the entire waterproofed areas for a period of twenty four (24) hours by main contractor under supervision of waterproofing installer.

END OF SECTION

SECTION 07210

BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Refer to the Drawings for locations and extent of required Insulation, to be supplied and installed in conformity with the Conditions, Supplementary Conditions General Requirements (Division 01), Specifications, Drawings, Addenda, and Change Orders.
- B. Insulation products in this Section are generally specified in terms of required performance, with reliance on Contractor's design using the expertise of manufacturers of Insulation. Contractor is to notify Architect in event that thickness of any proposed product would be greater than indicated on the drawings or herein and would interfere with clearance or tolerance of other construction.
- C. Insulation is required at locations as indicated on the Drawings, summarised as follows:
 - 1. @ Roof area.
- D. Required work of Insulation includes manufactured products for control of heat transfer, membranes for control of vapor migration through installed construction, and accessories for maintaining correct position and shape of insulation during and after installation.

1.2 QUALITY ASSURANCE AND PERFORMANCE

- A. The solar radiant barrier shall consist of a high density and tough olefin center core reinforcement and 2 pressure laminated aluminum-metalized film on both sides.

The center core shall be made from olefin of high tensile strength to enable the radiant barrier to be tear proof and be able to support itself without wire netting when laid from purlin to purlin.

The highly polished reflective surface of the metalized film on both sides shall be protected against all weather conditions by a proprietary waterproof coating to resist surface oxidation. The radiant barrier shall possess the following properties.

$$\begin{aligned}\text{Reflectivity} &= 0.95(\text{both sides}) \\ \text{Emissivity} &= 0.05(\text{both sides})\end{aligned}$$

- B. Thermal Resistivity: Where thermal resistivity of insulation materials is designated by r-values, they represent the rate of heat flow through a homogeneous material, measured by test method as stated in the reference standard for the material, or as otherwise identified. Thermal resistivity is expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperature indicated.

The required re-values for insulation are as follows:

- 1. Roof areas: R-Value 14.5, PARSEC, R –Value 17 (submit sample for approval)
- C. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, using methods as indicated below, by Underwriters Laboratory or other testing Laboratory acceptable to authorities having jurisdiction.
- D. Surface Burning Characteristics: ASTM E84
- E. Fire Resistance Ratings: ASTM E119
- F. Combination Characteristics: ASTM E136
- G. Prohibition of Asbestos Content: Insulation materials containing asbestos materials, including microscopic proportions of asbestos materials will be rejected.
- H. Owner may decide to test insulation materials proposed by Contractor. Cost of testing will be arranged by Owner and paid for by Owner. For tests where materials fail to meet standards as specified, cost of testing shall be paid by Contractor.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation and vapor retarder material required.
- B. Thermal Transfer Calculations: Obtain information of thermal transmittance values from manufacturers of



materials to be installed in adjacent construction. Obtain information in writing and submit as supplementary information to substantiate calculations of heat transfer through exterior walls. Using the basic data submitted by manufacturers, prepare and deliver calculations to demonstrate the theoretical performance of insulation and thickness of Insulation proposed to be installed. Proposed insulation and calculations shall conform to performance specified.

- C. Certified Test Reports. With product data, submit copies of certified test reports showing compliance with specified performance values, including r-values, densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings, and similar properties related to safety, reliability, and long-life. Date for r-values shall be for aged test samples.

1.4 DELIVERY, STORAGE, HANDLING

- A. General Protection: Protect Insulation from physical damage, water, wetness, moisture, ice, snow, dust, dirt and other contaminants harmful to performance and long-life.
- B. Comply with manufacturer's recommendations for handling, storage, and protection during installation. Retain manufacturer's original packaging intact until time immediately prior to installing of Insulation.
- C. Protection for Plastic Insulation: Protect from sunlight at all times, except to extent necessary during installation. Do not deliver more insulation than can be installed during 10 days of working. Comply with application regulations for temporary storage of insulation at the place of construction, to reduce fire hazard to a reasonable minimum. Install materials as soon as delivered to the construction site.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers of acceptable products includes, but is not necessarily limited to manufacturers listed as follows:

1. Astrofoil 2. ACEG Polynum Insulation 3. AC I 4. Philippine Insulation

2.2 MATERIALS

- A. Subject to compliance with requirements, acceptable products for use as insulation shall be limited to materials listed as follows:

1. Parsec Thermo Brite Radiant Barrier with Aluminum Tape

- B. Products selected from the above list shall not be considered as suitable for use unless accompanied by technical analysis to demonstrate required performance for proposed context of use, and compliance with reference standards.

1. Performed Units: Sizes to fit locations and applications as indicated, selected as standard widths and lengths from manufacturer's standard range of thickness as appropriate to deliver required limitation of heat transfer.
2. Thickness: Design for and install increased thickness of insulation if manufacturer's nearest stock size delivers lower value of insulation than calculated values.

2.3 MATERIALS AND STANDARDS

- A. Extruded Polystyrene Board: Rigid cellular thermal insulation with closed cells and integral high density skin, formed by the expansion of polystyrene base resin during extrusion.

- B. Manufacturer Standards:

- | | |
|---|-------------------------|
| 1. Reflectivity (both sides) | 0.95 |
| 2. Emissivity | 0.05 |
| 3. Thickness | 150 microns (5.0 mills) |
| 4. Puncture Propagation & Tear Resistance (Newton)(ASTM D-2582) | 35 |
| 5. Toyo Impact Strength (ASTM D-781) | 173kg/cm |
| 6. Beach Puncture (ASTM D-781) | 80kg./cm |
| 7. Tensile Strength (ASTM D-882) | 7.267kg/cm |
| 8. Elongation (ASTM D-882) | 150% |
| 9. Yield (ASTM D-882) | 0.1537kg/sq.m. |
| 10. Water Vapor-Transmission (ASTM E96, Method B) | 0.0184 metric |
| 11. Surface Flame Spread | Class 1 |

- | | |
|------------------------------------|------------|
| (British Standard 476 Part 7) | |
| 12. Fire Propagation Test | Class 0 |
| (British Standard 476 Part 6) | |
| 13. MIL-Standard 810 Salt Fog Test | No defects |
| (Method 507) | Observed |
| 14. MIL-Standard 810 Humidity Test | No defects |
| (Method 509) | Observed |
- C. Phenolic Board Insulation: Rigid cellular thermal insulation with thermoset core of Phenolic-based closed cells, and 2-ply foil-Kraft liner facing laminated to both sides. Physical properties of installed products shall comply with properties as follows, measured in accordance with ASTM methods as stated:
1. Compressive Strength: 25 psi, with 10% deformation when tested and measured as ASTM D1621, Procedure A.
 2. Water Vapor Permeability: Not to exceed 8.19 perminch, when tested and measured as ASTM 355.
 3. Dimensional Stability: Change of length, width, and thickness not to exceed 1.0% when tested and measured as ASTM D2126, Procedure C.
 4. Water Absorption: Change of volume not to exceed 1.8% when tested and measured as ASTM C272 after 2-hour immersion.
 5. Density: Not less than 2.5 pounds per cu ft, when measured as ASTM D1622.
 6. Surface Burning Characteristics: Spread of flame and smoke development not to exceed 25 and 15 respectively.
- C. Cellular Glass Insulation: Rigid cellular thermal insulation with closed cells, complying with requirements of ASTM E136 for testing of combustion characteristics. In block form, complying with ASTM C552 for type 1.
- D. Glass Fiber Insulation: Thermal insulation manufactured by combining glass fibers with thermosetting resin binders to comply with ASTM C553, Class B-4, or ASTM C612 for class as indicated.
- E. Molded-Polystyrene Board Insulation: ASTM C 578 for type indicated below:
1. Type I, 0.9-lb/cu. ft (15-kg/cu. m) minimum density.
 2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.
- F. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation faced on both sides with aluminum foil to comply with requirements indicated below.
1. Federal Standard: FS HH-I-1972/1, 2 (reinforced core).
 2. ASTM Standard: ASTM C 1289, Type I, Class 1 or 2.
 3. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 754.
 4. Thermal Resistivity: 7.2 deg F x h x sq. ft./Btu x in. at 75 deg F (50 K x m/W at 24 deg. C).
- 2.3D Unfaced, Flexible Glass-Fiber Board Insulation: ASTM 612, Type IA or ASTM C 553, Types II, III, and I.
1. Nominal Density: Not less than 1.5 lb./cu. ft./24 kg/cu. m) nor more than 1.65 lb./cu. ft. (26-kg/cu. m).
 2. Thermal Resistivity: 4.13 deg. F x h x sq. ft./Btu x in. at 75 deg F (28.6 K x m/W at 24 deg C).
 3. Surface-Burning Characteristics: Smoke-developed indices of 25 and 50, respectively.
- 2.3D Foil-Faced, Flexible Glass Fiber Board Insulation: ASTM C 612, Type IA or ASTMC553, Types II, III, and I; faced on one side with foil-scrim-Kraft vapor retarder.
1. Nominal Density: 1.5 lb/cu. ft (24-kg/cu. m)
 2. Thermal Resistivity: 4.13 deg F x h x sq. ft./Btu x in. at 75 deg F (28.6 K x m/W at 24 deg C).
 3. Surface-Burning Characteristics: maximum flame-spread and smoke developed indices of 25 and 50, respectively.
- 2.3D Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA and IB.
1. Nominal density of 2.25lb/cu. ft. (36 kg/cu. m). Thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg c).
 2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- 2.3D Foil-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Type IA and IB, faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder.
1. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of

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25 and 50, respectively. 2.3D Glass-M at-Faced, Glass-Fiber Board Insulation for Sprandel Glass Panel: ASTM C 612, Type IA or Type IB, faced on one side with black glass-fiber mat.

1. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).

- I. Sound attenuation insulation: Apply to inside face of mechanical rooms. Use semi-rigid Vinyl-faced fiberglass, non-com bustible. Attach to walls using stick clips. Material to be 50 mm thick Owens-Corning Stonebrook or equal.

2.4 AUXILIARY MATERIALS

- A. Sealing Tape: The sealing tape used shall be an aluminum metalized solar film with highly polished reflective surface and a permanent acrylic pressure sensitive adhesive.
- B. Subject to contractor proposal, delivery of required performance and requirements as specified and install auxiliary materials as normally supplied or recommended by the manufacturer of the insulation, selected for compatibility with materials or adjacent constructions.
- C. Polyethylene Vapor Retarder: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/PA x sq. m).
- D. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner Reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25lb/1000 sq. ft. (12 kg/100 sq. m), with maximum permeance rating of 0.0403 perm (2.3 ng/PA x sq. m).
- E. Fire- Retardant, Reinforced - Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either a nonwoven grid of nylon cord or polyester scrim and weighing not less than 26 lb/1000 sq. ft. (13 kg/100 sq. m), with maximum permeance rating of 0.0403 permeance (2.3 ng/PA x sq. m) and flame-spread and smoke developed indices of not more than 50 and 75, respectively.
- F. Foil-Polyester Film Vapor Retarder: 2 layers of 0.5-mil- (0.013-mm-) thick polyester film laminated to an inner layer of 1-mil-(0.025-mm-) thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0g/h x sq m and with maximum flame-spread and smoke-developed indices of 15 and 15, respectively.
- G. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.
- H. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation substrates.
- I. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch (6 mm) thick, formed under heat and pressure, standard sizes.
- J. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements.
 1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
 2. Spindle: Copper-coated low carbon steel sheet, fully annealed, 0.105 inches (2.67 mm) in Diameter, length to suite depth of insulation indicated.
- K. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle, capable of holding insulation securely in position indicated with self-locking washer in place, and complying with the following requirements:
 1. Angle: Formed from 0.030-inch-- (0.760-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
 2. Spindle: Copper-coated low carbon steel, fully annealed, 1.105 inches (2.67 mm) in diameter, length to suite depth of insulation indicated.
- L. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.14-mm-) thick galvanised steel sheet, with beveled edged for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.
 1. Where spindles will be exposed to human contact after installation, protect ends with capped self-locking washer incorporating a spring steel insert to ensure permanent retention of cap.
- M. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.
 1. Air Space: 1 inch (25 mm).
- N. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

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PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Require installer to examine substrates and conditions under which work of Insulation is to be installed. Refer to other Sections for required standard of construction for substrates and adjacent construction. Proceeding construction complying with requirements as specified in other Sections shall be considered as suitable to receive installation of Insulation. Obtain installer's written list detailing conditions, if any, detrimental to correct performance of work of Insulation. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
- B. Remove contaminants and substances from substrates where harmful to insulation or to vapor retarder, including removal of projections and sharp edges which might puncture vapor retarders.

3.2 INSTALLING INSULATION

- A. Manufacturer's Recommendations: Comply with printed recommendations of manufacturer for installation of each type of Insulation. If printed instructions are not available or do not apply to context, consult manufacturer's technical representative for specific recommendations before proceeding with work.
- B. Install Insulation full thickness at locations as indicated to receive Insulation. Cut and fit closely around projections and obstruction. Fill voids with Insulation as indicated and as necessary to maintain continuous thermal protection. Remove projections, which interfere with placement.
- C. Install Insulation as a single layer unless otherwise shown or required to make up total thickness.
- D. Apply Insulation to substrate by method indicated, complying with manufacturer recommendations for type of adhesive or type of mechanical anchorage. Secure at recommended vertical and horizontal intervals. If no specific method is indicated, secure to substrate with permanent placement and support.
- E. Seal Joints between closed-cell non-breathing types of Insulation, applying specified sealant to holes and to edges of Insulation to form a tight seal as Insulation is installed into position. Repeat hole filling after installation is completed.
- F. Vapor Retarder: Install Insulation with integral vapor retarder, if any, with vapor barrier faced in direction as indicated or as directed. Do not obstruct ventilation spaces, except for firestopping. Apply vapor proof tape to joints and to holes in vapor barrier. Seal each vapor retarding area of Insulation with vapor proof tape applied against adjacent construction so as to produce an airtight installation.
- G. Install foil-faced Insulation, if required to be installed, with an air space of not less than 20mm in front of foil.

3.3 INSTALLING VAPOR RETARDER

- A. If required to be installed, extend vapor retarder to extremities of areas required to be protected from transmission of vapor. Seal vertical joints in vapor retarder over framing by lapping not less than 2 wall studs or frame posts. Fasten vapor retarder to framing at top, end and bottom edges, at perimeter of wall openings and at lap joints. Space fasteners at 400mm on centers or at closer intervals if required by manufacturer of Insulation or retarder.
- B. Seal overlapping joints in retarder using adhesives as recommended by the printed instructions of the manufacturer of retarder. Seal butt joints and penetrations by fasteners using tape as supplied by or recommended by the manufacturer of installed retarder. Locate all joints over framing members, or at other solid substrates. Attach retarder firmly to substrates, using fasteners or adhesives as recommended by the manufacture of vapor retarder installed.
- C. Seal irregularities, penetrations and obstructions, pipe holes, and other joints, using cloth-tape or aluminised tape purpose-made and recommended by the manufacturer of installed retarder.
- D. Repair splits and punctures in vapor retarder immediately, before concealment by subsequent construction. Cover with tape or another layer of vapor retarder.

3.4 TEMPORARY PROTECTION

- A. Protect installed Insulation and vapor retarder from harmful exposure to weather and physical damage and interference.
- B. Protect by immediately installing subsequent construction to cover installed Insulation, or by installing temporary covers or enclosure.
- C. Stick Clip Protection: Pins shall be cut or bent and protected so as not to be a hazard in locations where maintenance personnel could be.

END OF SECTION

SECTION 07840

FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

- A. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Siding slot gaps between edge of floor slabs and curtain walls.
- C. Openings between structurally separate sections of wall or floors.
- D. Gaps between the top of walls and ceilings or roof assemblies.
- E. Expansion joints in walls and floors.
- F. Openings and penetrations in fire-rated partitions or walls containing fire doors.
- G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
1. Section 03300 - Cast-In-Place Concrete
 2. Section 07900 - Joint Sealers
 3. Section 04200 - Masonry Work
 4. Section 09200 - Lath and Plaster
 5. Section 09250 - Gypsum Drywall Systems
 6. Section 13080 - Sound, Vibration and Seismic Control
 7. Section 13900 - Fire Suppression and Supervisory Systems
 8. Section 15050 - Basic Mechanical Materials and Methods
 9. Section 15250 - Mechanical Insulation
 10. Section 15300 - Fire Protection
 11. Section 15400 - Plumbing
 12. Section 16050 - Basic Electrical Materials and Methods

1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"

- D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
1. UL Fire Resistance Directory:
- a. Firestop Devices (XHJI)
 - b. Fire Resistance Ratings (BXRH)
 - c. Through-Penetration Firestop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 - f. Joint Systems (XHBN)
 - g. Perimeter Fire Containment Systems (XHDG)
2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).
- E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"
- F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
- H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
- I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- J. All major building codes: ICBO, SBCCI, BOCA, and IBC.
(Note to specifier: Retain or delete building codes listed above as applicable)
- K. NFPA 101 - Life Safety Code
- L. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

- C. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

2.02 **ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:
1. Hilti, Inc., Philippines
 2. Provide products from the above acceptable manufacturer

2.03 **MATERIALS**

- A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Cast-in place firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and cable bundles penetrating concrete floors, the following products are acceptable:
1. Hilti CP 680 Cast-In Place Firestop Device
 - a. Add Aerator adaptor when used in conjunction with aerator ("sovent") system.
 2. Hilti CP 681 Tub Box Kit for use with tub installations.
 3. Hilti CP 682 Cast-In Place Firestop Device for use with noncombustible penetrants.
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
 2. Hilti CP 604 Self-leveling Firestop Sealant
 3. Hilti CP 620 Fire Foam
 4. Hilti CP 606 Flexible Firestop Sealant
 5. Hilti CP 601s Elastomeric Firestop Sealant
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
1. Hilti CP 601s Elastomeric Firestop Sealant
 2. Hilti CP 606 Flexible Firestop Sealant
 3. Hilti FS-ONE Intumescent Firestop Sealant
- E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti CP 672 Speed Spray
 2. Hilti CP 601s Elastomeric Firestop Sealant
 3. Hilti CP 606 Flexible Firestop Sealant
 4. Hilti CP 604 Self-leveling Firestop Sealant
- F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
1. Hilti CP 777 Speed Plugs
 2. Hilti CP 767 Speed Strips
- G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
- H. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
 2. Hilti CP 620 Fire Foam
 3. Hilti CP 601s Elastomeric Firestop Sealant
 4. Hilti CP 606 Flexible Firestop Sealant
- I. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Firestop Putty Stick
 2. Hilti CP 658T Firestop Plug
- J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti CP 617 Firestop Putty Pad
- K. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 643N Firestop Collar
 2. Hilti CP 644 Firestop Collar
 3. Hilti CP 645/648 Wrap Strips
- L. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti CP 637 Firestop Mortar
 2. Hilti FS 657 FIRE BLOCK
 3. Hilti CP 620 Fire Foam
 4. Hilti CP 675T Firestop Board
- M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
 2. Hilti CP 675T Firestop Board
- N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti CP 672 Speed Spray
 2. Hilti CP 601s Elastomeric Firestop Sealant
 3. Hilti CP 606 Flexible Firestop Sealant
 4. Hilti CP 604 Self-Leveling Firestop Sealant
- O. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
 2. Hilti CP 658T Firestop Plug
- P. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- Q. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
 - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - 3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION

SECTION 07920

JOINT SEALERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Joint Sealers are specified by requirements for performance, with reliance on Contractor's design using the expertise of Sealant manufacturers, to propose sealants selected from acceptable Sealants as specified.

Use types of Sealants as indicated at locations where types are identified on Drawings. For other requirements related to Sealers, refer to Section 08900, Exterior Cladding Systems, applicable to Sealers located as follows:

1. Basement
 2. Roofing
 3. Exterior
- B. Cross Reference: Installing of Joint Sealers is specified in work of other Sections, by cross reference to this Section. Refer to Division 8 Section "Glazing", for Joint Sealers supplied and installed as work of glazier.
- C. Required work of Joint Sealers includes sealant, backing, joint fillers, bond-breakers, priming, and related accessories as normally recommended by the manufacturer for a complete and effective installation.

1.2 REFERENCE STANDARDS

- A. Quality standards for Sealers are identified in this Section by reference to published standards as follows:
1. ASTM C719.....Testing of Sealants
 2. ASTM C790.....Latex Sealants
 3. ASTM C804.....Sealants cured by solvent release
 4. ASTM C920.....Properties of Sealants
 5. ASTM C962.....Installing Elastomeric Sealers

1.3 PERFORMANCE REQUIREMENTS

- A. For requirements related to installed performance of Sealers, in context of adjacent construction, refer to Section 08900, Exterior Cladding Systems.
- B. Use Sealers manufactured to establish and maintain water- tight and airtight continuous seals, and as follows:
1. Adhesion to adjacent construction where designed for adhesion. Non-adhesion where not required to adhere.
 2. Chemically and electrologically passive in contact with atmospheric contaminants and materials of adjacent construction.

1.4 QUALITY ASSURANCE

- A. Installer's Experience: Use installers and labor approved by or licensed by the manufacturer. Alternatively, engage an Installer who has successfully completed within the last 3 years not less than 3 installations of similar Joint Sealers for projects of similar type and size as required for this project.
- B. Products: Use products and formulations previously demonstrated by successful use in similar projects and similar climatic conditions.

- C. Single Source Responsibility: For each required type of joint, install Joint Sealer and related accessories from a single manufacturer. Products from other sources may be used in combination only if recommended in the standard printed instructions of the sealant manufacturer.

1.5 TESTING OF SEALERS

- A. For requirements related to testing of Sealers, refer to Section 08900, Exterior Cladding Systems.
- B. Submit samples of all materials that will contact or affect Joint Sealers to manufacturers of proposed Sealers, for testing of compatibility and adhesion.
- C. Use manufacturer's standard test methods to determine if priming and other specific joint preparation techniques are required to assist obtaining rapid, optimum adhesion between Sealers and substrates.
1. Test in same environmental conditions as will apply during actual installation.
 2. Investigate materials failing tests for compatibility and adhesion. Obtain written recommendations of the Sealant manufacturer proposing technical modifications, including use of specially formulated primers, at no additional cost to Owner.

1.6 TRIAL PORTIONS OF CONSTRUCTION

- A. Install Sealers in trial portions of construction for each type of construction proposed to be installed at exterior locations exposed to weather.
- B. For requirements related to installing of Sealers in trial portions of construction, refer to Section 08900, Exterior Cladding Systems.
- C. Use trial portions to verify designed performance of Sealers. Verify by daily recording of joint movements, temperatures of adjacent surfaces and ambient temperature.
1. Temperature: Record maximum and minimum temperatures each day for 60 consecutive days.
 2. Measured joint movements: Compare against calculated theoretical movements, as assurance that working performance of Sealants meets specified requirements, not exceeding theoretical limits of motion as recommended by manufacturer.
 3. Measured joint movements and measured temperatures shall be interpolated to assess theoretical performance for annual extremes of highest and lowest temperature.
 4. Use trial portion as final verification of performance of primers and to assess adhesion. Use methods recommended by manufacturer of Sealant to determine if primers and other joint preparation techniques are required to obtain rapid, optimum adhesion between Sealers and substrates.

1.7 SUBMITTALS

- A. Schedule of Sealers: Submit schedule of Sealers, identifying types of proposed Sealers. Identify joints, if any, with dimensions considered to be inadequate or incorrect for context. Submit calculations and data to demonstrate corrective modifications.
1. Propose base polymer for each required type and context of sealant.
 2. Identify proprietary products proposed to be installed in each joint. Ascertain availability of proprietary products before including in schedule.
- B. Product Data: Submit from manufacturers for each type of proposed Joint Sealer, with calculations to verify conformance with performance requirements.
- C. Qualification Data: Complying with requirements as specified in adjacent paragraph "Quality Assurance". Include list of similar projects completed under similar environmental conditions, with names and addresses of Architects and Owners.

- D. Samples for Initial Selection: For each type and color of required Sealer, submit manufacturers standard sample strips of actual products, to show the full standard range of available colors.
1. Samples shall be used to review conformance with required colors, and shall not denote approval of technical properties of products.
- E. Samples for Final Selection: Conforming to manufacturer's technical analysis of joint performance. Install each type and color of proposed Sealer in joints of width same as proposed in technical analysis of manufacturer's design proposal. Install samples in finish materials representing finishes same as to be installed in completed construction.
- F. Test Reports: To verify adhesion and compatibility between proposed Sealants and materials of adjacent construction, including substrates and backings. Include recommendations of sealant manufacturer with regard to primers, preparation of substrates, and reliability of adhesion.
1. For products from manufacturers other than those listed in this Section, submit the manufacturer's comprehensive test data for each type of sealant proposed to be used. Test data shall apply to current formulations. If available, include test results for sealants tested after during for 1 year.
 2. Test data for elastomeric sealants shall include data to demonstrate compliance with ASTM C920, as follows:
 - a. Hardness
 - b. Stain resistance
 - c. Adhesion under cyclic motion - as ASTM C719
 - d. Cohesion under cyclic motion - as ASTM C719
 - e. Modulus of elasticity at 100 percent strain
 - f. Aging effects of heat.
 - g. Effects of accelerated weathering
- G. Manufacturer's Certificate: To attest compliance of products proposed to be installed as specified, applicable to context, and suitable for use as proposed.

1.8 DELIVERY, STORAGE, HANDLING

- A. Deliver, store and handle in conformance with the printed recommendations of the manufacturer, in original unopened containers or bundles of the manufacturer.
- B. Delivered materials shall be identified by the original labels of the manufacturer; stating name of manufacturer, product name, product type, colour, expiration period for use, pot life, curing time, mixing instructions for multi-part formulations.

1.9 INSTALLATION CONDITIONS

- A. Conditions Generally: Do not proceed with installation of Joint Sealers unless conditions are correct as follows:
1. Environmental Conditions: Ensure joint substrates are dry, and ambient temperatures including substrate temperatures are within the limits permitted by manufacturers of Sealants to be installed.
 2. Joint Dimensions: Ensure width of joints is not less than required by manufacturer of Sealers.
 3. Substrate Conditions: Ensure substrate is free of harmful obstructions and contaminants.

1.10 WARRANTY

- A. General: Execute and deliver a written Warranty, signed by Contractor and Installer, agreeing to repair or replace defective materials and workmanship of installed Sealers during a five year Warranty Period. Warranty shall include Sealers installed at locations as follows:

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FOR CONSTRUCTION	
Date: _____	By: _____

1. Exterior, exposed to weather.
2. Edges of frames for glass and glazing.

PART 2 - PRODUCTS

1. RHODOSIL Silicones;
2. GE;
3. Dow Coning
4. Bostik
5. Or Approved equal

2.1 MATERIALS GENERALLY

- A. Compatibility: Provide sealers, sealants, backer rods, gaskets, resilient spacers, and other related materials compatible with each other and with substrates under conditions of service and application, as demonstrated by sealant manufacturer's testing and field experience.
- B. Colors: Provide custom colors for exposed joint sealers conforming to colors of Architect's samples.
- C. Colorless Sealants: Use colorless silicon sealant at locations as indicated and at all other glass-to-glass joints.
- D. Materials and Standard: Sealants shall be elastomeric, complying with the requirements of ASTM C920, or other equivalent published standard of the country of origin. Propose Sealants selected from available types of elastomeric Sealants.
 1. Use silicon Sealants at locations identified on Drawings, and at all glass-to-glass joints exposed to weather.
 2. Propose polymer formulations to deliver performance as required for each context.
- E. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated complying with ASTM C 920 requirements.
- F. Acrylic Sealant: One-Part, non-sag, solvent-release-curing acrylic terpolymer sealant complying with AAMA 808.0 or FS TT-S-00230, or both, with capability, when tested per ASTM C 719, to withstand the following percentage change in joint width existing at time of application without failing adhesively or cohesively.
 1. Maximum cyclic movement capability: plus or minus 12-1/2 percent.
- G. Butyl Sealant: Manufacturer's standard one-part, non-sag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1085 and formulated with minimum of 75 percent to be non-staining, paintable, and have a tack-free time of 24 hours of loss.
- H. Acrylic-Emulsion Sealant: One-part, non-sag, mildew-resistant, paintable, acrylic-emulsion sealant complying with ASTM C 834.
- I. Silicone-Emulsion Sealant: Product complying with ASTM C 834 and, except for weight loss measured per ASTM C 92, with ASTM C 920, that accommodates joint movement of not more than 25 percent in both extension and compression for a total of 50 percent.
- J. Acoustical Sealant: Non-sag, paintable, non-staining, latex sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.
- K. Acoustical Sealant for Concealed Joints: Non-drying, non-hardening, non-skinning, non-taining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

- L. Tape Sealant: Solvent-free, butyl-based tape sealant with a solid content of 100 percent formulated to be non-staining, paintable, and non-migrating in contact with nonporous surfaces with or without reinforcement thread to stretch and packaged on rolls with release paper on one side.
- M. Performed Foam Sealant: Preformed, pre-compressed, open-cell, high-density urethan foam sealant impregnated with a non-drying, water-repellent agent; in pre-compressed sizes and in roll or stick form to fit compatible with joint substrates and other joint sealants; and as follows:
 - 1. Impregnating Agent: Manufacturer's Standard.
 - 2. Backing: None.
 - 3. Backing: Pressure-sensitive adhesive factory applied to one side, with protective wrapping.

2.2 CONTRACTOR'S DESIGN

- A. Joint Analysis: Technically analyse joints, check width of joints, and propose Sealants custom-selected for each type and location of required movement joint. Identify and schedule each joint, joint dimension, accessories, back-up components, sealant proposed for each joint, reserve plasticity of sealants available if joint movement exceeds calculated theoretical limits.
- B. Design and select Sealants so as to retain 50% safety factor within the maximum percentage deformation as recommended by the manufacturer of each proposed type of Sealant. Design in response to:
 - 1. Seismic movement
 - 2. Climatic conditions
 - 3. Coefficient of thermal expansion of materials to be installed adjacent to proposed Sealants.
 - 4. Structural shrinkage, ageing, creep, deflection.
 - 5. Identify joints where indicated width is considered to be unsuitable for context, if any.
 - 6. Performance requirements as stated in Section 08900, Exterior Cladding Systems.

2.3 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers of acceptable products includes, but is not necessarily limited to manufacturers listed as follows:
 - 1. RHODOSIL Silicones; GE; Dow Coning or approved equal.

2.4 JOINT SEALANT ACCESSORIES

- A. General: Provide sealant accessories and backings using materials which are non-staining and compatible with joint substrates, sealants, primers and other materials present in the joint. Install at indicated locations, and as necessary at all other locations for performance.
- B. Plastic Foam Backer Rods: Install at indicated locations, and at all other locations as necessary for bond-breaking and backing for injected Sealants. Use backer rods with characteristics as follows:
 - 1. Purpose-made, performed, compressible, resilient, manufactured from non-extruding and non-waxing, flexible, non-gassing plastic foam.
 - 2. Plastic foam shall be either open-cell polyurethane or closed cell polyethylene, subject to approval of sealant manufacturer and compliance with other re-sealant manufacturer and compliance with other requirements as specified.
- C. Elastomeric Tubing Backer Rods: Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum performance of installed Sealants.
 - 1. Suitable materials shall include neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056.
 - 2. Tubing and materials of tubing shall be non-absorbent to water and gas.

3. Install at indicated locations, and as necessary for bond breaking and backing for injected Sealants.
- D. Spacer Profiles: Propose and install extruded polymeric spacers, of neoprene or other approved material, as continuous spacers at indicated locations and wherever necessary to provide a resilient surface for spacing and distribution of concentrated loading.
- E. Bond-Breaker Tape: Polyethylene or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint fillers, or to joint surface at back of joint where adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: As recommended for context by manufacturer of Sealer. Use at locations as follows:
 1. For adhesion between sealants and joint substrates
 2. According to results observed in pre-construction testing and trial portions.
- B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials. Select as follows:
 1. Non-harmful to adjacent nonporous materials.
 2. Freedom from oily residues.
 3. No detrimental effects on sealant adhesion and on in-service performance.
- C. Masking Tape: Provide non-staining, non-absorbing type compatible with joint sealants and to surfaces adjacent to joints.
- D. Accessories for Fire-Stop Sealants: Provide forming, joint fillers, packing and other accessory materials necessary for an effective and durable installation of fire-stop sealants applicable to context.
- E. Application Tool: Use only the correct tools for inserting, applying and finishing of Sealers, as supplied or recommended by the manufacturer of installed Sealers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints and adjacent construction at locations required receiving Joint Sealers to ensure suitable and ready to receive required Sealers. Do not proceed with installation of Sealers until unsatisfactory conditions have been corrected. Give prior notice if adjacent construction is considered unsuitable to receive Sealers.
- B. Commencement of installation shall denote installer's acceptance of adjacent construction as being suitable to receive Sealers.

3.2 PREPARATION

- A. Cleaning: Immediately before installing Joint Sealers, thoroughly clean joints and surfaces of joints. Cleaning shall comply with recommendations of the manufacturer of sealants to be installed, and as follows:
 1. Remove oil, dirt, dust, grease, temporary coatings and wrappings, water, surface dirt, labels, and any other contaminants harmful to adhesion, performance, and appearance. Retain permanent paints, and protective coatings tested and approved for Sealant adhesion and compatibility by manufacturer of Sealants.
 2. Cleaning methods shall conform to recommendations of manufacturers of adjacent materials, to produce a clean substrate capable of developing optimum bond with Joint Sealers. Remove loose particles by vacuuming or by blowing with oil-free compressed air.

3. Clean metal, glass, porcelain enamel, glazed ceramic surfaces, and other sensitive nonporous surfaces using non-reactive chemical cleaners, or other approved method not harmful to surfaces and free of harmful residual substances.
- B. Joint Priming: Apply primer to substrates of joints at locations and by methods as recommended by manufacturer of Sealants and primer, and as follows:
 1. As verified by adhesion tests.
 2. As observations during trial portions.
 3. Confine application of primer to areas where Sealant is required to develop adhesive bond.
 4. Prevent spillage to adjacent surfaces.
- C. Masking Tape: Apply masking tape to prevent application of Sealant to surfaces which would be stained by contact with Sealant, or which would be damaged by cleaning to remove excess Sealant. Remove tape immediately after tooling, taking care not to disturb installed Sealer.

3.3 INSTALLATION OF JOINT SEALERS

- A. General: Comply with the printed recommendations of the manufacturer of Sealers to be installed, except where experience of trial portions prescribes otherwise.
- B. Installation Standard: Comply with recommendations of ASTM C962 for use of elastomeric Joint Sealers as applicable to materials, applications, conditions, and context. For other types of Sealers, if any, comply with other reference standards as follows:
 1. ASTM C790Latex Sealants
 2. ASTM C804Sealants cured by solvent release

3.4 INSTALLATION OF SEALANTS

- A. Installing Sealants: Install Sealants as printed recommendations of Sealant manufacturer, using proven techniques, for joints sealed as follows:
 1. Complete and regular insertion of Sealants for optimum performance.
 2. Sealants in complete contact with substrates.
 3. Complete adhesion where required.
 4. Free movement where designed and where desirable.
 5. Complete filling of each recess with a uniform cross-section of Sealer where required to be filled.
- B. Tooling of Sealants: Immediately after application of Sealer, and prior to start of surface skinning or curing, tool Sealants to form smooth, uniform beads of configuration indicated.
 1. Eliminate air pockets.
 2. Ensure full adhesion between Sealant and sides of joint.
- C. Tooled Profiles: Tool to profiles as indicated, conforming to standards as follow:
 1. Concave joint profile: as Figure 6A, ASTM C962
 2. Flush joint profile: as Figure 6B, ASTM C692
- D. Tooling Agents: Use only if recommended by the manufacturers of Sealant and adjacent materials to be installed.
- E. Pre-formed Foam Sealants: Install each length of Sealant immediately after removing protective wrapping. Take care not to pull, stretch, or twist the material. Use tools, methods and materials complying with printed recommendations of manufacturer for continuity, turns, intersections, and ends.

3.5 CLEANING

- A. Remove excesses sealant during progress, before curing commences. Use methods recommended by manufacturer of Sealants, and by manufacturers of products installed in adjacent construction.

3.6 TEMPORARY PROTECTION

- A. Protect installed Joint Sealers during and after curing, to prevent contact with contaminants and to exclude damage by adjacent operations of construction. Protect so as to deliver installed Sealants in correct condition at time of Substantial Completion.
- B. If damage occurs, immediately remove the damaged portion and repair with new materials installed so as to be in distinguishable from adjacent portions of correctly installed Sealers.

END OF SECTION

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

SECTION 07921

POLYURETHANE SEALANT

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 REFERENCES

- A. **ASTM C 719-14** - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
- B. **ASTM D 23699-10** - Standard Test Method for Volatile Content of Coatings
- C. **ASTM D 1475-13** - Standard Test Method for Density of Liquid
- D. **ASTM C 661-06 (2011)** – Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
- E. **ASTM C920** - Standard Specification for Elastomeric Joint Sealants

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including installation instructions.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer. Installer must be an approved applicator of Speciality Engineering Chemicals.

PART 2-DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in manufacturer's unopened containers with all labels intact and legible at time of use.
- B. Maintain the products in accord with manufacturer's recommendations with proper precautions to ensure fitness of material when installed.

PART 3- PRODUCT DATA

3.1 2.2. MATERIALS, GENERAL

- A. One –part polyurethane, medium modulus construction sealant

1. Product:	Polyurethane Sealant
2. Movement Accommodation Factor:	25%
3. Elongation at Break:	750%
4. Modulus @ 100% Elongation:	0.40 MPa
5. Curing Speed (23°C 50% R.H.):	3.0mm/day
6. Shore A Hardness:	35
7. Tooling time @ 20°C:	60 mins.
8. Skin formation time (23°C 50% R.H.):	120 mins.
9. Specific Gravity @ 20°C:	1.18
10. Temperature resistance:	-30°C to 70°C
11. Consistency:	Thixotropic
12. Paint compatibility:	Water-based paints

B. Manufacturers

1. G.E
2. Dow Corning
3. Rhodosil
4. Or Approve equal

PART 4 – EXECUTION

4.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of traffic-coating work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of traffic-coating work.
- C. Proceed with installation only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.
 1. Begin coating application only after minimum concrete-curing and -drying period recommended in writing by traffic-coating manufacturer has passed and after substrates are dry.
 2. Application of coating indicates acceptance of surfaces and conditions

4.2 PREPARATION

A. 1. SURFACE PREPARATION

It is essential that the joint arises are clean and free from any deleterious matter which could prevent adequate bond to the substrate.

The substrates must be clean, dry, free of dust and grease and other contaminations. Do not Apply to wet, damp or hot surfaces, or during inclement weather when used in exterior joints.

2. APPLICATION

Polyurethane sealant shall be applied with a manual or pneumatic caulking gun. After application the sealant can be smoothed with a finishing tool or gloved finger dipped in soapy water as lubricant.

3. EQUIPMENT CLEANING

Polyurethane sealant should be removed immediately from tools using solvent (white spirit) before curing. Cured material can only be removed by mechanical means.

SECTION 08120

ALUMINUM GLASS DOORS/WINDOW

PART 1.1 GENERAL

- A. This Section includes architectural-grade aluminum sliding glass doors.
1. Glazing requirements, including those specified to be factory-glazed, are specified in Division 8 Section "Glazing."
- B. Design Requirements: Comply with structural performance, air infiltration, and water penetration requirements indicated in AAMA 101 for each grade and performance class required.
1. Optional Performance Class Requirements: Where the required design pressure exceeds the minimum for the specified door grade, comply with AAMA 101, Section 3, "Optional Performance Classes" for higher than minimum performance class.
 - a. Design wind velocity at Project site is 175 mph.(Verify Struct'l designer)
 2. Conform with design requirements specified in Section 08520 - Aluminum Windows.
- C. Testing Requirements: Test each door grade and size, according to ASTM E 330 for structural performance, ASTM E 283 for air infiltration, and ASTM E 547 and ASTM E331 for water penetration. Comply with AAMA 101 for sample size.
1. Operating Force: Adjust each moving panel before testing so the maximum force to open the panel is 30 lbf and the maximum force required to maintain motion is 20 lbf.
- D. Performance Requirements: Sliding glass doors shall satisfy primary and optional performance requirements for designation SGD-AW80. Each door unit shall comply with the following performance requirements:
1. Structural Performance: Doors shall not show evidence of failure or permanent deflection of frame or panel after testing according to ASTM E 330 at a positive and negative test pressure of 120 lbf per sq. ft.
 2. Air Infiltration: Not more than 0.30 cfm per sq. ft. of area at an inward test pressure of 6.24 lbf per sq. ft. when tested according to ASTM E 283.
 3. Water Penetration: No water leakage at an inward test pressure of 12.00 lbf per sq. ft. when tested according to ASTM E 547 and ASTM E 331.
 4. Deglazing: No disengagement of glazing surround members of operable panels when tested according to ASTM E 987 at 70 lbf on vertical rails and 50 lbf for other rails.
 5. Doors shall also comply with performance requirements specified in Section 08800 - Windows.
 6. Prior to test, door shall be unlocked, fully opened, closed and locked for a minimum 50 cycles. If any repairs or adjustments are performed after cycling, the minimum 50 cycles shall be repeated.
- E. Warranty: Provide written warranty to comply with the requirements described in Section 08900.
- F. Forced-Entry Resistance: Performance Level 10 when tested according to ASTM F 842.
- G. Submittals: Submit the following:

1. Product data for each type of door required. Include profiles and dimensions; construction details; data on finishes, hardware, and accessories; and recommendations for maintenance and cleaning of exterior surfaces.
 2. Shop drawings for each type of door required. Include layout and installation details, including anchors; typical elevations; full-size details of members, including reinforcement; glazing details; and hardware and accessories.
 3. Samples for Initial Color Selection: Samples of each finish on 12-inch-long sections of frame members.
 4. Samples for Verification Purposes: The Architect reserves the right to require additional samples that show fabrication and workmanship and design of hardware and accessories.
 5. Certification: Provide certification by an independent testing agency showing that each type, grade, and size of door complies with performance requirements indicated.
 6. Material Test Reports: Provide certified test results from a recognized independent testing agency showing that each required type, grade, and size of door complies with performance requirements indicated.
- H. Safety Glass Standard: Where required, provide glass that complies with ANSI Z97.1 and 16 CFR for Category II materials.
- I. Glazing Standards: Comply with recommendations of the Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual."
- J. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements and are based on the specific type and model indicated. Units by other manufacturers may be considered provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect.

1.2 PRODUCTS

Supplier/ Installer:

GSSI/Arlo-Aluminum/Wil-an/Austphil/or approved equal

- A. Aluminum Extrusions: Alloy and temper recommended for the strength, corrosion-resistance, and application of required finish; not less than 22,000-psi ultimate tensile strength; and not less than, 0.062-inch thickness at any location for main frame and panel members.
1. Sill Cap (Track): Extruded aluminum track of profile indicated.
 2. Acceptable alloy and temper combinations shall be as described in Section 08900, Part 2, Item B.
- B. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive material, compatible with door members and other components.
1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in splined grommet nuts.
 2. Exposed Fasteners: Use exposed fasteners (Phillips flat-head screws) only to apply hardware. Match the finish of the member or hardware being fastened.
 3. All exposed fasteners and fasteners in areas that are subject to wetting are to be 300 series, non-magnetic stainless steel.
 4. Anchors, Clips, and Accessories: Fabricate anchors, clips, and sliding glass door accessories of aluminum, non-magnetic stainless steel or hot-dip, zinc-coated steel

complying with ASTM A 123; provide strength sufficient to withstand design pressure indicated.

