"ANNEX A"

TECHNICAL SPECIFICATION

SECTION 02010
SUBSURFACE INVESTIGATION

PART 1 – GENERAL

1.01 WORK INCLUDE

A. All labor, materials, tools, equipment, transportation and temporary construction of any nature necessary to complete the Work as shown in the Plans and/or specified herein.

1.02 RELATED WORK:

A. Consult all other Specification Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete Work.

1.03 REFERENCES:

A. American Society for Testing and Materials: (ASTM)

1. D1556: Density of Soil in Place by Sand Cone Method.

2. D1557: Test Methods for Moisture-Density Relations of Soil and Soil Aggregate Mixtures Using 10-lb (4.5kg) Rammer in 457 Drop.

3. D2922: Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depths).

B. National Structural Code of The Philippines, Chapter 7, Sec.7.3 "Foundation Investigation".

1.04 SOIL INVESTIGATION PRIOR TO CONSTRUCTION: During the Bid Period, the Contractor may make such subsurface investigations necessary to satisfy himself as to the nature of the material.

1.05 SOIL INVESTIGATION INTERPRETATION:

A. Soils investigation data provided by the Owner for information and convenience of the bidders. Bidders are urged to examine soils investigation data and to make their own investigation of the site before bidding. The Owner and Engineer disclaim any responsibility for the accuracy, true location and extent of the soils investigations that

have been prepared by others. They further disclaim responsibility for interpretation of that data by bidders as in projecting soil-bearing values, rock or soil profiles, soil stability and the presence, level and extent of the underground water. Soils investigation data is not part of the Contract Documents.

1.06 SOILS TESTING DURING CONSTRUCTION:

A. Usual Services by Soils Engineering Retained by the Owner or their representative:

1. Site Grading and Excavation: Selection of fill materials for reuse on Project shall be based on testing by Soils Engineer. Bottoms of excavations shall be checked and tested for suitability.

2. Footings, Piers and Caisson: Bottom of excavations shall be checked and tested for soil suitability. The Architect and Structural Engineer shall be advised on all revisions necessary to meet Specifications for foundation excavations.

3. Backfill Operations: Soils Engineer shall test import and native materials for suitability and for compaction.

4. Utility Trenching and Other Miscellaneous Operations: Soils Engineer shall test materials and compaction.

5. Driveway and Parking: Soils Engineer shall test materials and compaction of sub-grade, sub-base, base and surface courses.

B. Soil Testing Services for Which the Contractor Must pay:

1. For retesting and inspection of rejected work, and in cases where the Contractor does not expedite the soils work in accordance with the Specifications, the Construction manager shall prepare a credit change order to the Contract to reimburse the owner for extra services rendered by the Soils Engineer. The Owner will require the Soils Engineer to invoice separately for the extra work, which will establish the amount of the change order. The Owner will, upon execution of the credit change order, pay the Soils Engineer directly for its extra work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION:

3.01 TEST METHODS

A. Relative Compaction: In-place compaction testing shall be in accordance with local testing code or in the absence thereof with ASTM 02922 and laboratory testing shall be in accordance with ASTM 01557.

B. Resistance Value (R-Value): The R Value of soil materials shall be as determined by the Test Method applied.

SECTION 02100
SITE PREPARATION

PART 1 – GENERAL

1.01 WORK INCLUDE

A. All labor, materials, tools, equipment, transportation, actual site investigation to inspect existing conditions and temporary construction of any nature, including coordination with works of other trades affected and necessary for a complete operational installation of all work shown on the Plans and/or specified hereinafter.

1.02 RELATED WORK:

A. The Contractor shall be responsible for inspecting and familiarizing himself with the existing conditions and utilities of the site prior to bidding for a complete overview of the Scope of his Work. Consult all other Specification sections, determine the extent and character of related work including work of related trades, properly coordinate work specified herein with that specified elsewhere to produce a complete operational installation.

1.03 REFERENCE:

A. Department of Public Works and Highways Regulations

B. Department of Environment and Natural Resources

C. National Building Code of the Philippines (NBCP) and its Implementing Rules and Regulations, latest edition.

1.04 SITE CONDITION:

A. General: Refer to Section 5, General Conditions for further requirements and procedure.

1. Clearing work shall not begin until temporary fences, barricades, warning signs and other pedestrian control devices are installed and all necessary permits and clearances have been obtained.

2. All trees, plants, utilities and existing facilities that are not to be removed shall be protected from injury or damage resulting from the Contractor's operation. The Contractor shall replace all damaged improvements or utilities in kind. Such repair and/or replacement work shall be considered as included in other items of work, and no additional compensation will be allowed.

B. Salvage: Contractor shall proceed with caution when removing

salvageable material to avoid damaging the material itself or the adjacent or adjoining structures that are to remain.

C. Existing Subsurface Utilities:

1. Verify existing subsurface facilities to help the Contractor avoid damage to essential utilities which must remain in service. The accuracy or completeness of existing utility information shown or identified on Plans cannot be guaranteed and Contractor is advised to make personal inspection of site prior to bidding.

2. The Contractor shall ascertain the exact location and condition of all existing facilities and fixtures prior to doing bidding and commencement of work and determine conditions that may damage such facilities and materials. If the Contractor discovers conditions, facilities, fixtures or materials not indicated on the Plans or on a location different from what is indicated on the Plans, the Contractor shall protect such facilities from damage and notify the Construction Manager immediately if a conflict exists.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

A. Demolition: Demolition Work shall conform with requirements of the NBCP, Rule XV, General Conditions for "Demolition".

1. Existing on-site underground utilities shall be protected and if conflicting with construction plans shall be cut off or capped, removed entirely, or relocated as indicated on Plans.

2. Existing concrete paving, concrete curbs and walks shall be broken up and removed where shown in plans for new construction.

3. Existing concrete structures or portions of structure extending below new structure shall be removed entirely.

4. Unless indicated to be re-used or as otherwise directed by the Construction Manager, salvageable material shall be delivered to the Owner. All adhering concrete shall be removed from materials or facilities to be salvaged or reconstructed.

5. Explosive shall not be used.

6. It shall be the responsibility of the Contractor to coordinate his work with work of other trades to determine scope of work, responsibility and extent in the surface preparation of substrate, including those involving other trades or subcontractors, such as door thresholds, material terminations and abutments of dissimilar materials to attain required floor grade and ceiling height. Consult all other Specification sections, determine the extent and character of related work including "NIC" indicated as parts 1 & 2, properly coordinate work specified herein with that specified elsewhere to produce a complete operational installation.

B. Stripping:

1. Existing topsoil shall be stripped to a depth of 150mm (or deeper where directed by Soils Engineer) as necessary to remove all vegetation, organic matter, or other objectionable material in those areas to be graded.

2. Topsoil not containing vegetation shall be stockpiled on-site for later use as topsoil backfill.

C. Grubbing and Trimming:

1. Trees designated for removal shall be removed to a point at least one foot below the lowest level of sub grade upon which fill will be placed.

2. Tree branches which extend over the line of construction and which hang within 15 feet of finished grade shall be cut off under the direction of the Owner's representative.

3. Pruning operations shall be extended to restore the natural shape of the entire tree as directed by the Owner's representative.

D. Excavation around trees:

1. Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging. Main lateral roots and tap roots shall not be cut. Roots smaller than 75mm that interfere with installation of new work may be cut.

2. Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If large, main lateral roots are encountered, they shall be exposed beyond excavation limits as required to bend and relocated without breaking.

3. If encountered immediately adjacent to location of new construction and relocation is not practical, roots shall be cut approximately 150mm back from new construction.

4. Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be packed with wet peat moss or 4 layers of wet untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.

5. Branching structure shall be thinned in accordance with DENR Regulations to balance loss to root system caused by damage or cutting of root system. Thinning shall not exceed 30% of existing branching structure.

3.02 FILLING AND BACKFILLING:

A. Pits or depressions resulting from above operations shall be filled and compacted prior to performing any earthwork.

B. Material to be used for filling shall be approved by the project incharge of the property Owner.

C. Fill material shall be compacted to 90% maximum density. Relative compaction will be tested in accordance to Section 02010.

3.03 DISPOSAL

A. All debris, site strippings, and objectionable materials shall be the property of the Contractor and shall be removed and disposed of in a legal manner off the Owner's property.