- C. Compression Weatherstripping: Provide compressible weatherstripping of molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4, designed for permanent resilient sealing under bumper or wiper action, concealed when door is closed.
- D. Sliding Weatherstripping: Provide woven-pile weatherstripping of wool, polypropylene, or nylon pile, with resin-impregnated backing fabric and an aluminum backing strip; comply with AAMA 701.2.
- E. Glass and Glazing Materials: Comply with ANSI Z97.1 and requirements of Division 8 Section "Glazing" of these specifications.
- F. Hardware: Provide hardware to properly operate, tightly close, and securely lock doors. Do not use aluminum in frictional contact with other metals. Where exposed, provide white bronze, cast or wrought aluminum, solid white metal with special-coating finish, or nonmagnetic stainless steel.
1. Roller Assemblies: Provide movable panels with rollers and roller assemblies that conform to AAMA 906.3.
 2. Door Pulls: Provide aluminum pull grips.
 3. Locks: Install standard pull and keyless locking device on each movable panel, lockable from the inside only.
- G. Fabrication: Fabricate aluminum sliding glass door units to comply with indicated standards. Include a complete system to assemble components and anchorage of units.
1. Provide units that are reglazable without dismantling panel framing.
 2. Assembly: Assemble components into complete weathertight units with flush, rigid, and hairline joints. Mill, cope, butt, and miter joints; secure by mechanical devices or by other means to ensure permanently watertight joints. Provide at least two corrosion-resistant, pre-lubricated or self-lubricating rollers for each sliding panel of sufficient capacity to ensure easy, quiet, and smooth operation.
 3. Weatherstripping: Provide operable panels with a double row of sliding weatherstripping in horizontal rails and single- or double-row weatherstripping in meeting or jamb stiles, as required, to meet specified performance requirements. Provide compression-type weatherstripping at the perimeter of each movable panel where sliding-type weatherstripping is not appropriate.
 - a. Provide weatherstripping locked in to extruded grooves in the panels.
 4. Preglazed Fabrication: Glaze aluminum sliding glass door units in the factory where practical and possible for the applications indicated. Comply with Division 8 Section "Glazing" and AAMA 101.
 5. Glazing Stops: Provide snap-on glazing stops, coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match panel frames.
 6. Screens: Provide insect screen unit for each operable panel. Design door units and hardware to accommodate screens in a tight-fitting removable arrangement on either inside or outside of door unit with a minimum of exposed fasteners and latches.

- H. Finishes: Comply with N AMM "Metal Finishes Manual."
1. High-Performance Coating: AA-C12C42R1x; . Prepare, pretreat, and apply coating to expose all surfaces to comply with coating and resin manufacturer's instructions.
- 1) Color and Gloss: As selected by the Architect from manufacturer's standard choices for color and gloss reference.
- Manufacturer
- a. Dulux ICI - Republic powdercoat

1.3 EXECUTION

- A. Examination: Inspect openings before installation. Verify that rough opening is correct and the sill plate is level. Do not proceed until unsatisfactory conditions have been corrected.
- B. Installation: Comply with manufacturer's instructions.
1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at contact points with other materials.
 2. Set sill and frame members in a bed of compound or with joint fillers or gaskets for a weathertight construction. Coordinate installation with wall flashing.
 - a. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets installed concurrently with sliding glass door units.
 3. Set units plumb, level, and true to line, without warp or rack of frames and panels. Provide support and anchor frames and fixed panels securely in place.
- C. Adjust operating panels, screens, and hardware for a tight fit at contact points and weather-stripping for smooth operation and weather-tight closure.
- D. Cleaning: Clean aluminum after installation. Avoid damaging protective coatings and finishes. Remove excess glazing and sealing compounds, dirt, and other substances. Lubricate hardware and moving parts.
- E. Clean glass promptly after installation. Wash and polish glass on both faces 4 days before final inspection. Comply with manufacturer's recommendations for final cleaning and maintenance.
- F. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged during the construction period.

END OF SECTION

SECTION 08125

TECHNICAL INFORMATION FOR POLYESTER POWDERS

The data given below are typical for CHEMREZ TECHNOLOGY / INSOLTECH / DIVERSYS SPECTRUM PRODUCTS, INC. / INTERPON / DUPONT applied to 0.8mm chromated aluminum panels.

Colour:

Wide range ex-stock or to customer's requirements

Gloss Level:

Full gloss 85%+ @60° Semi-gloss 50-60%+ @60° Matt 25-35%+ @60°

Film Thickness.

65+/-15 microns

Adhesion (DIN 53151/ISO 2409-2mm).

Cross hatch rating GT 0 (100% adhesion)

Impact Resistance (ASTM 2794).

More than 20 in/lbs without film cracking. When tested at lower film thickness (i.e. 50-60 microns) it exceeds twice this value.

Erichsen Cupping Test (DIN 53156/ISO 1520).

Indentation depth in excess of 7.5mm without film cracking.

Flexibility (DIN 53153/ISO 1519).

Cylindrical mandrel bending test passes mandrel diameter

Film Hardness (DIN 53153/ISO 2815).

Indentation resistance according to Buchholz: 80-155.

Mortar Resistance (ASTM C 207).

After 24 hours at specified conditions mortar is easily removed from the coating, resulting neither in loss of adhesion nor in surface marring. (Mortar should preferably be removed as soon as possible if spilled on coated surfaces).

Drilling, Milling and Sawing Test.

No flaking of coating.

Salt Spray Resistance (ASTM B 117-73).

Should not have blistering or loss of adhesion after 1000 hours

Resistance to Humid Atmospheres Containing SO₂.

Test according to DIN 50018 and ISO 3231-1974 with 0.2 l SO₂ per cycle. After 30 cycles – i.e. total of 720 hours of which 240 hours are direct to SO₂ exposure – no blistering or loss of adhesion occurs. Should not have any noticeable change in colour or gloss.

Resistance to Humid Atmospheres (DIN 50017)

No blistering or loss of adhesion after 1000 hours continuous exposure at 100% RH and 40°C

Resistance to Water (ISO/ 1621-1971)

No blistering or loss of adhesion after 100 hours de-ionized (but not aerated) water at 40°C

Weathering Resistance (FLORIDA TEST)

No chalking, excellent gloss retention and colour stability after more than 1000 hours testing in Sun-test (17/3 cycle-back enamel temperature 40°C)

UV Resistance (Xenon Test)

Excellent colour stability

Dry-heat Resistance

2 hours at 150 degrees centigrade: Cross hatch Gt 0 (100% adhesion)

SECTION 08130

STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Full flush steel doors.
- B. Pressed steel frames and cased openings, including anchors and silencers.

1.2 QUALITY ASSURANCE

- A. Quality Marking: Mark each door indicating compliance with applicable requirements of reference standards or provide certification indicating compliance.

1.3 REFERENCES

- A. Steel Door Institute (SDI): SDI-100 - Recommended Specifications - Standard Steel Doors and frames.
- B. National Association of Architectural Metal Manufacturers (NAAMM): Hollow Metal Technical and Design Manual.
- C. Underwriters' Laboratories Inc. (UL) standards as applicable to fire rated doors and frames.
- D. Product Standards Agency (PSA) - Certification

1.4 SUBMITTALS

- A. Shop Drawings: Indicate general construction, configuration, jointing methods, reinforcements, anchorage methods, hardware locations, and locations of cut-outs.
- B. Product Data: Submit manufacturers' literature.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store doors and frames under cover, on minimum 100mm high wood blocking; avoid use of non-vented plastic or canvas shelters which could create humidity chamber.
- B. Provide minimum 6mm space between stacked doors to allow air circulation.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Metro Tech
- B. LEC Steel
- C. Doortech
- D. Or approved equal

2.2 MATERIALS

- A. Doors: Hollow metal flush type, 45mm thick.
 - 1. Typical: Conform to SDI Full Flush Style 2; close top with flush end closer treatment, bottom optional flush or recessed channel; manufacturer's standard core, insulated type at exterior doors.

2. Option: Conform to NAAMM Full Flush with Unfilled Edge Seams Type B; close top with flush end closer treatment, bottom optional; insulated core exterior, steel stiffened or laminated core interior.
 3. Interior Doors: Provide ANSI/SDI Type II Heavy Duty, NAAMM 18 gage.
 4. Exterior Doors: Provide ANSI/SDI Type III Extra Heavy Duty, NAAMM 16 gage.
- B. Frames: Comply with ANSI/SDI-100, of the types and styles indicated, for materials quality, metal gages, and construction details.
1. Provide standard hollow metal frames for doors, transoms, sidelights, borrowed lights, and other openings as indicated.
 - a. Fabricate frames with mitred, coped, or welded corners.
 2. Prepare frames to receive 2 silencers on strike jambs of single-door frames and on heads of double-door frames.
 3. Provide 26-gage steel plaster guards or mortar boxes, welded to frame, at back of hardware cutouts where installed in concrete, masonry or plaster openings.
 4. Protect inside faces of frames in plaster or masonry wall construction which are placed with anti-freeze additives, using high-build fibered asphalt emulsion coating.
 5. Form exterior frames from 16-gage galvanized steel.
- C. Fire Rated Doors and Frames: In addition to SDI and NAAMM, construct in accordance with requirements of Underwriters' Laboratories Inc. (UL) or other certified testing agencies standards if required by local authorities.
1. Place UL labels on PS if required where visible when doors and frames are in installed, opened position.
 2. Refer to Drawings for fire rating class requirements.
 3. For Louvered Doors: Provide tightly fitted, spring loaded, automatic closing louver with operable blades retained by flexible links. Rating label same as door units.
 4. Where oversized metal doors and frames are required, provide certification and information required by applicable authorities for approval.
 - a. Indicate at time of bid which assemblies will receive such certification.
- D. Temperature Rise Rating: Provide labelled doors for stairwell enclosures which indicate "Temperature rise 30 minutes - 450 deg. F maximum," or better rating.
- E. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
- F. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.
- G. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, or drawing quality, ASTM A 642, hot dipped galvanized in accordance with ASTM A 525, with A60 or G60 coating designation, mill phosphatized.
- H. Supports and Anchors: Fabricate of not less than 18-gage sheet steel; galvanized where used with galvanized frames.
- I. Shop Applied Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with AS\NSI A224.1.

2.3 FABRICATION

- A. Conform to requirements of SDI or NAAMM.
- B. Reinforce and prepare doors and frames to receive mortised and concealed finish hardware including cut-outs reinforcing drilling and tapping.
 - 1. Refer to Section 08700 for hardware requirements.
 - 2. Provide reinforcing plates to allow all surface applied hardware to be attached with machine screws. Through bolts and sex bolts will not be permitted.
 - a. Minimum Reinforcement Gage: 12 gage.
- C. Frames and Cased Openings:
 - 1. Welded Frames: Accurately form and cut mitred corners of welded type frames; weld on inside surfaces; grind welded joints to smooth uniform finish.
- D. Door Silencers:
 - 1. Place minimum of three single bumpers on single door frames and double door frames with removable mullions for doors up to and including 2250mm, add an additional silencer for each additional 750mm or fraction thereof; space equally along strike jambs.
 - 2. Place minimum of two single bumpers on double door frames; place on frame heads.
- E. Provide jamb anchors per SDI-100 and NAAMM; weld floor jamb anchors in place. Provide head anchors for doors over 1050mm wide.
- F. Provide double doors tested and approved without astragals.
 - 1. Provide astragals for double doors when required to meet UL requirements for Class A, 3-hour rated doors only.
 - a. Interior Units: Chemically treat surfaces and apply one coat of primer.
 - 2. Exterior Exposed Units: Apply manufacturer's standard electrolytic zinc coating, but no less than Class C, minimum 0.15 oz/ft .
 - a. Phosphatize or surface treat after galvanizing, and apply one coat of primer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install doors and frames in accordance with SDI-100 or NAAMM.
 - 1. Install fire rated units in conformance with fire label requirements and NFPA 80.
 - 2. Install frames in accordance with SDI-105 recommendations for installation of steel frames.
- B. Install doors and frames plumb and square, and with maximum diagonal distortion of 1.5mm.
 - 1. Coordinate hardware installation with requirements of Section 08700.
 - 2. Coordinate glass installation with requirements of Section 08800.
- C. Remove and replace doors and frames damaged during delivery, storage, installation or construction.
 - 1. Paste filler repair shall not be permitted.
- D. After installation, touch-up scratched paint surfaces.

SECTION 08520

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide labor, materials, equipment and related items to furnish and install horizontal strip and punches windows as shown on Drawings and as specified. Provide items not specifically mentioned but necessary to complete the Work. Items include:
1. Extruded aluminum frames.
 2. Extruded aluminum fixed and operable windows.
 3. Anchorage to building structure.
 4. Extruded aluminum interior head, jamb, and sill trim closures to concrete.
 5. Operable windows.
 6. Sealants within work of this Section and at boundaries with work of other sections.
 7. Test mock-ups.
 8. Field tests for resistance to water leakage.
- B. Related Sections: Work specified in other sections, and requiring coordination with this Section, include:
1. 03300 - Cast-in-Place Concrete.
 2. 08710 - Door Hardware.
 3. 08800 - Glazing.

1.2 REFERENCES

- A. Except as otherwise specified, comply with:
1. Aluminum Association Specifications for Aluminum Structures, Current Edition.
 2. Aluminum Association Standards and Data, Current Edition.

1.3 DESIGN REQUIREMENTS

- A. Contract Documents define design intent and performance requirements. Details show preferred profiles. Provide final design.
- B. Unless otherwise defined by Contract Documents, appearance of exposed elements, including width and depth, shall be consistent throughout project.
- C. Unless otherwise defined by Contract Documents, overall thickness of each glass type, and component thickness of multiple layer glass types, shall be consistent throughout project.
- D. Provide anchor adjustment capability for full range of specified tolerances for building structure, but not less than one (1) inch (25 mm) in all directions.
- E. Design wind pressures are as determined by wind tunnel tests. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and other changes in plane, both surfaces shall be assumed to experience inward pressure simultaneously, and outward pressure simultaneously. Design for simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface is not required.
- F. Anchors embedded in concrete shall be designated by the ultimate strength method. Cold formed stainless steel, but not stainless steel fasteners, shall be designated by the LRFD method. Stainless steel fasteners and other materials shall be designed by the allowable stress method. Stresses shall not exceed values established by specifications listed under REFERENCES. For allowable stress design, stress shall not exceed yield stress. Where permitted by code, a 1/3 increase in allowable stress for wind or seismic load is acceptable, but not in combination with any reduction applied to combined loads. An allowable stress increase is not permitted for: metal plates or legs with

thickness of 0.5 inch (12.7 mm) or less bent about the weak axis; fasteners in drilled holes in concrete; fillet welds; partial penetration groove welds; stresses resulting from dead loads; structural silicone; glass.

G. Framing Members

1. Glass, sealant and interior finishes shall not be assumed to contribute to framing member strength, stiffness or lateral stability.
2. Compression flanges of flexural members may be assumed to receive effective lateral bracing only from (a) anchors to building structure and (b) horizontal glazing rails or interior trim which contact the compression flange. Points of contra-flexure shall not be regarded as lateral braces or as end points of an unbraced length; unbraced length shall be the distance between effective lateral braces.

H. Fasteners

1. General Requirements

- a. Tension shall be taken as sum of direct tension plus tension due to prying.
- b. Penetrations of a shim stack with total thickness "t" by a fastener with nominal diameter "d" shall require reductions in allowable tension and shear forces. Minimum reduction shall be zero percent for $t=d$, varying linearly to 100 percent for $t=2d$. Such reduction shall be in addition to any other reductions which may be applicable. An acceptable alternative method is to assume that shims provide no resistance to fastener bending, compute fastener bending stress with cross sectional properties based on root diameter, add bending stress to tension stress, and evaluate tension / shear interaction.
- c. Unless otherwise specified, combined tension and shear shall be evaluated according to an interaction formula in which each term equals the square of actual force divided by the square of allowable force. Sum of terms shall but exceed 1.0.

2. Carbon Steel Bolts and Screws

- a. For nominal diameter equal to or greater than 0.5 inch (12 mm), evaluate tension, shear and combined stress according to AISC Steel Construction Manual.
- b. For nominal diameter less than 0.5 inch (12 mm), compute tensile and shear stress based on tensile stress area. Tensile stress shall not exceed 0.44 times ultimate tensile stress. Shear stress shall not exceed 0.22 times ultimate tensile stress.

3. 300 Series Stainless Steel Bolts and Screws

- a. For nominal diameter equal to or greater than 0.25 inch (6 mm), comply with AISI Stainless Steel Cold Formed Structural Design Manual. Tensile stress based on tensile stress area shall not exceed 0.541 times tensile yield stress. Shear stress based on gross area shall not exceed 20 percent of ultimate tensile stress where threads are not included in the shear plane, and 14 percent of ultimate tensile stress where threads are included.
- b. For nominal diameter less than 0.25 inch (6 mm), tensile stress based on the tensile stress area shall not exceed 0.541 times tensile yield stress. Shear stress based on tensile area shall not exceed 20% of ultimate tensile stress.
- c. Unless manufacturer's written certification of greater strength is submitted with design calculations, provide fasteners with minimum yield stress of 30 ksi (207 N/mm²) and minimum ultimate tensile stress of 75 ksi (517 N/mm²).

4. Fasteners in Drilled Holes in Concrete

- a. Tension shall not exceed 25 percent of ultimate tensile strength. Shear shall not exceed 25 percent of ultimate shear strength. Combined load shall be evaluated by an interaction formula, the terms of which shall be actual load divided by allowable load; sum of terms shall not exceed 1.0. Comply with manufacturer design rules if more stringent than specified. Apply reductions for spacing and edge distance.
 - b. Self drilling, self threading fasteners are not acceptable. Screws in plugs and powder actuated fasteners are not acceptable.
5. Allowable tension and shear for self-drilling steel fasteners in metal shall not exceed 30 percent of ultimate strengths.
 6. Allowable stress for aluminum fasteners shall be determined according to Aluminum Association Specifications for Aluminum Structures.
- I. Structural Silicone
1. Wind pressure shall be supported in tension or shear, but not tension and shear simultaneously.
 2. Allowable tension stress or shear stress (but not combined tension and shear stress) shall not exceed 20 PSI (137.9 kPa) at design pressures and loads.
 3. Structural silicone shall not support dead load.
- J. System shall be designed to support its own weight in combination with other specified pressures and loads.
- K. Movements
1. Provide movable joints to accommodate full range of manufacturing tolerance, field tolerance, thermal movement, wind, sway, seismic movement, floor sag, beam sag and column shortening. Design differential floor edge vertical movement between successive floors if $10+5+3\text{mm}=18\text{mm}$).
 2. Thermal component of joint movement shall be based on minimum material temperature increase of 85 Fahrenheit degrees (29.4 Centigrade degrees) and decrease of 40 Fahrenheit degrees (4.4 Centigrade Degrees) relative to nominal condition. Assume entire cross section has uniform temperature. For thermal design other than joint movement, design winter surface temperature is 73 Fahrenheit degrees (22.8 Centigrade degrees). Design summer surface temperature shall be at least 160 Fahrenheit degrees (71 Centigrade degrees). All components including adhesives and sealant shall be capable of withstanding without failure design temperatures with simultaneous specific loads.
 3. At any floor, in-place displacement shall be assumed to occur while floor immediately above and below remain stationary. There shall be no failure or gross permanent distortion of anchors, frames or glass; gaskets and weatherstrips shall not disengage; structural silicone shall not fail; weather seals shall not fail. Maximum in-plane displacement is to be confirmed by the Structural Engineer
- L. Provide internal gutters and weep system to collect and drain water leakage and condensation to the exterior. Punches windows shall have an isolated gutter cavity at each glass perimeter, so that leakage is confined to and weeped from the opening of leakage origin. Horizontal ribbon windows shall have a continuous gutter at the glass head which either drains directly to exterior or directs leakage to the window sill.
- M.. Glazing details shall permit glass replacement after initial construction, shall permit reuse of original gaskets, shall permit replacement glass of same nominal size as original glass, and shall not require cutting of framing members or removal of interior finishes. Vision glass in conventional frames shall be replaceable from interior. Spandrel glass shall be replaceable from exterior.

- N. Snap engaged components shall be secured against migration, and shall not serve any primary structural function, such as retention of glass or panels. Snap engaged plastic components are not permitted, except as non-structural thermal improvement for interior trim.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Criteria

1. At pressures and loads from zero to 150 percent of design values:
 - a. Framing member residual deflection after pressure or load is removed shall not exceed 1/1000 times distance between supports.
 - b. At anchors, framing member deflection relative to building structure shall not exceed 0.187 inch (4.7 mm), nor 0.125 inch (3.2 mm) after pressure or load removed.
 - c. Upon reversal of pressure or load direction, relative movement between two components that are fastened or clamped together shall not exceed 0.1877 inch (4.7 mm).
 - d. There shall be not disengagement, failure or gross permanent distortion of any component, including glass and gaskets.
2. At 100 percent of design pressures and loads:
 - a. Net deflection perpendicular to enclosure surface for framing members supporting glass shall not exceed: 1/75 times distance between supports for spans less than 156 inches (3962 mm); 0.00427 times distance between supports plus 0.225 inch (5.72mm) for spans exceeding 156 inches; 2/175 times cantilever length, not to exceed 0.375 in (9.5 mm).
 - b. Net deflection of framing members parallels to enclosure surface shall not exceed smallest of: 0.125 inch (3.2 mm) due to dead load; 0.125 inch (3.2 mm) change in opening size at any point; 1/360 times distance between supports, not to exceed 0.375 inch (9.5 mm).
 - c. Net deflection parallel and perpendicular to enclosure surface for framing members at perimeter sealant joints shall not exceed smallest of : valued specified above; 50 percent of joint width; movement capacity of sealant.
 - d. Interior window sill shall not deflect more than 0.125 inch (3.2 mm) when subjected to a concentrated force of 200 pounds (888 N) at any point. Residual deflection after force is removed shall not exceed 0.062 inch (1.6 mm).

B. Structural Silicone

1. Ultimate tensile strength of structural silicone and the substrates to which it adheres for static loading at 160 degrees F (71 degrees C) shall be at least 60 PSI (414 kPa).
2. If structural silicone products other than those specified are proposed, perform tensile tests prior to fabrication of test mock-ups. Contractor is responsible for assembly of specimens and laboratory fees. Contractor shall reimburse Owner for fees and expenses of one observer to witness tests. Prior to scheduling tests, submit technical data for proposed silicones and request approval to proceed with tests.
 - a. Specimens shall consist of single line of silicone with dimensions 2.0x0.5x0.5 inch bonded to two glass rectangles. Fully cure specimens at room temperature. Immerse specimens in water for 7 days.
 - b. Test minimum of 3 specimens each at 75 +/- degrees F (24 +/-3 degrees C) and 160 +/-5 degrees F (71 +/-3 degrees C). Increase tensile stress in silicone to 60Psi in one minute or less maintain 60Psi for minimum of one minute.
 - c. Specimens shall not experience adhesive or cohesive failure, partial or total. All specimens must pass.

- d. Submit laboratory report for approval.
3. Where a mock-up is tested to 1.5 times design pressures and loads, structural silicone and related structural components shall not fail.
4. Where a mock-up is subjected to a racking test, structural silicone shall not fail.
5. On the building, structural silicone shall not experience adhesive or cohesive failure.
- C. Sealant used as weather seals shall not experience adhesive or cohesive failure. Sealants shall withstand movements up to the limits prescribed by manufacturers. Expose sealant surface shall not crack or bubble. Sealant and primers shall not stain adjacent materials. Sealants shall be used if manufacturer's adhesion, compatibility and stain tests yield favourable results.
- D. Snap engaged components shall not disengage when subject to a concentrated force of 10 pounds (44.5 N) or during mock-up structural tests.
- E. Operable Windows
 1. Operable windows and doors shall conform to requirements of this Section. In addition, and as a minimum, operable windows and doors shall also conform to ANSI / AMA 101-93 classification P-AW80. This Section governs with respect to any conflicts.
 2. Prior to any other mock-up tests, operable windows and door shall be unlocked, fully opened, closed and locked for a minimum 50 cycles shall be repeated. Mock-up specimens shall be tested for water leakage with and without screens.
 3. As part of mock-up tests, provide separate unglazed vents in fixes frames to the laboratory for concentrated load tests per ANSI / AAMA 101.
- F. Performance requirements specified for test mock-ups and specimens also apply to actual building, and vice versa. Variations in criteria over the surface of building, such as wind pressure, are taken into account in testing requirements. Where certain performance is required for specific test conditions of mock-ups and specimens, that same performance is required for actual building, for conditions equivalent to or less than test conditions.

1.5 SUBMITTALS

- A. Provide the following submittals for information only. Promptly provide additional information and clarifications upon request.
 1. Submit with bid scope drawings for typical areas of building. Quality and content of scope drawings shall be same as required for building drawings.
 2. Prior to submitting documents for approval, submit itemized list of Specification requirements and architectural drawing requirements that are not embodied in contract, or intended contract, for work of this Section. Identify specification page and paragraph, or architectural drawing sheet, elevation, plan, section or detail for each item. Deviations not specifically identified shall not be deemed valid in submittal review. If there are no deviations, provide written statement of full compliance with architectural drawings and specifications. Failure to provide an itemized list of deviations or statement of full compliance shall, at reviewers discretion, because for return of submittals without review.
 3. Prior to, or simultaneous with, first submittal of structural calculations for approval, submit dimensioned die drawings for aluminum extrusions. If extrusion profiles are not finalized, provide die drawings for interim profiles. If profiles are revised, provide revised die drawings with first calculation or shop drawings submittal which follows revision. Die drawings shall show profile dimensions, metal thickness, alloy and temper.
 4. Submit die drawings of gaskets and weatherstrips. Die drawings shall show profile dimensions and shall identify materials.

5. Submit glass manufacturer's revise of shop drawings stating that details are suitable for proposed glass products.
 6. Submit sealant manufacturer's test reports confirming sealant adhesion, compatibility and absence of staining, and acceptability for structural silicone application. Submit application and quality control procedures for sealants.
 7. Submit reports for quality control uniform pressure tests of shop applied structural silicone.
- B. Submittals for Approval: Submittals shall be complete and in required form. Re-submittals shall include requested corrections and shall respond to previous comments. Each revised sheet shall bear a revision date and number. Revisions shall be flagged with conspicuous revision symbols and numbers. Failure of submittals to be complete, in the proper form, responsive to comments, or identify revisions shall be cause for disapproval and return of documents without review. Failure of review comments to note a non-compliance with plans and specifications shall not relieve the Contractor from his obligation to comply. Failure of review comments to note a non-compliance on a given submittal shall not reclude a directive to comply on future submittals. A maximum of two reviews will be performed without additional cost to the Contractor. If a submittal does not achieve an approved status by the second submittal, cost of additional reviews by Architect and Consultant shall be borned by Contractor.
1. Submit drawings showing materials in place on building. Drawings shall include elevations, floor plans, sections and full size details. Details shall be fully drawn (not outlined). Drawings shall include the following information.
 - a. Joinery and internal seals.
 - b. Glass and metal thickness.
 - c. Metal alloy, temper and finish.
 - d. Glass strength, tint, coating, opacifier, frit and safety backing.
 - e. Fastener alloy, strength, finish, diameter, length and spacing.
 - f. Glazing materials identification.
 - g. Sealants identification by product name.
 - h. Relative layout of walls, beams, columns and slabs with dimensions notes.
 - i. Dimensioned position of glass edge relative to metal daylight.
 - j. Provisions for movements.
 - k. Locations of, and details for, embedded anchors.
 - l. Identification of, and details for, thermal insulation.
 - m. Glazing details applicable to replacement glass, with outline of procedure for glass replacement.
 - n. Provisions for adjustment of anchors relative to tolerances of building structure.
 2. Provide structural calculation prepared in compliance with referenced documents and these specifications. Calculations shall be legible and shall incorporate sufficient cross references to shop drawings to make calculations readily understandable and reviewable. Test reports are not an acceptable substitute for calculations. Calculations shall include:
 - a. Analysis of framing members.
 - b. Analysis of anchors, including anchors embedded in concrete.
 - c. Section property computations for framing members.
 - d. Analysis of stress in structural silicone.
 - e. Seal and signature of professional engineer.
 3. Drawings and structural calculations are required for test mock-ups. The required content is the same as for actual building.
- C. Samples
1. Submit for approval three (3) sets of labeled samples of each type and color of metal finish, one 12 inch (305 mm) long sections of extrusion shapes and 12 inch (305 mm) squares of sheet aluminum. Samples shall show extremes of color and texture variation. Samples will be reviewed

by Architect for color and texture only. Compliance with other requirements is the responsibility of the Contractor.

2. Architect reserves right to require samples which show the fabrication techniques and workmanship for component parts.

1.6 QUALIFICATIONS

- A. Aluminum Fabricator: Company specializing in fabrication of architectural aluminum extrusions with minimum 5 years experience.
- B. Gasket Supplier: Company specializing in manufacture of products specified in this Section with minimum 10 years experience.
- C. Sealant Supplier: Company specializing in manufacture of products specified in this Section with minimum 10 years experience.
- D. Installer qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in design and extent to those required for the project and which has resulted in construction with a record of successful in-service performance.
- E. Testing Laboratory Qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to the Architect's satisfaction that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the work, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699.
- F. Single-Source Responsibility: Provide aluminum window units from one source and produce and by a single manufacturer.

1.7 MOCK-UPS

- A. Test Mock-ups
 1. Furnish labour and materials to build and test mock-ups as shown on the attached sketches. Mock-ups shall accurately represent project conditions including joints, sealants, glass, glazing, anchors and finishes. Install sufficient thermal insulation to demonstrate details of installation. Delay installation of thermal insulation until completion of air, water and structural tests.
 2. Two mock-ups are anticipated. If the same system is proposed for all window areas on the project requirements for the smaller mock-up may be waived.
 3. Each mock-up shall be glazed with one consistent set of gaskets. Use of multiple gasket profiles and / or thickness at the contractor's discretion is not permitted.
 4. Prior to tests, remove and re-glaze selected glass units, using the details and procedures intended for glass replacement on the actual building. Re-glazed units must satisfy test criteria.
 5. Provide at least one extra light of glass for each type and size on mock-ups. Glass which breaks during testing shall be replaced with new glass and the tests continued. Repeated glass breakage shall constitute failure.
 6. Construct mock-ups in accordance with approved shop drawings. Deviations from or additions to details shown on drawings are subjected to approval.
 7. Owner shall pay laboratory fees for one series of tests. Testing laboratory shall conduct and report tests, shall state in the report whether test specimen conforms to requirements of Contract Documents, and shall not deviations from mock-up drawings.
 8. If failures occur, revise and retest mock-ups. Modifications must be realistic in terms of project conditions, must maintain standards of quality and durability, and are subject to approval.

9. If failures necessitate retest, pay the additional laboratory fees and other fees and expenses, including architect's and consultant's fees.
 10. The name and qualifications of the test laboratory must be submitted for approval.
 11. Mock-ups are subject to observation by Owner, Architect and their consultants during construction and testing. Provide minimum two week notice before beginning construction of mock-ups. Provide materials and personnel for prompt continuous construction mock-ups.
- Delays in mock-up construction due to lack of materials or personnel could result in the Contractor being charged for fees and travel expenses of observers. Contractor shall coordinate chamber availability, shipping schedules and mock-up construction schedules directly with laboratory.
12. The testing laboratory shall not perform any of the following functions.
 - a. Act as consultant to a contractor for this project.
 - b. Modify Contract Documents requirements.
 - c. Modify mock-up configuration.
 - d. Dismantle mock-ups until notified that no further testing is required.
 13. Undocumented tests are not permitted. All test results and all remedial work shall be documented in the laboratory report.
 14. Mock-up design pressures are 75 (3.6 KPa) PSF inward and 84 (4.0 KPa) PSF outward. Maximum test pressures are 113 (5.4 KPa) PSF inward and 125 (6.0 KPa) PSF outward.

B. Mock-up Tests

1. Testing Sequence
 - a. Unlock, fully open, close and lock operable windows for a minimum of 50 cycles. Repeat cycling after any repairs or adjustments.
 - b. Preload at 50 percent of inward design pressure.
 - c. Air infiltration and exfiltration.
 - d. Water infiltration under static pressure.
 - e. Water infiltration under dynamic pressure.
 - f. Structural test at 50 percent and 100 percent of inward design pressure.
 - g. Structural tests at 50 percent and 100 percent of outward design pressure.
 - h. Water infiltration under static pressure.
 - i. Racking.
 - j. Concentrated load tests of operable windows.
2. Air leakage test shall conform to ASTM E 283, modified to include measurement of exfiltration. Differential static test pressure shall be 6.24 PSF (299 Pa). Chamber leakage shall be accurately determined, not estimated. Air infiltration and exfiltration of fixed wall area shall not exceed 0.09 CFM per square foot (1.64 cubic meter per hour per square meter) of projected exterior surface, exclusive of windows and doors shall not exceed 0.30 CFM per foot (2.06 cubic meter per hour per meter) of crack length. Fixed panels of sliding windows and sliding doors are included in fixed wall area, and are not included in operator crack perimeter.
3. Water leakage is acceptable only if all of the following conditions are satisfied: (a) water is contained and drained to exterior; (b) there is no wetting of a surface that would be visible to building occupants; (c) there would be staining or other damage to completed building or its furnishings. This definition of water leakage governs over other definitions which may appear in referenced documents.
4. Where test sequence or test failure requires successive water infiltration tests, the only means used to drain water from internal cavities shall be gravity drainage through weep system for a minimum of 15 minutes. Air pressure, removal of parts or other means of draining water shall not be used.

5. Static water infiltration test shall conform to ASTM E 331. Differential test pressure shall be 12 PSF (575 Pa). There shall be no unacceptable water leakage as defined herein. Sources of water leakage shall be identified.
6. Dynamic water infiltration test shall conform to AAMA 501.1-94 except as otherwise specified herein. Differential test pressure shall be 12 PSF (575 Pa). There shall be no unacceptable water leakage as defined herein. Sources of water leakage shall be identified.
7. Structural tests shall conform to ASTM E 330. Deflection gages shall be set to zero prior to each application of pressure at 50, 75, 100 and 150 percent of design pressures. Deflection gage readings shall be recorded after each application of pressure. Deflection measurements are not required for initial preload. Specified deflection and set limitations apply to one application of pressure, not to cumulative effects of two or more loading.
8. Racking Tests
 - a. Mock-up test chamber shall be constructed so that simulated floor structure above the mock-up is moveable in a horizontal sense parallel to glass plane(s).
 - b. Displacement is to be confirmed by the Structural Engineer.
 - c. Displace moveable structure first in one direction, then in other direction. Repeat for total of at least 3 two-stroke cycles.
 - d. There shall be no failure or gross permanent distortion of anchors, frames or glass; structural silicone shall not fail; gaskets and weatherstrips shall not disengage; weather seals shall not fail.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials in transit and stored materials from damage.
- B. Replace damaged materials.

1.9 SEQUENCING

- A. Coordinate with requirements of material and personnel hoists. Defer installation at obstructed areas, and install materials when obstructions are removed.

1.10 WARRANTY

- A. Provide written warranty agreeing to repair or replace defective materials and workmanship during warranty period. Defective materials and workmanship include, but are not limited to:
 1. Abnormal deterioration, gain or weathering.
 2. Water leakage.
 3. Air leakage exceeding specified limits.
 4. Failure of operating parts to function normally.
 5. Structural failure.
 6. Sealant (including structural silicone) loss of adhesion, loss of cohesion, cracking or discoloration.
 7. Disengagement of gaskets or weatherstrips.
 8. Deterioration or discoloration of aluminum finish.
 9. Loss of glass bite due to shifting glass.
 10. Loss of glass bearing on setting blocks due to shifting of glass and / or blocks.
 11. Collapse of thermal insulation.
- B. Warranty does not include damage caused by vandalism, or natural conditions exceeding the performance requirements. Warranty & its enforcement shall not deprive Owner of other action, right or remedy .

- C. Warranty period for entire system shall be five (5) years from date of substantial completion. System warranty includes materials and labor.
- D. Certain materials are required to have special warranties. Special warranties shall not limit or reduce requirements of system warranty. Special warranties may originate, in part or in whole, with manufacturers or fabricators and pass through Contractor to Owner. Warranties as written or interpreted by manufacturers or fabricators shall not limit or reduce special warranty requirements of this Section.
 - 1. Reflective glass whose reflective coating cracks, peels or discolors shall be replaced at no charge (material only) for minimum ten (1) year period beginning on date of manufacture.
 - 2. Spandrel glass whose pacifier cracks, peels, wrinkles, discolors, or stains shall be replaced at no charge for minimum five (5) year period beginning on date of manufacture.
 - 3. Paint which cracks, peels, fades in excess of specified limits or chalks in excess of specified limits shall be replaced at no charge (material and labor) for minimum five (5) year period beginning on date of manufacture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

AustPhil
Arlo Aluminum
Wilans
Or approved equal

2.2 MATERIALS

- A. Steel

- 1. Hot rolled shapes and plates shall conform to ASTM A 36.
- 2. Tubing shall conform to ASTM A or A 501.
- 3. Stainless steel bars and sheet shall be AISI Type 302 or 304. Minimum thickness is: 0.062 inch (1.5 mm) for frames; 0.031 inch (0.79 mm) for trim covers; 0.012 inch (0.30 mm) for concealed flashing; 0.125 inch (3.2 mm) for stone anchors.
- 4. Non tubular cold formed carbon steel with thickness 0.168 inch (4.27 mm) or less shall conform to ASTM A 446.

- B. Aluminum

- 1. Acceptable alloy and temper combinations for extrusions subject to fabrication, finish and structural requirements are: 6063-T5;6063-T6;6061-T6. Other alloys of the 6xxx series & other tempers may be submitted for approval. Nominal wall thickness of 0.125 inch(3.2mm) or greater is acceptable for structural extrusions; wall thickness less than 0.125 inch(3.2mm) may be acceptable and is subjected to approval. Minimum nominal wall thickness for non structural trim shall be 0.062 inch (1.6mm).
- 2. Acceptable alloy and temper combinations for sheet and plate subject to fabrication finish and structural requirements are: 3003-H14; 5005-H14. Other alloys of the 3xxx, 5xxx and 6xxx series and other tempers may be submitted for approval. Provide 0.125 inch (3.2 mm) minimum nominal thickness.

C. Anchors in Concrete

1. Anchors embedded in concrete and masonry shall be prime painted or hot dip galvanized rolled steel, or hot dip galvanized cold formed steel.
2. Strength of embedded anchors shall be developed by integral projections, welded deformed bars, or headed studs.
3. Expansion bolts are acceptable at concrete.
4. Self drilling, self threading screws are not acceptable. Screws in plugs and powder actuated fasteners are not acceptable.

D. Fasteners

1. Fasteners requirements are applicable to screws, bolts, nuts, washers, rivets and pins.
2. Fasteners outboard of or within a glazing pocket, gutter, flashed cavity or other potentially wet location (after completion of construction) shall be stainless steel type 302 or 304. Fasteners inboard of potentially wet locations shall be stainless steel type 302 or 304 or carbon steel with zinc plating, cadmium plating or Stalgard coating.
3. Provide lock washer or other locking device at all bolted connections.
4. Powder actuated fasteners are not acceptable.

E. Shims

1. At connections subject to movement, separate moving surfaces with friction reducing pads. Pads shall have minimum 0.062 inch (1.6 mm) thickness, shall sufficiently reduce friction to permit movement, shall be resistant to wear, and shall be positively retained in position (open ended slots are not acceptable). Pads shall not be subjected to heat damage welding or cutting, or to excessive pressure from over tightening of bolts.
2. Shims which transfer shear forces (tending to slid one shim against another) shall be steel plates, set in staggered and fillet welded to each other and to adjacent steel surfaces. Shims and welds shall be structurally designed to support applied loads.
3. Plastic shims are acceptable at static connections for which shims transfer only compressive forces.
4. Wood shims are not acceptable.

F. Weep hole filters shall be 20 to 45 pore per inch PVC coated open cell urethane foam.

G. Sealants

1. Acceptable products (subject to tests) for non-structural seals to substrates are: General Electric Silpuf; Dow Corning 790, 795 and 995; Tremco Spectrm 1 and Spectrem 2.
2. Acceptable products (subject to tests) for structural seals are: Dow corning 795, 983 and 995; Tremco Proglaze II; General Electric SSG 4000 and SSG 4400. Products requiring mixing of components are acceptable only for shop application.
3. Data sheets for and samples of other sealants may be submitted for approval. Oil base sealants are not acceptable.
4. Sealant back-up materials shall be polyethylene foam, urethan foam or extruded silicone as recommended by sealant manufacturer. Back-up shall not absorb water.
5. Coordinate with other sections to assure compatibility of intersecting sealants.

H. Thermal Insulation

1. Insulate spandrels areas with USG Thermo fiber or approved equal having 2 inch (50.8 mm) minimum nominal thickness with reinforced foil backing. Minimum R-value for insulation alone shall be 10.8 square feet - F - h/Btu (1.90 square meters - K/W).
2. Insulation shall be retained by aluminum or galvanized steel clips or straps, or integral pockets within window frames. Maximum spacing of clips and straps shall be 24 inches (610 mm). Welded or glued impaling pins are not acceptable. Maintain one inch (25 mm) nominal air space between insulation and glass.
3. Brace insulation where it contacts sashing, to prevent bow of insulation from pressure exerted by sashing.

I. Primers

1. Coat aluminum surface in contact with masonry, concrete or steel with prime paint or bituminous paint.
2. Prime paint carbon steel parts of anchors, embedded anchors, reinforcement and supports. After field welding, remove weld slag and touch up primed surface.
3. Provide minimum dry film thickness of one mil (0.0254 mm) for paint and 30 mils (0.762 mm) for bituminous paint. Prime paint shall conform to GSA specification TT-P-645.

J. Operable windows are required to conform to requirements of this Section. Except as otherwise specified, operable windows shall also conform (as a minimum) to ANSI / AAMA 101-9 classification P-A W 80.

1. Comply with Glazing System requirements.
2. Required test specimen size is largest size for this project, not the size required by ANSI / AAMA 101.
3. Locks and strikes shall be white bronze or type 302 or 304 stainless steel. Provide minimum two cam locks with removable handles and two strikes per vent.
4. Vent frames shall be extruded tubular aluminum.
5. Weatherstrips shall have a continuous spline engage in a continuous groove in the frame. Provide two continuous lines of weatherstrip at vent perimeters. Weatherstrips shall be extruded neoprene.
6. Balance arms shall be four-bar stainless steel type 302 or 304 with adjustable friction shoe. Provide two balance arms per vent.
7. Provide two limit stops and two hold open devices per vent. Material shall be type 302 or 304 stainless steel. Stops shall restrict clear opening to six inches (152 mm).
8. Provide push-bar-type operator located on the jamb at the sill.
9. Provide insect screen at each vent.
 - a. Aluminum screen cloth shall conform to FS RR-W-365 Type VII. Provide color as selected by Architect. Fabric 18BY18, 18BY16, or 18BY14 mesh of 0.013 inch diameter coated wire.
 - b. Wickets: Sliding or hinge type, framed and trimmed for a tight fit and durability during handling.
 - c. Frames: Tubular-shaped extruded or formed aluminum members of 0.040-inch minimum wall thickness, with mitred or coped joints and concealed mechanical fasteners. Finish matching windows. Provide removable PVC spline-anchor concealing screen frame edge.