B. Disposal shall be performed as promptly as possible after removal of the material and shall not be left until the final clean-up period.

3.04 SURFACE STRUCTURES:

A. Grade Adjustments:

1. Coordinate with work of other trades to determine scope of work and responsibility in the surface preparation of different finishes, such as door thresholds, material terminations and abutments of dissimilar materials, to attain required wall finish, floor grade and ceiling height. Consult all other Specification sections, determine the extent and character of related work including work "NIC" indicated as Parts 1 & 2, properly coordinate work specified herein with that specified elsewhere to produce a complete operational installation.

2. Frames, grates and covers of all existing surface structures (valve boxes, drain inlets, etc.) shall be adjusted to proposed finished grade.

3. Work shall not be constructed to final grade or finished to final profile until work of adjacent surface has been determined and properly coordinated with involved trade/specialty contractor and submitted shop drawings have been approved. Coordinate all necessary dowels, embedded frames, angles, clips, sleeves or parts of the work of other trades that needs to be in place prior to work of the General Contractor before proceeding with construction. It shall be the responsibility of the involved Contractors (General Contractor, Specialty Contractor, Subcontractor and/or Sub-subcontractor) to coordinate their work including correct line and grade, plumbness of walls and other surfaces finished to receive material as indicated in Plans and Specifications.

4. Consult with Aluminum and Glass Specialty Contractor for specific door and window openings, jamb and window sill profile, embedded framing members, anchors, straps, angles etc. Request for template for accurate work. Submit shop drawings for approval before proceeding with work. Likewise, all Specialty and Sub-contractors, if already determined, who will receive work of the General Contractor shall coordinate his work to ascertain all surface conditions, dowels, hangers

are in place correctly and inspect completed work before proceeding with his own work. All cost of correcting errors or improperly coordinated work between all Contractors shall be borne by the concerned Contractor(s) and shall not be billed as additional cost to the Owner.

5. When reconstruction or adjustment of a concrete requires partial removal of concrete to the extent allowed by the Building Rules and Regulations, sufficient concrete shall be removed to permit new reinforcing steel to be spliced to existing reinforcing steel. Existing reinforcement that is to be incorporated in new work shall be protected from damage and shall be thoroughly cleaned of all adhering material before being embedded in new concrete. Concrete removal shall be performed without damage to any portion that is to remain in place. All damage to the existing concrete, which is to remain in place, shall be repaired to a condition equal to that existing prior to the beginning of removal operations. The cost of repairing existing concrete damaged by the Contractor's operations shall be at his expense.

6. All manholes that are to be lowered shall be removed to an approximate depth of 3.5 feet below finished grade and shall then be reconstructed with the proper taper to finish grade.

7. When existing manholes or inlets are to be abandoned, all pipes entering the manhole or inlet shall be securely closed by tight fitting plug or wall of Class A or B concrete not less than 150mm thick. The bases of manholes or inlets shall be broken in a manner to prevent entrapment of water. The manhole or inlet shall be demolished to an elevation 3 feet below finished grade and backfilled in accordance with 3.02 of this Section.

SECTION 02280
SOIL TREATMENT

PART 1-GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 of the Specifications shall apply to work of this Section.

B. Structural Specifications Sections for Excavation Work.

1.02 SUMMARY: Provide soil treatment for termite control, as herein specified for all areas and surfaces in contact with the ground.

1.03 SUBMITTALS:

A. Submit manufacturer's technical product data and application instructions.

B. Submit to the Owner a copy of the license or certificate from Fertilizer and Pesticide Authority (FPA) of the Philippines and certified by the DENR as "environmentally friendly".

1.04 QUALITY ASSURANCE

A. Engage a professional pest control applicator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.

B. Use only termiticides which is licensed and approved by the Fertilizer and Pesticide Authority of the Philippines, and DENR.

1.05 JOB CONDITIONS:

A. Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

B. To ensure penetrations, do not apply soil treatment to excessively wet soils or during inclement weather. Comply with handling and application instructions of the manufacturer soil toxicant manufacturer.

1.06 SPECIFIC PRODUCT WARRANTY:

A. Refer to Section 1740 for procedure and format requirements.

B. Furnish the Owner written warranty certifying that applied soil termiticide treatment will prevent infestation of subterranean termites and that if subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.

C. Provide warranty for a period not less than 5 years from date of treatment.

1.07 DELIVERY & STORAGE:

A. Insecticides 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 label of the Manufacturer. Temporary storage of insecticides utilized at the project site shall be minimized. Provisions are to be made to prevent unauthorized handling and entry. Separation from water systems and buildings should be made sufficient to prevent contamination by runoff, percolation, windblown particles or vapors.

PART 2-PRODUCT

2.01 MATERIALS

A. Use an emulsible concentrate termiticide for dilution with water, specially formulated to prevent infestation by termites. Fuel oil will not be permitted as diluents. Provide a solution consisting of one of the following chemical elements and concentrations.

PART 3-EXECUTION

A. Surface Preparation: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen rake and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.

B. Application Rates: Apply as per manufacturer's recommended rates:

1. Under slab-on-grade structures, treat soil before concrete slabs are placed:

a. Apply chemical solution to soil in critical areas under slab, including entire inside perimeter of foundations walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.

b. Apply chemical solution as an overall treatment underslab and attached slab areas where fill is soil or unwashed gravel. Apply 5.68 liters (1-1/2 gallons) of

chemical solution to areas where fill is washed gravel or other coarse absorbent material.

c. Apply chemical solution for each foot of depth from grade to footing along outside edge of building. Dig a trench 150mm to 200mm wide along outside of foundation to a depth not less than 300mm. Punch holes to top of footing at not more than 300mm on center and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench.

C. Under basement structures: Treat soil along exterior and interior walls of foundation with shallow footings as specified above for exterior of slab-on-grade structures.

D. At expansion joints, control joints, and areas where slabs will be penetrated, apply a rate of 15.14 liters (4 gallons) per 3.08 linear meters (10 feet) of penetration.

E. Post signs in areas of applications to warn workers that soil termiticide treatments have been applied. Remove signs where areas are covered by other construction.

F. Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading or other construction activities following application.

SECTION 02515
CONCRETE PAVING & UTILITY CONRETE WORKS

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. All labor, tools, equipment, transportation and temporary construction of any nature necessary for a complete operational installation of all Work shown on the Plans and/or specified hereafter. Work shall include but is not limited to:

1. All utility concrete works such as ANECO post, service entrance post, concrete trench and trench covers, elevated water tank, pumps and other mechanical equipment concrete podium or base, catch basins, cistern, concrete trench drains, sump pits, etc.

2. Parking, driveway and sidewalk concrete works such as curbs, pavements, parking stall wheel guards, paving for sidewalk, handicap ramps, tree and plant boxes etc., including all surface finishing and scoring of ramps and pavement as required. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections shall apply to work in this Section.

3. All concrete or masonry cover/cladding required for pipes, ducts, or other penetrations that should be enclosed.

1.02 RELATED WORK:

A. Consult all other Specification Sections, such as Structural, Electrical, Mechanical and Sanitary & Fire Protection Plans for concrete pads, podium, posts, hoist beams required, driveway and sidewalk finish, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete operational installation.

1.03 REFERENCES

A. AMERICAN Society for Testing and Materials: (ASTM)

1. A615: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

2. C150: Portland cement

3. C33: Concrete Aggregates.

B. Philippine Bureau of Standards:

1. PNS07: Standard Specification for Portland Cement

2. PNS18: Standards Specification for Concrete Aggregates.

1.04 SUBMITTALS: Refer to Section 01300 for procedures.

A. When so requested the Contractor shall furnish mill test reports on the cement, reinforcement bars and aggregates, showing compliance with the respective specifications. The Construction Manager may make concrete test cylinders and slump tests as deemed necessary to determine compliance with Specifications.

B. Provide samples and manufacturer's product data for products indicated or as required by Owner.

PART 2 – PRODUCTS

2.01 PORTLAND CEMENT CONCRETE (PCC)

A. Concrete shall be Class A concrete

B. Cement shall be Type I Cement conforming to ASTM C150

C. Standard Aggregates shall be ¾" maximum size

D. Water shall be clear and free from injurious amounts of oil, acid, alkali, salts, organic matter or other substances that may be deleterious to concrete or reinforcement.