K. Attic Stock

1. Upon completion of construction, deliver to designated storage area spare materials for maintenance and repair. Materials shall conform to the same requirements as materials used for construction.
2. Provide fifty (50) exterior horizontal trim covers in lengths required to satisfy all project conditions.

2.3 FABRICATION

- A. As far as practicable, fabrication shall be done in the shop.
- B. Exposed work shall be carefully matched to produce continuity of line and design. Joints in exposed work, unless otherwise shown or specified, shall be accurately fitted and rigidly secured.
- C. Except where otherwise shown, specified or directed, method of assembly and joining shall be at manufacturer's discretion.
- D. Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and by methods recommended by suppliers of alloys being welded. Welds behind finished surfaces shall be done as to minimize distortion and / or discoloration on finished side. Weld spatter and welding oxide on finished surfaces shall be removed by descaling and / or grinding.
- E. Unless otherwise shown or specified, weld beads on exposed surfaces shall be ground and finished to match and blend with finish on adjacent metal. Grinding and polishing of non-ferrous metal shall be done only with clean wheels and compounds free from iron and iron compounds. Soldering and / or brazing are not acceptable.
- F. Provide exposed fasteners only where shown on approved drawings. Exposed fastener heads shall be finished to match fastened material.
- G. Provide specified finishes on exposed surfaces. Provide specified galvanized finish or prime paint on concealed steel.
- H. Operable windows with two (2) sided structural glazing shall be unitised and shall be fully assembled, including silicone and glass, in the shop.

2.4 TOLERANCES

- A. Tolerances in current of Aluminum Association "Aluminum Standards and Data" are applicable to finished, fabricated and assembled materials. Maintain stricter tolerances where required for proper fit of components.

2.5 PAINTED ALUMINUM FINISH

- A. Painted aluminum finish shall be factory oven cured two coat (minimum) finishes. (Use DULUX ICI by Republic Powder Coat).
- B. Application of finish shall be performed under specifications issued by licensed formulator, by an applicator approved by formulator.
- C. Formulation shall follow Manufacturer Standard.
- D. Color shall match approved samples. Samples shall show extremes of color range.
- E. Pre-treatment for metal surfaces shall be done in accordance with procedures recommended by formulator.
- F. Pigmented organic painted aluminum is permitted only with written permission from the Architect. Unless touch-up is authorized, replace damage material with new material.

- G. Field touch-up of painted aluminum is permitted only with written permission from the Architect. Unless touch-up is authorized, replace damaged material with new material.
- H. Provide colors as selected by Architect.
- I. Warranty
 - 1. Color changes shall not exceed 5E NBS units as defined by ASTM D 2244 for specified special warranty period.
 - 2. Chalking shall not exceed a number 8 rating for colors and a number 6 rating for whites as defined by ASTM D 659 for specified warranty period.
 - 3. Paint film shall not crack or peel during specified warranty period.

2.6 ALUMINUM FINISH AT STRUCTURAL

- A. Mill finish is not acceptable at structural silicone bonding surfaces.
- B. Aluminum surface to which structural silicone will be adhered shall have a finish which demonstrates by the ability to satisfy specified requirements. Subject to testing, acceptable finishes are as follows.

2.7 STEEL FINISHES

- A. Cold formed carbon steel with 0.168 inch (4.27 mm) or less shall be hot dip galvanized to meet or exceed requirements of classification G 90 of ASTM A 525.
- B. Cold formed carbon steel with thickness exceeding 0.168 inch (4.27 mm) and hot rolled steel shall be prime painted in conformance with GSA Specification TT-P-645, or hot dip galvanized in conformance with ASTM A 123.

2.8 SOURCE QUALITY CONTROL

- A. Test shop applied structural silicone by applying outward design pressure for at least 10 seconds. Test minimum 5 percent of units, using random selection throughout production. Record date of test, result and identification marking of unit tested. Mark each unit so that structural silicone batch numbers and date of application can be traced. Submit test date for information only.
- B. Adhesion, Compatibility and Stain Tests
 - 1. Provide to sealant manufacturers samples of all substrates which are in contact with sealant, regardless of weather adhesion must be received.
 - 2. For substrates which must support adhesion, submit for record only sealant manufacturer's reports of adhesion tests conducted in accordance with ASTM C 794. Metal screen is an acceptable substitute for airplane cloth. Report shall specifically acknowledge suitability for structural silicone application where applicable.
 - 3. For substrates which are in contact with sealant, submit for record only sealant manufacturer's reports of compatibility tests for sealants and primers conducted in accordance with ASTM C 1087.
 - 4. For concrete, and other porous materials submit for record only sealant manufacturer's reports of stain test performed in accordance with ASTM C 1248.
- C. Inspect materials and workmanship to assure compliance with Contract Documents. Provide access to storage and manufacturing facilities for observation by Owner and Architect.

PART 3 – EXECUTION



3.1 EXAMINATION

- A. Verify that structure and site conditions are ready to receive work of this Section.
- B. Establish lines and elevations.

3.2 INSTALLATION

- A. Install materials in accordance with approved drawings. Provide labor, material, equipment and supervision necessary for complete installation.
- B. Tolerances
 - 1. Provide anchor adjustment capability for full range of specified tolerances for building structure, but not less than one inch (25 mm) in all directions.
 - 2. Work of this Section shall be within the following tolerances.
 - 3. Deviation from plumb, level or dimensioned angle shall not exceed 0.125 inch per 10 feet (3.2 mm per 3048 mm) of length of any member, 0.25 inch (6.4 mm) in any total run in any line.
 - 4. Deviation from theoretical position in plan or elevation, including deviation from plumb, level or dimensioned angle, shall not exceed 0.125 inch for any 12 foot (3.2 mm per 3658 mm) run in any direction.
 - 5. Maximum offset from true alignment between two consecutive members placed end to end shall not exceed 0.062 inch (1.6 mm).
 - 6. Maximum offset between glass framing members at corner of glazing pocket shall not exceed 0.031 inch (0.8 mm).
- C. Anchorage
 - 1. Anchor component parts. Install slip pads between moving parts.
 - 2. Provide non-corrosive separators between dissimilar materials.
 - 3. Remove weld slag and apply prime paint over welds. Prime paint exposed portions of embedded anchors. Touch up applied primer that is damaged by welding or other causes.
 - 4. Where slots or oversize holes are provided for adjustment only, secure connection after final adjustment. Interlocking serrations in extruded aluminum brackets and washers are acceptable. Steel weld washers with 0.25 inch (6 mm) minimum thickness are acceptable with steel brackets. Special washers or nuts which rely on friction and / or surface indentation of fastened part are not acceptable.
 - 5. Remove temporary shims and fasteners. Leave expansion joints free to move as designed.
- D. Clean surfaces to be sealed. Install backers, primers and sealants in accordance with drawings, test results and manufacturer recommendations. Tool sealants as separate operation after application. Immediately remove masking.
- E. Install thermal insulation specified supports.

3.3 FIELD QUALITY CONTROL

- A. Method for field check for water leakage, but not interpretation of results, shall conform to AAMA 501.2-94, except as modified herein. Operable doors and windows shall be tested in the same manner as fix wall areas. There shall be no unacceptable water leakage as defined herein. Provide powered

scaffold, hose, water supply and manpower to perform at least four successful tests, plus any unsuccessful tests. Water testing shall be conducted early in construction schedule. Construction sequence shall include provisions for timely completion of test areas. Remedial measures shall maintain standards of quality and durability and are subject to approval.

- B. Periodically test sealants in place for adhesion, using methods recommended by sealant manufacturer. Promptly replace any sealant which does not adhere or fails to cure.
- C. Test internal gutters by temporarily plugging weep holes and filling with water. After minimum of fifteen minutes, inspect for water leakage. Correct deficiencies and retest until successful tests are achieved. Remove weep hole plugs.

3.4 ADJUSTMENT

- A. Adjusting operating windows for proper fit within fixed frame.
- B. Adjust weatherstrips for continuous contact and seal in closed position.
- C. Adjust hardware for proper operation.

3.5 PROTECTION AND CLEANING

- A. Protect materials against damage and contamination. Clean surfaces as required to remove corrosive substances, during and at conclusion of construction.
- B. Periodically remove from the site debris, excess materials and unused tools and equipment resulting from this work. At conclusion of construction, leave premises in clean condition.
- C. Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- D. Clean glass of pre-glazed units promptly after installation of windows. Comply with requirements of the "Glazing" Section for cleaning and maintenance.
- E. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 08330

OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Extent of overhead coiling grilles is shown on drawings.
- B. Types of overhead coiling grilles include the following :
 - 1. Overhead coiling stainless steel grilles at parking garage entrances and exits electronically operated.
- C. Provide complete operating grille assemblies including curtains, guides, counterbalance mechanisms, hardware, operators and installation accessories, as indicated.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead coiling grille. Include operating instructions and maintenance data.
- B. Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturers product data.

1.3 QUALITY ASSURANCE

- A. Provide each overhead coiling grille as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.
- B. Unless otherwise acceptable to Architect, furnish overhead coiling grille units by one manufacturer for entire project.
- C. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of overhead coiling grille units. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.
- D. See concrete and masonry sections of these specifications for installation of inserts and anchorage devices.

PART 2 - PRODUCTS

2.1 GRILLE CURTAIN at Parking Levels

- A. General: Fabricate grille curtain consisting of a network of 16 mm minimum diameter horizontal rods spaced approximately 50 mm o.c. Interconnect rods by vertical links approximately 16 mm wide, spaced approximately 225 mm apart and rotating on the rods.
 - 1. Stainless Steel Grilles: AISI Type 302/304 with No. 4 finish.
- B. Bottom Bar: Manufacturer's standard extruded shape or two angles, finished to match grille.
 - 1. Provide replaceable flexible vinyl or neoprene continuous floor bumper at underside of bar.
- C. End Locks: Continuous end links or other devices at ends of rods, locking and retaining grille curtain in guides against excessive pressures, maintaining curtain alignment and preventing lateral movement.
- D. Guides: Manufacturer's standard extruded aluminum shape having curtain groove with return lips or bars to retain curtain. Furnish pile strips, rigid vinyl liner, or other non-metallic inserts to prevent metal-to-metal contact and minimize noise of travel. Furnish removable stops on guides to prevent over travel of curtain.

2.2 COUNTER BALANCING MECHANISM

- A. Counterbalance grille by means of steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel, connected to curtain. Use grease-sealed ball bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance: Hot-formed structural quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to support the roll-up curtain without distortion and limit barrel deflection to not more than 1 mm per 300 mm of span under full load.
- C. Furnish spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of case-hardened steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard design, either cast iron or cold-rolled steel plate.
- F. Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head. Contour to suit end of brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.
 - 1. Fabricate hoods for stainless steel grilles of Type 302/304, 24-gage stainless steel sheet, finished to match curtain.
 - 2. Furnish removable metal soffit when hood is mounted above ceiling, of same material and finish of curtain unless otherwise indicated.

2.3 MANUAL OPERATION

- A. Manual Push-Up Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 12 kg. Adjust operating mechanism so grille can be easily stopped at any point in its travel and to remain in position until movement is reactivated. Furnish pull down chain, strap, or hook. For grilles 2400 mm high and over, furnish pull down pole with hook.
 - 1. Furnish slide bolt locking device (with hasp for padlock) at each jamb on bottom bar.
- B. Chain Hoist Operator: Furnish manual chain hoist operator consisting of an endless steel hand chain, chain pocket wheel and guard, and a geared reduction unit with a maximum 15 kg. pull for door operation. Design chain hoist with a self-locking mechanism allowing grille to be stopped at any point in its travel and to remain in position until movement is reactivated.
 - 1. Furnish alloy steel hand chain with chain holder secured to operator guide.

2.4 ELECTRIC GRILLE OPERATORS

- A. General: Furnish electric operator assembly of size and capacity recommended and provided by grille manufacturer; complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, remote control stations, and control devices.
- B. Provide hand-operated disconnect or mechanism for automatically engaging a sprocket and chain operator and releasing brake for emergency manual operation. Mount disconnect and operator so they are accessible from floor level. Include an interlock device to automatically prevent motor from operating when emergency operator is engaged.
- C. Design operator so that motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- D. Operator Type: Furnish wall or bracket-mounted operator units consisting of electric motor, worm gear drive from motor to reduction gear box, chain or worm gear drive from reduction box to a gear wheel

mounted on counterbalance shaft, and disconnect- release for manual operation. Provide motor and drive assembly of horsepower and design as determined by manufacturer for size of unit required.

- E. Electric Motors: Provide high-starting torque, reversible, constant duty, Class A insulated electric motors with overload protection, sized to move grille in either direction, from any position, at not less than 200 mm nor more than 300 mm per second.
1. Coordinate wiring requirements and current characteristics of motors with building electrical system.
2. Provide open-drip-proof type motor, and controller with NEMA Type I enclosure.
- F. Remote Control Station: Provide momentary-contact, 3-button control station with push button controls labeled "open", "close" and "stop".
1. Provide interior units, full-guarded type, surface-mounted, heavy-duty, with general purpose NEMA Type I enclosure.
 2. Provide exterior units, full-guarded, standard duty, surface- mounted, weatherproof NEMA Type 4, enclosure, key operated.
- G. Automatic Reverse Control: Provide each grille with automatic safety switch, extending full width of bottom, and located within neoprene or rubber astragal mounted to bottom rail. Contact with switch before fully closing will immediately stop downward travel and reverse direction to fully opened position. Connect to control circuit through retracting safety cord and reel or self-coiling cable.
1. Provide electrically actuated automatic bottom bar.

2.5 APPROVED MANUFACTURERS

1. Metro Shutter
2. Lec Steel
3. Doortech
4. Or approved equal

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install grilles and operating equipment complete with necessary hardware, in accordance with final shop drawings, manufacturer's instructions, and as specified herein.
- B. Upon completion of installation including work by other trades, lubricate, test and adjust grilles to operate easily, free from warp, twist or distortion.

END OF SECTION

SECTION 08200

FLUSH PVC DOORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to work of this section.

1.2 SUMMARY

- A. Extent and location of each type of PVC door is indicated on drawings and in schedules.
- B. Shop priming of PVC doors is included in this section.
- C. Factory finishing of PVC doors is including in this section.
- D. Factory prefitting to frames and factory-premaching for hardware for PVC doors is including in this section.
- E. PVC flush door with louver including furnishing and installation, are specified under this section.

1.3 SUBMITTALS

A. Product Data

1. Door manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.
2. Made from PVC resin, stabilizer, modifier, and filler as required by SGS.
3. Thickness of panel board is between 1.51 mm – 1.66 mm.
4. The number of post or (key) of panel board :
 - a. size 60 cm. have 23 post
 - b. size 70 cm. have 27 post
 - c. size 83.5 cm. have 35 post
5. The thickness of the post is between 0.91 mm – 0.98 mm.
6. The thickness of stiffener for reinforcement of the hinges is between 1 mm. – 2 mm.
7. Hinges and screw are made from # 304 stainless steel.
8. Stainless steel plate @ knob area. Refer to architectural plan.
9. Panel can be painted by acrylic paint.

B. Shop Drawings

1. Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.
 - a. For factory-premachined door, details of construction, location and extent of hardware blocking fire ratings, requirements for factory finishing and other pertinent data.

C. Samples

1. Submit samples, 300 mm. square or as indicated, for the following
 - a. Doors for Transparent Finish: Door faces with PVC hardboard representing typical range of color for door finish.
 - b. Factory-Finish Doors: Each type of factory finish required.
 - c. PVC Louvers : Blade and frame in 150 mm lengths, for each material and finish required.
 - d. PVC Frames for Light Openings: PVC frames in 150 mm lengths; for each material, type and finish required.

1.4 QUALITY ASSURANCE

- A. Quality Standards : Comply with the following standards :
- a. Have BSMI (Bureau of Standards, Metrology, and Inspection) ISO 9002.
 - b. Have obtained SGS ISO 14001. Certificate number 82058-1.
 - c. Manufacturer: Obtain doors from a single manufacturer.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Identify each door with individual opening numbers, which correlate with designation system used on shop drawings for door, frames, and hardware, using temporary, removable or concealed markings.
- B. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the following requirements applicable to project's geographical location.
- C. Protect door during transit, storage, and handling to prevent damage.
- D. To prevent warp, don't store on temperature above 70°C.
- E. Avoid sharp object to prevent scratch or damage.
- F. Keep away from fire.
- G. As much as possible, do not expose to direct sunlight.

1.6 WARRANTY

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) or that show telegraphing of core construction in face PVC hardboard or do not conform to tolerance limitations or referenced quality standards.
- C. Contractor's Responsibilities
1. The contractor should check the door and jamb for defect. If there are defective doors, the contractor should reject the item and have it replaced.
 2. Under normal usage, the warranty allows to a period of 5 years.
 3. Scratches and change of color are not under warranty.

4. Replace or refinish doors where contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers : Subject to compliance with requirements, manufacturer's offering doors which may be incorporated in the work include, but are not limited to the following :
 - a. Polydoor Industrial Sales
 - b. Upson Industries Corp.
 - c. Emerald Vinyl Corp
 - d. Or Approve equal
- B. LOUVERS AND LIGHT FRAMES
 1. PVC Louvers: Door manufacturer's standard PVC louvers, unless otherwise indicated, and of size indicated.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine installed door frames prior to hanging door :
 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 2. Reject doors with defects upon delivery.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation see Division 8 "Finish Hardware" section of these specifications.
- B. Manufacturer's Instruction: Install PVC doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated.
- C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 1. Fitting Clearances for Non-Rated Doors: Provide 3mm at jambs and heads; 1.5mm per leaf at meeting stiles for pairs of doors; and 3mm from bottom of door to top of decorative floor finishes or covering. Where threshold is shown or scheduled, provide 12mm clearance from bottom of door to top of threshold.
 2. Bevel non-rated doors 3mm in 50mm at lock and hinge edges.
- D. Field- Finished Doors : Refer to the following for finishing requirements :
 1. Division 9 section "Painting".

3.3 ADJUSTING AND PROTECTION

- A. Operation: Rehang or replace doors, which do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure the PVC doors will be without damage or deterioration at time of substantial Completion.

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES AND COMMERCIAL STALLFRONTS/RESTAURANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections: The following sections contain requirements that relate to this Section:

1. Glazing requirements for aluminum entrances and storefront, including entrances specified to be factory glazed, are included in Division 8 Section "Glazing".
2. Lock cylinders are included in Division 8 Section "Finish Hardware".

1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum entrance and storefront assemblies that comply with performance characteristics specified, as demonstrated by testing the manufacturer's corresponding stock assemblies according to test methods indicated.
- B. Thermal Movement: Design the aluminum entrance and storefront framing systems to provide for expansion and contraction of the component materials. Entrance doors shall function normally over the specified temperature range.
1. The system shall be capable of withstanding a metal surface temperature range of 100 deg C without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.
- C. Design Requirements: Provide aluminum entrance and storefront system that comply with structural performance, air infiltration, and water penetration requirements indicated.
1. Wind Loads: Provide aluminum entrance and storefront assemblies capable of withstanding wind pressures of 1.28 KPa inward and 1.28 KPa outward acting normal to the plane of the wall.
- D. Structural Performance: Conduct tests for structural performance in accordance with ASTM E 330. At the conclusion of the tests there shall be no glass breakage or permanent damage to fasteners, anchors, hardware or actuating mechanism. Framing members shall have no permanent deformation in excess of 0.2 percent of their clear span.
1. Deflection Normal to the Plane of the wall: Test pressure required to measure deflection of framing members normal to the plane of the wall shall be equivalent to the wind load specified above. Deflection shall not exceed 1/175 of the clear span, when subjected to uniform load deflection test.
 2. Deflection Parallel to the Plane of the Wall: Test pressures required to measure deflection parallel to the plane of the wall shall be equal to 1.5 times the wind pressures specified above. Deflection of any member carrying its full dead load shall not exceed an amount that will Reduce glass bite below 75 percent of the design dimension and shall not reduce the edge clearance between the member and the fixed panel, glass or other fixed member above to less than 3.125 mm. The clearance between the member and an operable door or window shall be at least 1.562 mm.
- E. Air Infiltration: Provide aluminum entrance and storefront framing system with an air infiltration rate of not more than 0.06 CFM per sq.ft. of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at an inward test pressure differential of 0.075 KPa.
- Water Penetration: Provide framing system with no uncontrolled water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 0.3 KPa.

1.3 SUBMITTALS

1. Product data for each aluminum entrance and storefront system required, including:
 - a. Manufacturer's standard details and fabrication methods
 - b. Data on finishing, hardware and accessories
 - c. Recommendations for maintenance and cleaning of exterior surfaces
2. Shop drawings for each aluminium entrance and storefront system required, including:
 - a. Layout and installation details, including relationship to adjacent work.
 - b. Elevations at 1:50 scale.
 - c. Detail sections of typical composite members.
 - d. Anchors and reinforcement
 - e. Hardwired mounting heights.
 - f. Provisions for expansion and contraction.
 - g. Glazing details.
3. Hardware Schedule: Submit complete hardware schedule organized into sets based on hardware specified. Coordinate hardware with doors frames, and related work to ensure proper size, thickness, hand, function, and finish. Include item name, name of the manufacturer and complete designations of every item required for each door opening.
4. Samples for Initial Color Selection: Submit pairs of samples of each specified color and finish on 12-inch-long sections of extrusions or formed shapes. Where normal color variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of color variations.
5. Samples for Verification Purposes: The Architect reserves the right to require additional samples, that show fabrication techniques and workmanship, and design of hardware and accessories.
6. Test Reports: Provide certified test reports from a qualified independent testing laboratory showing that aluminum entrance and storefront system have been tested in accordance with specified test procedures and comply with performance characteristic indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed installations of aluminum storefront and entrances similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fabricator Qualifications: Provide aluminum entrances and storefront systems fabricated by a firm experienced in producing systems that are similar to those indicated for this Project, and that have a record of successful in-service performance. The fabricator shall have sufficient production capacity to produce components required without causing delay in progress of the work.
- C. Single Source Responsibility: Obtain aluminum entrance and storefront system from one source and from a single manufacturer.
- D. Design Criteria: The drawings indicate the size, profile, and dimensional requirement of aluminum entrance and storefront work required and are based on the specific types and models indicated. Aluminum entrance and storefront by other manufacturers may be considered, provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver aluminum entrance and storefront components in the manufacturer's original protective packaging.
- B. Store aluminium components in a clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.
 1. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.



1.6 PROTECT CONDITIONS

- A. Field Measurements: Check openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.
1. Where necessary, proceed with fabrication without field measurements, and co-ordinate fabrication Tolerances to ensure proper fit.

1.7 WARRANTY

- A. Warranty: Submit a written warranty, executed by the manufacturer, agreeing to repair or replace skylights that fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to, the following:
1. Structural failure including excessive deflection, excessive leakage or air infiltration.
2. Faulty operation
3. Deterioration of metals, metal finishes and other materials beyond normal weathering
- B. Warranty Period: 5 years after the date of Substantial Completion.
1. The warranty shall not deprive the Owner of other rights or remedies the Owner may have under other provision of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Members: Alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for aluminum extrusions, ASTM B 209 for aluminum sheet or plate, and ASTM B 211 for aluminum bars, rods, and wire.
- B. Carbon Steel reinforcement of aluminum framing members shall comply with ASTM A 36 for structural shapes, plates and bars, ASTM A 611 for cold rolled sheet and strip, or ASTM A 570 for hot rolled sheet and strip.
- C. Glass and Glazing Materials: Comply with requirements of "Glass and Glazing" section of these specifications.
- D. Panel Core Material: Resin-impregnated Kraft paper honeycomb.
- E. Panel Core Material: Rigid, closed-cell polyurethane insulation.
- F. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, zinc plated steel or other material warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
1. Reinforcement: Where fasteners screw-anchor into aluminum members less than 3.125 mm thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splinted grommet nuts.
2. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws that match the finish of member or hardware being fastened.
- G. Concealed Flashing: 0.5 mm (26 gage) minimum dead-soft stainless steel, or 0.65 mm thick minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

- H. Brackets and Reinforcements: Provide high-strength aluminum brackets and reinforcements; where use of aluminum is not feasible provide nonmagnetic stainless steel or hot-dip galvanised steel complying with ASTM A 123.
- I. Concrete and Masonry Inserts: Provide cast iron, malleable iron, or hot-dip galvanised steel inserts comply with ASTM A 123.
- J. Compression Weather-stripping: Manufacturer's standard replaceable compressible weather-stripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
- K. Sliding Weather-stripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, w/ nylon fabric or aluminum strip backing, complying w/ AAMA 701.2.

2.2 HARDWARE

- A. General: Refer to Division 8 Section "Finish Hardware" for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer.
- B. Provide heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.
 - 1. Center Pivot Sets: Comply with ANSI A156.4, Grade 1. Provide exposed parts of cast aluminum alloy.
 - 2. Ball Bearing Butts: 5-knuckle, 2-bearings, steel ball bearing butts sized to comply with ANSI A156.1, Grade 1. Provide 2 butt for doors 2,250 mm or less; provide 3 butts for taller and heavier doors.
 - 3. Single-Acting Center-Hung Concealed Floor Closers: Comply with ANSI A 156.4, Grade 1.
 - 4. Provide bottom arm, top pivot, cement case, and threshold or finished floor plate as indicated. Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather and anticipated frequency of use. Include the following:
 - a. Automatic hold-open at 85, 90, 95 or 105 degrees, as selected.
 - b. Provide positive dead stop at the opening angle standard with the manufacturer for the hold-open angle selected.
 - c. Delayed action closing.
 - 5. Double-Acting Center-Hung Concealed Floor Closers: Comply with ANSI A 156.4, Grade 2.

Provide bottom arm, top pivot, cement case, and threshold or finished floor plate, as indicated. Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather and anticipated frequency of use. Include the following:

 - a. Automatic hold-open at 85, 90, 95 or 105 degrees, as selected.
 - b. Provide positive dead stop at the opening angle standard with the manufacturer for the hold-open angle selected.
 - 6. Single-Acting, Independently Hung, Concealed Overhead Closers: Comply with ANSI A156.4, Grade 2. Provide concealed arm and track. Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather and anticipated frequency of use.
 - 7. Single-Acting, Center-Pivoted Concealed Overhead Closers: Comply with ANSI AS 156.4, Grade 2. Provide bottom pivot. Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather and anticipated frequency of use. Include the following:
 - a. Automatic holds open.
 - 8. Double-Acting, Centre-pivoted Concealed Overhead Closers: Comply with ANSI A156.4, Grade 2.

Comply with the manufacturer's recommendations for closer size, depending on door size, exposure to weather and anticipated frequency of use. Include the following:

- a. Automatic hold-open
8. Surface-Mounted Overhead Closers: Modern type with cover, for hinge side installation. Comply with ANSI A156.4, Grade 1. Comply with manufacturer's recommendations for closer size, depending on closer size, depending on door size, exposure to weather & anticipated frequency of use. Include the following:
- a. Hold-open arm
 - b. Delayed-action closing.
9. Concealed Overhead Holders: Adjustable, shock-absorbing type concealed overhead holders; comply with ANSI AS 156.8.

10. Exposed Overhead Holders: Streamlined type exposed overhead holders for use on single-acting doors; comply with ANSI A 156.8.
11. Door-mounted Holder: Flip-up type holder with rubber shoe, for mounting on lower rail; comply with ANSI A156.16, Grade 1.
12. Door Stop: Floor-or wall-mounted doors stop, as appropriate, with integral rubber bumper; comply with ANSI A156.16, Grade 1.
13. Cylinders are supplied under another Division 8 Section for keying into the building system.
14. Cylinders: Mortise type, 6-pin tumbler, inside cylinder units with cast aluminum face; comply with ANSI A156.5, Grade 1.
15. Thumb-Turns: Inside thumb-turn cylinders of cast aluminum alloy.
16. Deadlocks: Mortised maximum security deadlock, with minimum 25 mm long pivoted bolt and stainless steel strike box; comply with ANSI A156.5, Grade 1.
17. Deadlatches: Mortise type detach with stainless steel strike box; comply with ANSI A 156.5, Grade 1.
18. Lever Handles: Cast aluminum alloy inside knob handles units.
19. Panic Hardware: Concealed-rod type panic exit devices activated by full-width crash bar. Comply with UL 305.

20. Flushbolts: Standard edge mortised lever extension type flushbolts for inactive leaves of pairs of doors. Provide flushbolts at both the top and bottom of doors. Comply with ANSI A 156.16.
21. Automatic Flushbolts: Edge mortised automatic flushbolts at top and bottom of the inactive leaf of pair of doors; use in combination with single point, center-mounted deadlock in the active leaf, concealed rod mechanism in the lock stile of the inactive leaf, two-stage locking of both leaves and one-stage unlocking of both leaves by actuation of deadlock
22. Push-Pull Plates: Aluminum push-pull plates of style indicated.
23. Pull Handles: Aluminum pulls handles of style indicated.
24. Push Bars: Aluminum pushes bars of style indicated.
25. Thresholds: Extruded aluminum threshold of size and design indicated in mill finish, complete with anchors and clips, coordinated with pivots and floor-concealed closers.

2.3 COMPONENTS

- A. Storefront Framing System: Provide storefront and entrance framing systems fabricated from extruded aluminum members of size and profile indicated. Include sub-frames and other reinforcing members of the type indicated. Provide for flush glazing storefront from the exterior on all sides without projecting stops. Shop-fabricate & pre-assemble frame components where possible. Provide storefront frame sections w/out exposed seams.
 1. Mullion Configurations: Provide pockets at the inside glazing face to receive resilient elastomeric glazing. Mullions and horizontal shall be one piece. Make provisions to drain moisture accumulation to the exterior.
 2. Infill Panels: Provide flush-laminated Infill panels of thickness indicated fabricated with panel core material laminated with waterproof glue between two sheets of aluminum.
- B. Entrance doorframes: Provide tubular and channel from entrance door frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards. Reinforce, as necessary to support required loads.
- C. Stile-and-Rail Type Entrance Doors: Provide tubular frame members, fabricated assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards. Reinforce, as necessary to support required loads.
 1. Glazing: Fabricate doors to facilities replacement of glass or panels, without disassembly of stiles and rails. Provide Snap-On extruded aluminum glazing stops, with exterior stops anchored for non-removal.
 2. Design: Provide 45-mm thick doors of design indicated.
 - a. Wide stile (over 4 inches wide)
 - b. Center panel (door glazed with 2 or 3 lights)
- D. Flush Panel-Type Aluminum Doors : Provide flush panel-type doors fabricated with tubular frame members with reinforced mechanical or welded joints; limit frame exposure to 19 mm maximum width on door faces. Provide minimum 1.6 mm thick aluminum face sheets, mechanically interlocked with frame members or laminated to panel core material and framing with waterproof glue.
 1. Design: Provide 45-mm thick doors of design indicated.
 2. Lights: Provide glazed openings as indicated, with aluminum moldings and stops. Provide non removable stops on the exterior.

2.4 FABRICATION

- A. General: Fabricate aluminum entrance and storefront components to designs, sizes and thickness indicated and to comply with indicated standards. Sizes and profile requirements are indicated on the drawings. Variable dimensions are indicated, with maximum and minimum dimensions required, to achieve design requirements and coordination with other work.
- B. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible before shipment to the Project site. Disassemble components only as necessary

for shipment and installation.

1. Perform fabrication operations, including cutting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
 2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
 3. Pre-glaze door and frame units to greatest extent possible
- C. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.
1. Welding behind finish surfaces shall be performed in such a manner as to minimise distortion and discoloration on the finished surface.
- D. Reinforcing: Install reinforcing as required for hardware and as necessary for performance requirements, sag resistance and rigidity.
- E. Dissimilar Metals separate dissimilar metals with bituminous paint, or a suitable sealant, or a non-absorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coating containing lead.
- F. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.
- G. Fasteners: Conceal fasteners wherever possible.
- H. Weather-stripping for exterior doors, provide compression weather-stripping against fixed stops. At other edges, provide sliding weather-stripping retained in adjustable strip mortised into door edge.
1. Provide EPDM or vinyl-blade gasket weather-stripping in bottom door rail, adjustable for contact with threshold.
 2. At interior doors and other locations without weather-stripping, provide neoprene silencers on stops to prevent metal-to-metal contact.
- I. Provide finger guards of collapsible neoprene or PVC gasketing securely anchored into frame at hinge-jamb of center-pivoted doors.

2.5 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and supports, with the Installer present, for compliance with requirements indicated installation tolerances, and other conditions that affect installation of aluminum entrances and storefronts. Correct unsatisfactory conditions before proceeding with the installation.
1. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Install components in proper alignment and relation to established lines and grades indicated. Provide proper support and anchor securely in place.

- C. Construction Tolerances: Install aluminum entrance and storefront to comply with the following tolerances
1. Variation from Plane: Do not exceed 1/8 inch in 12 feet in of length or 1/4 in any total length.
 2. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16 inch.
 3. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8 inch.
 4. Offset at Corners: The maximum out-of-plane offset of framing at corner shall not exceed 1/32 inch.
- D. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
1. Zinc or cadmium plate steel anchors and other unexposed fasteners after fabrication.
 2. Paint dissimilar metals where drainage from them passes over aluminum.
 3. Paint aluminum surfaces in contact with mortar, concrete or other masonry with alkali resistant coating.
 4. Paint wood and similar absorptive material in contact with aluminum and exposed to the elements or otherwise subject to wetting, with two coats of aluminum house paint. Seal joints between the materials with sealant.
- E. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- F. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealant, fillers, and gaskets.

3.3 ADJUSTING

- A. Adjust operating hardware to function properly, for smooth operation without binding, and weathertight closure.

3.4 CLEANING

- A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with requirements contained in the "Glass and Glazing"
- C. Section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.5 PROTECTION

- A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrance and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.1 SUMMARY:

- A. Everything necessary for and incidental to the execution and completion of all finish hardware work, as indicated on the drawings and specified herein.
- B. Extent of finish hardware is shown on the drawings and in the schedules. Finish hardware is hereby defined to include all items known commercially as "Builders Hardware" as required for "Main Doors" (swinging), including special purpose type doors as may be listed herein, except for special types of hardware specified in the same section as the door or door frame.

1.2 QUALITY ASSURANCE:

- A. Manufacturer: Obtain each kind of hardware (latch and locksets, hinges, closers, etc.) from one manufacturer even though several may be listed as acceptable.
- B. Supplier: Subcontract the furnishing of hardware only to a recognized builders hardware supplier who has been furnishing hardware for a period of not less than 5 years and who has in his full time employ an Architectural Hardware Consultant to supervise the execution of this section. Consultant will be available at all reasonable time, during the course of the work, for project consultation with the Owner, Architect or Contractor. Contractor: Assign the installation of hardware to tradesmen experienced in the installation of commercial finish hardware.
- C. Scheduled Designations: Except as otherwise indicated, the use of one manufacturer's numeric designation system in schedules does not imply other manufacturer's products will not be acceptable. Proposed substitutions must be submitted to the Architect/Project Manager at least 10 days prior to bid date complete with all necessary documentation, samples, price comparisons or other pertinent information required for proper evaluation. If acceptance is granted, notification will be issued by Addenda.
- D. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard 80. This requirement takes precedence over other requirements for such hardware. Provide only hardware, which has been tested and listed by UL or other, approved testing and standards agency and bears appropriate label or symbol for the types and sizes of doors required and compliance with the requirements of the required label and function of the opening.
- E. Accessibility for the physically handicapped: Special hardware requirements for knurling, slow acting closers or other barrier free opening requirements shall be provided as indicated by the hardware schedule or as required by applicable code.
- F. Any opening shown on plans requiring hardware and not specifically mentioned shall be furnished with hardware corresponding to that of similar openings. Any item of hardware not specifically called for in the hardware groups but obviously required for proper operation of the openings or compliance with the applicable codes, including handicapped requirements, if not brought to the attention of the Architect prior to bid date, is assumed to be included in the suppliers proposal.

1.3 REFERENCES:

- A. Applicable specifications listed below (including the amendments, addenda and designated changes) form a part of this specification to the extent indicated by the reference thereto.
- B. Federal Specifications (FS): FF-H-111C-74 Hardware, Builders Shelf and Miscellaneous.
- C. National Fire Protection Association (NFPA): 80-86 Fire Doors and Windows.

- D. American National Standards Institute (ANSI): A117.1-86 - Specifications for making buildings and facilities accessible to and usable by physically handicapped people. A.156.18 - Materials and Finishes.
- E. Door and Hardware Institute (DHI):
 - 1. Keying - Procedures, Systems and Nomenclature - 1978.
 - 2. Abbreviations and Symbols - 1983.
 - 3. Recommended Locations for Builders Hardware for Custom Steel Doors and Frames - 1976.
 - 4. Recommended Procedures for Processing Hardware Schedules and Templates - 1978.

1.4 SUBMITTALS:

- A. Suppliers Hardware Schedule: Submit finish hardware schedule in accordance with Division -1 in the manner and format prescribed and used herein, complying with the actual construction progress. Hardware schedules are intended for coordination of the work. Review and acceptance by the Architect or Owner does not relieve the Contractor of his exclusive responsibility to fulfil the requirements as shown and specified.
- B. Finish Hardware Schedules: Based on finished hardware indicated, organize hardware schedule into groups or sets showing complete designations of every item required for each door opening. Horizontal hardware schedules are not acceptable and will not be reviewed by the Architect. Include the following:
 - 1. Number, location, hand and material of each door opening. (Hands and swings to be determined in relation to key side of opening). Type, style, function, size, finish and quantity of each hardware item.
 - 2. Name and manufacturer of each item.
 - 3. Fastening requirements.
 - 4. Explanation of abbreviations used if other than DHI abbreviations and symbols.
 - 5. Special mounting locations and instructions.
 - 6. Keying information.
- C. Furnish an index cross referencing door number, Architects hardware group and suppliers hardware group. Schedule shall be vertical layout similar to the format used herein. Lines shall be double-spaced, pages numbered and dated.
- D. Submit 3 copies of catalogue cuts of all items used in the suppliers' schedule. Two copies are to be retained by the Contractor and one copy retained by the Architect.
- E. Samples: If requested by the Architect, submit one sample of each type of exposed hardware, finished as required, and tagged with full description for coordination with the schedule.
- F. Certificate: When requested by the Architect furnish manufacturers certificates attesting that hardware items conform to the references under which the items are governed.
- G. Operating Instructions: Furnish Owner with one complete set of installation instructions, including the manufacturer's catalogue, special adjusting tools and maintenance instructions. One complete catalogue shall be furnished for each manufacturer listed in the approved hardware schedule.
- H. Templates: The hardware supplier shall provide necessary templates and/or physical hardware to all trades or factories requiring them so they may cut, reinforce or otherwise prepare their material or product to receive the hardware item. If any manufacturer requires physical hardware, the hardware

supplier shall ship to them such hardware via prepaid freight in sufficient time to prevent any delay in the execution of their work.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. All items of hardware to be delivered to the job site shall be completely packaged with all necessary screws, bolts, miscellaneous parts, instructions and where necessary installation templates for manufacturer's suggested installation. They are to be clearly labelled so as to conveniently identify them and their intended location in the building.
- B. Finish hardware shall be delivered to the General Contractor by the hardware supplier. Direct factory shipments (drop shipments) to the job site are not acceptable. Representatives of the General Contractor and the hardware supplier shall jointly inventory the hardware. Items damaged in shipment shall be replaced promptly and with proper material without additional cost to the General Contractor. All hardware shall be handled in a manner to eliminate marring, scratching or damage.
- C. A representative of the General Contractor shall receive the hardware when delivered at the job site. A dry, locked storage space complete with shelving, shall be set aside for the purpose of unpacking, sorting out, checking and storage. Control the handling and installation of hardware items, whether immediately replaceable or not, so completion of the work will not be delayed by losses before or after installation.

1.6 WARRANTIES:

- A. Warranties shall be furnished in accordance with Division 1.
- B. All hardware shall be warranted by the Manufacturer to be free from defects in materials and workmanship for a period of five (5) years from substantial completion of the project.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Products are listed here on an "or equal" basis but must be approved by the Architect prior to the placing of any orders.

2.2 MANUFACTURERS:

Distributors:

- 1.) Hafele 2.) Chain Glass 3) Yale 4) Stanley 5) Dormakaba 6) Co Ban Kiat
- 7) Or Approve equal

A. LOCKS AND LATCHES:

- 1. Are coded in the schedules by single or double letters which are abbreviations for the description of the latch set function e.g. Latch set function designation 'C' stands for a "Classroom" type lock, whereby the outside knob is locked and unlocked by a key whilst the inside knob is always unlocked. A list of designations for functions together with their operational descriptions is given below.
- 2. All locks and latches shall be heavy duty commercial grade; Yale "D" series, ANSI Grade 1, or similar approved except for doors in residential area's which shall be heavy duty residential grade; "Yale "A" series, ANSI Grade 2, or similar approved.
- 3. Locks and latches for use on all doors shall be heavy-duty mortise locks; N-301 series, For toilet use Falcon N-511 ANSI Grade 1, or similar.

4. A list of acceptable manufacturers are as follows; All locks and latches are to be supplied from the same manufacturer for toilet & typical door.

A.) Hafele B.) Goodlock C.) or approved equal

Distributed by :

1.) Main Hardware 2.) Goldbond Marketing 3.) Philman Comm'l 4.) Grand Nova

5. Panic devices are described as "PA" in the schedules and shall be the product of Adams Rite, Ada Duprin, Sargent, Monarch. Grade and function as listed at least equal to Von Duprin series 9975K-FX (MK Cylinder) for approval.
6. Gear shall be selected from manufacturers standard range to fully suit type of door specified for the opening and to generally comply with the details provided. The contractor shall co-ordinate all accessories to make the door fully functional and as accepted by the Architect.

Refer to drawings for further details and requirements.

7. Successful lock manufacturer must furnish a mounted sample of their lock and design prior to final approval.

B. HINGES:

1. Hinges are described in the schedule sheets by grade of function in the following manner. Number of hinges per door is specified elsewhere in this section although 3 sets (1 1/2 pairs) is usual for standard type doors. Manufacturers written recommendations and warranty must accompany any deviation from specification requirements.
2. All hinges shall be mortise five knuckle butt hinges unless specifically detailed or shown on swing requirements on plans. All hinges shall be by the same manufacturer and match in appearance. All hinges shall be of polished stainless steel.
- a. NBB = No Ball Bearing, low frequency, plain bearing stainless steel hinge
 - b. 2BB = 2 Ball Bearing, Med. frequency anti-friction stainless steel hinge
 - c. 4BB = Four Ball Bearing High frequency, heavy door, anti-friction stainless steel hinge
3. Hinges shall be the product of "Hafele", Stanley 0 knuckle design shall be the type & grade listed and hinges are to have holes in the bottom plug to facilitate pin removal.
4. Furnish 2 hinges for doors 1500 mm or less in height and one additional hinge for each additional 750 mm of height or fraction thereof. Mineral core, labelled wood doors are to have 1 (one) more hinge than required by the preceding, unless door manufacturer guarantees his door with full mortise hinges using the above quantities.
5. Furnish non-removable pins (NRP) for all reverse bevel doors receiving keyed locks, rigid outside trim, or exit only hardware.
6. Hinges for single doors greater than 1200 mm wide, or 2400 mm high, or where the door thickness exceeds 45 mm, or where doors are fabricated or designed to special requirements requiring special or non-standard hinges, shall be designed to suit by the contractor. Hinges in this category must have the manufacturers guarantee and warranty confirming that hinges are suitable and proper for the application in hand and shall require the Architects approval.
7. Hinges for labelled doors shall comply with the requirements of NFPA 80. Hinges and door thickness are to be co-ordinated & checked for proper interfacing by the contractor prior to placing of any orders.
8. Hinge backset for doors up to 58 mm thick shall be 6mm. Backsets for doors over 58 mm thick shall be 9 mm although backset dimensions require ratification and approval by Hinge manufacturer selected.
9. Doors which open onto public spaces and would ordinarily have exposed hinge knuckles shall be fitted with invisible hinges matching performance for full mortise butt hinges where specified.

This is a co-ordination responsibility for the contractor where doors may be listed otherwise, and is only subject to final approval on submission of contractors door schedules for purchasing.

C. DOOR CLOSERS:

1. Closer types are described in the schedules in the following manner. Descriptions are given adjacent.
 - a) Room-side : "Exposed overhead" closer on room side of door opening serving that room.
 - b) Out-side : "Exposed overhead" closer on out side of door opening serving that room.
 - c) C.O.H.: Concealed Overhead Closer. Fully mortised into head frame.
 - d) Jamb : Concealed Jamb Closer. fully mortised in door or jamb frame.
 - e) Floor : Concealed Floor Closer. Fully recessed flush with finished floor.
2. Sizes and models for all types of closers shall be determined by the manufacturers written recommendations for door and frame sizes, materials, finishes, and location, Architects approval will be subject to contractors final fully co-ordinated proposal prior to ordering of any items including doors, frames, or any materials which may affect the final selection of closer types.
3. Exposed overhead closures for standard doors shall be the product of the following or approved equal. All closers of this type shall be non-handed.
 - a) Dorma TS83 series.
 - b) LCN 1460 series.
 - c) Modric 9156A/9151A series.
 - d) Norton 8400 series.

Closers shall receive full covers for satin or polished stainless steel finish, or polished chrome where specified.

4. Concealed Overhead Closers (C.O.H.) for all he/she toilets/fire escape shall be the product of the following or approved equal.
 - a) Dorma RTS 88 series.
 - b) LCN 2010 series.

Concealed overhead closers shall be head frame recessed type with arm completely concealed when door closes.

D. GASKETING:

1. Gasketing is described in the schedule sheets as being one of the following;
 - a) Airtight (AIR) - Pemko S2/S3
 - b) Fireproof (FIRE) - Pemko S88/Hager 726S
 - c) Smokeproof (SMOKE) - Pemko S88/Hager 726S
 - d) Soundproof (SOUND) - Pemko 320AN
 - e) Weatherproof (WEATHER) - Pemko S2/S3
2. Gasketing shall be the products of Pemko Hager, Zero, Stanley, Reese, .
3. Gasketing requirements shall be co-ordinated by the contractor to comply with thresholds where required and to comply with door ratings and other requirements of the specification. Generally, where a particular manufacturer has been selected for gasketing materials/systems then the same manufacturer should be used where thresholds or saddles are required.
4. All proposals by the contractor shall be in accordance with the written recommendations of the manufacturer for compliance with all requirements, including compatibility with thresholds, jamb frames and gasketing.
5. Door bottom protection where required shall be compatible with jamb and head system proposed as per manufacturers recommendations.

6. Except for plant and non public areas, astragal or meeting stile gasketing shall be rebated into the stiles as per Pemko 369 AS W/S2 gasket.
7. All door frames shall be furnished with "Silencers" in grey line moulded rubber equal to "Hafele" door silencer or equivalent for hollow metal frames and "Hafele" door silencer or equivalent for wood frames. Furnish three (3) silencers per single door and four (4) silencers for double doors.

E. ASTRAGALS:

1. Astragals for plant or back of house double doorsets shall be formed using flat surface astragals on "V" bevel junctions between meeting stiles unless otherwise noted. Typical details are included in the detail book under section A.30.
2. Astragals or meeting stile conditions for doors in public areas, front of house areas, or where specified shall be furnished with bullnose meeting stiles. Gaskets where required in such doors shall be fully recessed and adjustable as per Pemko Mortice Mount 354 series, or equal to suit gasketing requirements.
3. Where rebated astragals are shown on door details, and flush bolts are specified, flush bolts shall be recessed fitted flush with the internal face of the door, or flush with the door face opposite public view.
4. Astragals, or meeting stile conditions, for plant or other doors accessible to public view shall be formed using parallel bevel door stiles. Gaskets where required in such doors shall be fully recessed and adjustable as per Pemko Mortice Mount 354 series or other to suit gasketing requirements.
5. All astragals where gasketing is specified shall be in accordance with the manufacturers written recommendations. It is the contractors sole responsibility to ensure that astragal proposals are fully co-ordinated with gasketing proposals for jambs, heads and thresholds, and that ratings for fire, smoke, sound etc are met with their proposal.

F. CO-ORDINATORS:

1. Co-ordinators shall be the product of Dorma Door Control, LCN.

G. THRESHOLDS:

1. Thresholds are described in the schedule sheets as being one of the following;
 - a) Airtight (AIR)
 - b) Fireproof (FIRE)
 - c) Smokeproof (SMOKE)
 - d) Soundproof (SOUND)
 - e) Weatherproof (WEATHER)
2. Threshold proposals including gaskets and saddles shall be co-ordinated with gasketing requirements and shall form part of the contractors proposal complying with requirements of this part, among others, of the specifications.
3. Threshold types are indicated at the front end of the Door Schedule and also in the External and Internal Door Details sections of the detail book; section A.30.
4. Where thresholds are co-ordinated with door bottom sweeps they shall suit Hager 778S or 777S series to suit door thickness in use for external doors. Refer to hardware groups at the end of this section for typical suggested combinations.

H. KEY ACCESS CODES:

1. Key access codes are described in the schedule sheets by letter coding for master key access and programming under the following designations;

M&E = Mechanical and Electrical Engineering Access
SEC = Security Personnel access
MAN = Complex Management access
COM = Communications Engineering personnel access
TEN - Tenant access

2. The above coding and programming is suggestive only and is intended for co-ordination between the Owner and the Supplier of locks for the project. Schedule sheets provided by the Architect shall remain blank and shall be interfaced by the contractor and Owners representatives.

I. DUST STRIKES:

1. Dust strikes shall be spring-loaded and the product of Glynn Johnson, HB Ives, Builders Brass, Modric, and shall be properly co-ordinated by the contractor to suit the finally selected flush bolts.
2. Duststrikes in thresholds shall be "Hafele" or equal. Oustrikes for floors and thresholds shall be of the following.
 - a) "Hafele" DPS-5 floor and threshold type.
 - b) "Hafele" DPS-5 for wood floor.
 - c) "Hafele" DPS-7 for stone floor.

J. FLUSH BOLTS:

1. Flush bolts are described in the schedules as being manual or automatic and shall be the product of "Hafele" of Glynn Johnson, Modric, Builders Brass, Works, HB Ives Hager,
2. Manual flush bolts for timber doors shall have " Hafele" one pair (top and bottom). Flush bolts shall have a spring loaded snap action lever, which will retract the bolt when moved to the "up" position, and project the bolt into the head frame when moved to the "down" position. Flush bolts shall have a 16 mm throw with a 22 mm vertical adjustment. Flush bolts shall be made from forged brass. When used on labelled doors, bolts shall wear appropriate listing as manufactured by "Hafele" or approved equal.
3. Manual flush bolts for metal doors shall have "Hafele" FWIHISULTS one pair (top and bottom). Other requirements will be same for manual flush bolts in timber doors, or as per manufacturers written recommendations.
4. Automatic Flush bolts for metal and timber doors shall have one pair (top and bottom). Flush bolts shall automatically retract when the active door is opened, and project into the head frame when the active door is closed. Flush bolts shall be reversible with an effective throw of 19 mm and a 50-mm vertical adjustment of the bolt and rod without removing door and frame. Units shall have built-in extra strength and Cam action to eliminate the need for a fusible link. When used on labelled doors, bolts shall bear UL listing as manufactured by Glynn Johnson or approved equal.
5. Flush bolts specified for doors with rebated stile junctions shall be fitted fully mortised into and flush with the internal or non-public side of the door.
6. Top bolts on all flush bolts shall not be more than 1875mm from finished floor to centreline, or to activating lever.

K. RESTRAINING HOOKS:

1. Restraining hooks shall be the product of Glynn-Johnson/Modric Builders/HB Ives/Hager-Automatic wall type holders series GJ-4W-45A with polished chrome finish.
- L. Miscellaneous Door Hardware: Provide Plates, trim, letter box, viewers, knockers, bells, and similar units as indicated.
- M. Weatherstripping: Provide type, size, and profile indicated, continuous at head and jamb edges of each exterior door opening. Provide non-corrosive fasteners.

2.3 FINISHES, KEYING AND FASTENERS:

- A. Base metals: Produce hardware units of basic metal and forming method indicated, using manufacturers standard metal alloy composition, temper and hardness, but in no case of lesser quality than specified or inferred by use of a particular manufacturer's number, style or grade or as established by appropriate referenced specification listed herein.
- B. Finishes: Unless otherwise specified all exposed hardware finishes shall be in bright polished chrome stainless steel finish. Finishes shall conform to the quality of finish including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than the standards established by ANSI A156.18 (BHMA 1301) or Federal Specifications FF-H-111C as applicable.
- C. All service areas with exposed hardware shall be satin finish stainless steel. Panics shall have satin finish extruded aluminium cross bars with satin finish trim and satin finish stainless push pads.
- D. Keying: Supplier to meet with Owner to determine keying requirements and obtain final instructions.
- E. Provide the type of system required: (master, grand master, great grand master). Nomenclature and layout to be consistent with DHI "keying - Procedures, Systems and Nomenclature."
- F. Provide keys of nickel silver only. Furnish 4 change keys per lock (stamped with key change number), 6 master keys per set, 6 grand master keys (per set).
- G. All locks to be construction master keyed. Equip locks with manufacturer's special 6 pin tumbler cylinders, which permit voiding construction keys without removal of the cylinder. Furnish 20 construction keys.
- H. Furnish a key control cabinet equal to Key Control Systems, Inc. with permanent loan register and hook capacity for each lock specified herein plus 200%.
- I. Fasteners: Manufacture hardware to conform to published templates, generally prepared for machine screw installation. Do not provide hardware, which has been prepared for self-tapping or sheet metal screws except as specifically indicated.
- J. Where wood screws are required they shall be full thread (to the head) type. Combined wood/machine screws, in lieu of wood screws, are to be avoided.
- K. Furnish screws for installation with each hardware item. Provide Phillips flat head or oval head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match the hardware finish or, if exposed in surfaces of other work, to match the finish of such work as closely as possible, except as otherwise indicated.
- L. Provide concealed fasteners for hardware units, which are exposed when the door is closed, except to the extent no standard manufactured units of the type specified are available with concealed fasteners. Do not use through bolts for installation except where it is not possible to adequately reinforce the work, to accept machine screws or concealed fasteners or another standard type, to satisfactory avoid the use of through bolts. Where door closers or panic devices are specified for use on mineral core, labelled wood doors they shall be installed with shoulder thru-bolts and screws, but only if the door manufacturer cannot adequately reinforce his door for non- "through the door" type fasteners, finished required, of the proper lengths to prevent collapsing of the face sheets. Grommet nuts and sealnuts

are not acceptable. Provide fasteners which are compatible with both the unit fastened and the substrate, and which will not cause corrosion or deterioration of hardware, base material reinforcement or fastener. Furnish wall stops with "Toggler" anchors and wood screws. Furnish thresholds and floor stops with lead anchors and 1/4 - 20 stainless steel or brass machine screws.

PART 3 - EXECUTION

3.1 STORAGE AND HANDLING:

- A. Product handling and storage: Provide secure lock up with adequate storage and shelving to properly store and organize hardware for orderly dispersment. Control the handling and installation of hardware items, whether immediately replaceable or not, so completion of the work will not be delayed by losses before or after installation.
- B. Tag each item or package separately, with identification related to the final hardware schedule, and include basic installation instructions in the package. Furnish hardware items of proper design for use on doors and frames of thickness, profile, swing, security and similar requirements indicated as necessary for proper installation and function.
- C. Delivery: Coordinate schedule submittal and ordering to insure delivery of all hardware items as directed by the Contractor.

3.2 HARDWARE MOUNTING HEIGHTS:

- A. Mount hardware units at heights recommended by DHI (see "Recommended Locations for Builders Hardware") on custom doors except as otherwise indicated or required to comply with governing regulations, and except as may be otherwise directed.

3.3 COORDINATION:

- A. Coordination: Prior to ordering any hardware, the finish hardware supplier shall examine the shop drawings and details of door and frame or other substrate suppliers to determine that the proper type and size piece of hardware is being furnished. No extra for material or labor will be allowed for any corrections that should have been eliminated by proper prior coordination.

3.4 INSTALLATION:

- A. Install each hardware item in strict compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in any other way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface mounted items until finishes have been completed on the substrate.
- B. Set units level plumb and true to line and location. Adjust and reinforce substrate as necessary for proper installation and operation. Drill and countersink units, which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards. Cut and fit thresholds, weatherstripping and floor covers to profile of door frames, with mitred corners and hairline joints. Join units with concealed welds or concealed mechanical joints wherever possible. Cut smooth openings for spindles, cylinders, bolts and similar items. All mortises to be smooth and tight. All drilling for tapping shall be done with proper sized drill bits to insure a minimum of 75% full thread.

3.5 ADJUST AND CLEAN:

- A. Adjust and check each operating item of hardware and each door to insure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by the manufacturer (graphite-type if no other recommended). Replace unit, which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.
- B. Final adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make a final check and adjustment of all hardware items in such space or area. Clean and re-adjust as necessary to restore proper function and finish of hardware and doors.

- C. After the Owner has occupied the buildings, manufacturer's representatives of Closers, panics, locks and other operating hardware as deemed necessary shall visit the site and make adjustments to the equipment to ensure proper functioning. This inspection and adjustment shall be made after final adjustment of the heating and ventilating equipment.
- D. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware. Verify that the Owner has been supplied with manufacturers' installation and maintenance manual catalogs and any special adjusting tools normally supplied by the manufacturer.

3.6 RESPONSIBILITY

- A. Although the following schedule of groups is intended to cover all doors and to establish a type and standard of quality, it shall be the specific duty and responsibility of the Contractor to examine the Contract Documents and furnish proper hardware for all openings, whether scheduled or not.

END OF SECTION

SECTION 08810

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. System Performance Requirements: Provide glazing systems capable of withstanding normal thermal movement, wind loading, and impact loading, without failure including loss or glass breakage attributable to: defective manufacture, fabrication, and installation; deterioration of glazing materials; and other defects in construction.
 - 1. Glass Design: Provide glass lites in the thickness and strengths (tempered glass) to meet or exceed the following criteria based on analysis of Project loads and in-service conditions:
 - a. Minimum glass thickness, nominally. (refer to plan/verify wind cladding requirement)
 - 2. Refer to Wind Tunnel Test results recommendation.

1.2 SUBMITTALS

- A. Product data for each glass product and glazing material indicated.
- B. Samples for verification purposes of 300 mm square samples of each type of glass indicated except for clear monolithic glass products, and 300 mm long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.
- C. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements.
 - 1. Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.
- D. Compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.
- E. Product test reports for each type of glazing sealant and gasket indicated, evidencing compliance with requirements specified.
- F. Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 1.

1.3 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers, "FGMA Glazing Manual," and publications of AAMA, LSGA, and SIGMA as applicable to products indicated, except where more stringent requirements are indicated.
- B. Fire-Resistive Glazing Products: Products identical to those tested per ASTM E 152 for doors and ASTM E 163 for window assemblies both labelled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Section Includes: Glass Visual Mock-up

D. Referenced:

1. ANSI Z97.1-1984 Performance Specifications and Methods of Test for Safety Glazing Materials.
2. ASTM C1036-91 Specification for Flat Glass.
3. ASTM C 1048-92 Specification for tempered glass
4. GSA-PBS Guide Specification PBS4-0085 and FCGS 08810; in reference to glass with adhered backing.

E. Design Requirements:

1. Design wind pressure shall be assumed to have one minute duration. Gravity loads shall be assumed to have one week duration.
2. Except for tempered glass fins, probability of breakage upon first application of design pressures shall not exceed 8/1000 for vertical glass, and 1/1000 for sloped and horizontal glass. Allowable stress for tempered glass fins shall not exceed 4300 PSI (29.6 N/mm²), this value shall not be increased by 1/3 or any other factor for wind or seismic load.
3. Provide heat-treated glass where annealed glass would be vulnerable to thermal breakage.

F. Performance Requirements:

1. Glass provided for test mock-ups shall be identical (including strength) to glass provided for corresponding zone on building. Glass in mock-ups is required to support up to 1.5 times design pressures without breakage. It is recognized that any one glass plate can break at any pressure. Therefore a limited amount of breakage of mock-up glass is acceptable, provided that replacement glass with the same nominal strength eventually passes all tests. Repeated glass breakage of mock-up glass constitutes failure.
2. Glass shall not experience spontaneous breakage.
3. Glass center deflection relative to glass edges at 50 percent of specified design pressures shall be limited to prevent disengagement from frame.
4. Monolithic spandrel glass shall have a safety backing and/or pacifier which is capable of retaining cracked glass in conformance with SGA-PBS Guide Specification PBS4-0885 and FCGS 08810.

G. Submittals

1. Submit glass manufacturers wind pressure and thermal stress analysis.
2. Provide at project site visual mock-up using full size glass, for evaluation of color range and distortion of reflected image.

H. Qualifications

1. Glass supplier and fabricator: Company specializing in manufacture of flat glass and fabrication of architectural glass with a minimum 10 years experience
2. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance with a minimum of 10 years experience.

I. Glass Visual Mock-Ups

1. Provide at project site a visual mock-up consisting of a full size vision light and a full size spandrel light for each proposed glass type, each mounted vertically in the plane with capability of rotation

about a horizontal axis at mid-height of the glass. Provide production thickness, tint, coatings and heat treatment.

2. Provide zebra board with diagonal stripes of alternating black and white color. Width of stripes shall be 4 to 6 inches (10 to 15 cm) and shall be uniform. Provide unobstructed viewing area of at least 50 feet (15m) between glass and zebra board. Bottom edge of zebra board shall be level with bottom edge of glass. Dimensions of zebra board shall be at least 8 feet wide by 8 feet high (2.4 m by 2.4 m). Maintain viewing area, samples and zebra board in unobstructed condition throughout construction.
3. Owner and Architect shall inspect glass samples for flatness, as evidenced by appearance of reflected image. If reflected image is acceptable, glass samples shall be retained as an acceptance standard for production material. If reflected image is unacceptable, provide additional samples for inspection until acceptable reflected image is obtained.
4. Owner and Architect shall inspect glass samples for appearance match of vision and spandrel. If match is acceptable, glass samples shall be retained as an acceptance standard for production material. If match is unacceptable, provide additional samples until acceptable appearance match is achieved.

J. Warranty

1. Provide written warranty agreeing to replace defective materials during the warranty period. Defective materials include but are not limited to:
 - a. Glass breakage: secondary breakage caused by falling glass; spontaneous breakage of heat treated glass.
 - b. Cracking, peeling, or discoloration of glass reflective coating.
2. Warranty does not include damage caused by vandalism, or natural conditions exceeding the performance requirements.
3. Warranty period for entire system shall be five (5) years from date of substantial completion. System warranty includes materials and labor.
4. Certain materials are required to have special warranties. Special warranties shall not limit or reduce requirements of system warranty. Special warranties may originate, in part or in whole, with manufacturers or fabricators and pass through Contractor to Owner. Warranties as written or interpreted by manufacturers or fabricators shall not limit or reduce special warranty requirements of this Section.
 - a. Spandrel glass whose opacifier cracks, peels, wrinkles, discolors, or stain shall be replaced at no charge for minimum (5) year period beginning on date of manufacture.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in Product Data Sheets at the end of this Section.

Use RAGC (Republic Asahi Glass Corp.) or approved equal

- B. Glass:

1. Glass shall conform, as a minimum, to the following standards.
 - a. Heat-treated flat glass shall conform to ASTM C 1048, except that surface compression of heat strengthened glass shall be 3500 to 8500 PSI (24.1 to 58.6 N/mm²).

- b. Provide tinted tempered glass as indicated on plans & safety requirements as specified.
 - c. Color : Verify approval by Architect.
 - d. Thickness: Verify thickness indicated on plan or higher requirements as stated on wind load calculation (By Supplier). No cost implication to owner in case calculation requires thicker glass over specification indicated on plan.
2. Provide safety glass at the following locations.
 - a. Doors.
 - b. Fixed and operable glazing with vertical edge within 24 inches (610 mm) of a door in closed position and with bottom edge less than 60 inches (1525 mm) above the walking surface.
 - c. Fixed glazing with area exceeding 9 square feet (0.83 m), with lowest edge less than 18 inches (45 cm) above a walking surface, top edge more than 36 inches (91 cm) above walking surface, with walking surface within 36 inches (91 cm) of glass; safety glass is not required if there is a horizontal member with minimum 1.5 inch (38 mm) width located between 34 and 38 inches (86 to 96 cm) above walking surface.
 - d. Additional locations required by code.
3. Provide heat strengthened glass where required by design pressures, anticipated thermal stress, or use in spandrel area. Provide fully tempered glass only where safety glass is mandatory or where design pressures are beyond capacity of heat strengthened glass.
4. In addition to conforming to ASTM C 1048, heat-treated glass shall conform to the following flatness tolerances.
 - a. Bow and warp are defined as deviation of a glass surface from a true plane, with glass freestanding or installed in a frame and positioned in a vertical plane.
 - b. Localized bow refers to any straight-line segment on a glass surface with length of 12 inches (305 mm).
 - c. Overall bow refers to any straight-line segment on a glass surface which extends between opposite edges and is perpendicular to at least on edge. Length of line segment is gage length.
 - d. Localized bow shall not exceed 0.0625 inch (1.6 mm).
 - e. Overall bow shall not exceed: 0.041 inch per foot for gage length zero to 36 inches; 0.031 inch per foot for gage length 36 to 60 inches; one half of the values listed is ASTM C 1048, Table 2 for gage lengths exceeding 60 inches.
 - f. Where heat treating results in parallel ripples or waves, maximum peak-to-valley deviation shall not exceed 0.005 inch. (0.127 mm). Requirements for localized bow and overall bow shall also be satisfied. Direction of ripples shall be consistent throughout building.
 - g. Specified bow and ripple tolerances are intended as manufacturing quality control limits. Refer to requirements for Glass Visual Mock-ups, which involve flatness, color, and appearance match of vision and spandrel. Glass visual mock-ups are the primary means of confirming acceptable glass appearance in the field.
7. Heat-treated glass shall be subjected to quality control measures to minimize inclusions, which could result in spontaneous breakage. Such inclusions are defined as material defects by this

specification. Installed heat-treated glass which experience spontaneous breakage shall be replaced (material and labor) under warranty provisions.

8. Spandrel glass shall be opacified with plastic film. Plastic film is not acceptable where glass visible light transmittance exceeds 30 percent.
9. Monolithic spandrel glass shall have a safety backing conforming to fallout resistance requirements of GSA-PBS Guide Specification PBS4-0885 and FCGS 08810.
10. Plastic Film Opacifier
 - a. Provide polyester with minimum nominal thickness of 0.003 inch (0.0762 mm). Film shall be pigmented and have a black color.
 - b. Bonding surface shall be completely coated with solvent based adhesive.
 - c. Film shall be a safety backing for fallout resistance.
11. Vision glass shall be 6 mm minimum thickness heat strengthened glass with coating as selected by the Architect.
12. Spandrel glass shall be 6 mm minimum thickness opacified heat strengthened glass with coating as selected by the Architect.
13. Glazing System
 - a. Gasket system shall consist of a dense gasket against one glass face, and a sponge gasket against the other glass face. Refer to Glazing Materials and Glazing regarding injection molded corners and sealing of gasket corner joints.
 - b. Structural silicone system shall consist of structural silicone at interior glass face and an exterior silicone weather seal. At glass edges not supported by structural silicone, provide gasket system; a recessed backer and silicone seal may replace either or both gaskets.
14. Gasket and Weatherstrips Except at Structural Silicone
 1. Gaskets and Weatherstrips Except at Structural Silicone
 - a. Sponge gasket shall be extruded black neoprene w/ hardness of 40+/-5 durometer Shore A & conforming to ASTM C509. Design sponge gaskets to provide 20% to 35% compression.
 - b. Dense gaskets shall be black extrusions with Shore A hardness of 75 +/-5 for hollow profiles and 60 +/-5 for solid profiles, and conforming to ASTM C 864. Outdoor gaskets shall be neoprene or Santoprene. Indoor gaskets shall be neoprene, Santoprene or EPDM. Where indoor and outdoor gaskets are reversible for re-glazing, EPDM shall not be used for either gasket.
 - c. Injection moulds corners of gaskets where compatible with installation procedures.
 - d. Gaskets shall be designed to produce glass edge pressure of 4 to 10 pounds per linear inch. (0.70 to 1.75 N/mm).
 2. Glazing gaskets, sealant backers within glazing pockets, and continuous glass spacer pads at structural silicone shall be black heat cured silicone rubber conforming to ASTM C 1115, Type C.
 3. Gaskets which maintain glass face clearance while serving as a backer for a silicone weather seal may have a friction fit. All other gaskets and weatherstrips, including backers

for structural silicone, shall have a continuous spline or a continuous groove which engages a matching groove or leg on the aluminum frame.

4. Norton V2100 Thermalbond Tape is acceptable as a glass spacer pad when used in conjunction with structural silicone, subject to verification of compatibility.

5. Setting Blocks

- a. Setting blocks shall be dense extruded neoprene, silicone or EPDM with hardness of 85 +/-5 durometer Shore A, minimum length 4 inches (102 mm), and minimum width corresponding to glass thickness. Setting blocks shall be equidistant from glass centerline. Location of setting blocks at glass quarter points is acceptable. Distance from vertical glass edge to nearest edge of setting block shall not be less than six inches, or 0.125 times glass width, whichever is greater.
- b. Shims used in conjunction with setting blocks shall be of the same material, hardness, length and width as the blocks.
- c. Setting blocks and chairs shall be secured against migration.
- d. Silicone setting blocks are required where structural silicone occurs at sill.
- e. Neoprene or EPDM setting blocks are acceptable if permitted by glass fabricator, and if structural silicone does not occur at sill.

6. Side Blocks

- a. Provide side blocks at both jambs, between midheight and top corner of glass. Blocks shall be 55 +/-5 durometer Shore A dense neoprene, silicone or EPDM. Block width shall be 0.125 inch less than nominal glass edge clearance.

- C. Sealant for Exterior Glazing

1. Acceptable products (subject to tests) for non-structural seals to substrates are:
General Electric Silpruf
Dow Corning 790, 795 and 995
Tremco Spectrem 1 and Spectrem 2

Acceptable products for nonstructural seals to stone are:
General Electric Silpruf
Dow Corning 790, 795 and 995

2. Acceptable products (subject to tests) for structural seals are:
Dow Corning 795, 983 and 995
Tremco Proglaze II
General Electric SSG 4000 and SSG 4400
Product requiring mixing of components are acceptable only for shop application.
3. Data sheets for and samples of other sealants may be submitted for approval. Oil base sealants are not acceptable.
4. Sealant back-up materials shall be polyethylene foam, urethane foam or extruded silicone as recommended by sealant manufacturer. Back up shall not absorb water.
5. Coordinate with other sections to assure compatibility of intersecting sealants.

- D. Glass Attic Stock

1. Upon completion of construction, deliver to a designated storage area spare glass for replacement.
 - a. Provide vision and spandrel glass in sizes as selected by the Architect equal to 0.5 percent of the area of glass on the project.

2.2 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass, edge of glass, and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

2.3 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, condensation, or other causes.

PART 3 - EXECUTION

3.1 EXECUTION

A. GLAZING

1. Inspect frame for proper dimensions and squareness. Adjust frame and/or glass size as required to meet specified requirements.
2. Clean glazing pocket before setting glass. Solvents shall be compatible with finished aluminum, glass and glazing materials. Setting blocks shall be equidistant from glass centerline. Location of setting blocks at glass quarter points is acceptable. Distance from vertical glass edge to nearest edge of setting blocks shall not be less than six inches, or 0.125 times glass width, whichever is greater. Side blocks shall be located between midheight and top corner of glass. Side blocks, setting blocks and chairs shall be positively retained in position.
3. Install gaskets with injection molded corners where indicated on drawings. Where gasket joints occur, tightly butt ends and seal with compatible sealant. Gasket joints shall not occur at locations other than corners.
4. Inspect glass before installation. Do not install glass which does not conform to specification. Replace glass, which is broken or damaged.
5. Except as otherwise specified, comply with FGMC Glazing Manual. Provide minimum nominal glass bite of 0.5 inch (12.7 mm) where joint movement will result in variable glass bite, increase nominal bite to provide 0.375 inch (9.5 mm) minimum bite and 0.25 inch (12.7 mm) where joint movement will result in variable glass bite, increase nominal bite to provide 0.375 inch (9.5 mm) minimum bite and 0.25 inch (6.4 mm) minimum edge clearance.
6. Remove and replace stops and apply sealants as required for complete glass installation.
7. Defer glazing of openings, which are obstructed during construction. Glaze such openings when obstructions are removed.
8. Clean, prime and mask at structural silicone joints during same work day on which silicone is applied.

9. Temporarily clamp glass during cure of structural silicone. After sufficient cure, remove clamps and fill gaps in silicone.
10. Mask glass and aluminum during application of structural silicone. Remove masking immediately after tooling sealant.

3.2 FIELD QUALITY CONTROL

- A. Periodically test sealants in place for adhesion, using methods recommended by sealant manufacturer. Promptly replace any sealant, which does not adhere or fails to cure.
- B. Perform peel test on at least 5 percent of glass openings with field applied structural silicone. Record date, location and results. Submit records for information only. Replace silicone which fails tests.

3.3 PROTECTION AND CLEANING

- A. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove non-permanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits or stains, and remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.
- E. Wash glass on both faces in each area of Project not more than four (4) days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION

SECTION 08850

SEALERS FOR GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Sealers are specified in this Section by requirements for installed performance of Sealers. Proprietary sources of Sealers identified in this Section are intended to represent products and sources of known quality and reliability, as a basis for Contractor's selection and design, subject to submittals, testing, and approval. Contractor, and Manufacturers of Sealers proposed by Contractor shall together complete the installed technical design of Sealers for Glazing, to deliver performance as specified. Scope of Sealers is summarised as follows:
1. Sealers for glass, at locations of glass installed metal frames.
- B. Cross Reference: Sealers for Glazing, are supplied and installed in other Sections, by cross reference to this Section, as follows:
1. Sealers for glass-to-glass joints
 2. Sealers for glass-to-frame joints

1.2 REFERENCE STANDARDS

- A. Quality standards are identified in this Section by reference to published standards as follows:

AAMA A 804.1EXTRUDED TAPE FOR GLAZING
ASTM C509CELLULAR GASKETS
ASTM C542LOCK STRIP GASKETS
ASTM C716INSTALLING OF GASKETS
ASTM C719TESTING OF SEALANTS
ASTM C864COMPRESSION SEAL GASKETS
ASTM C920PROPERTIES OF SEALANTS
ASTM D2000NEOPRENE GLAZING GASKETS
ASTM D412 TESTING OF SEALANTS

1.3 QUALITY ASSURANCE

- A. Reference Standard: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except as specified.
- B. Single Source: For each installed joint condition, use only the products of a single source of manufacture, for compatibility and single source of responsibility.

1.4 TESTING

- A. Compatibility Testing: Prior to fabrication of glass for installation in trial portions of construction, test glass and Sealers for compatibility and adhesion.
1. Submit samples to sealant manufacturer for testing.
 2. Samples shall consist of all glass, gaskets, glazing accessories, and glass framing members proposed to be installed in contact with or close to glazing sealants.
 3. Require sealant manufacturer to conduct his standard tests, including any other test which the manufacturer considers appropriate for assessing suitability of proposed products for context of use.
 4. Submit not less than 9 pieces of each type and finish of product, including each type and color of glass, framing member, frame jointing material, frame anchor where in contact with sealants,

including one sample of substrates for compatibility testing. Substrates means gaskets, setting blocks, and spacers.

5. Schedule sufficient time for testing and analysis of results, including time for re-testing where products are found to be partially or wholly incompatible. Sufficient time means so as to prevent delay in the progress of construction.
6. Investigate materials failing compatibility tests or adhesion tests. Obtain sealant manufacturer's written recommendations for corrective action, including use of specially formulated primers.

1.5 TRIAL PORTIONS

- A. Install trial portions at locations same as specified for trial portions of Glass, in Section 08810.

1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each product proposed to be installed. Include building addresses, and construction date, of nearest buildings where same types of products may be inspected.
- B. Samples: Submit, Samples for each type of Sealer proposed to be installed for weathersealing of Glass, as follows:
 1. Sealers: 300mm lengths, each required color.
 2. Black Sealers: Samples not required.
 3. Install sealants between two strips of material representing materials and colors of adjacent construction.
- C. Manufacturer's Certificate: Submit certificates from respective manufacturers attesting compliance as follows:
 1. Proposed installation conforming to specifications.
- D. Technical Analysis: Submit data and calculations to demonstrate theoretical basis of performance of proposed Sealers, relevant to glass, details, and adjacent construction. Relate sealer performance to percent movement of joint.

1.7 DELIVERY, STORAGE, HANDLING

- A. Temporary Protection: Protect Sealers for Glazing during delivery, storage and handling, in accordance with manufacturers recommendations.
- B. Guard against damage caused by effects of moisture, condensation, temperature changes, direct exposure to sun, dust, abrasion, and all other causes.

1.8 WARRANTY AND MAINTENANCE

- A. Sealers for Glazing, as installed, shall be included in Warranty and Maintenance for Glass and Glazing.
- B. Refer to Section 08880, Glass and Glazing, for requirements of Warranty and Maintenance for Glass and Glazing.

PART 2 - PRODUCTS

2.1 PRODUCTS AND TRIAL PORTIONS

- A. Subject to requirements as specified, Sealers shall be as selected and recommended by manufacturer and installer of glass. Select acceptable products from options as specified, adapting stock designs to

suite proposed context of use. Adaptations of stock designs shall be made available at no additional cost to Owner.

- B. Manufacturers standard products are subject to review of samples, and trial portions of construction.

2.2 ELASTOMERIC GLAZING SEALANTS

- A. Use Sealants complying generally with requirements as specified in Section 07901, Joint Sealers, except where otherwise specified in this Section.
- B. Install sealants for glazing, selected for adhesion, compatibility, and context, using products as listed below.
- C. Two-Part Polysulfide Glazing Sealant: Type M, grade NS, class 25, uses NT, M, G, A, and O as applicable to uses indicated. Not to be installed at visible glass-to-glass locations.
- D. One-Part Acid-Curing silicone Glazing Sealant: Type S, grade NS, class 25, uses NT, G, A, and O as applicable to uses indicated.
- E. One-Part Non-Acid-Curing Silicone Glazing Sealant: Type S, grade NS, class 25, uses NT, G, A, and O as applicable to uses indicated. For each context of use, select for modulus and movement capability from options as follows:
1. Low Modulus: Tensile strength of 45 psi or less at 100 percent elongation when tested as ASTM D412 after 14 days at 20 deg C and 50 percent relative humidity.
 2. Medium Modulus: Tensile strength not less than 45, and not more than 75 psi at 100 percent elongation when tested as ASTM D412 after 14 days at 20 deg C and 50 percent relative humidity.
 3. Additional Movement Capability: Sealant shall be suitable, in combination with joint and size of joint, to withstand 50 percent increase and 50% decrease of joint width, as measured at time of applicable, when tested as ASTM C719 for adhesion and cohesion in compliance with requirements of ASTM C920.

2.3 PREFORMED GLAZING TAPES

- A. Standard butyl-polyisobutylene extruded tape, as AAMA A804.1. Solvent-free, solids content 100 percent, non-staining and non-migrating in contact with nonporous surfaces. Supply in rolls, with release-paper on one side.
- B. Spacer Rods: Use glazing tape with or without continuous spacer-rod, according to recommendations of manufacturers of proposed tape and glass for contexts as indicated.

2.4 GLAZING GASKETS

- A. General: Pre-install gaskets in frame to maximum extent, with shop fabricated corners, mitres and joints as manufacturer's standard details. Use types selected from options as specified, and as follows:
- B. Cleaners, Primers, Sealers: Use types as recommended by manufacturers of installed sealants and gaskets.
- C. Compressible Backer Rods: Use synthetic rubber or plastic foam, with 25 percent deformation under compressed of 5-10 pounds per square inch load, and as follows:
1. Closed-cell or waterproof jacketed
 2. Stock rod
 3. Flexible and resilient

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect works of glass framing erector, and other adjacent construction in place. Deliver written report listing conditions, if any, detrimental to performance of installed Glazing.
- B. Inspection shall be to check suitability of preceding work as follows:
 - 1. Compliance with manufacturing tolerances
 - 2. Compliance with installation tolerances
 - 3. Other tolerances, including size, squareness, alignment, offsets at corners
 - 4. Presence and effective operation of weep system
 - 5. Sufficiency of bearings and anchors for glass support
 - 6. Sufficiency of clearances for edge and face dimensions

3.2 PREPARATION

- A. Pre-installation Conference: Sealant manufacturers' technical representatives are required to participate in pre-installation conference as specified in Section XXXXX, Glass and Glazing.
- B. Cleaning: Immediately prior to installation of Glazing, thoroughly clean metal frames and profiles ready to receive glass. Remove coatings, which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.
- C. Sealant Adhesion: Apply primers to joint surfaces where required for adhesion of sealants, as determined by trial portions and other pre-construction testing of sealants.

3.3 PREPARATION OF GLASS

- A. Advise on handling of glass during installing of Sealers installed before and after installing of Glass.
- B. Frame Dimensions: Do not proceed with installation if the frame dimensions are incorrect. Dimensions of glazing frames as indicated on shop drawings are intended to provide installed conditions as follows:
 - 1. Firm support for glass, and for resilient Sealers, in all directions.
 - 2. Neat jointed edges, of constant dimension.
 - 3. Maximum continuous edge support.
 - 4. Continuous adhesion where designed for adhesion.
 - 5. Adequate sealant thickness', and firm entrapment.
 - 6. Reasonable tolerances, relevant to sequence and context.

3.4 INSTALLING OF GLASS

- A. Spacers, edge blocking, glazing tape: Install as work of Section 08810, Glass and Glazing.
- B. Application of Sealants: Install compressible filler-rods or other purpose-made material as recommended by manufacturers of installed Glass and sealant. Install filler rods to effectively deliver requirements as follows:
 - 1. Prevent sealant from obstructing drainage channel adjacent to edges of glass.
 - 2. Prevent sealant from adhering to back surface of joint, but not to interfere with adhesion to sides of joint.
 - 3. Control thickness of sealant for optimum installed performance.
- C. Tooling of Sealants:

Force into channels and joints, using injection pump. Tool to smooth edge profile using the correct tool as recommended by manufacturer of sealant. Do not use metal instrument, or other sharp device harmful to finish surfaces.

1. Ensure complete "wetting" bond between glass and adjacent frame by means of compressive action of tooling.
2. Install pressurised tapes and gaskets to protrude slightly out of interstices.
3. For sealants installed with permanent residual pressure applied through gaskets, provide anchorage sufficient to ensure the gaskets cannot be forced out of position due to residual pressure in sealant or other causes.
4. Lock-Strip Gaskets: For glazing installed with lock-strip gaskets, if any, comply with ASTM C716 and printed recommendations of gasket manufacturer. Provide supplementary wet seal and weep system unless otherwise indicated.

3.5 INSTALLATION ACCURACY

- A. Install Sealers, as smooth continuous profiles, tooled or installed as shop drawings, with corners square where intended as square, with edge joints fully adhered.

3.6 CLEANING AND PROTECTION

- A. Cleaning and Washing: During installation, until time of substantial completion, clean the installed Glass and maintain clean condition at all times.
 1. Clean by methods approved by glass manufacturer.
- B. Deposits and Staining: Examine glass surfaces adjacent to and below exterior concrete and other masonry surfaces exposed to weathering, at frequent intervals during construction, but not less than one time each month. Inspect for build-up of dirt, scum, alkali deposits or staining.
- C. Repairs: Remove damaged installed portions, Reinstall, new at locations as follows:
 1. Sealers of irregular profile, incorrectly adhered to frames or to glass, incorrectly related to frame dimensions, leaking, not conforming to sample, not installed as manufacturers printed recommendations as applicable, damaged by subsequent construction preparations.
- D. Final Clean-up: Check for, and carefully remove excess elastomeric Sealers not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project.

END OF SECTION

SECTION 08830

MIRRORED GLASS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Float glass mirrors at the following locations:

- a. He/she/toilet
- b. Residential toilets/Powder Room
- c. As Where shown on drawings.

1.2 SUBMITTALS

- A. Product data for each type of product specified including description of materials and process used to produce mirrored glass, including source of glass, glass coating components, edge sealer, and quality control provisions.
- B. Samples, 300 mm square in size, of each type of mirrored glass specified, including edge treatment on 2 adjoining edges of samples.
- C. Product certificates signed by manufacturers of mirrored glass certifying that their products and edge sealers comply with specified requirements.
- D. Mirror mastic glass coating compatibility test reports from organic protective coating manufacturer indicating that mirror mastic has been tested for compatibility and adhesion with organic protective coating. Include organic coating manufacturer's interpretation of test results relative to performance and recommendations for use of mastics with organic protective coating.

1.3 QUALITY ASSURANCE

- A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" except where more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or referenced standards.
- B. Mirror Manufacturer's Document: Comply with recommendations of National Association of Mirror Manufacturers (NAMM) in its publication "MIRRORS, Handle with Extreme Care, Tips for the professional on the Care and Handling of Mirrors."
- C. Safety Glass Standard: Where safety glass mirrors are indicated or required by authorities have jurisdiction, provide products of type indicated that comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
 - 1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- D. Single-Source Responsibility: Provide products obtained from one source for each type of mirror indicated.
- E. Pre-construction Mirror Mastic Glass Coating Compatibility Test: Submit mirror mastic products to manufacturer of protective organic coating for testing by coating manufacturer's standard test method to determine compatibility of adhesive with mirrored glass coating.
- F. Mock-ups: Provide full-scale mock-ups of each condition and type of mirror for architect's review and approval.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's instructions for shipping, storing, and handling mirrored glass; avoid deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.5 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with mirrored glass installation until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include but are not limited to, the following:
1. Submit list of supplier for Architect approval.