E. Reinforcing bars: Shall conform to the requirements of ASTM Designation A615, Grade 60 or as specified or required.

F. Filled joints, unless noted otherwise on the plans, shall be 6mm thick, the full depth of the concrete section.

G. Joint filler shall conform to Standard Specifications for premolded expansion joint filler and expanded polystyrene joint filler.

H. No admixtures will be allowed without prior approval of the Construction Manager.

I. Forms: Steel, wood or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortions, knots, protrusions and defects. Coat forms with non-staining form release agent that will not discolor or deface surface of concrete.

J. Joint Dowel Bars: Plain steel bars: Plain steel bars, ASTM 615, Grade 60 "Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement". Cut bars to true length with ends square and free of burrs.

K. Sealer for Exposed Concrete Paving: "Ashford Formula", matte finish, unless otherwise indicated.

L. Floor Hardener for Driveway and Parking Area: Apply monolithic, surface hardening, nonmetallic Floor Hardener, color as approved by Owner. Approved brands are:

1. "ABC Non-Metallic Floor Hardener; manufactured and represented by Allgemeine-Bau-Chemie Philippines, Inc.

2. "Nitroflor Hardtop" manufactured by Fosroc Philippines,

3. "Quicseal 535: Paver-Top N" manufactured by ML Management 7 Supplies Pte Ltd, represented by Gloscore Philippines.

M. Sealer for Exposed Concrete Paving: "Ashford Formula", matte finish, unless otherwise indicated.

N. Pipe cladding/enclosure: 100mm concrete hollow blocks or cement board on metal framing as approved by Owner or required. Refer to drawings for details of any pre-cast or cast in place concrete enclosures for utility shafts.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION:

A. Remove loose materials from compacted sub-base surface immediately before placing concrete.

B. Proof roll prepared sub-base surface to check for unstable areas and need additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.02 CONCRETE CONSTRUCTION:

A. All concrete shall be mixed and placed in accordance with accepted Section 5.5 of the National Structural Code of the Philippines (NSCP). Comply with requirements of applicable Division 3 Sections for concrete mix design. Refer to Structural Specifications for additional requirements.

B. Construction of concrete substructures shall conform to applicable provisions of the Building Code and National Structural Code. Unless noted otherwise, all exposed surfaces of structure shall have Class 1 surface finish. Refer to Section 03345, Concrete Finishing and Schedule of Finishes for Concrete surface preparation.

C. Construction of concrete curbs, gutters, sidewalks, wheelchair ramps

and driveway aprons shall conform to Rule VI, "Implementing Rules and Regulations" of the National Building Code of the Philippines and BP 344: "Law to Enhance Mobility of Disable Persons".

D. Curing shall conform to Section 5.5.5 of the National Structural Code of the Philippines. No pigment shall be used in curing compounds.

E. All work shall be subject to the inspection of the Construction Manager and the approval of shop drawings by MEPF Consultants. Coordinate requirements of Specialty Contractor as well as approval of involved local enforcing agency or utility company. No concrete shall be placed until the Construction Manager has approved the forms and reinforcement.

F. Expansion joints on curb, gutters and walks shall be placed maximum of 6000mm centers, adjacent to structures and at all returns, shall be filled with joint filler. Dummy joints shall be formed maximum of 3000mm on centers; the score shall be 25mm deep.

G. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than 1800mm. Spouts or other approved means shall be used to prevent segregation.

H. Produce curbs and gutters to required cross-section, lines, grades, finish and jointing as specified. At the termination of all curbs, the final 300mm length of curb shall be tapered from the full curb height to the gutter flow line or adjacent pavement elevation unless noted otherwise on the Plans.

I. Pits and trenches: Place bottoms and walls monolithically or provide waterstop and keys.

3.03 FORM COSNRTUCTION:

A. Set forms to require grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain ill place at least 24 hours after placement of concrete.

B. Check complete formwork for grade and alignment to following tolerances:

1. Top of forms not more than 3mm in 3 meters.
2. Vertical face on longitudinal axis, not more than 6mm in 3 meters.

C. Clean forms after each use and coat with form release agent as required ensuring easy and clean separation from concrete without damage. Discard damaged forms.

D. Slope step treads at 6mm per 300mm to drain.

3.04 REINFORCEMENT:

A. Locate, place, and support reinforcement as specified in Division 3

Sections, unless otherwise indicated or required.

3.05 CONCRETE PLACEMENT:

A. General: Comply with requirements of Division 3 Sections for mixing and placing concrete and as herein specified.

B. Do not place concrete until sub-base and forms have been checked for line and grade and finish of adjoining surface has been established with other trades. Moisten sub-base if required to provide uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels and joint devices. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 30 minutes, place a construction joint. When adjacent pavement lanes are placed in separate pours, do not operate equipment on concrete pavement until pavement has attained sufficient strength to carry loads without damage.

3.06 CONCRETE FINISHING:

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 3-meter straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 12.5mm radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and when excess moisture or surface sheen has disappeared, provide slab finish as indicated in Section 03351.

3.07 FLOOR HARDENER: Comply strictly with manufacturer's instructions in surface preparation, application, finishing and curing of floor hardening compound. Unless otherwise indicated by manufacturer or required follow the following steps:

A. The base concrete should be place and compacted in accordance with good concrete placing practice.

B. Application: Floor hardening compound is applied at different rates per sq.m. To provide different floor demands and requirements refer to manufacturer's manual. Application rate shall be determined based on project specification. Sufficient material should then be laid out to meet the specified spread rates. Application of floor hardening compound can begin when the base concrete has stiffened to a point when light foot traffic leaves an imprint of 3mm. To achieve uniformity and thickness, apply in two stages:

   1. First application is made using Y to 2/3 of the total material required. Hardening compound is evenly sprinkled onto the concrete surface. Allow the first shake to remain unworked on the surface until it has absorbed moisture and achieve a uniform color. Then float with power float or wooden floats.

   2. Immediately after floating, the remaining hardening compound is thrown evenly over the surface. Again, moisture is absorbed and the surface can be floated as before.

   3. Final finishing of the floor using the blades of a power float can be carried out when the floor has stiffened sufficiently to prevent uneven finish or damage.

C. Curing: Proper curing and sealing is essential to achieve optimum performance of the floor finish. Upon completion of application of hardening compound, the floor should be treated with curing compound as recommended by manufacturer. Other curing method such as polyethylene sheets is also acceptable. Apply the curing compound by spray over the freshly laid surface when the surface water has disappeared. If spray is not available, apply with a soft brush when the surface is hard enough.

3.08 REPAIRS AND PROTECTION

A. Repair or replace broken or defective concrete, as directed by Architect or Project Engineer.

B. Drill test cores where directed by Architect or Structural Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement epoxy adhesive.

C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean and original condition as possible by removing surface stains and spillage of materials as they occur. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just before final inspection and acceptance of work.

SECTION 02577
PAVEMENT MARKINGS & ACCESSORIES

PART 1 – GENERAL

1.01 WORK INCLUDE

A. All labor, materials, tools, equipment, transportation and temporary construction of any nature necessary for a complete operational installation of all Work shown on the Plans and/or specified hereafter including but not limited to sidewalk, parking and driveway markings.

1.02 RELATED WORK:

A. Consult all other Specification Sections, ascertain driveway and sidewalk material finish, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete operational installation.

1.03 REFERENCES:

A. Department of Public Works and Highways Standard Specification and Traffic manual.

1.04 PROJECT CONDITIONS:

A. Specifications, standards, tests and recommended methods cited in the referenced specifications shall determine quantity and quality of materials and methods unless specifically designated otherwise.

B. Contractor shall guarantee that all traffic lane pavement markers be in place and adhered to the pavement for a period of not less than (90) ninety days from the date of acceptance of the work by the Owner.

C. Existing traffic sign shall remain in place until the new traffic signs have been erected

PART 2 – PRODUCTS

2.01 TRAFFIC PAINTS

A. Traffic Paint shall conform to or exceed the standards set forth by the Department of Public Works and Highways.

B. All paints shall be thoroughly mixed prior to placing in painting

equipment.

2.02 SIGNS

A. Sign Posts: Unless otherwise indicated, new sign posts shall be 50mm I.D. standard steel galvanized pipe with one end finished to receive mounting cap and fittings.

B. Concrete for sign post footings and hardware shall conform to applicable requirements of the Department of Public Works and Highways Standard Specifications and Traffic manual.

C. Sign panels, unless noted otherwise shall be of reflectorized porcelain enamel. They shall be of the size noted on the plans or when not specified they shall be the smallest available size. Contractor shall submit shop drawings to the Engineer for approval prior to ordering signs.

2.03 WHEEL GUARDS: Provide concrete wheel guards, painted at parking stall as indicated in drawings.

PART 3 – EXECUTION

3.01 TRAFFIC PAINT

A. Types of Traffic Paint

1. White
    a. Solid 100mm line: edge lines, regular parking stalls.

2. Blue:
    a. Solid 100mm line: handicapped parking stalls.
    b. Blue Curb: handicapped; parking stalls.
    c. Pavement Markings: International handicapped symbol.

3. Red
    a. Solid 150mm stripe 60 degrees angle 1100mm height from floor finish: At parking area walls, columns etc. as designated by Owner.

    b. Solid 100mm stripe 60 degrees angle: parking wheel stops, maximum headroom bars, etc.

B. Rates of Application

1. All new surfaces shall have the traffic paint applied in two applications. The first or priming coat shall be in light application without glass beads to seal the pavement. The second heavier coat of paint is the wearing surface.

2. Re-stripping where indicated on the drawings, shall coincide with the original painting and shall be applied in one application.

3. All surfaces to be painted shall be clean and dry prior to painting. Ample time shall be allowed between the concrete pavement seal

coat and the initial painting application. Usually the drying time of the seal coat is approximately three to four days, depending on weather conditions. There shall be a minimum drying time between paint applications of approximately 20 minutes.

4. Stripping shall not be applied if pavement surface are wet.

5. The alignment of all striping shall be accurately laid out. Lines which do not conform to the alignment as set forth in the plans or which have wavy appearances shall be removed and replaced by the Contractor at his expense.

3.02 TRAFFIC CONTROL SIGNS: Posts, attachments and sign backs shall be given a prime coat before erection. After erection, surfaces shall be touched up with two coats of specified paint.

SECTION 03345
CONCRETE FINISHING

PART 1 – GENERAL

1.1 DESCRIPTION: Division 1 applies to this Section. Perform all concrete finishing required to complete the Work, except for concrete finishing specified to be performed under other Sections.

A. Work In This Section: Principal items include:

1. Samples and submittals.
2. Finishing of exposed formed concrete (if any).
3. Concrete finishing of surface to receive new material such as tiling, natural stone, waterproofing, floor protection coatings, etc., as indicated in Drawings.
4. Concrete floor topping.
5. Door and window frame preparation.
6. Stair Nosing

B. Related Work Not In This Section:

1. Waterproofing surface treatment.
2. Plastering
3. Door Frames
4. Section 08410: Aluminum Door and Window
5. Section 08100: Metal Doors & Frames

1.2 QUALITY ASSURANCE

A. Reference Standards

1. American Concrete Institute (ACI)

a. ACI 211.1 - "Recommended Practice for Selecting Proportions for Lightweight and Normal Weight Concrete"
b. ACI 304 - "Recommended Practice for Measuring, Mixing and Placing Concrete"
c. ACI 306 - "Recommended Practice for Curing Concrete"

2. American Standard for Testing and Materials (ASTM)

a. C33 - "Standard Specifications for Concrete"

b. C31 - "Standard Method of Making and Curing Concrete Test

Specimens in the Field"

c. C88 - "Standard Specification for Method of Test for Soundness of Aggregates by use of Sodium Sulphate"

d. C150 - "Standard Specification for Portland Cement", Type I

e. D2419 - "Standard Specification for Method of Test for Sand - Equivalent Value of Soil and Fine Aggregate"

f. National Building Code and National Structural Code"

1.3 SUBMITTALS: Refer to Section 01300 for procedures and additional requirements.

PART 2 – PRODUCTS - General Contractor-supplied and Installed

2.1 MATERIALS: Furnish materials conforming to above standards and specifications as applicable.

A. Portland Cement: gray, ASTM C150, Type 1; white cement, "CEMEX"

B. Standard Aggregate:

1. Fine aggregate, consisting of sand or crushed stone screenings, clean, hard, free from deleterious matter. Grade by weight to pass sieves as follows:

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

2. Coarse Aggregate consisting of gravel or crushed stone, clean, hard, free from deleterious materials. Grade by weight to pass sieves as follows:

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

3. All aggregates to be used for the construction of the building must be sourced from Cabadbaran City.

C. Miscellaneous Materials:

1. Epoxy Adhesive: ASTM C 881, Type I, for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete.

2. Concrete topping Sealer: "Ashford Formula", matte finish.

3. Stainless Steel Divider Strips: Provide AISI Type 304 6mm thk x 25mm stainless steel satin finish at exposed edge unless otherwise indicated in Drawings.

4. Stair Nosing: For stairs with bare concrete finish, extruded rubber or PVC nosing strip with slip resistant safety profile PVC insert, designed for use on stairs of type shown, 1-piece length on each tread, 35mm minimum, approved type is "Koenig" SNF 1042, represented by Spurway Enterprises. Other approved brands are "Armstrong" represented by AVD Marketing, "Gradus", represented by Spurway Enterprises, color and type as approved by the Owner. Stair nosing shall be installed flush to concrete finish, with at least 35mm embedded in finish material, non-slip insert, exposed.

PART 3 – EXECUTION: Dimensions indicated in plans shall be clear dimensions including finish as indicated in Drawings or Specifications. Make appropriate adjustments in substrate thickness and preparation of surface to receive finishing material such as tiling, plastering or other material in order to achieve clear dimensions indicated in plans. Corridor width dimension indicated in plans is clear finish dimension, after receiving plastering.

3.01 FINISHING EXPOSED FORMED CONCRETE: Surface patching and initial curing of formed concrete shall conform with the requirements of the National Structural Code of the Philippines.

A. Rubbed Finish: Provide a newly hardened concrete within 24 hours following form removal. Rub surfaces with a carborundum brick or equal until smooth and free from marks, offsets, and other defects, and in uniform planes. Wet rubbed surface and then brush coat with cement grout consisting of 1 part light-colored Portland cement to two parts fine aggregate and mixed with water to the consistency of thick paint. Substitute white cement for a part of the gray cement in order to produce a color matching the color of the surrounding concrete, determined by trial patch. Wet the surface of the concrete sufficiently to prevent absorption of water from grout. Apply the grout uniformly with brushes or spray gun. Immediately after applying the grout, scrub the surface vigorously with cork or wood float to fill all pits, air bubbles, and surface holes. Scrape off excess grout while still plastic by working surface with rubber float, sack or other approved method. When dry, rub the surface vigorously with clean burlap as necessary to eliminate remaining defects and blemishes, and required to complete curing of concrete. Finish, clean, and cure each surface as a continuous operation. Produce uniformly plane smooth surfaces free of grout film, grout or rubbing marks, defects, or blemishes after painting or covering with a flexible type finish material. Keep damp for 36 hours minimum after final rubbing. Unless otherwise indicated or specified, apply this finish on exposed formed concrete. Finishing operations shall not begin until adjacent surfaces to be cleaned are completed and accessible. Cleaning as the work progresses shall not be permitted.

B. Surfaces Exempted: Rubbed and grouted finish is not required on

permanently concealed concrete.

C. Defects: Repair formed surfaces by removing minor honeycombs, pits greater than one square inch surface area or 0.25 inch maximum depth, or otherwise as directed. Provide edges perpendicular to the surface and patch with non-shrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb (including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate or other defects) which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair. The surface of the concrete shall not vary more than allowable tolerances of ACI 347. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish unless otherwise specified.

3.02 SLAB FINISHES: Establish finish floor elevations including floor finish material thickness plus mortar it will accept before finishing concrete slab to achieve correct finish floor elevations as indicated in Plans. Bare floors ready to receive flooring material and/or waterproofing shall be finished off in the appropriate substrate preparation enumerated below or otherwise smooth, depressed or raised at the elevation as indicated in Plans.