2.2 GLASS FOR MIRROR PRODUCTION

- A. Primary Glass: Float glass complying with ASTM C 1036 requirements for Type I (transparent, flat) and for class and quality indicated below:
1. Clear Float Glass: Quality q2 (mirror), Class 1 (clear).
- B. Tempered Glass: Tempered float glass manufactured by horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated, complying with ASTM C 1048 for Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent, flat), Quality q3 (glazing select), and for class indicated below.
1. Clear Tempered Float Glass: Class 1 (clear).

2.3 MIRRORRED GLASS PRODUCTION AND FABRICATION

- A. Glass Coating: Coat second surface of glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard protective organic coating to produce coating system that complies with FS DD-M-0041, except with salt-spray test period extended to 300 hours and undercutting, discoloration, blackening, and silver impairment at mirror edges not greater than 3 mm
1. Copper Substitute: In place of electrically or chemically deposited copper layer provide material equivalent in performance to copper.
- B. Mirror Sizes after application of glass coating, cut mirrored glass to final sizes and in the following nominal glass thickness.
1. Thickness: 6.0 mm unless shown otherwise on the drawings.
 2. Thickness: As indicated.
- C. Mirror Edge Treatment: Provide forms of edge treatment indicated below, with edges sealed after treatment to prevent chemical or atmospheric penetration of glass coating:
1. One inch bevelled edged finished on mirror glass perimeter.
 2. Perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.4 MISCELLANEOUS MATERIALS

- A. Setting Blocks Neoprene, 70 - 90 shore hardness.
- B. Edge Sealer: A coating that has proven to be compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirror edges.
- C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors by spot application, certified as compatible with glass coating by organic protective coating manufacturer and approved by mirror manufacturer.
- D. Mirror Hardware: Extruded aluminum mirrors hardware, of size and profile indicated, in manufacturer's standard finish, for architect approval.
- E. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture.
- F. Anchors and Inserts: Provide devices as required for installation of mirror hardware. Provide toothed or lead-shield expansion bolt devices for drilled-in-place anchors. Provide galvanised or cadmium-coated anchors and inserts for applications on inside face of exterior walls and where indicated.

PART 3 – EXECUTION

3.1 GLAZING

- A. General: Install mirrors to comply with printed directions of mirror manufacturer, and with referenced FGMA standard and NAMM document. Mount mirrors in place to avoid distorting reflected images and provide space for air circulation between back of mirror and face of mounting surface.
- B. Mastic Spot Installation System: Install mirrors with mastic as follows:
 - 1. Identify and examine surfaces over, which mirror is to be mounted. Comply with manufacturer's printed installation directions for preparation of mounting surfaces including coating surfaces with mastic manufacturer's special bond coating where applicable.
 - 2. Apply barrier coat to mirror backing where approved by manufacturers of mirror and backing material.
 - 3. Apply mastic in spots to comply with mastic manufacturer's printed directions for coverage and to allow air circulation between back of mirror and face of mounting surface.
 - 4. After mastic is applied, align mirror and press into place while maintaining a minimum air space of 5 mm between back of mirror and mounting surface.
 - 5. For wall-mounted mirrors install permanent means of support at bottom and top edges with bottom support designed to withstand mirror weight and top support to prevent mirror from coming away from wall along top edges.
 - a. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable.
 - b. For continuous bottom supports, provide 3 mm by 100 mm setting blocks at quarter points. For channels or other continuous supports in which water could be trapped, provide two 6 mm diameter weeps drilled between setting blocks.
 - c. For metal or plastic clips, place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges.
 - d. For wall application provide clips along top of mirror.
 - 6. For ceiling applications provide mirror hardware of type and at locations indicated but not further apart than 900 mm or closer to edges than 100 mm. Insert a felt or rubber cushion between mechanical supporting surface and mirror face.

3.2 PROTECTION AND CLEANING

- A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirror to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirror from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Wash mirrors not more than 4 days prior to date scheduled for inspections intended to establish date for Substantial Completion. Wash glass by methods recommended in NMM document and by mirrored glass manufacturer. Use water or glass cleaners free from substances capable of damaging mirror edges or glass coating.

END OF SECTION

SECTION 09225

LATH AND PLASTER

PART - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Portland cement plastering.
- B. Wood framing and furring are specified in Division 6.
- C. Portland cement plaster scratch and leveling coats on wall surfaces indicated to receive tile are specified in Division 9 Section "Tile."

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer.
- B. Store materials inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes. Neatly stack gypsum lath flat to prevent deformation.
- C. Handle gypsum lath to prevent damage to edges, ends, or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.3 PROJECT CONDITIONS

- A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after application of plaster.
- B. Ventilation: Ventilate building spaces as required to remove water in excess of that required for hydration of plaster. Begin ventilation immediately after plaster is applied and continue until it sets.
- C. Protect contiguous work from soiling, spattering, moisture deterioration and other harmful effects that might result from plastering.

PART 2 - PRODUCTS

2.1 STEEL STUDS AND RUNNERS (TRACKS)

- A. Non-Load (Axial) - Bearing Studs and Runners: ASTM C 645 and complying with following requirements for minimum thickness of base metal (uncoated) and other characteristics:
 - 1. Stud Thickness: 8 mm minimum thk. base (uncoated metal for head runners, sill runners, jams and cripple studs at openings, unless otherwise indicated.
 - 2. Stud Depth: 412 mm, unless otherwise indicated.
 - 3. Stud Depth: unless otherwise indicated.
 - 4. Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) hot-dip galvanized coating.
 - 5. Hat Channels: Hat-shaped screwable furring channels, 7/8 inch (22.2 mm) deep, formed from zinc-coated (galvanized) steel sheet, minimum 0.0179 inch (0.455 mm) thick, Grade 33.

- B. Load-Bearing (Transverse and Axial) Studs and Runners: ASTM C 955 and complying with the following requirements for quality, grade, and finish of steel sheet, design thickness of base metal (uncoated), and other dimensional characteristics:
1. Metal Quality: Zinc-coated (galvanized) steel sheet complying with ASTM A 446, Coating Designation G.
 2. Stud Thickness: 1.087mm, unless otherwise indicated.

2.2 VERTICAL METAL FURRING

- A. Channel Furring and Braces: Cold-rolled steel, 0.0598-inch min. thickness of base (uncoated) metal, allowable bending stress of 18,000 psi, protected with rust-inhibitive paint finish or galvanizing, 3/4-inch-deep by 7/16-inch-wide flanges, 300 lbs. per 1000 feet with painted finish, 316 lbs. per 1000 feet with galvanized finish.
1. Hat-Channels: Hat shaped screwable furring channels, 7/8-inch deep formed from zinc-coated (galvanized) steel sheet minimum 0.0179-inch thick complying with ASTM A 446, Coating Designation G 60, grade A (33,000 psi yield point).
- B. Z-Furring Members: Manufacturer's standard screw-type zee-shaped furring members formed from zinc-coated (galvanized) steel sheet, 0.0179-inch min. base (uncoated) metal thickness, complying with ASTM A 525, Coating Designation G 60, designed for mechanical attachment of insulation boards or blankets to monolithic concrete and masonry walls.
- C. Furring Brackets: Serrated-arm type, .836mm min. thickness of base (uncoated) metal, adjustable from 1/4-inch to 2-1/4-inch wall clearance for channel furring.
- D. Protective Coating: ASTM A 653, G40 hot dip galvanized coating.

2.3 LATH

- A. Expanded Metal Lath: Fabricate expanded metal lath from uncoated or zinc-coated (galvanized) steel sheet to produce lath complying with ASTM C 847 for type, configuration, and other characteristics indicated below, with uncoated steel sheet painted after fabrication into lath.
1. Diamond Mesh Lath: Comply with the following requirements:
 - a. Configuration: Flat.
 1. Weight: 1.36 kg/sq. mt.
 - b. Configuration: Self-furring.
 1. Weight: 1.36 kg/sq. mt.
 - c. Paper Backing: Where paper-backed diamond mesh lath is indicated, provide asphalt-impregnated paper factory-bonded to back and complying with FS UU-B-790, for Type I, Grade D (vapor permeable), Style 2.
 2. Rib Lath: Comply with the following requirements:
 - a. Configuration: Flat, rib depth of not over 3mm.
 1. Weight: 1.5 kg/sq. mt.
- B. Gypsum Lath: ASTM C 37, type and thickness as indicated below, in length standard with manufacturer for thickness indicated.
1. Type: Plain, unless otherwise indicated.
 2. Type: Foil-backed where indicated.

3. Type: Type X for fire-resistance-rated assemblies and where indicated.
 4. Thickness: As indicated, or if not otherwise indicated, as required to comply with ASTM C 841 for type of installation and support spacing provided.
- C. Lath Attachment Devices: Devices of material and type required by referenced standards and recommended by lath manufacturer for secure attachment of lath to framing members and of lath to lath.

2.4 PLASTER ACCESSORIES FOR GYPSUM PLASTER

- A. General: Comply with material provisions of ASTM C 841; coordinate depth of accessories with thickness and number of plaster coats required.
- B. Metal Corner Beads: Fabricated from zinc-coated (galvanized) steel.
- C. Plastic Corner Beads: Small nose corner, with perforated flanges, fabricated from high-impact polyvinyl chloride.

2.5 PLASTER ACCESSORIES FOR PORTLAND CEMENT PLASTER

- A. General: Comply with material provisions of ASTM C 1063; coordinate depth of accessories with thickness and number of coats required.
1. Aluminum Components: ASTM B 221 (ASTM B 221M) for alloy and temper 6063-T5 or aluminum extrusions with similar properties.
 2. Galvanized Steel Components: Fabricated from zinc-coated (galvanized) steel sheet complying with ASTM A 653, G40 (ASTM A 653M, Z90) minimum coating designation.
- B. Metal Corner Reinforcement: Expanded large-mesh diamond mesh lath fabricated from zinc-alloy or welded wire mesh fabricated from 0.0475-inch-diameter zinc-coated (galvanized) wire and specially formed to reinforce external corners of portland cement plaster on exterior exposures while allowing full plaster encasement.
- C. Metal Corner Beads: Small nose corner beads fabricated from zinc alloy, with expanded flanges of large-mesh diamond lath to allow full encasement by plaster.
- D. Casing Beads: Square-edged style, with expanded flanges and removable protective tape, of the following material:
1. Material: Aluminum, coated with clear plastic.
- E. Control Joints: Prefabricated, of material and type indicated below:
1. Material: Aluminum, coated with clear plastic and adjustable for joint widths.

2.6 GYPSUM PLASTER MATERIALS

- A. Base Coat Plasters: ASTM C 28, types as indicated below:
1. Gypsum neat plaster.
- B. Finish Coat Plasters: Type as indicated below:
1. Gypsum ready-mixed finished plaster, manufacturer's standard mill-mixed gauged interior finish.

2.7 PORTLAND CEMENT PLASTER MATERIALS

- A. Base Coat Cements: Type as indicated below:
1. Portland cement, ASTM C 150, Type I or II.
 2. Masonry cement, ASTM C 91, Type N.
- B. Finish Coat Cement: Type as indicated below:
1. Portland cement, ASTM C 150, Type I, white.
 2. Masonry cement, ASTM C 91, Type N, white.
- C. Factory-Prepared Finish Coat: Manufacturer's standard product requiring addition of water only; white unless otherwise indicated.
1. Product: Subject to compliance with requirements, provide Oriental Exterior Finish Stucco manufactured by United States Gypsum Co.
- D. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S, or special hydrated lime for masonry purposes, ASTM C 207, Type S.
- E. Sand Aggregate for Base Coats: ASTM C 897.
- F. Aggregate for Finish Coats: ASTM C 897 and as indicated below.
1. Manufactured or natural white sand.
 2. Manufactured or natural sand, in color required to match Architect's sample.
- G. Fiber for Base Coat: Alkaline-resistant (AR) glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- H. Equipment locally available materials acceptable subject to similar performance standards.
1. Substitutions: Refer to Division 1 Clean.

2.8 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Drinkable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Bonding Agent for Portland Cement Plaster: ASTM C 932.
- C. Acoustical Sealant: ASTM C 919, non-oxidizing, skinning paintable types for exposed applications; nondrying, non-hardening, non-staining, non-bleeding, gunnable-type sealant complying with requirement specified in Division 7 Section "Joint Sealers" for concealed applications.
- D. Sound Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (without membrane facing); of widths to fill completely void formed by framing members and as follows:
1. Mineral Fiber Type: Fibers manufactured from glass.
- E. Thermal Insulation: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (without membrane facing); of widths to fill completely void formed by framing members and as follows:
1. Mineral Fiber Type: Fibers manufactured from glass.
- F. Steel Drill Screws: ASTM C 1002, ASTM C 954.
- G. Nails: ASTM C 514.

2.9 GYPSUM PLASTER MIXES AND COMPOSITIONS

- A. Plaster Base Coat Compositions: Comply with ASTM C 842 and manufacturer's directions for gypsum plaster base coat proportions that correspond to application methods and plaster bases indicated below:
1. Three-Coat Work Over Metal Lath: Base coats, as indicated below:
 - a. Scratch Coat: High-strength gypsum plaster with job-mixed sand.
 - b. Brown Coat: High-strength gypsum plaster with job-mixed sand.
 - c. Brown Coat: Gypsum neat plaster with job-mixed sand.
 - d. Scratch Coat: Gypsum neat plaster with job-mixed sand.
 2. Three-Coat Work Over Unit Masonry: Base coats as indicated below:
 - a. Scratch Coat: Gypsum neat plaster with job-mixed sand.
 - b. Brown Coat: Gypsum neat plaster with job-mixed sand.
 3. Two-Coat Work Over Concrete: Base coats of gypsum neat plaster with job-mixed sand.
 4. Two-Coat Work Over Unit Masonry: Base coats as indicated below:
 - a. Base Coats: Gypsum neat plaster with job-mixed sand.
- B. Finish Coats: Proportion materials for finish coats to comply with ASTM C 842 for each type of finish coat and texture indicated.
- C. Finish Coats: Proportion materials in parts by dry weight for finish coats to comply with the following requirements for each type of finish coat and texture indicated.
1. Troweled Finishes: Finish coat as indicated below:
 - a. Gypsum Gauging Plaster: 1 part plaster and 2 parts lime.
 1. Over lightweight aggregate base coats, add 1/2 cu. ft. of perlite fines or 50 lbs. of No. 1 white silica sand per 100 lbs. of plaster.
 - b. Gypsum Ready-Mixed Finish Plaster: Neat.
 - c. High-Strength Gypsum Gauging Plaster: Proportion as indicated below:
 1. 1 part plaster and 1 part lime.
 2. 1 part plaster to 2 parts lime.
 - d. Gypsum Keene's Cement: Proportion as indicated below:
 1. 4 parts plaster to 1 part lime.
 2. 2 parts plaster to 1 part lime.
 2. Floated Finishes: Finish coat materials as indicated below:
 - a. Gypsum Gauging Plaster: 1 part plaster, 2 parts lime, 8 parts sand.
 - b. Gypsum Keene's Cement: 2 parts plaster, 1 part lime, 8 parts sand.

2.10 PORTLAND CEMENT PLASTER MIXES AND COMPOSITIONS

- A. General: Comply with ASTM C 926 for portland cement plaster base and finish coat mixes as applicable to plaster bases, materials, and other requirements indicated.
- B. Portland Cement Plaster Base Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume for cementitious materials

and in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.

1. Fiber Content: Add fiber to following mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's directions but do not to exceed 3.2 kg. per cu. ft. of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.
2. Three-Coat Work Over Metal Lath: Base coats as indicated below at contractors option.
 - a. Scratch Coat: 1 part portland cement, 0 to 3/4 parts lime, 2-1/2 to 4 parts sand.
 - b. Brown Coat: 1 part portland cement, 0 to 3/4 parts lime, 3 to 5 parts sand.
 - c. Scratch Coat: 1 part portland cement, 3/4 to 1-1/2 parts lime, 2-1/2 to 4 parts sand.
 - d. Brown Coat: 1 part portland cement, 3/4 to 1-1/2 parts lime, 3 to 5 parts sand.
 - e. Scratch Coat: 1 part masonry cement, 2-1/2 to 4 parts sand.
 - f. Brown Coat: 1 part masonry cement, 3-5 parts sand.
 - g. Scratch Coat: 1 part portland cement, 1 to 2 parts masonry cement, 2-1/2 to 4 parts sand.
 - h. Brown Coat: 1 part portland cement, 1 to 2 parts masonry cement, 3 to 5 parts sand.
- C. Job-Mixed Portland Cement Plaster Finish Coats: Proportion materials for finish coats in parts by volume for cementitious materials and parts by volume per sum of cementitious materials for aggregates to comply with the following requirements:
 1. 1 part portland cement, 3/4 to 1-1/2 parts lime, 3 parts sand.
- D. Factory-Prepared Portland Cement Finish Coats: Add water only; comply with finish coat manufacturer's directions. Contractor may elect to use either job mixed factory prepared finish coats.

2.11 MIXING

- A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART - EXECUTION

3.1 INSTALLATION OF LATHING AND FURRING, GENERAL

- A. Interior Lathing and Furring Installation Standard: Install lathing and furring materials indicated for gypsum plaster to comply with ASTM C 841.
- B. Portland Cement Plaster Lathing and Furring Installation Standard: Install lathing and furring materials indicated for portland cement plaster to comply with ASTM C 1063.
- C. Install supplementary framing, blocking, and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable published recommendations of gypsum plaster manufacturer or, if not available, of "Gypsum Construction Handbook" published by United States Gypsum Co.
- D. Isolation: Where lathing and metal support system abuts building structure horizontally and where partition/wall work abuts overhead structure, isolate the work from structural movement sufficiently to prevent transfer of loading into the work from the building structure. Install slip- or cushion-type joints to absorb deflections but maintain lateral support.
 1. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.

3.2 INSTALLATION OF VERTICAL METAL FURRING

- A. Metal Furring to Receive Metal Lath: Comply with requirements of ML/SFA "Specification for Metal Lathing and Furring" applicable to each installation condition indicated.
- B. Metal Furring to Receive Gypsum Lath: Comply with referenced interior lathing and furring standard applicable to each installation condition indicated. Space furring channels as follows:
 - 1. For 9mm thick gypsum lath, not over 40mm o.c.
 - 2. For 12mm thick gypsum lath, not over 60 mm o.c.
- C. Z-Furring with Thermal Insulation: Erect thermal insulation vertically and hold in place with Z-furring members spaced 60 mm o.c. Except at external corners, securely attach narrow flanges of furring members to wall with concrete stub nails or power-drive fasteners spaced 60 mm o.c. At external corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of

attached channel. Start from this furring channel with standard-width insulation panel and continue in regular manner. At internal corners, space second

member no more than 30 mm from corner and cut insulation to fit. Until plaster base is installed, hold insulation in place with 25 mm long staples fabricated from 18-gage tie wire and inserted through slot in web of member.

3.3 METAL LATHING

- A. Install expanded metal lath for the following applications where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced lathing installation standards.
 - 1. Suspended and furred ceilings using 1.8 kg per sq. mt. minimum weight diamond mesh lath.
 - 2. Vertical metal framing and furring.
 - 3. Ceramic tile setting beds using 1.8 kg. per sq. mt. minimum weight diamond mesh lath.
 - 4. Exterior sheathed wall surfaces using 1.8kg per sq. mt. minimum weight self-furring diamond mesh lath:
 - 5. Solid partitions:
 - a. Monolithic surfaces not complying with requirements of referenced plaster application standards for characteristics that permit direct bond with plaster.

3.4 GYPSUM LATHING

- A. Install gypsum lath for the following applications using attachment method indicated where plaster base coats is required.
 - 1. Suspended and furred ceilings with lath attached to furring members with clips.
 - 2. Vertical metal framing and furring with lath attached to framing as follows:
 - a. With screws.
 - b. With clips, supplemented by screws where required by lath manufacturer.
 - c. Where sound-rated partitions are indicated, attach lath with resilient clips.

3.5 INSTALLATION OF PLASTERING ACCESSORIES

- A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and alignment during plastering.
- B. Accessories for Gypsum Plaster: Provide the following types to comply with requirements indicated for location:
1. Corner Beads: Install at external corners.
 2. Casing Beads: Install at terminations of plaster work, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or metal frames and act casing beads.
 3. Control Joints: Install at locations indicated or, if not indicated, at spacings and locations required by referenced standard and recommended by plaster manufacturer and approved by Architect.
 4. Spacing between joints in either direction shall not exceed:
 - a. Partitions: 9 mts.
 - b. Ceilings with Perimeter Relief: 15 mts.
 - c. Ceilings without Perimeter Relief: 9 mts.
- C. Accessories for Portland Cement Plaster: Provide the following types to comply with requirements indicated for location:
1. Corner Reinforcement: Install at external corners.
 2. Corner Bead: Install at external corners.
 3. Casing Beads: Install at terminations of plaster work unless otherwise indicated.
 4. Control Joints: Install control joints at locations indicated or, if not indicated, at locations complying with the following criteria and approved by Architect.
 - a. Where an expansion or control joint occurs in surface of construction directly behind plaster membrane.
 - b. Where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.
 - c. Where, in surfaces of ceilings and walls, distances between and areas within control joints exceed, respectively, the following measurements:
 1. 5.4 mt. in either direction and 144 sq. ft.
 - d. Where area within portland cement panels exceed 10 sq. mt.

3.6 INSTALLATION OF SOUND-RATED PLASTER WORK

- A. Where sound-rated plaster work is indicated by STC ratings or other notation, seal work at perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Comply with ASTM C 919 and plastering manufacturer's recommendations for location of sealant beads.
1. Install sound attenuation blankets within stud cavities of sound-rated partition assemblies where indicated.

3.7 PLASTER APPLICATION, GENERAL

- A. Clean plaster bases and substrates for direct application of plaster removing loose material and substrates that may impair the works.
- B. Each concrete and concrete unit masonry surfaces indicated for direct plaster application to obtain adequate section and mechanical bond or plaster.
- C. Prepare monolithic surfaces for bonded base coats and use bonding compound or agent to comply with requirements of referenced plaster application standards for conditioning of monolithic surfaces.
- D. Tolerances: Do not deviate more than 3mm in 3m from a true plane in finished plaster surfaces, as measured by a 3m straightedge placed at any location on surface.
- E. Grout hollow metal frames, bases, and similar work occurring in gypsum plastered areas, with base coat plaster material, and prior to lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches at each jamb anchor clip.
- F. Sequence plaster application with the installation and protection of other work so that neither will be damaged by the installation of the other.
- G. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where plaster is not terminated at metal by casing beads, cut base coat free from metal before plaster sets and groove finish coat at the junctures with metal.
- H. Apply thickness and number of coats of plaster as indicated or as required by referenced standards.
- I. Concealed Plaster: Where plaster application will be concealed by wood paneling, above suspended ceilings and similar locations, finish coat may be omitted; where concealed behind cabinets and similar furnishings and equipment, apply finish coat; where used as a base for adhesive application of tile and similar finishes, omit finish coat and coordinate thickness with overall dimension as shown and comply with tolerances specified.

3.8 GYPSUM PLASTER APPLICATION

- A. Interior Gypsum Plaster Application Standard: Apply gypsum plaster materials, composition, mixes, and finishes indicated to comply with ASTM C 842.
- B. Number of Coats: Apply gypsum plaster, of composition indicated, to comply with the following requirements.
 - 1. Use three-coat work over the following plaster bases:
 - a. Metal lath.
 - b. Gypsum lath, 9mm thick, with separate vapor retarder behind.
 - c. Unit masonry.
 - d. Concrete, cast-in-place or precast when surface condition complies with ASTM C 842 for plaster bonded to solid base.
 - 2. Use two-coat work over the following bases.
 - a. Gypsum lath except for installations requiring 3-coat work.
 - b. Unit masonry.
 - c. Concrete, cast-in-place or precast when surface condition complies with ASTM C 842 for plaster bonded to solid base.

- C. Finish Coats: Apply finish coats to comply with the following requirements:
 - 1. Troweled finish for gypsum finish coat plasters, unless otherwise indicated.
 - 2. Floated finish for gypsum finishes coats of type and where indicated; match Architect's sample for texture and color.
- D. Moist cure plaster and finish coats to comply with ASTM C 926 including written instructions for time between coat curing.

3.9 PORTLAND CEMENT PLASTER APPLICATION

- A. Portland Cement Plaster Application Standard: Apply portland cement plaster materials, compositions, and mixes to comply with ASTM C 926.
- B. Number of Coats: Apply portland cement plaster, of composition indicated, to comply with the following requirements:
 - 1. Use three-coat work over the following plaster bases:
 - a. Metal lath.
 - b. Concrete unit masonry.
 - c. Concrete, cast-in-place or pre-cast when surface complies with ASTM C 926 for plaster bonded direct to solid base.
 - 2. Use two-coat work over the following plaster bases:
 - a. Concrete unit masonry.
 - b. Concrete, cast-in-place or pre-cast when surface complies with ASTM C 926 for plaster bonded direct to solid base.
 - 3. Finish Coat: Floated finish unless otherwise indicated; matches Architect's sample for texture and color.
- C. Moist-cure portland cement plaster base and finish coats to comply with ASTM C 926, including recommendations for time between coats and curing in "Annex A2 Design Considerations."

3.10 CUTTING AND PATCHING

- A. Cut, patch, point up, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to the substrate has failed.
- B. Sand smooth-troweled finishes lightly removing trowel marks and arises.

3.11 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces that are not to be plastered. Repair floors, walls, and other surfaces that have been stained, marred, or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers, and equipment and clean floors of plaster debris.
- B. Provide final protection and maintain conditions, in a manner suitable to Installer that ensure plaster work's being without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09250

GYPSUM BOARD/FICEM BOARD CEILING & PARTITION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Metal framing, 16 gage and lighter, to receive gypsum board products as finish.
- B. Exterior and Interior Gypsum board, Ficem Board, Ceiling & Wall Partition, Thai and accessories
- C. Concealed acoustical insulation, where shown on drawings and schedules.
- D. Joint treatment
- E. Sound transmission characteristics
- F. Fire Rest resolves characteristics

1.2 QUALITY ASSURANCE

- A. Perform gypsum wallboard systems work in accordance with recommendations of ASTM C754 and ASTM C840 unless otherwise specified or as otherwise directed by the Architect.
- B. Systems Responsibility: Provide products manufactured by or recommended by manufacturer of gypsum wallboard to maintain single source responsibility for system.
- C. Fire-Rated Assemblies: Tested in accordance with ASTM E119 and listed by Underwriters Laboratory or other independent testing laboratory acceptable to applicable authorities.
- D. Openings: Obtain dimensions and locations from other trades and provide openings and enclosures for accessories, specialties, equipment, and ductwork.

1.3 REFERENCES

- A. ASTM C754: Installation of Steel Framing Members to Receive Screw - Attached Gypsum Wallboard, Backing Board, or water-resistant Backing Board.
- B. ASTM C840: Application and Finishing of Gypsum Board. Gypsum Wallboard Systems

1.4 SUBMITTALS

Submit the following product data: Manufacturer's recommendations for installation of framing, insulation, adhesives, gypsum board and acoustical sealant.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum board flat to prevent sagging.
- C. Handle gypsum boards to prevent damage to edges, end, and surface. Do not bend or otherwise damage metal corner beads and trim.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
- B. Minimum Room Temperatures: For adhesive attachment and finishing of gypsum board maintain not less than 50 deg. F (10 deg. C) for 48 hours prior to application and

continuously thereafter until drying is complete.

C. Ventilate building spaces to remove water not for drying joint treatment materials.
Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 CEILING GYPSUM BOARD

- A. World Home Depot
- B. Spurway
- C. Knauf Gypsum
- D. Saint Gobain Phils.
- E. or Approved equal

2.1a FOR DOUBLE WALL PARTITION – FICEM BOARD

- A. Eternit
- B. Hardiflex
- C. Forans

2.2 MATERIALS

- A. Provide materials in accordance with ASTM C840
- B. Steel Framing Components for Suspended and Furred Ceilings: Sized per ASTM C 754, unless otherwise indicated and as follow:
 - 1. Cast-In-Place and Post-Installed Anchors in Concrete: Capable of sustaining a load equal to 5 times that imposed by ceiling construction, as determined from testing per ASTM E 488.
 - 2. Powder-Actuated Fasteners in Concrete: Corrosion-resistant, with clips or other devices for hanger attachment, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
 - 3. Cold-Rolled Steel Channels: 0.0598-inch thickness of base metal and 7/16-inch wide flanged, and as follows:
 - a. Carrying Channels: 2 inches deep, 590 lb. per 1000 feet
 - b. Carrying Channels: 1-1/2 inch deep, 475 lb per 1000 feet.
 - c. Furring Channels: 3/4-inch deep, 300 lb per 1000 feet.
 - d. Finish: G-60 hot-dip galvanized coating per ASTM A 525 for framing for exterior soffits and where indicated.
 - 4. Wire for Hangers and ties: ASTM A 641, soft temper, Class 1 zinc coating.
 - 5. Steel Rigid Furring Channels: ASTM C 645.
 - a. Where shown as resilient, provide manufacturer's special type designed to reduce sound transmission.
 - 6. Steel Studs for Furring Channels: ASTM C 645.
 - a. Protective Coating: G40 hot-dip galvanized coating per ASTM A 525.
 - 7. Grid Suspension System for Interior Ceilings: ASTM C 645, suspension system composed of interlocking main beams and cross furring members forming a modular supporting network.
 - 8. Stud and Tracks (U-profile gage 16-24)

9. Set Tox (Metal screw, Plastic Tox washer)
- C. Steel Framing for Walls and Partitions: Comply with ASTM C 754 and the following:
 1. Component Sizes and Spacing: As indicated but not less than that required to comply with ASTM C 754 under the following maximum deflection and lateral loading conditions:
 - a. Maximum Deflection: $L/240$ at 5 lbf per sq. ft.
 2. Protective Coating for Framing Members: G40 hot-dip galvanized coating per ASTM A 525.
 3. Steel Studs and Runners: ASTM C 645; 0.0179-inch base metal thickness, unless otherwise indicated.
 4. Steel Rigid Furring Channels: ASTM C 645, 0.0179-inch base metal thickness, hat-shaped.
 5. Steel Resilient Furring Channels: Standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 525 or ASTM A 568 to form 1/2-inch deep channel of the following configuration:
 - a. Asymmetric-shaped channel with face connected to a single flange by a single slotted leg (web).
 - b. Hat-shaped channel, with 1-1/2-inch-wide face connected to flanges by double slotted or expanded metal legs (webs).
 6. Z-Furring Members: Z-shaped, 0.0179-inch base metal thickness, fabricated from steel sheet complying with ASTM A 525 or ASTM A 568, for mechanical attachment of insulation walls.
 7. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates and complying with the recommendations of gypsum board manufacturers for applications indicated.
 8. Stud & Tracks (U-profile gage 16-24)
 9. Set Tox (Metal Screw, Plastic Tox Washer)
 10. 4-7 and 4-3 measurement of blind
- D. Gypsum Board: Provide gypsum board of types indicated, in maximum lengths of available, to minimize end joints.
 1. Gypsum Wallboard: ASTM C 36, thickness as indicated.
 - a. Type: Regular for vertical surfaces, unless otherwise indicated.
 - b. Type: Foil-backed where indicated.
 - c. Type: Type X where required for fire-resistive-rated assemblies.
 - d. Type: Sag-resistant type for ceiling surfaces.
 - e. Type: Proprietary type, as required, for specific fire-resistive-rated assemblies.
 - f. Edges: Tapered.
 - g. Edges: Tapered and featured for pre-filling.
 - h. Products: Subject to compliance with requirements, provide one of the following products where proprietary gypsum wallboard is indicated.
 1. Gyprock Fireguard C Gypsum Board, Domtar Gypsum

2. Firestop Type C, Georgia-Pacific Corp
 3. Fire-Shield G, Gold Bond Building Products Div., National Gypsum Co
 4. SHEETROCK Brand Gypsum Panels, FIRECODE, C Core, United States Gypsum Company.
 5. SHEETROCK Brand Gypsum Panels. ULTRACODE Core, United States Gypsum Company.
2. Gypsum Backing Board for Multilayer Applications: ASTM C 442 or A 36, thickness as indicated.
- a. Type: Type X for fire-resistive-rated assemblies.
 - b. Type: Foil-backed where indicated.
3. Exterior Gypsum Board: ASTM C 931, thickness as indicated.
- a. Type: Regular, unless otherwise indicated.
 - b. Type: Type X for fire-resistive-rated assemblies.
4. Glass-Mat Water-Resistant Gypsum Backing Board: ASTM C 1178, of type and thickness indicated below.
- a. Type and Thickness: Regular, 1/2 inch thick, unless otherwise indicated.
 - b. Type and Thickness: Type X, 5/8 inch thick, for fire-resistive-rated assemblies.
 - c. Product: Subject to compliance with requirements, provide Dens-Shield Tile Backer units manufactured by Georgia Pacific Corp.
- E. Cementitious Backer Units: Panels complying with ANSI A118.9, of thickness indicated below, and in maximum lengths available to minimize end-to-end butt joints.
1. Thickness: 7/16 inch, unless otherwise indicated.
 2. Thickness: 1/2 inch, unless otherwise indicated.
 3. Thickness: Manufacturer's standard thickness but not less than 7/16 inch, unless otherwise indicated.
 4. Thickness: 5/8 inch, where indicated.
 5. Thickness: As indicated.
- F. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below.
1. Materials: Formed metal, plastic, or metal combined with paper, with metal complying with the following requirements.
 - a. Sheet steel zinc-coated by hot-dip process.
 - b. Sheet steel coated within zinc by hot-dip electrolytic processes or with aluminum or rolled zinc.
 2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
 - a. Cornerbead on outside corners, unless otherwise indicated.
 - b. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim unless otherwise indicated.
 - c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.

d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.

e. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening.

G. Zinc Accessories for Exterior Ceilings: Corner beads, edge trim, and control joints formed from rolled zinc complying with ASTM C 1047, in shapes indicated below by reference to ASTM C 1047:

1. Corner bead on outside corners, unless otherwise indicated.
2. Edge trim complying with ASTM C 1047, formed from rolled zinc, shape LC-bead per Fig. 1, unless otherwise indicated.

H. Aluminum Accessories: Where indicated, provide manufacturer's standard extruded aluminum accessories of profile indicated and with the following finish:

1. Class II Clear-Anodized Finish: AA-C12C22A31.

I. Gypsum Board Joint Treatment Materials: ASTM C 475 and ASTM C 840, and as follow:

1. Joint Tape: Paper reinforcing tape, unless otherwise indicated.
 - a. Use open-weave glass-fiber tape where recommended by gypsum board manufacturer with setting-type joint compound.
2. Setting-Type Joint Compound: Factory-package, job-mixed chemical-hardening powder products formulated for uses indicated.
 - a. For topping compound, use sandable formulation.
3. Drying-Type Joint Compounds: Factory-packaged, vinyl-based products complying with the following requirements.
 - a. Ready-Mixed Formulation: Factory premixed.
 - b. Job-Mixed Formulation: Powder product, mixed with water at Project Site.
 - c. Tapping compound formulated for embedding tape and first coat over fasteners and flanges of corner beads and edge trim.
 - d. Topping compound formulated for fill (second) and finish (third) coats.
 - e. All-purpose compound formulated as both taping and topping around.

J. Joint Compound for Cementitious Backer Unit: Materials recommended by cementitious backer unit manufacturer.

K. Miscellaneous Materials: As follows, recommended by gypsum board manufacturer.

1. Laminating Adhesives: Product recommended by gypsum board manufacturer.
2. Fastening Adhesive for Wood: ASTM C 557.
3. Steel drill screws complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.03 inch thick.
4. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.03 to 0.112 inch thick.
5. Gypsum Board Nails: ASTM C 514.
6. Corrosion-resistant-coated steel drill screws of sized and type recommended by board manufacturer for fastening cementitious backer units.

7. Asphalt-Saturated Organic Felt: ASTM C 226, Type I (No. 15 asphalt felt), non-perforated.
8. Exposed and Concealed Acoustical Sealant: Manufacturer's standard nonsage, paintable, non-staining latex sealant complying with ASTM C 834.
9. Concealed Acoustic Sealant: Comply with requirements specified in Division 7 Section "Joint Sealant"
10. Sound Attenuation Blankets: ASTM C 665, Type I, unfaced mineral-fiber blanker insulation.
11. Thermal Insulation for Z-Furring Members: ASTM C 665, Type I, unfaced mineral fiber blanker insulation.
12. Thermal Insulation for Z-Furring Members: ASTM C 578, Type IV, extruded polystyrene board insulation with flame-spread and mock-developed ratings or not more than 25 and 450, respectively, per ASTM E 84.
13. Polyethylene Vapor Retarder: ASTM D 4397, thickness and maximum permeance rating as follows:
 - a. 4.0 mils, 0.19 perms
 - b. 6.0 mils, 0.13 perms

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Metal Framing/Erection & Board Installation for Wall Partition
 1. Accurately layout the track for top and bottom horizontal
 2. Attach stud vertically, spaced at 600mm o.c. or as specified
 3. Attached track horizontally, spaced at 1200mm o.c. or as specified
 4. Fix Board using screw or rivets
 5. Putty works
- B. Metal Framing Erection: Install metals framing in accordance with ASTM C754 and manufacturer's recommendations.
 1. Install members true to lines and levels to provide surface flatness with maximum variation of 3mm in 3 meters in any direction.
 2. Door opening Framing: Install double studs at door frame jambs; install runners on each side of opening at frame head height between jamb studs and adjacent studs.
 - a. Brace each jamb of door openings in partitions terminating at ceiling, with 45-angle stud in each direction perpendicular to partition; attach to structure.
 - b. Frame opening other than doors in same manner as specified, unless otherwise indicated.
 3. Install metal framing backing where required for support of fixtures, cabinets, accessories, hardware and other partition and ceiling mounted work indicated.
 4. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work, which is to be placed in or behind partition framing; allow items to be installed after framing, is complete.
 5. Install runner tracks at floors, ceiling and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.
 - a. Where studs of various gages are used in one run of track. Use track of gage to match heaviest studs.
 - b. Align tracks accurately to layout at base and tops of studs.

- c. Head tracks shall have extra long legs, of dimensions indicated, to accommodate fireproofing thickness and additional depth to anchor studs.
 - d. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 600mm o.c. spacing for nails or powder-driven fasteners, or 400mm o.c. for other types of attachment.
 - 1) Provide fasteners at corners and ends of tracks.
- B. Install steel framing to comply with ASTM C 754 and ASTM C 840.
 - 1. Do not bridge building expansion joints with support systems; frame both sides of joints with furring and other supports as indicated.
 - 2. Secure hangers to structural support by connecting directly to structure where possible. Otherwise connect to inserts, clips, other anchorage devices, or fasteners, as indicated.
 - 3. Install directly hung grid suspension system, including perimeter wall track or angle, with members spaced and installed to comply with manufacturer instructions.
 - 4. Install steel studs with bottom and top runner tracks anchored to substrates. Isolate system from building structure to prevent transfer of loading and deflections into metal support system, both vertically and horizontally.
 - 5. Frame door and other openings with studs and runners of thickness, number and arrangement to comply with manufacturer's recommendations for size of opening, weight and height of doors, and stud size, unless otherwise indicated.
 - 6. Erect insulation and Z-furring members to comply with manufacturer's directions.
 - 7. Install polyethylene vapor retarder, where indicated, to comply with the following requirements:
 - a. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with mechanical fasteners or adhesives. Extend vapor retarder to cover miscellaneous voids in insulates substrates.
 - b. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall opening openings, and at lap joints.
 - c. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor retarder tape. Repair any tears or punctures
 - 8. Install supplementary framing, runners, furring, blocking, and bracing at openings and terminations in gypsum board assemblies and where required to support other work that cannot be adequately supported on gypsum board alone.
- C. Install and finish gypsum board to comply with ASTM C 840 and as follows:
 - 1. For floating construction for gypsum boards at internal corners, expect where special isolation or edge trim is indicated.
 - 2. Isolate gypsum board construction from abutting structural and masonry work. Provide edge trim and acoustical sealant as recommended by manufacturer.
 - 3. Install sound attenuation blankets where indicated, without gaps, and support, where necessary, to prevent movement or dislocation.

4. Install cementitious backer units at showers, tubs, and where indicated to comply with ANSI A108.11.
 5. Install glass-mat water-resistant gypsum backing board panels to comply with manufacturer's installation directions.
 6. Install water-resistant backing board where indicated to receive thin-set tile and similar rigid finishes at tubs, showers, and where indicated.
 7. Install exterior gypsum board for exterior ceilings and soffits where indicated.
 8. Install gypsum-backing board where work is indicated to receive adhesively applied acoustical tile.
 9. Do not screw gypsum boards of studs into the runner track to allow for differential floor specifications.
 10. Fasten gypsum board to wood supports with adhesive.
 11. Use screws when fastening gypsum board to metal furring on framing.
 12. Screw both layers to supports where double-layer work is indicated or otherwise required.
 13. Direct Bonding: Comply with manufacturer's recommendations where gypsum board is indicated to be directly bonded to substrate.
 14. Do not bridge building expansion joints: Leave a space of the width indicated between boards, and trim both edges for installation of sealant or gasket.
- D. Ceiling Framing Installation: Erect in accordance with ASTM C754 and manufacturer's recommendations.
1. Coordinate location of hangers with other work; provide trapeze supports and steel bracing as required to support ceiling.
 2. Install ceiling furring independent of walls, columns, and above ceiling work.
 3. Space main carrying channels at maximum 1200mm on center, not more than 150mm from perimeter walls. Lap splices minimum 300mm and secures together 50mm from each end of splice.
 4. Place furring channels perpendicular to carrying channels at maximum 400mm on center and not more than 50mm from perimeter walls.
 5. Lap splices minimum 200mm and secures together 50mm from each end of splice.
 6. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing; extend bracing minimum 600mm past each end of openings.
 7. Laterally brace entire suspension system as required to comply with applicable codes, but no less than two 10 gage wires, one each way, at 45 from partition head to structure, maximum 3.0 meters on center.
 - a. Provide compression post at each lateral brace location.
 - b. Provide wire bracing at ceiling applications and at partitions, which terminate at ceilings.
- E. Gypsum Board Installation: Install in accordance with ASTM C840 and manufacturer's recommendations.
1. Use screws when fastening gypsum board to metal furring or framing.
 - a. Do not screw gypsum board or studs into top runner track, to allow for differential floor deflection.

2. Erect gypsum board with ends and edges occurring over firm bearing.
3. For double layers, secure second layer with screws of sufficient length to attach to metal framing system, in accordance with manufacturer's recommendations.
4. Ensure joints of second layer do not occur over joints of first layer in double layer applications.
5. Avoid end-butt joints where possible, located exposed end-butt joints as far from center of surfaces as possible and stagger minimum 300mm in alternate courses of wallboard.
6. Treat cut edges and holes in moisture resistant gypsum board with sealant.
7. Place control joints where shown and to be consistent with lines of building spaces and as directed by Architect.
 - a. Provide where system abuts structural elements.
 - b. Provide at dissimilar materials.
 - c. Ceiling areas exceeding 18.0 meters or 250 sq. meters
 - d. Wings of "L", "U" and "T" shaped ceilings.
8. Place corner beads at external corners; use longest practical lengths.
9. Place edge trim where gypsum board abuts dissimilar materials.
10. Tape, fill, and sand exposed joints, edges, corners and openings to produce surface ready to receive finishes; feather coats onto adjoining surfaces.
11. Three coat finishing and sanding is required for surfaces indicated to be painted; provide flush, smooth joints and surfaces ready for applied paint finishes.
 - a. Omit third coat and sanding in areas not indicated to be painted.
12. Tolerances: Maximum 5mm in 2.50 meters or 2mm in 1.0 meter, non-cumulative, variation in plumb, level, or plane; maximum 2mm offset in plane or panel joints.
13. Remove and replace defective work.

F. Finishing Gypsum Board Assemblies: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge, trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere, as required, to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.

1. Apply joint tape over gypsum board joints and to trim accessories with concealed face flanges as recommended by trim accessory manufacturer and as required to prevent cracks from developing in joint compound at flange edges.
2. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
 - a. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.
 - b. Level 2 of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
 - c. Level 3 for gypsum board surfaces where indicated.
 - d. Level 4 for gypsum board surfaces unless otherwise indicated.
 - e. Level 5 for gypsum board surfaces where indicated.

3. For level 4 gypsum board finish, embed tape in finishing compound plus two separate coats applied over joints, angles, fastener heads, and trim accessories.
4. Where level 5 gypsum board finish is indicated, apply joint compound as specified for level 4 a thin, uniform skim coat of joint compound over entire surface. Produce surface free of tool marks and ridges ready for decoration of type indicated.
5. Where level 3 gypsum board finish is indicated, apply joint compounds specified for first and second coat in addition to embedding coat.
6. Where level 2 gypsum board finish is indicated, apply joint specified for first coat in addition to embedding coat.
7. Where level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.
8. Finish exterior gypsum soffit board using setting-type joint compounds to prefill joints and embed tape, and for first, fill (second), and finish (third) coats, with the last coat being a sandable product.
9. Finish water-resistant gypsum backing board-forming base for ceramic tile to comply with ASTM C 840 and board manufacturer's directions for treatment of joints behind tile.
10. Finish glass-mat water-resistant with manufacturer's directions.
11. Finish cementitious backer units to comply with unit manufacturer's directions.
 1. Place acoustical insulation tight within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
 2. Place acoustical sealant within partitions in accordance with ASTM C919 and manufacturer's recommendations; install acoustical sealant at gypsum board perimeter at:
 - a. Metal Framing: One or two beads.
 - b. Base layer and face layer.
 - c. Penetrations of partitions
 3. Tolerance: Maximum 6mm space between gypsum board at floor, ceiling and penetrations.

END OF SECTION

SECTION 09260

GYPSUM BOARD (Moisture-Resistant)

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Metal framing, 16 gage and lighter, to receive gypsum board products as finish.
- B. Exterior and Interior Gypsum board and accessories.
- C. Concealed acoustical insulation, where shown on drawings and schedules.
- D. Joint treatment.
- E. Sound transmission characteristics
- F. Fire Resistant resolve characteristics

1.2 QUALITY ASSURANCE

- A. Perform gypsum wallboard systems work in accordance with recommendations of ASTM C754 and ASTM C840 unless otherwise specified or as otherwise directed by the Architect.
- B. Systems Responsibility: Provide products manufactured by or recommended by manufacturer of gypsum wallboard to maintain single source responsibility for system.
- C. Fire-Rated Assemblies: Tested in accordance with ASTM E119 and listed by Underwriters Laboratory or other independent testing laboratory acceptable to applicable authorities.
- D. Openings: Obtain dimensions and locations from other trades and provide openings and enclosures for accessories, specialties, equipment, and ductwork.

1.3 REFERENCES

- A. ASTM C754: Installation of Steel Framing Members to Receive Screw - Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board.
- B. ASTM C840: Application and Finishing of Gypsum Board. Gypsum Wallboard Systems

1.4 SUBMITTALS

Submit the following product data: Manufacturer's recommendations for installation of framing, insulation, adhesives, gypsum board and acoustical sealant.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum board flat to prevent sagging.
- C. Handle gypsum boards to prevent damage to edges, end, and surface. Do not bend or otherwise damage metal corner beads and trim.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions, General : Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
- B. Minimum Room Temperatures: For adhesive attachment and finishing of gypsum board maintain not less than 50 deg. F (10 deg. C) for 48 hours prior to application and continuously thereafter until drying is complete.
- C. Ventilate building spaces to remove water not for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

ACCEPTABLE INSTALLER (ALPHA 7)

- A. World Home Depot
- B. Spurway
- C. Knauf Gypsum
- D. Saint Gobain Phils.
- E. or Approved equal

2.2 MATERIALS

- A. Provide materials in accordance with ASTM C840.
- B. Steel Framing Components for Suspended and Furred Ceilings: Sized per ASTM C 754, unless otherwise indicated, and as follows:
 - 1. Cast-In-Place and Post-Installed Anchors in Concrete: Capable of sustaining a load equal to 5 times that imposed by ceiling construction, as determined from testing per ASTM E 488.
 - 2. Powder-Actuated Fasteners in Concrete: Corrosion-resistant, with clips or other devices for hanger attachment, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
 - 3. Cold-Rolled Steel Channels: 0.0598-inch thickness of base metal and 7/16-inch wide flanged, and as follows:
 - a. Carrying Channels: 2 inches deep, 590 lb per 1000 feet
 - b. Carrying Channels: 1-1/2 inch deep, 475 lb per 1000 feet.
 - c. Furring Channels : 3/4 inch deep, 300 lb per 1000 feet.
 - d. Finish: G-60 hot-dip galvanized coating per ASTM A 525 for framing for exterior soffits and where indicated.
 - 4. Wire for Hangers and ties: ASTM A 641, soft temper, Class 1 zinc coating.
 - 5. Steel Rigid Furring Channels: ASTM C 645.
 - a. Where shown as resilient, provide manufacturer's special type designed to reduce sound transmission.
 - 6. Steel Studs for Furring Channels: ASTM C 645.
 - a. Protective Coating: G40 hot-dip galvanized coating per ASTM A 525.

7. Grid Suspension System for Interior Ceilings: ASTM C 645, suspension system composed of interlocking main beams and cross furring members forming a modular supporting network.
- C. Steel Framing for Walls and Partitions: Comply with ASTM C 754 and the following:
1. Component Sizes and Spacings: As indicated but not less than that required to comply with ASTM C 754 under the following maximum deflection and lateral loading conditions:
 - a. Maximum Deflection: $L/240$ at 5 lbf per sq. ft.
 2. Protective Coating for Framing Members: G40 hot-dip galvanized coating per ASTM A 525.
 3. Steel Studs and Runners: ASTM C 645; 0.0179-inch base metal thickness, unless otherwise indicated.
 4. Steel Rigid Furring Channels: ASTM C 645, 0.0179-inch base metal thickness, hat-shaped.
 5. Steel Resilient Furring Channels: Standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 525 or ASTM A 568 to form 1/2-inch deep channel of the following configuration:
 - a. Asymmetric-shaped channel with face connected to a single flange by a single slotted leg (web).
 - b. Hat-shaped channel, with 1-1/2-inch-wide face connected to flanges by double slotted or expanded metal legs (webs).
 6. Z-Furring Members: Z-shaped, 0.0179-inch base metal thickness, fabricated from steel sheet complying with ASTM A 525 or ASTM A 568, for mechanical attachment of insulation walls.
 7. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates and complying with the recommendations of gypsum board manufacturers for applications indicated.
- D. Gypsum Board: Provide gypsum board of types indicated, in maximum lengths of available, to minimize end joints.
1. Gypsum Wallboard: ASTM C 36, thickness as indicated.
 - a. Type: Regular for vertical surfaces, unless otherwise indicated.
 - b. Type: Foil-backed where indicated.
 - c. Type: Type X where required for fire-resistive-rated assemblies.
 - d. Type: Sag-resistant type for ceiling surfaces.
 - e. Type: Proprietary type, as required, for specific fire-resistive-rated assemblies.
 - f. Edges: Tapered.
 - g. Edges: Tapered and featured for prefilling.
 - h. Products: Subject to compliance with requirements, provide one of the following products where proprietary gypsum wallboard is indicated.
 1. Gyprock Fireguard C Gypsum Board, Domtar Gypsum.
 2. Firestop Type C, Georgia-Pacific Corp.
 3. Fire-Shield G, Gold Bond Building Products Div., National Gypsum Co.
 4. SHEETROCK Brand Gypsum Panels, FIRECODE, C Core, United States Gypsum Company.

5. SHEETROCK Brand Gypsum Panels. ULTRACODE Core, United States Gypsum Company.
2. Gypsum Backing Board for Multilayer Applications: ASTM C 442 or A 36, thickness as indicated.
 - a. Type: Type X for fire-resistive-rated assemblies.
 - b. Type: Foil-backed where indicated.
3. Exterior Gypsum Board: ASTM C 931, thickness as indicated.
 - a. Type: Regular, unless otherwise indicated.
 - b. Type: Type X for fire-resistive-rated assemblies.
4. Glass-Mat Water-Resistant Gypsum Backing Board: ASTM C 1178, of type and thickness indicated below.
 - a. Type and Thickness: Regular, 1/2 inch thick, unless otherwise indicated.
 - b. Type and Thickness: Type X, 5/8 inch thick, for fire-resistive-rated assemblies.
 - c. Product: Subject to compliance with requirements, provide Dens-Shield Tile Backer units manufactured by Georgia Pacific Corp.
- E. Cementitious Backer Units: Panels complying with ANSI A118.9, of thickness indicated below, and in maximum lengths available to minimize end-to-end butt joints.
 1. Thickness: 7/16 inch, unless otherwise indicated.
 2. Thickness: 1/2 inch, unless otherwise indicated.
 3. Thickness: Manufacturer's standard thickness but not less than 7/16 inch, unless otherwise indicated.
 4. Thickness: 5/8 inch, where indicated.
 5. Thickness: As indicated.
- F. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below.
 1. Materials: Formed metal, plastic, or metal combined with paper, with metal complying with the following requirements.
 - a. Sheet steel zinc-coated by hot-dip process.
 - b. Sheet steel coated within zinc by hot-dip electrolytic processes, or with aluminum or rolled zinc.
 2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
 - a. Cornerbead on outside corners, unless otherwise indicated.
 - b. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim unless otherwise indicated.
 - c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.

- d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
 - e. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening.
- G. Zinc Accessories for Exterior Ceilings: Corner beads, edge trim, and control joints formed from rolled zinc complying with ASTM C 1047, in shapes indicated below by reference to ASTM C 1047:
- 1. Corner bead on outside corners, unless otherwise indicated.
 - 2. Edge trim complying with ASTM C 1047, formed from rolled zinc, shape LC-bead per Fig. 1, unless otherwise indicated.
- H. Aluminum Accessories: Where indicated, provide manufacturer's standard extruded aluminum accessories of profile indicated and with the following finish:
- 1. Class II Clear-Anodized Finish: AA-C12C22A31.
- I. Gypsum Board Joint Treatment Materials: ASTM C 475 and ASTM C 840, and as follows:
- 1. Joint Tape: Paper reinforcing tape, unless otherwise indicated.
 - a. Use open-weave glass-fiber tape where recommended by gypsum board manufacturer with setting-type joint compound.
 - 2. Setting-Type Joint Compound: Factory-package, job-mixed chemical-hardening powder products formulated for uses indicated.
 - a. For topping compound, use sandable formulation.
 - 3. Drying-Tape Joint Compounds: Factory-packaged, vinyl-based products complying with the following requirements.
 - a. Ready-Mixed Formulation: Factory premixed.
 - b. Job-Mixed Formulation: Powder product, mixed with water at Project Site.
 - c. Tapping compound formulated for embedding tape and first coat over fasteners and flanges of corner beads and edge trim.
 - d. Topping compound formulated for fill (second) and finish (third) coats.
 - e. All-purpose compound formulated as both taping and topping around.
- J. Joint Compound for Cementitious Backer Unit: Materials recommended by cementitious backer unit manufacturer.
- K. Miscellaneous Materials: As follows, recommended by gypsum board manufacturer.
- 1. Laminating Adhesives: Product recommended by gypsum board manufacturer.
 - 2. Fastening Adhesive for Wood: ASTM C 557.
 - 3. Steel drill screws complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.03 inch thick.
 - 4. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.03 to 0.112 inch thick.
 - 5. Gypsum Board Nails: ASTM C 514.

6. Corrosion-resistant-coated steel drill screws of sized and type recommended by board manufacturer for fastening cementitious backer units.
7. Asphalt-Saturated Organic Felt: ASTM C 226, Type I (No. 15 asphalt felt), non-perforated.
8. Exposed and Concealed Acoustical Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834.
9. Concealed Acoustic Sealant: Comply with requirements specified in Division 7 Section "Joint Sealants"
10. Sound Attenuation Blankets: ASTM C 665, Type I, unfaced mineral-fiber blanker insulation.
11. Thermal Insulation for Z-Furring Members: ASTM C 665, Type I, unfaced mineral fiber blanker insulation.
12. Thermal Insulation for Z-Furring Members: ASTM C 578, Type IV, extruded polystyrene board insulation with a flame-spread and smoke-developed ratings or not more than 25 and 450, respectively, per ASTM E 84.
13. Polyethylene Vapor Retarder: ASTM D 4397, thickness and maximum performance rating as follows:
 - a. 4.0 mils, 0.19 perms.
 - b. 6.0 mils, 0.13 perms.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Metal Framing Erection: Install metals framing in accordance with ASTM C754 and manufacturer's recommendations.
 1. Install members true to lines and levels to provide surface flatness with maximum variation of 3mm in 3 meters in any direction.
 2. Door opening Framing: Install double studs at door frame jambs; install runners on each side of opening at frame head height between jamb studs and adjacent studs.
 - a. Brace each jamb of door openings in partitions terminating at ceiling, with 45-degree stud in each direction perpendicular to partition; attach to structure.
 - b. Frame opening other than doors in same manner as specified, unless otherwise indicated.
 3. Install metal framing backing where required for support of fixtures, cabinets, accessories, hardware and other partition and ceiling mounted work indicated.
 4. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work, which is to be placed in or behind partition framing; allow items to be installed after framing, is complete.
 5. Install runner tracks at floors, ceiling and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.
 - a. Where studs of various gages are used in one run of track. Use track of gage to match heaviest studs.
 - b. Align tracks accurately to layout at base and tops of studs.
 - c. Head tracks shall have extra long legs, of dimensions indicated, to accommodate fireproofing thickness and additional depth to anchor studs.

- d. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 600mm o.c. spacing for nails or powder- driven fasteners, or 400mm o.c. for other types of attachment.
 - 1) Provide fasteners at corners and ends of tracks.
- B. Install steel framing to comply with ASTM C 754 and ASTM C 840.
 1. Do not bridge building expansion joints with support systems; frame both sides of joints with furring and other supports as indicated.
 2. Secure hangers to structural support by connecting directly to structure where possible. Otherwise connect to inserts, clips, other anchorage devices, or fasteners, as indicated.
 3. Install directly hung grid suspension system, including perimeter wall track or angle, with members spaced and installed to comply with manufacturers instructions.
 4. Install steel studs with bottom and top runner tracks anchored to substrates. Isolate system from building structure to prevent transfer of loading and deflections into metal support system, both vertically and horizontally.
 5. Frame door and other openings with studs and runners of thickness, number and arrangement to comply with manufacturer's recommendations for size of opening, weight and height of doors, and stud size, unless otherwise indicated.
 6. Erect insulation and Z-furring members to comply with manufacturer's directions.
 7. Install polyethylene vapor retarder, where indicated, to comply with the following requirements:
 - a. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with mechanical fasteners or adhesives. Extend vapor retarder to cover miscellaneous voids in insulates substrates.
 - b. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studies. Faster vapor retarders to framing at top, end, and bottom edges, at perimeter of wall opening openings, and at lap joints.
 - c. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor retarder tape. Repair any tears or punctures
 8. Install supplementary framing, runners, furring, blocking, and bracing at openings and terminations in gypsum board assemblies and where required to support other work that cannot be adequately supported on gypsum board alone.
- C. Install and finish gypsum board to comply with ASTM C 840 and as follows:
 1. For floating construction for gypsum boards at internal corners, except where special isolation or edge trim is indicated.
 2. Isolate gypsum board construction from abutting structural and masonry work. Provide edge trim and acoustical sealant as recommended by manufacturer.
 3. Install sound attenuation blankets where indicated, without gaps, and support, where necessary, to prevent movement or dislocation.
 4. Install cementitious backer units at showers, tubs, and where indicated to comply with ANSI A108.11.
 5. Install glass-mat water-resistant gypsum backing board panels to comply with manufacturer's installation directions.

6. Install water-resistant backing board where indicated to receive thin-set tile and similar rigid finishes at tubs, showers, and where indicated.
 7. Install exterior gypsum board for exterior ceilings and soffits where indicated.
 8. Install gypsum-backing board where work is indicated to receive adhesively applied acoustical tile.
 9. Do not screw gypsum boards of studs into the runner track to allow for differential floor specifications.
 10. Fasten gypsum board to wood supports with adhesive.
 11. Use screws when fastening gypsum board to metal furring on framing.
 12. Screw both layers to supports where double-layer work is indicated or otherwise required.
 13. Direct Bonding: Comply with manufacturer's recommendations where gypsum board is indicated to be directly bonded to substrate.
 14. Do not bridge building expansion joints: Leave a space of the width indicated between boards, and trim both edges for installation of sealant or gasket.
- D. Ceiling Framing Installation: Erect in accordance with ASTM C754 and manufacturer's recommendation.
1. Coordinate location of hangers with other work; provide trapeze supports and steel bracing as required to support ceiling.
 2. Install ceiling furring independent of walls, columns, and above ceiling work.
 3. Space main carrying channels at maximum 1200mm on center, not more than 150mm from perimeter walls. Lap splices minimum 300mm and secures together 50mm from each end of splice.
 4. Place furring channels perpendicular to carrying channels at maximum 400mm on center and not more than 50mm from perimeter walls.
 5. Lap splices minimum 200mm and secures together 50mm from each end of splice.
 6. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing; extend bracing minimum 600mm past each end of openings.
 7. Laterally brace entire suspension system as required to comply with applicable codes, but no less than two 10 gage wires, one each way, at 45 from portion head to structure, maximum 3.0 meters on center.
 - a. Provide compression post at each lateral brace location.
 - b. Provide wire bracing at ceiling applications and at partitions, which terminate at ceilings.
- E. Gypsum Board Installation: Install in accordance with ASTM C840 and manufacturer's recommendations.
1. Use screws when fastening gypsum board to metal furring or framing.
 - a. Do not screw gypsum board or studs into top runner track, to allow for differential floor deflection.
 2. Erect gypsum board with ends and edges occurring over firm bearing.

3. For double layers, secure second layer with screws of sufficient length to attach to metal framing system, in accordance with manufacturer's recommendations.
4. Ensure joints of second layer do not occur over joints of first layer in double layer applications.
5. Avoid end-butt joints where possible, located exposed end-butt joints as far from center of surfaces as possible and stagger minimum 300mm in alternate courses of wallboard.
6. Treat cut edges and holes in moisture resistant gypsum board with sealant.
7. Place control joints where shown and to be consistent with lines of building spaces and as directed by Architect.
 - a. Provide where system abuts structural elements.
 - b. Provide at dissimilar materials.
 - c. Ceiling areas exceeding 18.0 meters or 250 sq. meters
 - d. Wings of "L", "U" and "T" shaped ceilings

8. Place corner beads at external corners; use longest practical lengths.
 9. Place edge trim where gypsum board abuts dissimilar materials.
 10. Tape, fill, and sand exposed joints, edges, corners and openings to produce surface ready to receive finishes; feather coats onto adjoining surfaces.
 11. Three coat finishing and sanding is required for surfaces indicated to be painted; provide flush, smooth joints and surfaces ready for applied paint finishes.
 - a. Omit third coat and sanding in areas not indicated to be painted.
 12. Tolerances: Maximum 5mm in 2.50 meters or 2mm in 1.0 meter, non-cumulative, variation in plumb, level, or plane; maximum 2mm offset in plane or panel joints.
 13. Remove and replace defective work.
- F. Finishing Gypsum Board Assemblies: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge, trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere, as required, to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.
 1. Apply joint tape over gypsum board joints and to trim accessories with concealed face flanges as recommended by trim accessory manufacturer and as required to prevent cracks from developing in joint compound at flange edges.
 2. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
 - a. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.
 - b. Level 2 of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
 - c. Level 3 for gypsum board surfaces where indicated.
 - d. Level 4 for gypsum board surfaces unless otherwise indicated.
 - e. Level 5 for gypsum board surfaces where indicated.
 3. For level 4 gypsum board finish, embed tape in finishing compound plus two separate coats applied over joints, angles, fastener heads, and trim accessories.
 4. Where level 5 gypsum board finishes is indicated, apply joint compound as specified for level 4 a thin, uniform skim coat of joint compound over entire surface. Produce surface free of tool marks and ridges ready for decoration of type indicated.
 5. Where level 3 gypsum board finish is indicated, apply joint compounds specified for first and second coat in addition to embedding coat.
 6. Where level 2 gypsum board finish is indicated, apply joint specified for first coat in addition to embedding coat.
 7. Where level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.
 8. Finish exterior gypsum soffit board using setting-type joint compounds to pre-fill joints and embed tape, and for first, fill (second), and finish (third) coats, with the latte coat being a sandable product.

9. Finish water-resistant gypsum backing board forming base for ceramic tile to comply with ASTM C 840 and board manufacturer's directions for treatment of joints behind tile.
10. Finish glass-mat water-resistant with manufacturer's directions.
11. Finish cementitious backer units to comply with unit manufacturer's directions.
 1. Place acoustical insulation tight within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
 2. Place acoustical sealant within partitions in accordance with ASTM C919 and manufacturer's recommendations; install acoustical sealant at gypsum board perimeter at:
 - a. Metal Framing: One or two beads.
 - b. Base layer and face layer.
 - c. Penetrations of partitions.
 3. Tolerance: Maximum 6mm space between gypsum board at floor, ceiling and penetrations.

END OF SECTION

SECTION 09270

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1. SECTION INCLUDES

- A. Wall access door and frame units, scheduled locations, and details of adjoining work.
- B. Manufacturer's Installation Instructions: Indicate installation requirements.
- C. Project Record Documents: Record actual locations of each access unit and Indicate equipment, device, or valve to which the panel provides access.

PART 2 PRODUCTS

2.1. ACCESS DOORS AND PANELS

- A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
- B. Units in Fire Rated Assemblies: Fire rating equivalent to the fire rated assembly in which they are to be installed.
 - 1. Provide products listed and test certificate by recognized test lab as suitable for the purpose specified and indicated.

2.2. WALL AND CEILING UNITS

- A. Door and Frame Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
 - 1. Material, Wall Units: form by Steel frame with finish to match adjacent wall finishes.
 - 2. Material, Ceiling Units: Aluminum or Steel with finish to match adjacent ceiling finishes.
- B. General: The following access panel types are for selection as required whether or not indicated on drawings. The INTERIOR FINISHES CONTRACTOR shall evaluate the specific requirements and provide the appropriate system based on the condition, as all types may not be required on the project. The inclusion of any of the listed access panel types does not necessarily imply that the condition exists in the scope of work.
- C. Standard Door and Frame Units: Formed by aluminum or steel with 1.5 mm thick Zincalume steel AZ150 minimum.
 - 1. Sizes: As required to allow access and maintenance of valves, fixtures, and concealed equipment indicated, or minimum:
 - a. Walls: 300 x 300 mm.
 - b. Ceilings: 300 x 300 mm.
 - c. Check with manufacturer for any special size to see the possibility in manufacture the special require size
 - 2. Prime coat with baked on primer.
 - 3. Frame: Frameless with set bead, featheredge.
 - 4. Latch: torch lock, concealed locks, key lock or screw fixed.
 - 5. Hinges: concealed.
 - 6. Fire rated and non-rated as required.
 - 7. Provide gypsum board recessed panel with tape and mud flange at gypsum board walls.
- D. Fully Concealed Door and Frame Units: 1.5 mm Zincalume steel AZ150. Door face lined with fiber cement sheet (board thickness to be determine by the thickness of attachment).
 - 1. Sizes: As required to allow access and maintenance of valves, fixtures, and concealed equipment indicated, or minimum:
 - a. Walls: 300 x 300 mm.
 - b. Ceilings: 300 x 300 mm.
 - c. Check with manufacturer for any special size to see the possibility in manufacture the

special require size.

2. Stone faced. In field
3. Frame: Frameless, recessed
4. Latch: key lock, concealed locks or latches.
5. Hinges: concealed, full height continuous hinge sized to carry load capacity of fully fitted panel with stone.
6. Stone tile thickness: 20 mm (to be advise the actual thickness).
7. Joint width: 3 mm

PART 3 EXECUTIONS

Suppliers = Rondo by World Home Depot

3.1. EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.2. INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Ensure there is a provision of perimeter supporting frame for access panel
- C. Install frames plumb and level in openings. Secure rigidly in place.
- D. Position units to provide convenient access to the concealed work requiring access.
- E. Drawings indicate general locations for access panels. Coordinate exact locations required to allow access to valves, ballasts, etc. Coordinate location with other wall and ceiling work to produce unified flush installation.

END OF SECTION

SECTION 09310

CERAMIC TILE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Definition: Tile includes ceramic surfacing units made from clay or other ceramic materials.
- B. Extent of tile work is indicated on drawings and schedules.
- C. Types of tile work in this section include the following:
 - 1. Glazed ceramic tile for walls & unglazed ceramic tile for floors.
 - 2. As shown on drawings.
- D. Sealing expansion and other joints in tile work with elastomeric joint sealers is work of this section.

1.2 QUALITY ASSURANCE:

- A. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.
- B. Shop Drawings: Submit shop drawings indicating tile patterns and locations and widths of control, contraction and expansion joints in tile surfaces. In case of owner supply of tiles contractor remains responsible for this part of the Work.
- C. Samples for Initial Selection Purposes: Submit manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.
- D. Samples for Verification Purposes: Submit the following:
 - 1. Samples for each type of tile and for each color and texture required, not less than 600mm square, on plywood or hardboard backing and grouted.
 - 2. Full size samples for each type of trim, accessory and for each color.
 - 3. 150mm long samples of stone thresholds.
 - 4. Samples of metal edge strip.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.

1.5 PROJECT CONDITIONS:

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent to exterior to prevent damage to tile work from carbon dioxide buildup.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, the following:

1. Eurotiles
2. Mall Tile
3. Lepanto
4. Or approved equal

2.2 PRODUCTS, GENERAL:

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.

1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

C. Colors, Textures and Patterns: For tile, grout and other products requiring selection of colors, surface textures or other appearance characteristics, provide products to match characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standards.

D. Provide tile trim and accessories which match color and finish of adjoining flat tile.

E. Mounting: Where factory-mounted tile is required provide back or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

F. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:

1. Size: As indicated, coordinate with sizes and coursing of adjoining flat tile, where applicable.
2. Shapes: Square, per sizes.
3. Base for Adhesive Installations: Coved.
4. Use home luxe or approved equal: Color verify Arch't.
5. Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap.

6. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above,

7. External Corners for Portland Cement Mortar Installations: Bullnose shape with a radius of not less than 15mm unless otherwise indicated.

8. Internal Corners: Field-butt square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.

2.3 SETTING MATERIALS:

A. At contractor's use Tile Adhesive installation methods. Specification includes both for reference.

B. Setting Materials: As follows :

1. Kemgrip (Dribond)
2. Davco
3. ABC

2.4 GROUTING MATERIALS: (Use Kemgrout (Dribond)/ Davco - color verify Architect)

- A. Sand-Portland Cement Grout: Provide materials complying with ANSI A108.10 and of color required to match Architect's sample.
- B. Prepackaged dry grout mix incorporating dry polymer additive in the form of a re-emulsifiable power to which only water is added at job site.

2.5 ELASTOMERIC SEALANTS:

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.
- B. Compatibility: Provide sealants, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
- C. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- D. One-Part Mildew Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and as applicable to nonporous joint substrates indicated, O; formulated with fungicide for sealing interior joints in and around ceramic tile, showers, sinks and plumbing fixtures.

- 2.6 Cementitious Backer Units: Provide products complying with ANSI A118.9, of thickness and width indicated, and in maximum lengths available to maximize end-to-end butt joints.

2.7 MISCELLANEOUS MATERIALS:

- A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8" wide at top edge with integral provision for anchorage to mortar bed or substrate, unless otherwise indicated.
- B. Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexandria, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029.
- C. Miscellaneous Materials: As follows:
 - 1. Towelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provide or approved by manufacturer of tile-setting materials for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard.

3.2 INSTALLATION, GENERAL:

- A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".

- B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.
- C. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated. Do not saw cut joints.
- H. Prepare joints and apply sealants to comply with requirements of referenced standards and sealant manufacturer.
- I. Grout tile to comply with the requirements of the following installation standards:
 - 1. For ceramic tile grouts- **Use Kemgrout (Dribond)/ Davco - color verify Architect)**
- J. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to the substrate.

3.3 FLOOR INSTALLATION METHODS:

- A. Paver Tile: Install tile to comply with requirements indicated below for setting bed method, TCA installation method related to types of subfloor construction, and grout types:
 - 1. Portland Cement Mortar: ANSI A108.1.
 - 2. Bond Coat:
 - 3. Grout:
- B. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated.
- C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood or other flooring which finishes flush with top of tile

3.4 WALL TILE INSTALLATION METHODS:

- A. Install types of tile designated for wall application to comply with requirements indicated below for setting bed methods, TCA installation methods related to subsurface wall conditions, and grout types:
 - 1. Portland Cement Mortar: ANSI A108.1.
 - 2. Grout: Latex-portland cement.

3.5 CLEANING AND PROTECTION:

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.
- C. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage and wear.
- D. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.
- E. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces

END OF SECTION

SECTION 09320

SYNTHETIC GRANITE TILE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Definition: Tile includes ceramic surfacing units made from clay or other ceramic materials.
- B. Extent of tile work is indicated on drawings and schedules.
- C. Types of tile work in this section include the following:
 - 1. Synthetic Granite tile, floors and walls. As indicated on plan
- D. Sealing expansion and other joints in tile work with elastomeric joint sealers is work of this section.

1.2 QUALITY ASSURANCE:

- A. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.
- B. Shop Drawings: Submit shop drawings indicating tile patterns and locations and widths of control, contraction and expansion joints in tile surfaces. In case of owner supply of tiles contractor remains responsible for this part of the Work.
- C. Samples for Initial Selection Purposes: Submit manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.
- D. Samples for Verification Purposes: Submit the following:
 - 1. Samples for each type of tile and for each color and texture required, not less than 600mm square, on plywood or hardboard backing and grouted.
 - 2. Full size samples for each type of trim, accessory and for each color.
 - 3. 150mm long samples of stone thresholds.
 - 4. Samples of metal edge strip.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.

1.5 PROJECT CONDITIONS:

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent to exterior to prevent damage to tile work from carbon dioxide buildup.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
1. Felport (Essenza)
 2. Floor Center
 3. Centro Ceramic
 4. Kaufman
 5. Multi-rich
 6. Or Approved equal

2.2 PRODUCTS, GENERAL:

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.
1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Colors, Textures and Patterns: For tile, grout and other products requiring selection of colors, surface textures or other appearance characteristics, provide products to match characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standards.
- D. Provide tile trim and accessories which match color and finish of adjoining flat tile.
- E. Mounting: Where factory-mounted tile is required provide back or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.
- F. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
1. Size: As indicated, coordinate with sizes and coursing of adjoining flat tile, where applicable.
 2. Shapes: Square, per sizes.
 3. Base for Adhesive Installations: Coved.
 4. Use home luxe or approved equal: Color verify Arch't.
 5. Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap.
 6. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above,
 7. External Corners for Portland Cement Mortar Installations: Bullnose shape with a radius of not less than 15mm unless otherwise indicated.
 8. Internal Corners: Field-butt square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.

2.3 SETTING MATERIALS:

- A. At contractor's use Tile Adhesive installation methods. Specification includes both for reference.
- B. Setting Materials: As follows :

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

1. Use Kemgrip (Dribond)/ ABC/Davco Tile Adhesive.

2.4 GROUTING MATERIALS:

- A. Sand-Portland Cement Grout: Provide materials complying with ANSI A108.10 and of color required to match Architect's sample.
- B. Pre-packaged dry grout mix incorporating dry polymer additive in the form of a re-emulsifiable power to which only water is added at job site. Use Kemgrout(dribond) / Davco). Color verify Arch't.

2.5 ELASTOMERIC SEALANTS:

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.
- B. Compatibility: Provide sealants, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
- C. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- D. One-Part Mildew Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and as applicable to nonporous joint substrates indicated, O; formulated with fungicide for sealing interior joints in and around ceramic tile, showers, sinks and plumbing fixtures.

- 2.6 Cementitious Backer Units: Provide products complying with ANSI A118.9, of thickness and width indicated, and in maximum lengths available to maximize end-to-end butt joints.

2.7 MISCELLANEOUS MATERIALS:

- A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8" wide at top edge with integral provision for anchorage to mortar bed or substrate, unless otherwise indicated.
- B. Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexandria, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029.
- C. Miscellaneous Materials: As follows:
 1. Towelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provides or approved by manufacturer of tile-setting materials for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard.

3.2 INSTALLATION, GENERAL:

- A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".

- B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.
- C. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated. Do not saw cut joints.
- H. Prepare joints and apply sealants to comply with requirements of referenced standards and sealant manufacturer.
- I. Grout tile to comply with the requirements of the following installation standards:
 - 1. For ceramic tile grouts Use Kemgrip (dribond)/ Davco.
- J. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to the substrate.

3.3 FLOOR INSTALLATION METHODS:

- A. Paver Tile: Install tile to comply with requirements indicated below for setting bed method, TCA installation method related to types of subfloor construction, and grout types:
 - 1. Portland Cement Mortar: ANSI A108.1.
 - 2. Bond Coat:
 - 3. Grout:
- B. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated.
- C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood or other flooring which finishes flush with top of tile.

3.4 WALL TILE INSTALLATION METHODS:

- A. Install types of tile designated for wall application to comply with requirements indicated below for setting bed methods, TCA installation methods related to subsurface wall conditions, and grout types:
 - 1. Portland Cement Mortar: ANSI A108.1.
 - 2. Grout: Latex-portland cement.

3.5 CLEANING AND PROTECTION:

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.
- C. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage and wear.
- D. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.
- E. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 09330

HOMOGENEOUS TILE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Definition: Tile includes ceramic surfacing units made from clay or other ceramic materials.
- B. Extent of tile work is indicated on drawings and schedules.
- C. Types of tile work in this section include the following:
 - 1. Homogenous tile, floors and walls. As indicated plan.
- D. Sealing expansion and other joints in tile work with elastomeric joint sealers is work of this section.

1.2 QUALITY ASSURANCE:

- A. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.
- B. Shop Drawings: Submit shop drawings indicating tile patterns and locations and widths of control, contraction and expansion joints in tile surfaces. In case of owner supply of tiles contractor remains responsible for this part of the Work.
- C. Samples for Initial Selection Purposes: Submit manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.
- D. Samples for Verification Purposes: Submit the following:
 - 1. Samples for each type of tile and for each color and texture required not less than 600mm square, on plywood or hardboard backing and grouted.
 - 2. Full size samples for each type of trim, accessory and for each color.
 - 3. 150mm long samples of stone thresholds
 - 4. Samples of metal edge strip.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.

1.5 PROJECT CONDITIONS:

- A. Maintain environmental conditions and protects work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent to exterior to prevent damage to tile work from carbon dioxide build-up.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products, which may be incorporated in the work, include, the following:
1. RC New Chemical
 2. Pharex Davco
 3. Sika
 4. Or Approve equal

2.2 PRODUCTS, GENERAL:

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.
1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Colors, Textures and Patterns: For tile, grout and other products requiring selection of colors, surface textures or other appearance characteristics, provide products to match characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standards.
- D. Provide tile trim and accessories, which match color and finish of adjoining flat tile.
- E. Mounting: Where factory-mounted tile is required provide back or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.
- F. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
1. Size: As indicated, coordinate with sizes and coursing of adjoining flat tile, where applicable.
 2. Shapes: Square, per sizes.
 3. Base for Adhesive Installations: Coved.
 4. Use home luxe or approved equal: Color verify Arch't
 5. Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap.
 6. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above,
 7. External Corners for Portland Cement Mortar Installations: Bullnose shape with a radius of not less than 15mm unless otherwise indicated.
 8. Internal Corners: Field-butt square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.

2.3 SETTING MATERIALS:

- A. At contractor's use Tile Adhesive installation methods. Specification includes both for reference.
- B. Setting Materials: As follows:
1. RC New Chemical
 2. Pharex Davco
 3. Sika
 4. Or Approve equal

2.4 GROUTING MATERIALS:

- A. Sand-Portland Cement Grout: Provide materials complying with ANSI A108.10 and of color required to match Architect's sample.

- B. Pre-packaged dry grout mix incorporating dry polymer additive in the form of a re-emulsifiable powder to which only water is added at job site. **(Use Kemgrout (Dribond)/ Davco - color verify Architect)**

2.5 ELASTOMERIC SEALANTS:

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.
- B. Compatibility: Provide sealant, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
- C. Colors: Provide colors of exposed sealant to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- D. One-Part Mildew Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and as applicable to nonporous joint substrates indicated, O; formulated with fungicide for sealing interior joints in and around ceramic tile, showers, sinks and plumbing fixtures.

- 2.6 Cementitious Backer Units: Provide products complying with ANSI A118.9, of thickness and width indicated, and in maximum lengths available to maximums end-to-end butt joints.

2.7 MISCELLANEOUS MATERIALS:

- A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8" wide at top edge with integral provision for anchorage to mortar bed or substrate, unless otherwise indicated.
- B. Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexandria, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029.
- C. Miscellaneous Materials: As follows:
 - 1. Towelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provides or approved by manufacturer of tile-setting materials for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard.

3.2 INSTALLATION, GENERAL:

- A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".
- B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.
- C. Extend tiles work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
- D. Accurately forms intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and

isolation joints, where indicated. Do not saw cut joints.

- H. Prepare joints and apply sealant to comply with requirements of referenced standards and sealant manufacturer.
- I. Grout tile to comply with the requirements of the following installation standards:
- 1. For ceramic tile grouts **(Use Kemgrout (Dribond)/ Davco - color verify Architect)**
- J. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to the substrate.

3.3 FLOOR INSTALLATION METHODS:

- A. Paver Tile: Install tile to comply with requirements indicated below for setting bed method, TCA installation method related to types of subfloor construction, and grout types:
 - 1. Portland Cement Mortar: ANSI A108.1.
 - 2. Bond Coat:
 - 3. Grout:
- B. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated.
- C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood or other flooring which finishes flush with top of tile.

3.4 WALL TILE INSTALLATION METHODS:

- A. Install types of tile designated for wall application to comply with requirements indicated below for setting bed methods, TCA installation methods related to subsurface wall conditions, and grout types:
 - 1. Portland Cement Mortar: ANSI A108.1.
 - 2. Grout: Dri-bond

3.5 CLEANING AND PROTECTION:

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbounded, or otherwise defective tile work.
- C. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent staining, damage and wear.
- D. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.
- E. Before final inspection, removes protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 09520

ROCK WOOL

MANUFACTURED BUILDING INSULATION SPECIALTIES

PART – I

A. MATERIALS

1. CSR GLASS WOOL OR FIBERGLASS INSULATION
Classified as mineral fiber insulation, manufactured by controlled felting of bio-soluble glass wool bonded with thermosetting resin. Fire rated in accordance to ASTM E84, BS476 and AS1530: Part 3 – 1989.
2. CSR ROCK WOOL INSULATION
Classified as mineral fiber insulation, which is spun from natural rock and bonded with thermosetting resin. Fire rated in accordance to ASTM E84, BS476 and AS1530: Part 3 – 1989.
3. ALUMINUM FOIL
Recommended vapor barrier is the Bradford Foil Scrim Kraft (FSK) reflective with 3 ways glass fiber reinforced foil with paper laminate.

PART – II

A. PRODUCT SPECIFICATION

1. MAXIMUM SERVICE TEMPERATURE
Bradford Insulation products are intended for use at temperatures normally prevailing in building structures.

Product	
Unfaced Glass Wool	350 deg C
Unfaced Fibertex R-40	350 deg. C
Unfaced Fibertex 350	350 deg C
Glass Wool w/ Thermofoil Facing	70 deg C (Faced Surface)
Fibertex 350 w/ Black Matt Tissue	70 deg C (Faced Surface)
2. CORROSION RESISTANCE
CSR Bradford Glass Wool and Fibertex Rock Wool are slightly alkaline and will not corrode mild steel. To maintain this condition, protection must be provided against contamination from external sources. Bradford products are pH tested in accordance with ASTM C871: 1989 and BS3958 part 5: 1986.
3. MOISTURE RESISTANCE
Exposure of Bradford Glass Wool and Fibertex Rock Wool to an atmosphere of 50 deg C and 95% relative humidity for four days results in moisture absorption of less than 0.2% by volume. CSR Bradford Glass Wool and Fibertex Rock Wool Insulation become wet, full thermal efficiency will be restored on drying out.
4. COMPRESSION RESISTANCE
CSR Bradford Glass Wool and Fibertex Rock Wool are resilient insulation materials, which readily recover to their nominal thickness after the removal of a normal compressive load.
5. FIRE RESISTANCE
A special feature of all CSR Bradford mineral fibre insulation products is their superior fire performance. In addition to the early fire hazard indices, CSR Bradford Fibertex Rock Wool insulation is also deemed non-combustible in accordance with ASI 530.1, ASTM E84 and BS476.
6. SOUND TRANSMISSION LOSS
CSR Bradford Glass Wool and Fibertex Rock Wool products are excellent sound insulation materials for the attenuation of noise across walls, floor/ceilings. Bradford Insulation offers a range of systems

to achieve the desired level of acoustic performance against generated within the building or from outside source.

7. HEALTH AND SAFETY INFORMATION

Glass Wool and Rock Wool are the most thorough researched building materials available in Australia today. After more than 50 years of medical research around the world there is no evidence of any long term health effects.

CSR Bradford Glass Wool and Bradford FIBERTEX Rock Wool Batts produce minimal VOC and dust emission in normal use, and are endorsed by the Allergy Research Foundation.

Information on any known health risks or our products and how to handle them safely is displayed on the packaging and/or the documentation accompanying them.

B. GENERAL INSTALLATION ADVICE

1. All CSR Bradford Glass Wool and Fibertex Rock Wool Insulation Products can be cut with a sharp knife or cutter.
2. Make sure that the surface to be covered by the insulation is clean and dry.
3. Install insulation in a dry state. If it becomes wet during application, allow to dry completely before covering with vapor barrier or protective with aluminum tape.
4. Butt the insulation edges firmly together at joints to prevent heat leaks.

C. SUBMITTALS

1. Samples for verification purposes of each product specified to check nominal density, thickness, rigidity and others.
2. Product data including technical data, installation methodology and material safety data sheet.

D. QUALITY ASSURANCE

All CSR Bradford Insulation products are tested to meet stringent quality control standards incorporating quality management systems such as AS3902 / ISO 9002.