A. Condition of Surfaces:

1. Topping Applied to Hardened Concrete: Remove dirt, loose material, oil, grease, paint or other contaminants, leaving a clean surface. When base slab surface is unacceptable for good bonding, roughen surface by chipping or scarifying before cleaning.

2. Prior placing topping mixture, thoroughly dampen slab surface but do not leave standing water. Over dampened surface, apply specified epoxy adhesive. Place topping mix while epoxy adhesive is still tacky.

3. For reinforced topping, provide necessary chairs or supports and maintain position of reinforcing mesh as shown on drawings.

4. Joints: Mark locations of joints in base slab so that joints in top course will be placed directly over them.

B. Placing & Floating: Produce finish slab surfaces level or sloped as required with maximum deviation of 3mm from 3500mm straightedge. Keep surface moist with a fine fog spray of water as necessary. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Dusting with dry cement or sand to absorb bleedwater is not permitted. Spread topping mixture evenly over prepared base to the required elevation and strike off. Finish all slab edges and joints with an edging tool. After the topping has stiffened sufficiently to permit the operation, and water sheen has disappeared, float the surface at least twice to a uniform sandy texture. Re-straighten where necessary with straightedge. Uniformly slope surface to drains. Match the approved Sample panels. Apply the following finishes as indicated, specified,

directed and applicable.

C. Rough Slab Finish: After initial set, coarse broom the slabs surfaces and expose coarse aggregate. Apply on slabs to receive deferred mortar setting beds or cementitious toppings or slabs.

D. Monolithic Trowel Finish: For slab and flatwork surfaces not indicated or specified to receive another finish. After surface water disappears and floated surface are adequately hardened, steel trowel and retrowel concrete to a smooth surface. After concrete has set sufficiently to ring the steel trowel, retrowel to smooth uniform finish free of trowel marks and blemishes. Avoid excessive retrowelling that produces burnished areas.

E. Steel Float Finish: Same as for monolithic trowel finish except omit the second retrowelling Apply on the following areas and surfaces:

1. Areas to receive Resilient Flooring cover;

2. Areas to receive waterproofing unless otherwise indicated by manufacturer's catalogue and directions;

3. Flooring to receive Carpeting

F. Broom Finish: Same as for monolithic steel trowel finish less the second retrowelling. When ready, apply approved coarse texture finish sliding a wire or stiff bristle broom in one direction along a straightedge guide set at right angles to the direction of traffic as approved by Owner. At walking areas, smooth finish 25mm wide at edges, expansion joints, and scoring. Apply on the following surfaces:

1. For slabs to receive ceramic, quarry tiles or stone, and wood; 2. Other slabs where indicated or directed.

2. Other slabs where indicate or directed

G. Scoring: Provide where shown or directed, using tool of approved size and profile. Run score lines straight and of uniform appearance. If scoring is not indicated, obtain Owner's instructions not less than two working days before the day slab concrete is placed.

H. Stair Nosing: Coordinate with concrete finishing works to ascertain final floor finish elevation so as to install nosing base embedded in concrete or tile finish, and Stainless insert flush with final floor finish elevation. Install in one-piece size on each tread conforming strictly to manufacturer's installation instructions and guidelines using recommended installation materials. Install full width landing and stair nosing strips. Fully bed both angles of base strip in manufacturer's recommended adhesive. Screw in place if recommended by manufacturer for "intermittently wet" areas. Install flush with floor slab, as indicated in details. Snap on non-slip Stainless insert, flush with floor finish.

3.03 SLAB CURING: Promptly apply approved curing media as soon as finishing is

complete without marring surfaces and in any case on the same day. Apply liquid compound in accordance with manufacturer's published application rates; apply 2 spray coats, with second coat at right angle to first coat. Cover adjoining surfaces.

A. Curing Period and Protection: Maintain all curing media intact and sealed for 10 days minimum after application. Keep foot traffic on the curing surfaces to minimum possible and completely off liquid compound cured surfaces until curing is completed. Immediately restore all damaged or defective curing media.

B. Restriction: Do not apply liquid membrane-forming curing compounds on any concrete to receive or bond to concrete or mortar, or any surfaces to receive subsequent material or finish unless such use and the specific compound used are approved by manufacturer of the material or finish to be applied, and verify all such use with related trades. Do not apply curing compounds on slabs to receive Elastomeric or bituminous type coatings.

C. Sheet Curing: Use the specified curing sheet material. Seal all laps and edges with plastic pressure sensitive tape, and immediately repair tears during the curing period. Verify that surfaces remain damp for the full curing period; if necessary, lift sheet, wet surfaces with clean water, then replace and reseal the sheeting. Use on surfaces where curing compound is not permitted.

3.04 FLOOR, WALL AND CEILING FINISH: Carefully study all Drawings including those labeled as "By Others" that will be affected by this Section as to floor and ceiling condition, material finish and requirements prior to bidding to attain finish floor elevation as required in plans. Coordinate with work of other trades to determine scope of work and responsibility in the surface preparation and floor/ceiling levels of different finishes, such as door thresholds, material terminations and abutments of dissimilar materials, to attain required floor grade, ceiling height and wall material finish and termination. Slope floors uniformly to drains where drains are provided. Depress the concrete slab where indicated in plans and those to receive tile, stone, paint or where required Consult all other Specification sections, determine the extent and character of related work including work of other trades, properly coordinate work specified herein with that specified elsewhere to produce a complete operational installation.

3.05 DOOR & WINDOW FRAMES: Refer to Sections 08100, 08410, 8900 for further requirements. Work shall not be constructed to final grade or finished to final profile until work of adjacent surface has been determined and properly coordinated with involved trade/specialty contractor and submitted shop drawings have been approved. Coordinate all necessary dowels, embedded frames, angles, clips, steel plates, sleeves or parts of the work of other trades that needs to be in place prior to concrete finishing before proceeding with work under this section. It shall be the responsibility of the involved Contractors (General Contractor, Specialty Contractor, Subcontractor and/or Sub-subcontractor) to coordinate their work including correct line and grade and plumbness. Finish concrete to receive finishes as indicated in Plans and Specifications. Consult with Aluminum & Glass Contractor, metal door and glass curtain wall manufacturer and installer for specific door and window

openings, jamb and window sill profile, embedded frames, etc. Request for template for accurate work. Submit shop drawings for approval by the Owner before proceeding with work. Likewise, all Specialty and Sub-contractors, if already determined, who will receive work of the General Contractor under this Section, shall coordinate with the General Contractor to ascertain all surface conditions, dowels, hangers are in place correctly and inspect completed work before proceeding with his own work.

3.06 All cost of correcting errors or improperly coordinated work between Contractors shall be borne by the concerned Contractor(s) and shall not be billed as additional cost to the Owner.

3.07 Liquid Chemical Sealer-Hardener Curing: Provide for interior floors that do not receive floor covering or in lieu of liquid membrane forming compound curing for other surfaces. Apply sealer-hardener in accordance with manufacturer's recommendations. Seal or cover joints and openings in which joint sealant is to be applied as required by the joint sealant manufacturer. Submit samples to Project in-charge of the Owner for approval.

SECTION 05030
METAL FINISHES

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. This Section covers the technical requirements for special metal finishes of shop-applied metallic protective coatings, aluminum anodized finish and stainless steel finish, and forms a part of all other Sections which require materials to be finished in accordance with this Section.

A. Work In This Section: Principal items include:

1. Aluminum Frames (As per Schedule of Doors & Windows)
2. Painted Metal Items
3. Metal floor strip/edging for material termination.
4. Metal railing and hand rails.

B. Related Work Not In This Section:

1. Section 09100 - Metal Support System
2. Section 08710 - Finish Hardware
3. Section 08800 - Glazing
4. Section 09900 - Painting
5. Section 05500 - Metal Fabrication

1.02 SUBMITTALS: Refer to Section 01300 for procedures, Section 01430 Mock-ups, Section 05500 Metal Fabrications, Section 08410 Aluminum Doors and Windows, for other requirements for mock-up samples that show metal finish.