END OF SECTION

SECTION 09750

INTERIOR STONE FACING

PART 1 GENERAL

- A. Seismic Performance: Provide interior stone facing capable of withstanding the effects of earthquake motions determined according to the building code in effect for this Project or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever is more stringent.
- B. Submittals: Submit the following:
1. Product Data: For each variety of stone, stone accessory, and other manufactured products specified.
 2. Shop Drawings: Show details of fabrication and installation of interior stone facing, including dimensions and profiles of stone units; arrangement and details of jointing, supporting, anchoring, and bonding interior stone facing; and details showing relationship with, attachment to, and reception of related work.
 - a. For installed stone anchorages and supports indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 3. Stone Samples: Sets for each color, grade, finish, and variety of stone required; not less than 12 inches (300 mm) square.
- C. Mockups: Before installing interior stone facing, construct sample wall panels, in the locations and of sizes indicated, to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.
- D. Refer to interior designer documents for interior stonework requirements.
- E. The schedule of the stone type is included in the drawings or in the finish schedule.
- F. Related Sections: The following sections contain requirements that relate to this Section:
1. Division 3 Section "Cast-In-Place Concrete (Architectural Reference Section) for preset concrete inserts for stonework.
 2. Division 4 Section "Concrete Unit Masonry" for substrate and preset masonry inserts for stonework.
 3. Sealing joints in stonework with elastomeric joint sealers are specified in Division 7 Section "Joint Sealers".

PART 2: PRODUCTS

- A. Provide stone from a single quarry for each variety of stone required.
1. Match Architect's samples for variety, color, finish, and other stone characteristics relating to aesthetic effects.
 2. Match existing stone for variety, color, and finish where stone is indicated to match existing.
 3. Provide stone that is free of cracks, seams, and starts impairing structural integrity or function.
 4. Provide matched blocks extracted from contiguous locations in a single bed of quarry stratum unless stone from blocks randomly selected for aesthetic effect is approved by Architect.

- B. Granite: ASTM C 615 and the National Building Granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."
- C. Marble: ASTM C 503.
- D. Manufacturers: Subject to compliance with requirements, and in addition to manufacturers recommended by design consultant, provide products of one of the following, or approved equal.
1. Euroasia
 2. Multi-Rich Interiors
 3. Samitrade
- E. Mortar Materials: As follows:
1. Portland Cement: ASTM C 150, Type I or II. Provide natural color, white, or a blend to produce mortar color indicated.
 2. Hydrated Lime: ASTM C 207, Type S.
 3. Aggregate: ASTM C 144 and as indicated below:
 - a. For joints narrower than 1/4 inch (6 mm), use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
 - b. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
 - c. White-Mortar Aggregates: Natural, white sand or ground, white stone.
 - d. Colored-Mortar Aggregates: Natural, colored sand or ground marble, granite, or other sound stone, as required to match Architect's sample.
 4. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in stone mortars.
 5. Molding Plaster: ASTM C 59.
 6. Water: Potable.
- F. Water-Cleanable Epoxy Adhesive: ANSI A118.3.
- G. Sealant for Countertops: Clear silicone sealant complying with requirements of Division 7 Section "Joint Sealants."
- H. Grout: As follows:
1. Grout Colors: Provide Architect's selection from manufacturer's full range of colors.
 2. Dry-Set Grout (Unsanded): ANSI A118.6, for materials described in H-2.3, for joints 1/8 inch (3 mm) and narrower.
 3. Commercial Portland Cement Grout (Sanded): ANSI A118.6, for materials described in H-2.1, for joints 1/8 inch (3 mm) and wider.
 4. Latex-Portland Cement Grout: ANSI A118.6, for materials described in H-2.4, composed as follows:
 - a. Factory-Prepared Dry-Grout Mixture: Factory-prepared mixture of portland cement; dry, re-dispersible, ethylene vinyl acetate additive; and other ingredients to produce the following:

- 1) Unsanded grout mixture for joints 1/8 inch (3 mm) and narrower.
- 2) Sanded grout mixture for joints 1/8 inch (3 mm) and wider.
- b. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factory-prepared dry-grout mix and latex additive to comply with the following requirements:
 - 1) Unsanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6, for materials described in H-2.3, for joints 1/8 inch (3 mm) and narrower.
 - 2) Sanded Dry-Grout Mix: Commercial portland cement grout complying with ANSI A118.6, for materials described in H-2.1, for joints 1/8 inch (3 mm) and wider.
 - 3) Latex Additive: Styrene butadiene rubber.
 - 4) Latex Additive: Acrylic resin.
- I. Provide anchors and attachments of type and size required to support interior stone facing and fabricated from materials as indicated below:
 1. Stainless Steel: For anchors in direct contact with stone or penetrating plane of back of stone and where indicated, use stainless steel, ASTM A 666, Type 304.
 2. Wire Tiebacks: 0.120-inch- (3.0-mm-) diameter stainless steel.
 3. Direct-Mount Fastener System: Stainless-steel stone panel fasteners designed to be applied directly to wall surfaces or to wood or metal furring by fastening with self-drilling screws. Fasteners lock into grooves routed into back of interior stone facing panels, eliminating the need for setting spots. Fasteners are secured to wall framing, furring, or sheet-metal reinforcing strips built into wall.
 - a. Product: Subject to compliance with requirements
- J. Setting Shims: Resilient plastic shims, non-staining to stone, sized to suit joint thickness.
- K. Stone Fabrication: Fabricate interior stone facing in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
 1. For granite, comply with recommendations of National Building Granite Quarries Association's (NBGQA) "Specifications for Architectural Granite."
 2. For marble, comply with recommendations of Marble Institute of America's (MIA) "Dimensional Stone--Design Manual IV."
 3. Control depth and thickness of stone to maintain minimum clearances indicated between backs of stone units and surfaces or projections of structural members, fireproofing (if any), back-up walls, and other work behind stone.
 4. Quirk-miter corners, unless otherwise indicated. Install anchorage in top and bottom bed joints of corner units.
 5. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.
- L. Pattern Arrangement: Fabricate panels from one block or contiguous, matched blocks, and arrange panels with veining and other natural markings to comply with the following requirements:
 1. Arrange panels with veining as indicated on Drawings.

- M. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
- N. Stone Countertop Fabrication: Fabricate stone countertops in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
 - 1. Comply with recommendations of Marble Institute of America's (MIA) "Dimensional Stone--Design Manual IV."
 - 2. Seams: Fabricate countertops in sections indicated for joining in field, with sealant-filled seams 1/16 inch (1.5 mm) in width.
 - 3. Under counter Lavatories: Make cutouts for under counter lavatories using template or pattern furnished by lavatory manufacturer. Form cutouts to smooth, even curves with edges at right angles to top. Ease juncture of cutout edges with tops, and finish edges to match tops.
 - 4. Fittings: Drill countertops for plumbing fittings, under counter soap dispensers, and similar items.
- O. Mortar and Grout Mixes: Comply with referenced standards and with manufacturers' written instructions. Do not use admixtures.
 - 1. Spotting Plaster: Stiff mix of molding plaster and water.
 - 2. Mortar: Comply with ASTM C 270, Proportion Specification, Type N.
 - a. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
 - 3. Joint Grout: Comply with mixing requirements of referenced ANSI standards and manufacturer's written instructions.

2.1 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect stone and all materials during storage and construction against moisture, soiling, staining, and physical damage.
- B. Handle stone to prevent chipping, breakage, soiling or other damage. do not use pinch or wrecking bars without protecting edges of stone with wood or other rigid materials. Lift with wide-belt slings wherever possible; do not use wire rope or ropes containing tar or other substances which might cause staining. If required, use wood rollers and provide cushion at end of wood slides.
- C. Store stone on wood skids or pallets, covered with non-staining, waterproof membrane. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones. Protect stored stone from weather with waterproof, non-staining covers or enclosures, but allow air to circulate around stones.

PART 3: EXECUTION

- A. Advise installers of other work about specific requirements for placement of inserts to be used by interior stone facing Installer. Furnish installers of other work with Drawings or templates showing locations of these items.
- B. Weather Protection:
 - 1. During all seasons, protect partially complete or stored stonework against weather when work is not in progress. Cover with strong waterproof, membrane and anchor securely in place.
- C. Execute interior stone facing installation by skilled mechanics and employ skilled stone fitters at the site to do necessary field cutting as stone is set. Use power saws to cut stone.

- D. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure interior stone facing in place.
- E. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing expansion and other joints is specified in Division 7 Section "Joint Sealants."
 - 2. Keep expansion joints free of plaster, grout, and other rigid materials.
- F. Erect interior stone facing and trim plumb and true with uniform joint widths and accurately aligned. Use temporary shims to maintain joint width. Remove shims before pointing or grouting.
- G. Set interior stone facing units firmly against setting spots located at anchors and spaced a maximum of 18 inches (450 mm) apart over back of unit, but no less than 1 spot per 2 sq. ft. (0.18 sq. m), unless otherwise indicated.
 - 1. Moisture Exposure: Use portland cement mortar for setting spots where stone is applied to inside face of exterior walls and at other locations where stone or cavity will be exposed to moisture.
- H. Minimum Anchors: Provide a minimum of 4 anchors per stone up to 12 sq. ft. (1.1 sq. m) in face area, plus a minimum of 2 additional anchors for each additional 8 sq. ft. (0.7 sq. m).
 - 1. Provide a minimum of 2 anchors per piece for stone trim up to 48 inches (1200 mm) in length,

plus 1 additional anchor for each additional 24 inches (600 mm) of length.
- I. Stone Base: Set stone base by adhering to interior stone facing with water-cleanable epoxy adhesive. Hold adhesive back from exposed edge of joint to allow for grouting.
- J. Stone Base at Walls without Interior Stone Facing: Set stone base by adhering to plywood backing with water-cleanable epoxy adhesive.
- K. Stone Window Stools: Set stone window stools in a full bed of water-cleanable epoxy adhesive.
- L. Point and grout joints after setting. Use mortar or grout type and color indicated. Tool joints uniformly and smoothly with plastic tool.
- M. Installing Countertops: Install countertops over plywood sub tops with a full spread of water-cleanable epoxy adhesive.
 - 1. Space seams with 1/16-inch (1.5-mm) gap for filling with sealant. Use temporary shims to ensure uniform spacing and use clamps to eliminate lipping.
 - 2. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts while cutting to prevent damage.
 - 3. Install back and end splashes with water-cleanable epoxy adhesive. Leave 1/16-inch (1.5-mm) gap between countertop and splash for filling with sealant.
 - 4. Apply sealant to seams and to gap between countertops and splashes complying with Division 7 Section "Joint Sealants."

3.1 ADJUSTMENT AND CLEANING

- A. Remove and replace damaged and defective interior stone facing in a manner that results in interior stone facing's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

- B. Clean interior stone facing not less than 6 days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.
- C. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.

3.2 PRODUCTS

Provide stone from a single quarry for each variety of stone requires.

- 1. Match Architects and Interior Designers samples for variety, color, finish and other stone characteristics relating to aesthetic effect.
- 2. Provide stone that is free of cracks, seams and scars impairing structural integrity or function.

3.3 GRANITE

- A. Minimum Standards:
 - 1. Conform to ASTM C615 for minimum acceptable physical qualities of density (26.50 kg/m²), absorption (0.4%), compressive strength (131 MPa) and modulus of rupture (10.34 MPa) and to National building Granite Quarries Association (NBGQA) Specifications.
- B. Finishes:
 - 1. Provide polished, honed, sandblasted, and flamed finishes for locations as indicated.
- C. Quality Control:
 - 1. Granite shall be as indicated on the drawings, matching Architect's samples. Flaws and imperfections shall not be greater in size or in average number per square meter than in Architect's samples. Color, grain, and variegation shall be within the limits established by Architect's samples. All pieces shall be cut and fabricated with correct grain direction, as chosen by Architect.
- D. Available Sources: Subject to compliance with requirements provide granite from the following source;
 - 1. Cold Spring Granite Company U.S.A.
202 South Third Avenue
Cold Spring, Minnesota 56320 U.S.A.
- E. Submit shop drawings of wall panels with fixing system to reinforced concrete or blockwork.
- F. Calculations: Provide calculations signed by a registered professional engineer, as approved by Architect, for engineering design of all stonework.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Painting and finishing of exposed interior and exterior items and surfaces.
 - 1. Specified surface preparation, priming and coats of paint are in addition to shop-priming and surface treatment specified under other sections of work.
 - 2. Paint exterior structural and mechanical components on roofs as well as sloping roof components.
 - 3. Paint car park masonry stair enclosures both inside and outside surfaces.
 - 4. Paint metal stairs and handrails, with exception of stair treads.
 - 5. Field painting of doors.
 - 6. Paint exterior face of pre-cast concrete panels and any exposed to view interior faces.
 - 7. Paint exposed plaster work.
 - 8. See Finish Schedule for additional extent of painting required.
- B. Field painting of exposed bare and covered pipes, ducts, and hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work in occupied spaces, including stairwells.
- C. Paint car park parking stripes and directional arrows.

1.2 RELATED WORK

- A. Shop Priming: Shop priming of ferrous metal items is included under various specification sections.
- B. Section 06400: Shop finishing of architectural woodwork.

1.3 SURFACES TO BE PAINTED

- A. Except where natural finish of material is specifically noted as surface not to be painted, paint all exposed surfaces that are not otherwise finished.
 - 1. Where items or surfaces are not specifically mentioned, paint with appropriate 3-coat system similar to adjacent materials or areas.
- B. Paint hollow metal doors and frames, whether in finished or unfinished spaces.
- C. Paint exterior surfaces that are noted to be painted. Paint mechanical components on roofs.
- D. Additional Items To Be Painted: In addition to general categories and surfaces shown or specified to be painted, following specific items shall be painted.
 - 1. Backflow presenters, gas meters, fire department pressurization valve piping and position indicator valves.
 - 2. Sheet metal flashing (galvanized steel and aluminium) at all areas except main building roof.
 - 3. Parapet caps (sheet metal).
 - 4. Fire department access boxes.

5. Heads of through-bolts on door mounted hardware.
6. Aluminium trims for door smoke gaskets.
7. Hardware labeled "USP" in hardware specification.
8. Roof overflows scuppers and mounting plates.
9. Guardrails.
10. Ladders.
11. Metal bollards/Plumber
12. Aluminium reveals in plaster & drywall. Paint to match color & finish of adjacent wall or ceiling.
13. Fire alarm bells on building exteriors.
14. Garage concrete and concrete masonry surfaces.
15. Exposed pipes hangers & other accessories.

1.4 SURFACES NOT TO BE PAINTED

- A. Pre-finished items including finished metal surfaces.
- B. Walls or ceilings in concealed areas and generally inaccessible areas.
 1. Walls and ceilings in foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts, elevator shafts.
- C. Equipment, piping and ductwork in mechanical spaces and machine rooms.
- D. Moving parts of operating mechanical and electrical units and labels.
- E. Code-Required Labels: Keep equipment identification and fire rating labels free of paint.
- F. Plastic components of smoke stops and weatherstripping at doors.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's technical information, including paint label analysis and application instructions for each material.
 1. Certification: Provide certificate from each manufacturer stating material is top quality line and suitable for intended use on this Project.
 2. Paint Schedule: Show proposed materials under each system, indicate manufacturer's designation.
- B. Samples: Submit samples for review of color and texture; provide list of material and application for each coat of each finish sample.
 1. Provide samples of each color and material with texture to simulate actual conditions, on hardboard.
 2. Provide minimum 200mm x 250mm samples of wood finishes on actual wood surfaces; label and identify each as to location and application.
 3. Provide samples of concrete masonry (maximum 100mm square) defining filler, prime and finish coats.

4. Duplicate painted finishes of approved samples on actual wall surfaces and components for approval prior to commencing work.
 - a. Size: Minimum 100 ft (10 sq.m.), located where approved.
 - b. Components: One full component as directed.
 - c. Simulate finished lighting conditions for review.
5. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil grease, dirt, loose mil scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
 - a. Touch up bare areas and shop-applied prime coats that have been damaged, Wire-brush, clean with recommended by paint manufacturer, and touch up with the same primer as the shop coat.
6. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants. Remove pre-treatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, with:
 1. Name of material, color and sheen.
 2. Manufacturer's name, stock number and date of manufacture.
 3. Contents by volume, for major pigment and vehicle constituents.
 4. Thinning and application instructions.
- B. Store materials in tightly covered containers; maintain free of foreign materials and residue.
- C. Protect from freezing and potential fire hazards

1.7 SITE CONDITIONS

- A. Apply water-base paints when temperature of surfaces and surrounding air are between 64 and 90 degrees F (18 and 32 degrees C)
- B. Apply solvent-thinned paints when temperature of surfaces and surrounding air are between 65 and 95 degrees F (18 and 34 degrees C.)
- C. Do not apply paint in rain or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces.
- D. Painting may be continued during inclement weather if areas to be painted are enclosed and heated or cooled within temperature limits specified.
- E. Do not paint over dirt, rust, grease, moisture, souffed dreaves on condition perimeter to formation of a durable paint fium.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide top line commercial products of one of the following:

Interior

1. Boysen
2. Davies
3. Or Approve equal

Exterior

1. Boysen
2. Davies
3. Asian Coating
4. Or Approve equal

2.2 MATERIALS

A. Definition: "Paint" as used herein means coating systems including primers, emulsions, enamels, stains, sealers and fillers, whether used as prime, intermediate or finish coats.

B. Colors and Finishes:

1. Prior to commencement of painting work, Architect will furnish color chips for surfaces to be painted.
2. Final acceptance of colors will be from samples applied on site.
3. Color pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
4. Finish Coat Coordination: Provide finish coats which are compatible with prime paints used.
 - a. Review other specification sections in which prime paints are provided; ensure compatibility of total coatings systems.
 - b. Upon request from other trades furnish information on characteristics of finish materials proposed for use.
 - c. Provide barrier coats over incompatible primers or remove and re-prime as required.
 - d. Notify Architect in writing of any anticipated problems in use of specified coating systems with substrates primed by others.

C. Material Quality: Materials not bearing manufacturer's identification as a best-grade product shall not be acceptable.

1. Use of proprietary names in color selection is not intended to imply exclusion of equivalent products of other manufacturers.
2. Provide undercoat paints produced by same manufacturer as finish coats; use only thinners approved by paint manufacturer, and use only within recommended limits.
3. Provide finish coats capable of being washed with mild detergent without loss of color, sheen, or pigments.
4. Lead Content: All paints shall be lead free.

PART 3 - EXECUTION

3.1 PREPARATION

A. Inspection: Examine areas and conditions under which painting work is to be applied.

1. Start of painting work indicates acceptance of surfaces and conditions of surfaces and conditions within any particular area.

2. Where exposed items or surfaces are not specifically mentioned in Schedules, paint same as adjacent similar materials or areas.
3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to a durable paint film.
- B. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as specified for substrate condition.
- C. Remove hardware, accessories, and items in place and not to be painted, or provide protection prior to surface preparation and painting; after painting reinstall removed items.
- D. Clean surfaces before applying paint; remove oil and grease prior to mechanical cleaning; program cleaning so contaminants from cleaning process do not fall onto wet, newly painted surfaces.
- E. Cementitious Materials: Prepare by removing efflorescence, chalk, dirt, grease, oils, and by roughening as required to remove glaze.
 1. Determine alkalinity and moisture content of surfaces to be painted.
 2. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, neutralize before application of paint.
 3. Do not paint over surfaces where moisture content exceeds manufacturer's printed directions.
 4. Concrete Floors: Clean using a commercial solution of muriatic acid, or other etching cleaner prior to painting; flush floor with clean water to neutralize acid, and allow to dry before painting.
- F. Wood: Clean wood surfaces of dirt, oil, or other foreign substances; sandpaper smooth surfaces exposed to view, and dust off.
 1. Scrape and clean seasoned knots and apply thin coat of recommended knot sealer, before application of priming coat.
 2. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job; prime edges, ends, faces, undersides, and backsides of wood.
 3. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler; sandpaper smooth when dry.
- G. Ferrous Metals: Touch up shop-applied prime coats wherever damaged or bare, using same type of primer.
 1. Bare Surfaces: Clean surfaces which are not galvanized or shop-coated, of oil, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
 2. Galvanized Surfaces: Clean free of oil and surface contaminants, using non-petroleum based solvent; acid wash where necessary to assure proper adhesion of finishes.
- H. Mix painting materials in accordance with manufacturer's directions.
- I. Store materials in tightly covered containers; maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- J. Stir materials before application to produce mixture of uniform density, and stir as required during application; do not stir surface film into materials, if necessary, strain material before using.

3.2 APPLICATION

- A. Apply paint in accordance with manufacturer's directions; use applicators and techniques best suited for substrate and type of material being applied.

1. Apply additional coats when stains or blemishes show through final coat, until paint is a uniform finish, color and appearance.
 2. Provide extra attention to assure dry film thickness at corners and crevices is equivalent to that of flat surfaces.
 3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces; paint surfaces behind permanently-fixed equipment and furniture with prime coat only.
 4. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 5. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 6. Finish exterior doors on tops, bottoms and side edges same as exterior faces.
 7. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pre-treated or prepared for painting as soon as practicable after preparation.
1. Allow time between successive coatings to permit proper drying.
 2. Do not recoat until paint feels firm and does not deform or feel sticky under moderate thumb pressure
- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer.
- D. Prime Coats: Apply to items not previously primed; recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat.
- E. Finish Coats: Provide even texture; leave no laps, irregularity in texture, skid marks, or other surface imperfections.
1. Opaque Finishes: Provide opaque, uniform finish, color and coverage; cloudiness, spotting, holidays, brush marks, runs, sags, ropiness or other surface imperfections are not acceptable.
 2. Transparent Finishes: Produce glass smooth surface film of even luster; provide with no cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
- F. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not accepted.
- G. Garage Stripes: Machine applied 100mm wide to within 150mm of walls, columns and obstructions.

3.3 FIELD QUALITY CONTROL

- A. Owner reserves right to invoke material testing procedure at any time during field painting.
- B. If test results show material being used does not comply with specified requirements, Contractor may be directed to remove non-complying work, pay for testing, and repaint surfaces.

3.4 PAINTING SCHEDULE

- A. Exterior Work: Provide following paint systems.
 1. Metal: Semigloss sheen.
 - a. 1st Coat - Touch-up primer, prime with alkyd chrome oxide primer if none.
 - b. 2nd and 3rd Coat - powder coated

2. Exterior Concrete & Plaster: Textured finish as selected by the Architect (Use Decrea/Granitone)
 3. Gypsum Wallboard at exterior exposed areas (if any): Flat sheen.
 - a. 1st Coat - Primer.
 - b. 2nd and 3rd Coat - Exterior acrylic emulsion.
 4. Traffic and Garage Parking Lines: Manufacturer's standard sheen.
 - a. 1st Coat - Alkyd, chlorinated rubber or vinyl toluene traffic line paint.
- B. Interior Work: Provide following paint systems.
1. Gypsum Wallboard Systems: Eggshell (satin) sheen at walls, flat sheen at ceilings.
 - a. 1st Coat - Latex primer.
 - b. 2nd and 3rd Coat - Interior latex or acrylic latex emulsion.
 2. Opaque Finished Wood: Ducco finished.
 - a. 1st Coat - Primer undercoat.
 - b. 2nd Coat - Lacquer duty
 - c. Lacquer primer / ACT
 - d. Automotive Lacquer
 3. Metal: Semi-gloss sheen.
 - a. 1st Coat - Touch-up primer, prime with chrome oxide primer if none.
 - b. 2nd and 3rd Coat - Interior alkyd or acrylic enamel.
 4. Concrete Masonry: Eggshell (satin) sheen.
 - a. 1st Coat - surface filler.
 - b. 2nd and 3rd Coat - Latex emulsion.
 - c. Apply filler at rate to ensure coverage with pores filled.
 5. Traffic Surfaces
 - a. 1st Coat - traffic primer
 - b. 2nd Coat - traffic paint topcoat
 - c. 3rd Coat - traffic paint sealer

3.5 CLEAN-UP, PROTECTION AND REPAIR

- A. Clean-Up: During progress of work, remove discarded paint materials, rubbish, cans and rags from site at end of each work day.
1. Clean glass and paint-spattered surfaces immediately by proper methods of washing and scraping, using care not to scratch or damage finished surfaces.
- B. Protection: Protect work of other trades, whether to be painted or not; correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
1. Provide "Wet Paint" signs to protect newly-painted finishes.
 2. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
- C. Repair: At completion of work of other trades, touch-up and restore damaged surfaces or defaced painted surfaces.

END OF SECTION

SECTION 09910

POLYURETHANE WATERPROOF COATING SYSTEM

PART 1 - Specifications for parking levels

1.1 WORK INCLUDED

Painting and finishing of all vehicular and pedestrian traffic areas at parking level.

1.3 SURFACES TO BE PAINTED

- A. Except where natural finish of material is specifically noted as surface not to be painted, paint all exposed surfaces that are not otherwise finished.
- B. Paint exterior surfaces that are noted to be painted. Paint mechanical components on roofs.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's technical information, including label analysis and application instructions for each material.
 - 1. Certification: Provide certificate from each manufacturer stating material is top quality line and suitable for intended use on this Project.
 - 2. Coating Schedule: Show proposed materials under each system, indicate manufacturer's designation.
- B. Samples: Submit samples for Architect's approval.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, with:
 - 1. Product name
 - 2. Product description (generic product classification)
 - 3. Manufacturer's name, stock number and date manufactured.
 - 4. Application instructions
- B. Store materials in tightly covered containers; maintain free of foreign materials and residue.
- C. Protect from freezing and potential fire hazards.

1.7 SITE CONDITIONS

- A. Do not apply paint in rain or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces
- B. Do not paint over dirt, rust, grease, moisture, souffed dreaves.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide top line commercial products of one of the following as approved by Architect:

1. SONNEBORN SONOSHIELD SONOGUARD / H-CHEM
2. EEI-Waterstop
3. or Approved equal

2.2 MATERIALS

- A. Notify Architect in writing of any anticipated problems in use of specified coating systems with substrates primed by others.
- B. Material Quality: Materials not bearing manufacturer's identification as a best-grade product shall not be acceptable.
- C. Polyurethane waterproof coating system composed of:ss
- a. Base coat - one-component moisture-curing polyurethane
 - b. Top coat - one-component aliphatic moisture-curing polyurethane
 - c. Top coat tint base - verify color from architect

PART 3 - EXECUTION

Refer to section 9900 - Painting, General

END OF SECTION

SECTION 09920

ELASTOMERIC WEATHERPROOF COATING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Coating and finishing of exposed interior and exterior items and surfaces.
 - 1. Specified surface preparation, priming and applying coatings are in addition to shop-priming and surface treatment specified under other sections of work.
 - 2. Coat exterior structural and mechanical components on roofs as well as sloping roof components.
 - 3. Coat car park masonry stair enclosures both inside and outside surfaces.
 - 4. Coat exterior face of precast concrete panels and any exposed to view interior faces.
 - 5. Coat exposed plasterwork.
 - 6. See Finish Schedule for additional extent of coating required.

1.2 SURFACES TO BE COATED

- A. Except where natural finish of material is specifically noted as surface not to be coated, coat all exposed surfaces that are not otherwise finished.
 - 1. Where items or surfaces are not specifically mentioned, coat with appropriate 3-coat system similar to adjacent materials or areas.
- B. Coat exterior surfaces that are noted to be coated.
- C. Additional Items To Be Coated: In addition to general categories and surfaces shown or specified to be coated following specific items shall be coated. Refer plan.
 - 1. Garage concrete and concrete masonry surfaces.

1.3 SURFACES NOT TO BE COATED

- A. Pre-finished items including finished metal surfaces.
- B. Walls or ceilings in concealed areas and generally inaccessible areas.
 - 1. Walls and ceilings in foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts, elevator shafts.
- C. Equipment, piping and ductwork in mechanical spaces and machine rooms.
- D. Moving parts of operating mechanical and electrical units and labels.
- E. Code-Required Labels: Keep equipment identification and fire rating labels free of coatings.
- F. Plastic components of smoke stops and weather-stripping at doors.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's technical information, including coat label analysis and application instructions for each material.
 - 1. Certification: Provide certificate from each manufacturer stating material is manufactured under an ISO 9001:2004 Quality Assurance programme and is top quality line and suitable for intended use on this Project.
 - 2. Coat Schedule: Show proposed materials under each system, indicate manufacturer's designation.
- B. Samples: Submit samples for review of color and texture; provide list of material and application for each coat of each finish sample.

1. Provide samples of each color and material with texture to simulate actual conditions, on hardboard.
2. Provide samples of concrete masonry (maximum 100mm square) defining filler, prime and finish coats.
3. Duplicate coated finishes of approved samples on actual wall surfaces and components for approval prior to commencing work.
 - a. Size: Minimum 100 ft (10 m²), located where approved.
 - b. Components: One full component as directed.
 - c. Simulate finished lighting conditions for review.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, with:
 1. Name of material, color and sheen.
 2. Manufacturer's name, stock numbers and dates of manufacture.
 3. Contents by volume.
 4. Application instructions.
- B. Store materials in tightly covered original containers; maintain free of foreign materials and residue.
- C. Protect from freezing and from excessive heat above 32°C.

1.6 SITE CONDITIONS

- A. Apply water-base coats when temperature of surfaces and surrounding air are between 64°F and 90°F (18°C and 32°C).
- B. Do not apply coat in rain or mist; or when relative humidity exceeds 85%; or to damp or wet Surfaces.
- C. Coating may be continued during inclement weather if areas to be coated are enclosed and heated or cooled within temperature limits specified.
- D. Do not coat over dirt, rust, grease, or moisture.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Provide top line commercial products of one of the following or equal as approved by Architect:
 1. Boysen
 2. Davies
 3. Or approved equals

2.2 MATERIALS

- A. Definition: "Coatings" as used herein means coat, including primers, emulsions and sealers, whether used as primer, intermediate or finish coats.
- B. Colors and Finishes:
 1. Prior to commencement of coating work, Architect will furnish color chips for surfaces to be coated.
 2. Final acceptance of colors will be from samples applied on site.
 3. Color pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
 4. Finish Coat Coordination: Provide finish coats which are compatible with primer coatings used.
 - a. Review other specification sections in which primer coatings are provided; ensure compatibility of total coatings systems.

- b. Upon request from other trades furnish information on characteristics of finish materials proposed for use.
 - c. Provide barrier coats over incompatible primers or remove and re-prime as required.
 - d. Notify Architect in writing of any anticipated problems in use of specified coating systems with substrates primed by others.
- C. Material Quality: Materials not bearing manufacturer's identification, as a best-grade product shall not be acceptable.
 1. Use of proprietary names in color selection is not intended to imply exclusion of equivalent products of other manufacturers.
 2. Provide first coat materials in a different colour to final coat to aid correct coverage rates and film thickness. For porous substrates, strictly follow manufacturer's recommendations for dilution of primer
 3. Provide finish coats capable of being washed with mild detergent without loss of color, sheen, or pigments.
 4. Lead/Solvent Content: All coatings shall be lead free and water-based.
 5. Fire Certification: All coatings shall comply with the requirements of BS 476 Pts 6 & 7 in relation to Surface Spread of Flame.
 6. Crack-Bridging: All coatings shall be elastomeric in nature and capable of bridging cracks of up to 1mm in width.
 7. Water Vapour Permeability: All coatings shall have a definable and tested water vapour transmission rate of at least 19.0 gm/m²/day
 8. Anti-Carbonation: All coatings shall have a definable and tested CO₂ diffusion rate of a minimum 50m equivalent air thickness layer (Englefried Technique)
 9. Volume Solids: All coatings shall have a minimum solids content by volume of 29%

PART 3 - EXECUTION

3.1 PREPARATION

- A. Inspection: Examine areas and conditions under which coating work is to be applied.
 1. Start of coating work indicates acceptance of surfaces and conditions of surfaces and conditions within any particular area.
 2. Where exposed items or surfaces are not specifically mentioned in Schedules, treat the same as adjacent similar materials or areas.
 3. Do not coat over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to a durable coating film.
- B. Perform preparation and cleaning procedures in accordance with coating manufacturer's instructions and as specified for substrate condition.
- C. Remove hardware, accessories, and items in place and not to be coated, or provide protection prior to surface preparation and coating. After coating, reinstall removed items.
- D. Clean surfaces before applying coating; remove oil and grease prior to mechanical cleaning; program cleaning so contaminants from cleaning process do not fall onto wet, newly treated surfaces.
- E. Cementitious Materials: Prepare by removing efflorescence, chalk, dirt, grease, oils, and by roughening as required to remove glaze.
 1. Determine alkalinity and moisture content of surfaces to be coated.
 2. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish coat, neutralise before application of coat.
 3. Do not coat over surfaces where moisture content exceeds manufacturer's printed directions.
- F. Ferrous Metals: Touch up shop-applied prime coats wherever damaged or bare, using same type of primer.
 1. Bare Surfaces: Clean surfaces which are not galvanised or shop-coated, of oil, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
 2. Galvanised Surfaces: Clean free of oil and surface contaminants, using non-petroleum-based solvent; acid wash where necessary to assure proper adhesion of finishes.

- G. Mix coating materials in accordance with manufacturer's directions.
- H. Store materials in tightly covered containers; maintain containers used in storage, mixing and application of coating in a clean condition, free of foreign materials and residue.
- I. Stir materials before application to produce mixture of uniform density, and stir as required during application; do not stir surface film into materials, if necessary, strain material before using.

3.2 APPLICATION

- A. Apply coatings in accordance with manufacturer's directions; use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Apply additional coats when stains or blemishes show through final coat, until coat is a uniform finish, color and appearance.
 - 2. Provide extra attention to assure dry film thickness at corners and crevices is equivalent to that of flat surfaces.
 - 3. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces; coat surfaces behind permanently fixed equipment and furniture with prime coat only.
 - 4. Coat interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black coating.
 - 5. Coat backsides of access panels and removable or hinged covers to match exposed surfaces.
- B. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pre-treated or prepared for coating as soon as practicable after preparation.
 - 1. Allow time between successive coatings to permit proper drying.
 - 2. Do not recoat until coating feels firm and does deform or feel sticky under moderate thumb pressure.
- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer.
- D. Primer Coats: Apply to items not previously primed; recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat.
- E. Finish Coats provide even texture; leave no laps, irregularity in texture, skid marks, or other surface imperfections.
 - 1. Opaque Finishes: Provide opaque, uniform finish, color and coverage; cloudiness, spotting, holidays, brush marks, runs, sags, ropiness or other surface imperfections are not acceptable.
- F. Completed Work: Match approved samples for color, texture and coverage.

3.3 FIELD QUALITY CONTROL

- A. Owner reserves right to invoke material testing procedure at any time during field coating.
- B. If test results show material being used does not comply with specified requirements, Contractor may be directed to remove non-complying work, pay for testing, and recoat surfaces.

3.4 COATING SCHEDULE

- A. Exterior Work: Provide following coating systems.
 - 1. Exterior Concrete & Plaster: Textured or smooth finishes as selected by the Architect.
 - 2. Gypsum Wallboard at exterior exposed areas (if any): Flat sheen.
 - a. 1st Coat - Primer
 - b. 2nd and 3rd Coat - Exterior acrylic water-based coating.
 - 3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil grease, dirt, loose mil scale, and other foreign substances. Use mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
 - a. Touch up bare areas and shop-applied primer coats that have been damaged. Wire-brush;

clean with materials recommended by coat manufacturer; and touch up with the same primer as the shop coat.

4. Galvanised Surfaces: Clean galvanised surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants. Remove any pre-treatment from galvanised sheet metal.
5. Anti-Fungicidal: All coatings shall incorporate a cross-linked, active fungicide to inhibit the growth of mould and lichen. Fungicidal wash solution can be added to the paint to be more resistant to mold and mildew. (Verify Manufacturer / Supplier)

3.5 CLEAN-UP, PROTECTION AND REPAIR

- A. Clean Up: During progress of work, remove discarded coating materials, rubbish, cans and rags from site at end of each workday.
 1. Clean glass and coating-spattered surfaces immediately by proper methods of washing and scraping, using care not to scratch or damage finished surfaces.
- B. Protection: Protect work of other trades, whether to be coated or not; correct damage by cleaning, repairing or replacing, and recoating, as acceptable to Architect.
 1. Provide "Wet Paint" signs to protect newly coated finishes.
 2. Remove temporary protective wrappings provided by others for protection of their work, after completion of coating operations.
- C. Repair: At completion of work of other trades, touch-up and restore damaged surfaces or defaced coated surfaces.

END OF SECTION

SECTION 09950

MASSIVE ALUMINUM COMPOSITE WALL SYSTEM

1. General

An Aluminum composite material is used as the exterior cladding of new buildings and retrofit applications.

2. Product composition

The aluminum composite material shall be composed of non-combustible mineral-filled core sandwiched between two skins of 0.5mm thick aluminum (3105-H14) sheets. The surface is finished with **VALSPAR PVDF FLUROPON** (Fluorocarbon), contains full strength Kynar 500 or Hylar 5000 resin (see attached VALSPAR brochure) coating on the top side and a service coating on the reverse side.

There are two kinds of coating system for VALSPAR FLUROPON fluorocarbon coating.

- a. "Solid Color" is two-coat two-bake system.
The total dry film thickness of the top side shall be 25 μ minimum consisting of a conversion coating.
- b. "Metallic Color" is three-coat three-bake system
That thickness shall be 35 μ minimum consisting of a conversion coating, an inhibitive primer, Valspar metallic coating and clear coating.

The top coated surface comply with the "specification for coated coil for exterior building applications" issued by ECCA (European Coil Coating Association) or AAMA (American Aluminum Manufacturers Association) to achieve the quality level for each Association.

The reverse side of the cladding panel surface facing the wall shall have polyester based wash coating to protect against the possible corrosion problems.

The finished surface shall be protected with a self-adhesive peel off protective film with two layers of white and black, tested to withstand at least six months exposure to local weather condition without losing the original peel-off characteristics or causing stains or other damages.

Composition

Skin material: 0.5mm thick aluminum sheets (3105-H14)
Core material: non-combustible mineral filled core

3. Product dimension and tolerance

- (a.) Panel thickness: 3mm, 4mm, 6mm
- (b.) Panel size: width: 1220 - 1500mm
Length: 2440 - 6000mm
- (c.) Product tolerance
Width: ± 2.0 mm
Length: ± 2.0 mm
Thickness: ± 0.2 mm
Bow: maximum 0.5% of the length and/or width
Squareness: maximum 5.0mm
Surface defect: The surface shall not have any irregularities such as roughness, buckling and other imperfections with or specification of visual inspection rules.

4. Principal properties

- (a.) Panel weight: 7.6 kg/m²
- (b.) Thermal expansion: 1.2mm / m / 50°C
- (c.) Mechanical properties:
Tensile strength (ASTM E8) 5.0kg/mm²

Yield strength (ASTM E8)	4.5 kg/mm ²
Elongation (ASTM E8)	5%
(d.) Mechanical properties of skin aluminium:	
Yield strength (ASTM E8)	15.5 kg/mm ²
Modules of elasticity: (ASTM C393)	7000 kg/mm ²
(e.) Deflection temperature:	116°C
(f.) Sound transmission loss: in accordance with ASTM E413 sound transmission loss (STC)	26 STC

5. Paint finish

(a.) In VALSPAR PVDF FLUROPON (Fluorocarbon) coating, the coating shall be factory-applied in a manufacturer's continuous coating line. The color shall be selected by architect from the manufacturer's standard pre-formulated or custom color upon request, which shall include "Solid Color: and "Metallic Color"	
(b.) Gloss (60° specular gloss,; ASTM D523-89	The manufacturer's standard and Pre-formulated Colours are 30% gloss. All colours are available in 30-80% Gloss upon architect's request
(c.) Weather-o-metre test	
Colour retention: ASTM D2244-89	Maximum rating of 5 units after 4000 hrs
Gloss retention: ASTM D523-89	70% after 4000 hrs.
Chalk resistance: ASTM D4214-89	Maximum rating of 8 units after 4000 hrs.
(d.) Pencil hardness ASTM D522-88	2H
(e.) Adhesion (ASTM D3356, method 8)	
Dry:	no change
Wet:	no change after 37.8 formulated °C, 24 hrs.
Boiling water:	no change after 100°C,20 min.
(f.) Impact resistance: (NCAA 11-5)	no picking off after reverse impact cross-hatch test
(g.) Abrasive resistance: (ASTM D968-81)	resisting 20 litres of falling sand
(h.) Salt spray resistance:	blister-10, scribe-8 after 3000 hrs, salt fog, 35°C
(i.) Humidity resistance: (ASTM D2247-87)	no change after 3000 hrs, 100% RH, 35°C
(j.) Warranty:	15-20 years

SECTION 10170

TOILET PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY:

- A. Extent of toilet partitions is indicated on drawings.
- B. Types of toilet compartments include:
 - 1. Solid compact laminate
- C. Styles of toilet compartments include:
 - 1. Floor-anchored.
- D. Styles of privacy screens include:
 - 1. Floor anchored
- E. Toilet accessories, such as toilet paper holder, grab bars, purse shelves, are specified elsewhere in Division 10.

1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of toilet partition assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.
- C. Samples: Submit full range of color samples for each type of unit required. Submit 150mm x 150mm square samples of each color and finish on same substrate to be used in work, for color verification after selections have been made.

1.3 QUALITY ASSURANCE:

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to ensure proper fitting of work. However, allow for adjustments within specified tolerances where ever taking of field measurements before fabrication might delay work.
- B. Coordination: Furnish inserts and anchorages which may be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- 1. G.S Go Bros Inc. 2. Jebesen 3. Multi-Rich 4. Or approved equal
- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, the following:
 - 1. Bescube fresh colour - Model Type Z

2.2 MATERIALS:

2.3 GENERAL: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.

- A. Intermediate Panel, pilasters and door : Trespa Athlon Solid Laminated Board.
- B. The intermediate panel shall be one continuous panel without any joint. All intermediate panel, pilaster and door shall be a 3mm thick surface, with edge core in black colour.
- C. The panels, using special techniques have an integral, decorative surface made of melamine impregnated sheets resistant to chemicals and scratches.
- D. Top rail of the system shall be anodised/ powder coated aluminum channel section fixed to the top pilaster by stainless steel screws.
- E. Hardware and Accessories: Manufacturer's standard design, heavy duty operating hardware and accessories of nylon coated stainless and polyamide cover with resistant to heat and chemicals and bacteria resistance nylon.
- F. Each toilet compartment shall be equipped with the following accessories (Honey brand, made in Germany).
 - 1. "Bescube Type Z" Privacy Thumbturn
 - 2. "Bescube Type Z" Door Knob
 - 3. "Bescube Type Z" Coat Hook
 - 4. "Bescube Type Z" Hinges
 - 5. "Bescube Type Z" Adjustable Leg
- G. Fasten hinges to door using factory installed stainless screw inserts.

2.4 FABRICATION:

- A. General: Furnish doors, panels, screens, and pilasters fabricated to match and fit in partition system, unless otherwise indicated. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.
- B. Pilasters shall be supported by nylon coated stainless steel adjustable for anchored to floor with a clearance height of 150 mm.
- C. Fixing of the intermediate panels to wall shall be anodised/powder coated aluminum channel section with screw insert.
- D. The standard height of toilet compartment shall be 2.01 mm.
- E. Door Dimension: Unless otherwise indicated, furnish 600 mm wide in swinging doors for ordinary toilet stalls and 900mm (clear opening) out swinging doors at stalls equipped for use by handicapped.
- F. Solid Compact Laminate board partitions and screens.
- G. Wall-Hung Privacy Screen: Furnish panel units in sizes indicated, of same construction and finish as partition system panels.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Comply with manufacturer's recommended procedures and installation sequence. Install partitions rigid, straight, plumb, and level fixed pilaster to wall by square aluminum channel with stainless screw inserts. Locate aluminum channel so that holes for wall anchorages occur in masonry on tile joints. Secure panels in position with manufacturer's recommended anchoring devices.

- B. Floor-Supported Partitions: Adjustable stand with having not more than 25mm penetration into structural floor, unless otherwise recommended by partition manufacturer. Level, plumb, and tighten installation with devices furnished. Hang doors and adjust so that tops of doors are level with tops of pilasters when doors are in closed position.
- C. Screens: Attached with concealed anchoring devices, as recommended by manufacturer to suit supporting structure. Set units to provide support and to resist lateral impact.

3.2 ADJUST AND CLEAN:

- A. Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on in swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out swinging doors (and entrance swing doors) to return to fully closed position.
- B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION

SECTION 10210
METAL WALL LOUVERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Metal louvers and frames, with screens and attachment hardware, head and sill flashing.
- B. Full concealed doors in louvers matching louvers, complete with hardware.

1.2 RELATED WORK

- A. Mechanical Consultant Specification drawings for final louver sizes and louver air requirements and air flow data.

1.3 SUMMARY

- A. Structural Performance: Engineer, fabricate, and install louvers and vents to withstand the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of components, noise or metal fatigue caused by louver blade rattle or flutter, permanent damage to fasteners and anchors.
 - 1. Wind Load: Uniform pressure (velocity pressure) of 20 lbf per sq. ft. (960 Pa), acting in wards or outwards.
 - 2. Normal thermal movement resulting from 100 deg F (56 deg C) change (range) in ambient temperature and its effect on actual surface temperatures of metals due to both solar heat gain and night time sky heat loss.
- B. Air-Performance, Water-Penetration, and Air-Leakage Ratings: Provide louvers complying with performance requirements indicated as demonstrated by testing manufacturer's stock units of height and width indicated. Test units according to AMCA 500.
 - 1. AMCA Seal: Marks units with the AMCA Certified Ratings Seal.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate profile of frame, details, relation to adjacent construction, flashing, blade configuration, and connections to duct work, screens, and percentage of free air opening.
- B. Product Data: Manufacturer's literature for each type of louver.
 - 1. Certification: Where performance requirements are included, provide AMCA Certified Rating Seal indicating louvers comply with requirements.
- C. Samples: Dulux Powder Coated Paint by Republic Powder Coat.

1.5 SITE CONDITIONS

- A. Take site dimensions affecting this work prior to fabrication.
- B. Ensure openings affecting this work are properly prepared and flashings are correctly located to divert moisture to exterior.
- C. Protect adjacent surfaces, finishes and materials from damage during installation of louvers.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The following manufacturers are listed to indicate quality of products desired.

1. Metrotech Steel Industrial Inc
2. Lecsteel
3. Doortech
4. Rapid Forming
5. Or approved equal

2.2 TYPE (Refer plan) For Architect's Approval.

A. Steel Wall Louvers:

1. Louver Type:
 - a. Refer plan .

2.3 FABRICATION

A. Louvers: Manufacturer's standard fabrication for types specified.

B. Screen for Exterior Louvers: Minimum 1.5mm diameter wire, 12mm interwoven square mesh.

1. Aluminum steel wire.
2. Match louver.

C. Accessories: Fabricate sill extension, flashings, wall anchors, structural supplementary sub-framing, and accessories as required for complete system.

D. Concealed Doors: Full flush type doors with louver section secured to exterior face, flush and even with wall louver, or custom framed panel with louver face, flush and even with wall louver.

1. Hardware:
 - a. Hinges conforming with requirements specified in Division B. Section headed "Finished Hardware"; designed to permit easy opening and closing of door without damage to door or adjacent materials.
 - b. Lockset: Deadlatch keyed to match building keying for transformer vault.
 - 1) Cylinders: Provided in Division Section headed "Finished Hardware".
 - c. Closer: Comply with requirements specified in Division 8 Section headed "Finished Hardware".

1. Color: Two custom colors maximum and in general to match aluminium window wall or adjacent construction.

F. Shop fabricate units to maximum extent possible and disassemble as necessary for shipping and handling limitations; clearly mark units for reassembly and installation.

1. Fabrication frames, including integral sills, to suit adjacent construction with tolerances for installation.
2. Provide sill extensions and loose sills of same material and finish as louvers.

- G. Join frame members and louver blades by welding; maintain equal blade spacing, including separation between blades and frame head and sill; maintain uniform appearance.
- 1. Shop miter and weld blades at continuous blade louvers into prefabricated corner units to align with straight sections; include concealed bracing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louver units plumb, level, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather tight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items that cannot be refinished in the field to the shop, make required alterations, and refinish entire unit, or provide new units.
- F. Protect galvanized-and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
- G. Set and tie into flashing to ensure diversion of moisture to exterior.

END OF SECTION

SECTION 10416

DIRECTORIES AND BULLETIN BOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and
- B. Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes directory at the lobby area.
 - 1. Refer Architectural plan.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 6 Section "Rough Carpentry" for wood blocking and grounds.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes. Include manufacturer's data substantiating that tackboard materials comply with requirements indicated.
- C. Shop Drawings: Provide dimensioned elevations for each type of directory and bulleting board required; include large-scale sections of typical members and other components. Show anchors, grounds, reinforcement and layout, and indicate finishes.
 - 1. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as a unit of Work in other Sections.
- D. Samples: Provide the following samples of each exposed material, including message strips, letters, and other graphics, for initial selection of colors, patterns, and textures, as required, and for verification of compliance with requirements indicated.
 - 1. Samples for initial selection of color, pattern and texture:
 - a. Vinyl-fabric-faced Cork Tackboards: Manufacturer's color charts consisting of actual sections of vinyl fabric, showing the full range of colors, textures, and patterns available for each type of vinyl-fabric-faced cork tackboard indicated.
 - b. Aluminum Trim and Accessories: Samples of each finish type and color, on 150 mm long sections of extrusions and not less than 100 mm squares of sheet of plate, showing the full range of colors available.
 - c. Message Strips: Samples of message strips in color selected with sample of typography specified.

- F. Certificates: In lieu of laboratory test reports when permitted by the Architect, submit the manufacturer's certification that vinyl-fabric-faced cork tack board materials furnished comply with requirements specified for flame spread ratings.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the building directory manufacturer for installation and maintenance of the manufacturer's product.
1. The Installer shall be acceptable of providing replacement message strips within 10 working days of receipt of an order.
- B. Fire Performance Characteristics: Provide vinyl-fabric-faced tackboards with surface burning characteristics indicated below., as determined by testing assembled materials composed of facings and backings identical to those required in this section, in accordance with ASTM E 84, by a testing organization acceptable to authorities having jurisdiction.
1. Flame Spread: 25 or less.
 2. Smoke Developed: 10 or less.
- C. Design Criteria: The drawings indicate sizes profiles, and dimensional requirements of bulletin board. Other bulletin boards with deviations from indicated dimensions and profiles may be considered, provided deviations do not change the design concept. The burden of proof of equality on the proposer.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

1.6 EXTRA MATERIALS

- A. Deliver extra message strips to the Owner. Furnish extra message strips matching message strips installed, packaged with protective covering for storage and identified with labels clearly describing contents.
1. Message Strip Units: Furnish quality of blank full size message strip units equal to 10 percent of the amount installed for the Owner's future use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
1. Manufacturers of Bulletin Boards:
 - a. Nelson Harkins Industries.
 - b. Andco Industries Corporation.
 - c. Claridge Products and Equipment, Inc.
 - d. Greensteel, Inc.
 - e. Poblocki & Sons.
 - f. or approved equal

2.2 MATERIALS

- A. Aluminum Extrusions: Provide manufacturers standard extruded aluminum sections with not less than the strength and durability properties specified in ASTM B 221 for 6063-T5 alloy.
- B. Clear Float Glass: Provide clear float glass, thickness as indicated, complying with the requirements of ASTM C 1036, Type I. Quality q3.
- C. Tempered Glass: Provide clear, tempered safety glass complying with the requirements of ASTM C 1048, Kind FT. Condition A, Type I, Class 1 - transparent.
- D. Natural Cork Tackboard: Provide single-layer 25mm thick seamless, compressed fine-grain bulletin board quality natural cork sheet face sanded for natural finish, complying with MSMIL-C15116, Type II.
 - 1. Backing: Factory-laminated cork face sheet to 6mm-thick hardboard backing.

2.3 BULLETIN BOARDS

- A. Bulletin Boards: Provide the manufacturer's standard surfaced-mounted, top-illuminated bulletin board. The assembly shall consist of the bulletin board housing with perimeter frame, sides, and back, a header panel, top-illumination system, tackable surface of material indicated, operable transparent covers with hardware, and other features indicated. Provide graphics for header panels and other designs in the letter style, size, spacing, and arrangement indicated.
 - 1. Perimeter Frame and Cover Design: Provide extruded aluminum perimeter frame of the profile indicated. Provide sliding glass doors glazed with 6mm thick tempered glass, with exposed edges seamed to eliminate cutting hazard.
 - a. Operating Hardware: Provide extruded aluminum top and bottom track, extruded aluminum bottom shoes, nylon rollers, rubber top guides, rubber bumpers, grooved finger pulls, and adjustable lock.
 - 2. Header Panels: Provide opaque acrylic sheet header panels with letters and graphics applied by the silk-screen printing process.
 - 3. Illumination System: Provide a concealed top-lighting system consisting of strip fluorescent fixtures. Include lamps and internal wiring with single concealed electrical connection to the building system. Coordinate electrical characteristics with those of the power supply provided.
 - a. Ballasts: Provide low-temperature, high power-factor, low-energy fluorescent lamp ballasts that comply with "Certified Ballast Manufacturers Association" standards and carry the CBM label. Provide exterior ballast for exterior signs.

2.4 ACCESSORIES

- A. Fasteners: Provide screws, bolts, and other exposed fastening devices of the same material as the items being fastened. Fasteners for applications on the exterior and exposed to the weather may be hot-dip galvanized, stainless steel, or aluminum. Provide types, gages, and lengths to suit installation conditions. Use theft-proof fasteners where exposed top view.

B. Hardware: Provide building directories and bulletin boards with the following hardware:

1. Hinges: Concealed pivot hinges.
2. Lock: Furnish each cover with the manufacturer's standard lock; key all locks alike. Furnish 2 keys per lock.

2.5 FABRICATION

A. General: Fabricate bulletin boards to requirements indicated including dimensions, design, the thickness and finish of materials. Use metals and shapes of thickness, with reinforcing, if needed, to produce flatness, free of "oil canning," and to impart strength for size, design, and application indicated.

1. Fabricate perimeter and cover frames with reinforced corners, mitred to a hairline fit, with no exposed fasteners.
2. Hardware for Covers: Equip covers with the manufacturer's standard hardware of the type indicated.

2.6 FINISHES

- A. General : Comply with NAAMM" Metal Finishes Manual" for finish designations and application recommendations.
- B. Colors: Where name strips, header panel, or other items, other than frames or glazing materials, require color selection to distinguish letters or graphic images from the background or for other purposes provide colors as selected by the Architect from the manufacturer's standard colors.
- C. Finish designation prefixed by "AA" conform to system established by the Aluminum Association for designating aluminum finishes.
- D. Class II Clear Anodized Finish: AA-M12C22A31 (Mechanical Finish : as fabricated non-specular; Chemical Finish : etched medium matte ; Anodic Coating: Class II Architectural, clear film thicker than 0.4mil).

END OF SECTION

SECTION 10522

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
1. Fire extinguishers.
 2. Fire extinguisher cabinets.
 3. Mounting brackets.
- B. Related Sections: The following sections contain requirements that relate to this section:
1. Division 4 Section " Stonework" for cabinets with stone faced doors and fronts set in stone cladwalls.
 2. M&E Consultants specification "Fire Protection" for fire hose cabinets and valve cabinets.
 3. M&E Consultants specification section "Fire Protection" for fire protection systems.
 4. Interior design specifications for cabinets exposed to view in front-of-house public spaces.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data and manufacturers literature for each type of product specified. For fire extinguisher cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.
- C. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors available for those units with factory-applied color finishes.
- D. Samples for verification purposes of each type of metal finish required, prepared on metal samples of same thickness and alloy indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.
- E. Samples for verification purposes of each type of special cladding finish required prepared on metal and plywood mounted samples of stone type in same thickness as designated for adjacent wall or unit of work.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain fire extinguishers and cabinets from one source from a single manufacturer.
- B. Coordination: Verify that fire extinguisher cabinets are sized to accommodate fire extinguishers of type and capacity indicated.
- C. UL-Listed Products: Fire extinguishers UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher.

- D. FM-Listed Products: Fire extinguishers approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher and carry appropriate FM marking.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allenco.
2. Ansul Fire Protection, Wormald US Inc.
3. Badger-Powhatan.
4. Bobrick Washroom Equipment, Inc.
5. J.L. Industries.
6. Larsen's Manufacturing Co.
7. Modern Metal Products by Muckle.
8. Potter-Roemer, Inc.
9. Samson Metal Products, Inc.
10. Walter Kidde, Division of Kidde, Inc.
11. Watrous Inc.
12. American Specialties Inc.

2.2 FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard, which comply with requirements of governing authorities.
1. Fill and service extinguishers to comply with requirements of governing authorities and manufacturer.
- B. Types: Provide fire extinguisher types as specified in the M&E consultants documentation from range of types listed below.
1. Stored-Pressure Water Type: UL-rated 2-A, 2-1/2-gallon nominal capacity, in stainless steel container with pressure-indicating gage.
 2. Stored-Pressure Antifreeze Type: UL-rated 2-A, 2-1/2-gallon nominal capacity containing approved antifreeze solution good for temperatures as low as minus 40 deg F (minus 40 deg C), in stainless steel container with pressure-indicating gage.
 3. Carbon Dioxide Type: UL-rated 5-B:C, 5-lb. nominal capacity, in manufacturer's standard enameled metal container.
 4. Carbon Dioxide Type: UL-rated 10-B:C, 10-lb. nominal capacity, in manufacturer's standard enameled metal container.
 5. Dry Chemical Type: UL-rated 5-B:C, 2-1/2-lb. nominal capacity, in enameled steel container.
 6. Dry Chemical Type: UL-rated 10-B:C, 5-lb. nominal capacity, in enameled steel container.
 7. Dry Chemical Type: UL-rated 40-B:C, 10-lb. nominal capacity, in enameled steel container.
 8. Multipurpose Dry Chemical Type: UL-rated 1-A:10-B:C, 2-1/2-lb. nominal capacity, in enameled steel container.
 9. Multipurpose Dry Chemical Type: UL-rated 2-A:10-B:C, 5-lb. nominal capacity, in enameled steel container.

10. Multipurpose Dry Chemical Type: UL-rated 4-A:60-B:C, 10-lb. nominal capacity, in enameled steel container.
11. Halon Type: UL-rated 5-B:C, 2-1/2-lb. nominal capacity, in enameled steel container with pressure-indicating gage.
12. Halon Types: UL-rated 10-B:C, 5-lb. nominal capacity, in enameled steel container with pressure-indicating gage.

2.3 MOUNTING BRACKETS

- A. Provide brackets designed to prevent accidental dislodgement of extinguisher, of sizes required for type and capacity of extinguisher indicated in plated finish.
 1. Provide brackets for extinguishers not located in cabinets and for those located in cabinets, where indicated or required.
 2. Location of Bracket Mounted Extinguishers: Mechanical and plant areas, basement and car parking garage floors, gaurdhouses and as shown on M&E consultants Fire Services drawings or as directed by local authorities and regulations.

2.4 FIRE EXTINGUISHER CABINETS

- A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.
- B. Construction: Manufacturer's standard enameled steel box, with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.
- C. Cabinet Type: Suitable for mounting conditions indicated, of the following types:
 1. Recessed: Cabinet box (tub) fully recessed in walls of sufficient depth to suit style of trim indicated.
 2. Semirecessed: Cabinet box (tub) partially recessed in walls of shallow depth.
 3. Surface-Mounted: Cabinet box (tub) fully exposed and mounted directly on wall.
- D. Trim Style: Fabricate trim in one piece with corners mitered, welded, and ground smooth.
 1. Trimless: Surface of surrounding wall finishes flush with exterior finished surface of frame and door of fire extinguisher cabinet, without any overlapping trim attached to cabinet.
 - (a) Provide recessed flange, of same material as box, attached to box to act as plaster stop.
 - (b) Rolled-Edge Trim with 62mm backbend depth.
- E. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected and designed to accommodate store facings or other special materials indicated.
 1. Enameled Steel: Manufacturer's standard finish, hollow steel door construction with tubular stiles and rails.
 2. Stainless Steel: Manufacturer's standard door construction, fabricated from austenitic stainless steel complying with ASTM A 167, for ISS Type 302/304 alloy.
 3. Door Glazing: Tempered float glass complying with ASTM C 1048, Type I, Quality q3, Class as follows:
 - (a) Tinted glass, Class 2 (heat-absorbing and light-reducing), bronze tint.

- F. Identify fire extinguisher in cabinet with lettering spelling "FIRE EXTINGUISHER" applied to door. Provide lettering to comply with requirements indicated for letter style, color, size, spacing, and location or, if not otherwise indicated, as selected by Architect from manufacturer's standard arrangements.
1. Application Process: Silk screen.
 2. Application Process: Engraved - (optional)
 3. Application Process: Etched - (optional)
- G. Stone faced doors shall have surface mounted lettering in 3mm thick mirror polished stainless steel No8 finish to style size, spacing, and location as selected by Architect.
- H. Identify bracket-mounted extinguishers with red letter decals spelling "FIRE EXTINGUISHER" applied to wall surface. Letter size, style, and location as selected by Architect.
- I. Door Style: Manufacturer's standard design.
1. Full-Glass Panel: Float glass, 3mm thick.
 2. Duo-Panel: Float glass, 3mm thick.
 3. Break Glass Panel: Float glass, 3mm thick, with inside latch and lock.
 - a. Frameless Tempered Full-Glass Panel: Tempered float glass with polished edges and inside surface etched with lettering or design indicated and frosted.
 - b. Solid Panel: Full flush opaque panel of stone or other special finish material indicated.
- (1) Silk-screen lettering or surface mounted design as indicated.
- J. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam action latch, or door pull, exposed or concealed, and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 deg. Hinge design to be formed to ensure 180 deg opening for doors with applied finish such as store or other special finished materials.

2.5 FINISHES FOR FIRE EXTINGUISHER CABINETS, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.

2.6 ALUMINUM FIRE EXTINGUISHER CABINET FINISHES

- A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
- B. Class I Color Anodized Finish: AA-M12C22A42/A44 (Mechanical Finish: as fabricated, non-specular; Chemical Finish: etched, Medium Matte; Anodic Coating: Class I Architectural, film thicker than 0.7 mil with integral color or electrolytically deposited color) complying with AAMA 606.1 or AAMA 608.1.
1. Color: Match Architect's sample.
- C. Baked Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: chemical conversion coating, acid chromate-fluoride-phosphate pre-treatment; Organic Coating: as specified below). Apply baked enamel in compliance with paint manufacturer's specifications for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting modified acrylic enamel primer/topcoat system complying with AAMA 603.8 except with minimum dry film thickness 1.5 mils, medium gloss.
2. Color: Match Architect's sample.

2.7 STEEL FIRE EXTINGUISHER CABINET FINISHES

- A. Surface Preparation: Solvent-clean surfaces in compliance with SSPS-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel in compliance with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).
- B. Baked Enamel Finish: Immediately after cleaning and pre-treatment, apply manufacturer's standard 2-coat baked enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's instructions for application and baking to achieve a minimum dry film thickness of 2.0 mils.
 1. Color and Gloss: Match Architect's sample.
 - (a) Exterior of cabinet except for those surfaces indicated to receive another finish.
 - (b) Interior of cabinet.

2.8 STAINLESS STEEL FIRE EXTINGUISHER CABINET FINISHES

- A. Remove or blend tool and die marks and stretch lines into finish.
- B. Polished and Buffed Finish: Fine grit followed by buffing.
- C. Satin, Reflective, Directional Polish: AISI No. 7 finish.
 1. Passivity and rinse surfaces after polishing. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine substrates and conditions where fire extinguisher cabinets are to be installed.
- B. Beginning installation signifies acceptance of conditions.

3.2 INSTALLATION

- A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.
 1. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
 3. Where exact location of surface-mounted cabinets and bracket-mounted fire extinguishers is not indicated, locate as directed by Architect.

END OF SECTION

SECTION 10700

ARCHITECTURAL LIGHTWEIGHT INTERIOR PRECAST

PART 1 – GENERAL

1.1 INTRODUCTION AND BRIEF HISTORY OF ARTY WORKS BUILDERS CORP.

1.2 SUMMARY

- A. Light-weight Precast unit construction, complete with mortar, reinforcement and anchorage.
 - 1. Extent of work is shown on the drawings and partition schedule.
 - 2. Cutting and fitting for work of other trades is scheduled as work of this section.
- B. Products Installed not Furnished: Building in items supplied by other trades or suppliers.

1.3 QUALITY ASSURANCE

- A. Testings: Conforms to requirement as per attached reports.
 - A.1 Pull-out Test
 - A.2 Sound Test
 - A.3 Fire Test
 - A.4 Compressive Strength Test
 - A.5 Moisture & Absorption Test
 - A.6 Structural Evaluation

1.4 SUBMITTALS

- A. Shop Drawings: Provide for reinforcing; show bar schedules, diagrams of bent bars, ties and arrangements and assemblies. All reinforcing shall meet applicable local requirements, and engineering of same is responsibility of the contractor.
- B. **Product Data:** Provide manufacturer's certificate concrete masonry units and reinforcing steel conform to specified standards.

1.5 SITE CONDITIONS

- A. Provide temporary bracing during erection of masonry work, maintain in place until building structure provides permanent bracing.
- B. Delivery & Storage: Delivery of Precast Panels in good condition & staging area should be provided. Delivery of adhesive and other cementitious materials to the site in unbroken bags, or other appropriate containers, plainly, marked and labelled with manufacturer's names and brands. Store cementitious materials in dry, weathertight sheds or enclosures and handle so as to prevent entry of foreign materials and damaged by water or dampness. Handle masonry units with care to avoid chipping and breakage. Protect masonry material from damage, and except for sand, keep dry until use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Subsequent to compliance with requirements manufacturers offering products that may be incorporated in the work include the following:

- A. Macro Industrial Packaging Product Corp,
- B. Arty Works

ASYA	
FOR CONSTRUCTION	
Date: _____	By: _____

- C. Starken
- D. Or approved equal

2.2 MATERIALS

- A. Hollow Non-Load Bearing Units: ASTM C-39 made with Light weight aggregates, and with ultimate compressive strength of 500 psi.
- B. Special Shapes: Provide special shapes as closures, header units, and jamb units as necessary to complete the work. Special shapes shall conform to the requirements for the units with which they are used. Shapes shall be cut on site as required.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Lifting of Precast Panels to designated working area.
- B. Zocalo recommended for T & B perimeter at least 20 cm.
- C. Ensure items built in by other trades are properly located and sized.
- D. Establish lines, levels and coursing, protect from disturbance.
- E. Clean surfaces to receive masonry free from dirt, debris, and laitance.

3.2 INSTALLATION & METHODOLOGY

1. Drill 2 pieces of 10mm dowels into column or wall. Use slurry as an adhesive.
2. Layout and chip the panels for utility fixtures for plumbing, electrical, ducting etc. using grinder, cut the arty wall according to layout.
3. Put slurry to the area or lay out that the Arty Panels where it will be installed.
4. Provide a space that will just fit a 10mm dowels drilled in one side of the Arty Panels before installing it in place, can be cut using grinder.
5. Seal the area provided for the dowels using slurry.
6. Lock the bottom edge of the Arty Panels by drilling a hole on the slab boring a 10mm Dowel in L-shaped form.
7. Apply Slurry for the next Arty wall.
8. After placing the next Arty panel, lock their joint with a U-shaped 10mm dowel.
9. Place the pipes then restore the areas using installation slurry or mortar.
10. Repeat all steps to complete the whole span. Check using levelling bar.
11. After filling with slurry, attached the Anti-cracking fiber mesh in 50mm to the panel.
12. Paint can be directly laid on the wall panels with cement paste, also the wallpaper and tiles can be covered directly without scraping.

3.3 CLEANING

- A. Remove excess mortar and smears upon completion of masonry work.
- B. Point or replace defective mortar, match adjacent work.
- C. Clean soiled surfaces using a non-acidic solution which will not harm Precast or adjacent materials, consult precast manufacturer for acceptable cleaners.
- D. Use non-metallic tools in cleaning operations.
- E. Protection: Protect work which may be damaged, stained or discoloured during cleaning operations.
- F. Pointing: Upon completion of precast work, cut out defective mortar joints and truck joints and all holes solidly with mortar.
- G. Cleaning: Clean exposed precast surfaces with clear water and stiff fiber brushes and rinse with clean water. Where stains, mortar, or other soil remain, continue cleaning as follows: Clean precast surfaces by scrubbing with warm water and soap and rinsing thoroughly with clean water. Restore damaged, stained, and discoloured work to its original conditions or replace with new work.

END OF SECTION

SECTION 10810

TOILET, FITTINGS & ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of each type of toilet accessory is indicated on drawings and schedules or as described herein.
- B. Male and female toilets, maids room toilets at apartments.
- C. Types of toilet accessories required include the following :
 - 1. Soap dispensers wall and surface mounted
 - 2. Mirrors
 - 3. Urinals
 - 4. Lavatories (wash hand basins)
 - 5. Flush valves
 - 6. Lavatory faucets
 - 7. Slop sinks
 - 8. Toilet tissue dispensers
 - 9. Floor drains
 - 10. Wall faucets
 - 11. Hook for each water closet/cubicle
 - 12. Toilet bowl / water closet

1.2 QUALITY ASSURANCE

- A. Urinals, and lavatory faucets shall function manually as specified.
- B. Inserts and Anchorages : Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.
- C. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.
- D. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless otherwise acceptable to Architect.
- E. Fittings and Accessories: Items specified herein shall be supplied with all necessary fittings and accessories for proper and normal functioning as intended by the Architect. Items shall be supplied and installed with all bolts, washers, fixings, gaskets, piping, wiring etc and shall be fully functional and as approved by the architect.

1.3 SUBMITTALS

- A. Product Data : Submit manufacturer's technical data and installation instructions for each toilet accessory.
- B. Samples : Submit full-size samples of units to Architect to review of design and operation. Acceptable samples will be returned and may be used in the work.
- C. Setting Drawings : Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.
- D. All items shall be installed in mock-up of each toilet prior to final acceptance. Mock-up shall establish installation process and final appearance and acceptance.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering toilet accessories which may be incorporated in the work include, but are not limited to, the following:

1. HCG
2. Kuysen
3. American Standard
4. Or approved equal

2.2 MATERIALS, GENERAL

- A. Stainless Steel: AISI type 302/304, with polished No. 8 mirror polished, 22 gage (0.85mm) minimum, unless otherwise indicated.
- B. Brass: Leaded and unleaded, flat products, FS QQ-B-613; Rods, shapes, forgings, and flat products with finished edges, FS QQ-B-626.
- C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 20-gage (1mm) minimum, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 527, G60.
- E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
- F. Mirror Glass: FS DD-G-451, Type I, Class 1, Quality q2, 6mm thick, with silver coating, copper protective coating, and non-metallic paint coating complying with FS DD-M-411.
- G. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
1. Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

2.3 TOILET TISSUE DISPENSERS

- A. Single-Roll Dispenser w/cover : Size to accommodate single roll of core type tissue to 125mm diameter. Refer to Miscellaneous Accessories, Toilet Fittings.
- B. Fabrication: Theft Resistant spindeless chrome-plated zinc alloy construction with tension spring delivery control; designed for surface mounting.

2.4 SOAP DISPENSERS

- A. Liquid Soap Dispenser, Surface mounted corrosion resistant valve 1.18L capacity, concealed fastening vandal resistant with stainless steel lather valve. Refer to Miscellaneous Accessories, Toilet Fittings.

2.5 MISCELLANEOUS ACCESSORIES

- A. Double Robe Hook: Heavy-duty satin finished stainless steel double prong robe hook; rectangular wall bracket with backplate for concealed mounting on inside face of each toilet compartment door, and adjacent to each shower stall. HCG or equivalent
- B. Male and Female Toilets - Toilet Fittings
1. Water Closet: as specified hereunder or equivalent.
- a. HGC Legato B White Italian design one-piece high tank water closet (C4283) for Master's Bedroom.
- b. HGC Jupiter B (verify color with Architect) close-coupled elongated water closet (CS4331) for regular rooms of typical residential units.

- c. HGC Earth Package close-coupled round front water closet with hand wash (CS4332H) for Maid's Room
2. Bathtub: as specified hereunder or equivalent
 - a. HGC Legato acrylic bathtub 1.5m with grab bar (F8250CB) with wall mounted single lever bath mixing faucet (BF6821C) and trip lever with pop-up drain system for Master's Bedroom
3. Urinal: Vitreous china wall mounted flush valve unit furnished complete with all required accessories, compatible with Legato B series. Verify Architect
4. Lavatory
 - a. HGC Legato B White Italian design under the counter lavatory (L4056) complete with BA111 soap holder and BA118 paper holder for Master's Bedroom
 - b. HGC Countertop lavatory (L363S verify size with architect) complete with soap holder (BA111) and paper holder (BA118) for regular rooms of typical residential units.
 - c. HGC Earth package soap holder (S6) and paper holder (S8) for Maid's Room
4. Toilet Flush Valve: Compatible with water closet - verify color
5. Urinal Flush Valve: Compatible with Urinal selected - verify color
6. Lavatory Faucet: as specified hereunder or equivalent:
 - a. HGC Legato B White Italian made single lever ceramic disc faucet (CLF3181) complete with angle valves, steel braided flexible hose and P-trap for Master's Bedroom
 - d. HGC Jupiter B everglades single ceramic disc faucet (LF3811 or LF3821) complete with angle valves, steel braided flexible hose and P-trap for regular rooms of typical residential units
 - e. HGC BF6811P concealed single lever bath mixing faucet for regular rooms of typical residential units
 - f. HGC BF3717 concealed single knob bath mixing faucet for Maid's Room
7. Janitors Lavatory: HGC vitreous China slop sink with compatible flush valve and all accessories or equivalent
8. Kitchen Sink: as specified hereunder or equivalent
 - a. HGC KF2811 single lever kitchen mixing faucet

2.6 FABRICATION

- A. General: Only an unobtrusive stamped logo of manufacturer, as approved by Architect, is permitted on exposed face of toilet accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate unit of all welded construction, without mitered comers. Hang doors or access panels with full-length stainless steel piano hinge. Provide anchorage which is fully concealed when unit is closed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install toilet accessory units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer to unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

3.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

END OF SECTION

SECTION 12390

RESIDENTIAL CASEWORK AND CLOSET LAMINATES (KITCHEN CABINET)

PART I – GENERAL

1.1 SUMMARY

- A. Extent of Kitchen Cabinet is indicated on the drawings.
- B. Types of kitchen cabinet compartments include :
 - 1. Refer plan
- C. Style of kitchen compartments include:
 - 1. Refer plan
- D. Kitchen accessories, refer plan, refer manufacturer standard.
 - 1. Granite Countertop with Granite Splashboard.
 - 2. Kitchen Sink use "Teka Brand 20"21"1B wit Overflow.
 - 3. Overhead Cabinet and Base Cabinet
 - 4. 25 MDF (HP Laminated to the solid wood frame) PVC sheet as laminates
 - 5. Cabinet handles/Concealed Hinges and other kitchen Accessories

1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication and installation including catalog cuts of anchors, hardware, fastening and accessories.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of kitchen cabinet assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.
- C. Samples: Submit full range of color sample for each type of unit required. Submit 150mm x 150mm square samples of each color and finish on same substrate to be used in work, for color verification after selections have been made.

1.3 QUALITY ASSURANCE

- A. Field Measurements: Take field measurements prior to preparation of shop drawing and fabrication where possible, to ensure proper fitting work. However, allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay work.
- B. Coordination: Furnish inserts and anchorage which maybe built into other work for installation of kitchen cabinet and related work; coordinate delivery with other work to avoid delay.

PART 2 – PRODUCTS

2.1 MANUFACTURERS:

- 1. Luxacraft 2. Rollette Marketing 3. Kusinart 4. Or approved equal
- A. Available Manufacturer: Use hi-pressure laminates. Subject to compliance with requirements, manufacturers offering products which maybe incorporated in the work include, but are not limited to the following:
 - 1. Formica
 - 2. Wilform
 - 3. Or approved equal

2.2 MATERIALS:

2.3 GENERAL: Provide material that has been selected for surface flatness and smoothness. Exposed surfaces, which exhibit pitting, seam marks, stains, and discoloration, telegraphing of core material or other imperfections on finished units are not acceptable.

- A. Intermediate Panel, pilasters and door: Refer plan
- B. The panels using special techniques have an integral, decorative surface made of melamine impregnated sheets resistant to chemicals and scratches.
- C. Hardware and Accessories: Manufacturer's standard design, heavy duty operating hardware and accessories of nylon coated stainless and polyamide cover with resistant to heat and chemicals and bacteria resistant nylon.
- D. Each toilet compartment shall be equipped with the following accessories (made in Taiwan)
 - 1. Door Knob – Hafele, Yale, Schlage
 - 2. Wire basket by ASIA Co.
 - 3. Hinges use Heitich
- E. Fasten hinges to door using factory installed stainless screw inserts.

2.3 FABRICATION:

- A. General: Furnish doors, panels, screens and pilasters fabricated to match and fit in partition system, unless otherwise indicated. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories and grab bars as indicated.
- B. Pilasters shall be supported by nylon coated stainless steel adjustable for anchored to floor with a clearance height of 150mm.
- C. Fixing of the intermediate panels to wall shall be anodized/powder coated aluminum channel section with screw insert.
- D. The standard height of kitchen cabinet compartment shall be 2.01mm.
- E. Door Dimension: Refer plan

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Comply with manufacturers recommends procedures and installation sequence. Install partitions rigid, straight, plumb and level fixed pilaster to wall by square aluminum channel with stainless screw inserts. Locate aluminum channel so that holes for wall anchorage occur in masonry on tile joints.
- B. Floor Supported Partitions: Adjustable stand with having not more than 25mm penetration into structural floor, unless otherwise recommended by partition manufacturer. Level, plumb, and tighten installation with devices furnished. Hang doors and adjust so that top of doors are level with tops of pilasters when doors are in closed position.

3.2 ADJUST AND CLEAN:

- A. Hardware Adjustment: Adjust and lubricate hardware for proper operation.
- B. Clean exposed surfaces of partition system using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION

SECTION 14210

PASSENGER ELEVATOR (MACHINE ROOM)

1.01 DESCRIPTION

General:

Provide A/C geared inverter controlled, elevators, complete, as shown and specified per Contract Documents.
All description below should follow the approved supplier prior to implementation.

1.02 SYSTEM DESCRIPTION

Passenger Elevator

1.	Elevator Designation	:	Verify Plan
2.	Location	:	Verify Plan
3.	No. of Units	:	(3) units (Center Opening)
4.	Capacity	:	17 persons (1275 Kgs)
5.	Speed	:	240 (4m/s) (with an average waiting time Of 60 seconds or less)
6.	No. of Stops	:	40 stops (G, 1 st - 12 th to 14 th – 40 th floor)
7.	Control System	:	Inverter & Microcomputer controlled (VVVF)
8.	Operating System	:	3C- AI22
9.	Traction Machine	:	AC Geared Type Traction Motor (Made in Japan)
10.	Shaft Size	:	2600(W) x 2200(D)
11.	Electric Power	:	(Refer to Electrical Plan)
12.	Car Door	:	Effective Opening: 1100mm (W) x 2100mm (H) Two-panels operated, center opening complete with mechanism, aluminium sill and safety shoe mechanism.
13.	Elevator Car	:	2000 (W) x 1400 (D) x 2200 (H) [As per manufacturer standard]
14.	Car Opening Board	:	Finish: Stainless steel, hairline finish
15.	Landing Door	:	Hairline finish stainless steel
16.	Transom	:	As per Interior Design
17.	Jamb	:	50mm narrow, hairline finished Stainless steel
18.	Floor Signal	:	Micro touch hall call buttons installed in between entrances, hall lanterns installed at every entrance, and floor designation (digital dot matrix) at Ground Floor only.
19.	Accessories	:	Interphone, overload protective device, arrival gong, emergency operation, automatic stop door, security camera, provisions for disabled (controls), similar accessories and devices for complete installation of work.
20.	Pit Depth	:	± 3600 mm (verify manufacturer)
21.	Overhead Height	:	± 6500 mm (verify manufacturer)
22.	Machine Room Height	:	± 3000 mm (verify manufacturer)
23.	Buffers	:	oil buffers
24.	Brand	:	Hitachi/ Mitsubishi

*NOTE: Platform should be depressed to allow installation of synthetic granite tile finish.
Fans shall be located at the sides of elevators. Verify elevator supplier upon fabrication.

1.03 **DESIGN CRITERIA**

A. Performance:

1. **Contract Speed:**
Within 5% under any loading condition in either direction
2. **Floor-to-Floor Time:**
Measure from start of door closing at any to 3/4 open door, car level and stopped at next floor maximum advance door opening of 3/4 open within 25mm of floor level. 8.0 seconds for greaseless passenger elevators; typical floor height 3000. Incorporate system, which initiates movement of passenger elevators within 0.5 seconds after makeup of hoistway interlocks.
3. **Levelling:**
Within 7mm under any loading condition
4. **Door Opening:**
Doors to be 3/4 open at completion of levelling operation.
5. **Capacity:**
Safely lower, stop, and hold up to 125% of rated load.
6. **Waiting Time:**
Passenger waiting time in the group, as measured by registration of hall calls, shall meet the following criteria during all traffic conditions of the day other than Up Peak.

The preceding performance characteristics shall be predicted on not more than 150 calls being registered within the designated 15minute period and on all cars being in passengers service during the test period. Waiting time for service at floors not served by all elevators shall not be included in the verification of waiting time performance.

B. Motor Control:

1. **Equipment:**
Operate at plus or minus 10% of normal feeder voltage and plus or minus 3% of feeder frequency without damage or interruption of elevator service, include protective devices to prevent damage on over or under voltage.
2. **Control Systems:**
Operate hoist motor continuously at contract speed and load for a 60-minute period. At end of test motor windings shall not exceed 50 degree Celsius above ambient. Under same conditions, elevators system not to adversely affect stability of voltage and frequency controls of emergency generator set or loads connected to emergency power bus during standby power operation.
3. **Shut Down:**
Provide adjustable timing device, up to 10minutes, to shut down each motor generator set after last call is answered. Automatically restart upon call registration.
4. **Starting:**
Do not start more than 2 motor generators in a Group simultaneously. Provide not less than a 30-second delay between starts.

PART 2.00 - PRODUCTS

2.01 MACHINE ROOM EQUIPMENT

- A. General:
Provide equipment to fit space and structural conditions shown.
1. Identification:
Permanently number equipment with numerals 100mm high corresponding with elevator numbers.
2. Sound Control
Provide effective sound isolation material to isolate machines, motor generators or solid state drive units, from beams and building structure to prevent objectionable noise transmission to building rental spaces. As a minimum, provide a 3-layer neoprene vibration isolation pad with steel shims between live units and building structure such that there is not solid contact between same. Provide flexibility in all electrical and other connections. Noise levels not to exceed NC-35.
3. Machine Beams:
Provide beams with bearing plates, anchors, shelf angles and blocking required to support equipment.
- B. Hoisting Machines:
1. General:
Provide machines to operate within specified temperature range. Provide anti-friction bearings with easy access for lubrication. Provide means to service secondary and deflecting sheaves from machine rooms. For adjacent offset machine conditions, provide direct roping without twists.
2. Motors:
Multi-polar DC type rated for 50 degrees rise during continuous operation.
- C. Controllers:
Provide enamel finished ventilated cabinet with hinged doors. Wire to identified terminal blocks studs. Provide permanently marked symbols or letters identical to those on wiring diagrams adjacent to each component.
- D. Power Conversion and Regulating Unit:
Motor-generator solid state SCR or VVF. Motor-generator rated for 50 degrees rise for continuous operation; speed not over 1,800 RPM; align and balance to minimize vibration and noise. Solid state units to limit current, suppress noise, and not produce voltage transients back into mainline feeders. Provide necessary filters and isolation to effectively prevent noise transmission to occupied portions of the building. Submit specifications of proposed system with proposal
- E. Sleeves and Guards:
Provide sleeves for conduit and other holes, projecting 50mm above machine room floor. Provide 50mm steel angle guards for all sheaves and cables. Extend sleeves 300 mm below hoistway ventilation opening.

2.02 HOISTWAY EQUIPMENT

- A. Guide rail:
1. Size:
Provide of adequate size to suit conditions shown; provide rail backing or heavier rail sections as required. Use minimum 22.3 Kg/M for car and counterweight with safety 18.0 Kg/M for counterweights without safety; car fishplates to have section modulus and moment of inertia equal to guide rail. For speeds over 3.5 MPS increase minimum rail sections to

27.5 Kg/M and 22 Kg/M respectively.

2. Mounting:

Mount directly to building structure with suitable brackets and sliding rail clips; brackets to be mounted to top 20% of beam web or top flange near slab connection. Bracket to center of web of members without slabs on top including WF shaped divider beams.

B. **Stopping Devices:**

Provide with noiseless operation.

C. **Buffers:**

Provide blocking, supports inspection ladders and platforms as required to service buffers and equipment on car bottom.

D. **Platform:**

All structural steel construction except for 16mm plywood top flooring. Provide plat form isolation from car frame. Recess passenger elevator platforms 25mm below threshold for installation of marble flooring. Light duty formed sheet metal platform construction is not acceptable.

E. **Guide Shoes:**

Roller type with 3 or more sound reducing rollers, spring or hydraulically loaded, to provide continuous contact with guide rail surfaces. Car rollers; 350 RPM maximum; counterweight rollers; 1,00 RPM maximum.

F. **Car frame, Safety and Governor:**

1. Car frame:

Welded or bolted steel channel, construction. Where solid state motor drive is provided, isolate hitch plate or car sheave at car frame connections to prevent motor noise transmission to car frame. Light duty rolled or formed shape construction is not acceptable.

2. Safety:

Type B; flexible guide clamp

3. Governor:

Centrifugal type with switches.

G. Hoist and Governor Ropes:

8 x 19 traction steel type; with adjustable babbitted shackles or with approved non-babbitted shackles.

H. Counterweights:

Provide means to prevent steel sub weights from rattling. Provide sufficient blocking to allow for rope stretch without increasing overhead height, or re shackling of hoist ropes. Bolt seismic retainer plates in place.

I. Compensation:

1. General:
Provide proper number and size to adequately compensate weight of hoist ropes and travelling cable.
2. Rope:
Tension sheaves with frame as required; frame tied-down to pit where speed is 4.0 MPS or higher or where travel of elevator exceeds 120,000.
3. Chain:
Provide encapsulated chain to assure quiet operation; Republic Wire and Cable Co's Whisper-Flex. Use sheaves in pit to increase loop to maintain static car balance.

PART 3.00 - EXECUTION

END OF SECTION