A. Master Samples: Submit one set of two identical Samples for each specified finish and type of material:

1. Prepare one set of Samples on 300mm squares of flat metal for all coatings and stainless steel finish;

2. One set of tubular, pipe sections or other standard mill shapes, at least 200mm long for each of profile, type and size, typical of members required for involved Work for finish sample;

3. One set extruded aluminum frames, trims angles, plates at least 200mm long for each profile, type and size and color;

4. One set each, metal ceiling, 300mm for each type, color and profile.

5. One set stainless steel handrail and railing, 200mm long for each type and size. Refer to Section 05500 for mock-ups to show design and finish of other metal fabrications.

6. One set stainless steel floor edging, 200mm long.

7. Submit as many sets of Master Samples as are required for approval.

B. Samples Required Under Other Sections: Samples of the anodized and baked enamel finish required to be submitted for Work under other Sections shall demonstrate an exact match with the approved Master Samples in all characteristics.

C. Other Samples: Submit approved other Samples as the Owner may request.

D. Product Data: Submit approved paint manufacturer's Product Data covering all paint and coating materials, surface preparation, pretreatment or priming, application, handling, and repair and touch-up instructions.

2.03 QUALITY CONTROL FOR ANODIC FINISHES: Comply with the following requirements to ensure anodic coating weight, thickness and resistance to staining by testing of random samples:

ASTM 8137	Coating Weight
ASTM 8244	Coating Thickness
ASTM 8136	Standard Method for Measurement of Stain
ISO-3210	Resistance of Anodic Coatings on Aluminum Assessment of Sealing Quality by Measurement of the Loss of Mass after Immersion in Phosphoric-Chromic Acid Solution. The maximum dissolution weight loss should be no more than 2.6 mg/sq.in.

PART 3 - EXECUTION: The final metal finish shall be as selected and approved by the Owner from samples submitted. A sample of the mechanical finish desired based on the Aluminum Association Classification of Mechanical Finishes shall be provided by the Contractor and examined by the Owner and the cost and suitability verified prior to making a commitment on the mechanical finish to be used. In addition, the mechanical finish should receive the proposed chemical and anodic treatment so that the ultimate finished product can be visualized.

3.01 PREPARATION FOR PAINTING: Clean, degrease, and prepare surfaces according to paint manufacturer's most current printed instructions, using methods that do not damage materials or leave deleterious residue.

A. Pre-treatment: After buffing is complete, aluminum may be given a fine matte caustic etch pre-treatment and rinse if standard with the product manufacturer.

3.02 PAINT APPLICATION: Apply painting systems under dust-free temperature and

humidity controlled paint booth conditions and thermo-cure each coat at the temperature and for the duration directed by paint manufacturer. Electrostatic spray application is preferred. Use method that minimizes handling both during and after paint application. Refer to Section 09900 (Painting).

A. Priming: Apply epoxy primer or other inhibitive primer as recommended by coating manufacturer, on all exposed and concealed surfaces, except the interior of tubular members. Exposed surfaces include interior surfaces of channel-shaped glazing stops, glazing rebates, and similar accessible or visible surfaces. Apply primer to minimum 0.005 dry film thicknesses.

B. Finish Paint: Apply on all exposed surfaces and extend over the concealed surfaces for a distance sufficient to assure complete continuity of the coatings without visible skips, or thin edges, and so the edges of finish paint are fully concealed by caulking sealant, glass setting materials, abutting finish materials or finish items, and like items. Fully coat surfaces visible through glass edges. Paint thickness on corners and edges shall equal that on the flat surfaces. Apply finish paint to minimum 1 mil dry film thickness.

3.03 STAINLESS STEEL: Stainless steel with architectural finish shall be erected with the grain parallel and in the same direction.

3.04 PACKING AND SHIPPING PROTECTION: Do not handle the painted products until paint finish is fully cured and hardened.

A. Primary Protection: Cover painted surfaces with a compatible strippable pressure-sensitive covering material of type that does not leave adhesive on the surface when removed, or enclose items with a polyethylene film wrapping secured with tape bands.

B. Packing: Secure bundled items with resilient separators, pads, and bands or tape, non-staining types that prevent chafing, gouging, excessive pressure at any point, or other damage. Ship the items in water-resistant sealed containers labeled as to contents and locations unless installed immediately.

3.05 INSTALLATION: If possible, leave primary protection in place until just prior to final cleaning, removing only those parts required for connections, caulking, glazing and related items. Where painted materials are jambs or heads of openings used for passage of materials or debris, install temporary boarding, flashing, or similar protection necessary to protect painted surfaces. Immediately remove damaged Work that is not acceptably repairable and provide acceptable Work at no extra cost to Owner.

3.06 ISOLATION: Isolate dissimilar metals and materials. At metals, apply on both contacting surfaces a heavy coat of alkali-resistant bituminous paint; or separate surfaces with non-absorptive exterior quality polyvinyl chloride tape or gasket, or coat both surfaces with fluid-applied neoprene or urethane membrane material. Coat both contact surfaces with alkali-resistant bituminous paint at concrete, masonry, plaster, tile and cementitious materials. Conceal all isolation in the finished Work.

3.07 TOUCH-UP AND REPAIR: Subject to Owner prior approval in each case, minor scratches and blemishes in paint finish may be repaired with the specified touch-up paint. Smooth the edges of defects and use air-brush and hot-airgun technique, or equivalent recommended by the paint manufacturer and produce virtually non-apparent repairs. If repairs are not acceptable, remove and replace involved Work as directed and as specified above for damaged Work.

3.08 FINAL CLEANING: Conform to Section 01700. Just before completion of the entire Work, remove protection and clean all painted surfaces. Use nonabrasive cleaning agents only, satisfactory to and recommended by paint manufacturer.

SECTION 05500
METAL FABRICATION

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide miscellaneous metal fabrication as indicated, specified and required.

A. Work In This Section: Principal items include:

1. Access ladders to elevated water tank, etc.
2. Metal fire exit stairs, access stairs, stair handrails and railing
3. Trench covers metal framing.
4. Non-standard metal connectors, plates and shapes for spandrel glass cladding finishes.
5. Setting of anchor bolts and inserts in concrete.
6. Metal angles at metal doors without jambs.
7. Aluminum edging for metal doors.
8. Metal Ceiling for Canopy as indicated in Drawings.
9. Metal strips edging for floor finish termination.
10. Building Signage.
11. All other miscellaneous metal fabrications required to complete the Work.

B. Related Work Not In This Section:

1. Finish painting
2. Metal Finishing
3. Cast-in-place concrete, reinforced masonry and/or gypsum wall to receive fabrication.
4. Section 08100: Metal Doors & Frames
5. Metal Stairs (Refer to Structural Specifications)

1.02 QUALITY ASSURANCE: Conform to Code and AISC Code of Standard Practice for Steel Buildings and Bridges; AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings; AISC Steel Construction manual; and AWS D1.1, Structural Welding Code. Comply with Aluminum Association and ASTM standards.

1.03 SUBMITTALS: Refer to Section 01300 for procedures.

A. Shop Drawings: Submit Shop Drawings fully detailing Work of this Section, including accessories, fastenings, and welding. Include minor connections and fastenings not indicated or specified to meet required conditions; indicate in detail on Shop Drawings.

B. Samples: Submit the following:

1. Metal panels, minimum 300 x 300mm square
2. Aluminum edging for doors, 300mm long.
3. Stainless steel trims, strips, minimum 300mm long, each type.
4. Brackets, flanges, clips, connecting hardware, plates angles, each type.
5. Stainless steel ladder, 300mm long, showing step and railing.
6. Stair handrail and railing, wall railing & bracket, minimum 300mm, connecting hardware each type.
7. Metal ceiling, 300mm long, each type, showing finish, accessories, frames and supports.
8. Trench grating, each type 300mm long and covers.
9. Expanded metal, each type including frames, angles and connection bolts, screws, brackets.
10. Metal insect screen, 150mm square.
11. Building signage.
12. Steel angles for jambless doors.
13. All other miscellaneous metal fabrications required by Owner.

1.04 PRODUCT DELIVERY AND HANDLING: Protect items from damage during shipping, transporting, handling and storage. Work showing dents, creases, deformations, weathering, or other defects is not acceptable. Deliver welding electrodes to site in unbroken packages bearing manufacturer's name and contents identification.

1.05 JOB CONDITIONS: Verify field measurements prior to fabrication of items. Use caution to protect concrete floor surfaces and adjacent Work from damage.

PART 2 – PRODUCT

2.01 BASIC MATERIALS: Standard stock mill product and furnish materials conforming to the following:

Steel shapes:	ASTM A36
Steel tubing:	ASTM A36 or ASTM A500, Grade B
Weathering Steel:	ASTM A242
Steel pipe:	ASTM A 120 Schedule 40 for general use, ASTM A53 Grade B for structural use, unless otherwise shown or specified
Steel sheet, strip:	ASTM A611, Sheet and Strip, Cold Rolled Structural Quality
Aluminum:	ASTM B221, 5050/6061 or Alclad 3004m, T5 or T6 alloy.
Stainless Steel:	ASTM A 167, Type 302 or 304, 18-8, brushed finish, sheet and strip gage 18 or thicker as required.
Stainless Steel Fasteners:	Type 305
Stainless Steel Bar Stock:	ASTM A276, Type 302
Bolts and Nuts:	ASTM A307
Electrodes:	AWS 01.1, E70XX Series as required for intended use.
Primer:	Red oxide or zinc chromate type metal primer.
Non-shrink grout:	Non-gas forming type grout, free of oxidizing

	catalysts and inorganic accelerators, non-staining, non-rusting type in exposed areas, conforming to all current Code requirements. Subject to compliance with requirements.
Galvanizing:	ASTM A123 hot dip with 2.0 ounces psf on actual surface and 1.8 ounces psf minimum on any specimen, and as specified herein.
Galvanizing repair:	Hot applied repair material, or anodic zinc-rich galvanizing repair paint.

2.02 GENERAL FABRICATION REQUIREMENTS: Conform to approved submittals, Article "Quality Assurance" above as applicable to the Work, and requirements herein. Fabricate and form the Work to meet actual installation conditions as verified at the site. Obtain necessary templates and information and provide all holes and drilling indicated or required for securing Work of other trades to metal fabrications.

A. Welding: Conform to AWS D1.1 as modified by referenced AISC Standards, and as indicated or noted on Drawings. Unless otherwise indicated or specified, weld joints by the shielded electric-arc method. Grind exposed welds to smooth surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finishing treatment is required for concealed welds. Cut out all defective welding and replace.

B. Shop Priming: Clean metal surfaces according to SSPC SP6-82 Commercial Blast Cleaning for metal items to remain exposed and finish painted; according to SSPC SP3-82 Power Tool Cleaning or SP7-82 Brush-Off Blast Cleaning for metal items to be concealed, or consult local code requirements in preparation of metal surface for shop priming. Promptly apply shop coat of metal primer to minimum 1.0 mil dry film thickness. Work primer into joints. Do not prime metal surfaces embedded in concrete or masonry. Shop prime all ferrous metal items not to be galvanized unless otherwise indicated or specified.

C. Galvanizing: Galvanize all items after fabrication and installation is completed, repair all damaged coatings and produce coatings free of roughness, whiskers, unsightly spangles, icicles, runs, barbs, sags, droplets, and other surface blemishes.

D. Miscellaneous Items: Fabricate items not specifically mentioned according to the Drawings, approved Shop Drawings, and as required to complete the entire Work. Galvanize exterior items and shop prime interior items unless otherwise shown or specified and finish paint according painting schedule or as directed by the Owner. Furnish required submittals and secure Owner's approval on all painting finish samples.

E. Forming: Stainless Steel and other metal for architectural applications may be cut be shearing and sawing. Extrusions shall be as required by manufacturer.

F. Lettering for Building Signage consisting of building name and address, size and type as indicated in Drawings, as approved in samples and shop Drawings, complete with anchors and setting bed.

G. Building Signage: Aluminum cladded pylon, 1800mm x 3000mm. Refer to Drawings for location and details. Provide all concrete podium and structural framing required to support building signage.

PART 3 – EXECUTION

3.01 INSPECTION: Refer to Section 01400, Article "Verification of Conditions", and report to Owner in writing those conditions that prevent or interfere with correct installation of Work of this Section.

3.02 GENERAL INSTALLATION REQUIREMENTS:

A. Grouting: Provide grouting for Work of this Section as shown, specified, and required. Use non-shrink, non-staining grout and conform to manufacturer's directions and compatible to adjacent metals.

B. Galvanizing Repair: Wire brush welds and damaged coating to clean bright metal. Apply one coat of galvanizing repair paint where surfaces are concealed or are to be finish painted. Use the specified hot-applied galvanizing repair compound where surfaces remain exposed and unpainted.

C. Shop Prime Coat Repair: Do not apply metal primer in wet weather unless steel is protected from dampness and is dry. Clean field welds, field bolts, and all damaged shop primer after erection and apply a spot coat of the same primer used for the shop coat.

D. Fasteners & Flanges: Provide heavy-duty fastener, flanges and connectors of approved types as required for the installations, whether or not indicated. Provide galvanized items for exterior use.

E. Isolate aluminum from dissimilar metals and materials other than nonmagnetic stainless steel. At metals, apply on both contacting surfaces a heavy brush coat of zinc chromate primer made with synthetic resin vehicle, followed by two heavy brush coats of spar varnish based aluminum metal and masonry paint; or apply a heavy coat of alkaliresistant bituminous paint; or separate the surfaces with non-absorptive exterior quality polyvinyl chloride tape or gasket, or coat both surfaces with a fluid applied neoprene or urethane membrane material. At concrete, tile and cementitious materials, coat both contact surfaces with alkali-resistant bituminous paint. Conceal all isolation in the finished Work. Provide metallic type f1ouropolymer paint finish an all exposed surfaces in accordance with Section 05030.

3.03 SCHEDULE OF ITEMS:

A. General: Following list of specific items is not necessarily complete. Check Drawings, other Sections, and other trades, and provide miscellaneous metal fabrications as required to complete the entire Work.

B. Specific Items:

1. Above-Ceiling Supports: Provide steel hangers, supports, attachments, and other framing for support of ceiling-hung items not included in Section 09100. Conform to approve Shop Drawings of related trades, Section 09100: "Metal Support System".

2. Stainless Steel Trims for floor finish termination, Handrails and Railing: Type 302 or 304, Standard stock mill, 18-8 stainless steel or 3mm thickness unless otherwise shown, size, shapes, configuration shown or required by the Drawings and conforming to approved submittals. Exposed Surfaces shall be No.6, directional brushed satin finish. Perform installation operations with tools and methods that prevent carbon pick-up. Coordinate with works of Section 08800 (Glazing) for glass railings, Factory-forge and finish stainless steel trims and shapes as recommended by manufacturer, label and deliver to site in protective packaging. On-site, manual shaping is not permitted. Handrails and Railing for Main Stairs, Lobby Balconies: Type 302 or 304, Standard stock mill, 18-8 stainless steel Factory-forge and finish, 50mm x 50mm, No.6, directional brushed satin finish vertical rails, of shapes, configuration shown or required by the Drawings and conforming to approved submittals Coordinate with works of Section 08800 (Glazing) and Section 06200 (Finish Carpentry).

3. Embedded and hidden Steel Items for framing where required as shown in Drawings: Provide miscellaneous embedded steel shapes, angles, and channels, complete with welded anchors and galvanized.

4. Stainless Steel Access Ladders: Type 302 or 304 18-8 stainless steel solid round bar, 12.5mm diameter or as shown, all exposed surfaces given a directional satin texture finish, exposed corners and edges smooth rounded, with matching stainless steel screws, unless otherwise required and indicated, as shown in drawings, in thickness, shape, and size required. Stair hand railing and rails shall be 12mm stainless steel flat bar, Perform welding by "heliarc" process, using electrodes of same or equivalent alloy as metal being welded and methods that prevent heat discoloration and carbon pick-up. No filed-welding is permitted. After fabrication at the shop and again after installation, apply two coats of silicone or Teflon base auto paste wax and buff each coat. Match approved sample.

5. Steel Ladders: Construct as shown and according to Code and ANSI A14.3. Continuously weld all joints and grind welds smooth and flush, and provide required brackets and attachments. Galvanize exterior ladders only.

6. Hand Railings: For Fire Exit Stairs, Ground to Mezzanine access stairs and balcony railing within each commercial unit; Standard weight 50mm x 12mm B.I steel flat bar, continuously welded, welds ground smooth and flush. Provide cast malleable steel brackets with mounting plates for railings on walls. Return all exposed rail ends to vertical surfaces unless otherwise shown. Extend rail ends as required for conformance with Code or as indicated. Finish shall be epoxy paint finish unless otherwise

indicated.

7. Cast-iron Trench Grates: Provide cast iron trench grates, painted, designed for vehicular traffic, at least flat bars and frames where specified or required, conforming to ASTM A48 Class 35 or better, designed for vehicular traffic, smooth and shotblast clean, free from blowholes, porosity, hard spots, shrinkage distortions or other defects. All castings shall be manufactured true to pattern and in accordance with shop drawings and details. Component parts shall fit together in satisfactory manner. Frame sections for trench gratings shall be 25mmx25mm angle frames bolted together and cast into concrete surround. They must be level and plumb and the seat for the grate must be true, flat, plane to prevent rocking of grate. Grates shall be set in flush with the top of the frame. Clean any foreign matter from the grates and frames prior to setting. In portions indicated on Drawings or as specified elsewhere or directed by the Owner, it shall be bolted or screwed securely to the frame, hot dipped galvanized after fabrication and finish painted as approved by Owner.

8. Removable Steel Grating: Provide custom fabricated grating designed for pedestrian or vehicular traffic, as shown in Drawings or submit shop drawings showing methods of connection, access panel, lift points and structural computations signed and stamped by a registered civil engineer of the Contractor. Hot dip galvanized after fabrication and finish painted, as approved by Owner.

9. Aluminum Door Edging: ASTM B221, 4mm thick, unless otherwise shown in Drawings, finish in shape and size as indicated in Drawings or as shown in approved Shop Drawings and samples. Refer to Section 07420 for other requirements.

10. Non-standard Connectors, Plates and Shapes (by Aluminum Contractor & Curtain wall Contractor): Fabricate as detailed or required of ASTM A36 steel, weathering type, or as required by Aluminum curtain wall manufacturer and installer.

11. Lettering for building signage consisting of building name and address, size and type as indicated in drawings, polished brass or stainless steel, as approved and shop Drawings, complete with anchor and setting. Provide Building Signage Drawings as indicated in Drawings, aluminum cladded pylon, 1800mm x 3000mm high, complete with concrete base and structural framing required.

12. Door Angles: Unless otherwise indicated or required, provide 50mm x 50mm steel angle frames and dowels as shown in Drawings, for all metal doors without jambs.

13. Stainless Steel Garbage Chute: Unless otherwise indicated in Drawings or required, provide Ga#16 stainless steel garbage chute, complete with framing and supports as required by the manufacturer, Ga. #22 satin stainless steel chute door, at each floor opening complete with door pull, automatic close door spring hinge and door frame. Perform welding by "heliarc" process, using electrodes of same or equivalent alloy as metal being welded and methods that prevent heat

discoloration and carbon pick-up. Spot weld all joints and apply approved sealant all around with sealing joint material as approved by manufacturer. Exposed Surfaces shall be NO.6, directional brushed satin finish. Coordinate with General Contractor for chute clearance opening and embedded anchors and frame support items required. Approved manufacturer shall be Stainless Steel Inc.

14. Metal Ceiling: Supply and fix exterior and interior linear aluminum metal ceiling, size and type as approved by Owner, fixed to an adjustable suspension system (Refer to Section 09100), in combination with locking clips, which allows for individual panels to be removed by using a dismounting tool. Panels of different widths can be combined in the ceiling as instructed by the Owner. To prevent contact corrosion by applying dissimilar metals, each fixing of the carriers to the subconstruction must be made through washer set approved by ceiling manufacturer. Approved type is "Luxalon Linear Ceiling System" manufactured by Hunter Douglas.

    a. Panels: Panels shall be either closed or open ceiling system, 75,150,or 225 x 15, 5mm thick, size, finish and profile as approved by Owner, manufactured from 0.6mm minimum Aluminum. Panels shall be pre-painted, stove enameled aluminum corrosion resistant alloy EN-AW-3005 or equivalent (according to EN 1396 and ECCA). Panels to be coupled in longitudinal direction by means of panel splices.

    b. Suspension: Refer to Section 09100 - Metal Support System Supply and fix metal suspension system for metal ceiling as recommended by metal ceiling manufacturer. Comply strictly to ceiling manufacturer's installation instructions. Rows of 0.95 Alu rollformed carriers shall be installed at spaces recommended by ceiling manufacturer or as required, center to center by means of a levelled suspension of sufficient strength and rigidity to provide resistance to wind pressure/wind suction. Carriers provided with prongs to hold panels in a module which is a multiple of 75mm. Panels are locked to carrier by crosswise installed separate locking clips.

    c. Perimeter profiles: Wall L-profile 29.2x 19.4mm made of 0.5 mm thick aluminum.
    Wall L-profile 45 x 18.5mm made of 0.8 mm thick aluminum Wall W-profile 45 x 21 x 21 x 18.5mm made of 0.8mm thick aluminum.
    Clip-on U-profile 28.6 x 12.5 x 20mm, made of O.35mm thick aluminum.

    d. Coating: Coating shall be as approved and selected by the Owner, tough and durable PVDF coating for all exterior applications, finish in nominal thickness of approximately 20 microns, applied in a continuous coil coating process ensuring uniform coating thickness.

3.04 INSTALLATION: Install panels/strips/trims plumb and true, free of warping and

twisting, using procedures recommended by panel manufacturer. Use fasteners in accordance with panel manufacturer's recommendations, and conform to approve Shop Drawings.

A. Cutting, Trimming and Drilling: Use diamond or carbide tipped blades. Use procedures conforming to manufacturer's instructions.

B. Installation to Framing: Support all panel edges by framing or furring. Before attaching panels to framing, apply a bond breaker tape to framing as required.

C. Trims & Closures: Provide as indicated or required for complete installation. Embedded trims shall be coordinated to be in anchored in place before tiling.

D. Metal Ceiling: All materials shall be installed in strict compliance with all local codes, ordinances and manufacturer's recommendations including specific additional requirements as may be called for in the specifications or shown in drawings or as required to complete the installation correctly.

3.05 FINISH: After fabrication, all tool marks and surface imperfections shall be dressed clean by grinding, filling and sanding as necessary to make all faces and vertical edges smooth, level and free all irregularities. Stainless steel panels shall have grain parallel and in the same vertical direction. Thoroughly clean metal surfaces and apply chemical treatment for paint adhesion. Paint inaccessible surfaces prior to assembling. Sand exposed surfaces of hollow metal and accessories and make smooth with mineral filler as required. Apply hollow manufacturer's standard rust inhibitive baked-on primer; include primer on all concealed surfaces of hollow metal door frames and anchors, provide galvanized anchors where installed concrete or masonry.

Frame Finish: After assembly, all tool marks and surface imperfections shall be dressed smooth by grinding, filling and sanding if necessary. For metals with painted finish, all exposed surfaces, both inside and outside shall be thoroughly cleaned of rust, oil and other impurities and phosphate coated to condition the surface of the metal to resist and inhibit corrosion and promote paint adhesion in accordance with Federal Specification TT-C-490. All exposed surfaces, both inside and outside the shall be further coated to a minimum thickness of 1 mil with a rust inhibitive red iron oxide-zinc chromate primer (equal to Federal Specification TT-P-664) which shall be dried and completely cured to develop maximum hardness and abrasion resistance of the primer paint. Refer to Section 05030 (Metal Finishes) for additional requirements.

SECTION 06100
ROUGH CARPENTRY

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide rough carpentry for framing of millwork items, as indicated and specified, complete.

A. Work In This Section: Principal items include:

1. Marine Plywood backing requirements.
2. Wood blocking, grounds, backing, stripping, cants, and nailers as indicated, specified, or required for securing other Work, except those items specified to be furnished by other trades.
3. Provide rough hardware incidental to Work of this Section and install steel non-standard framing connectors furnished under Division 5.
4. Wood preservative treatment.
5. Counter backing and framing support.

B. Related Work Not In This Section:

1. Concrete forms
2. Finish carpentry and millwork
3. Casework and cabinet work
4. Painting
5. Furnishing of steel non-standard wood framing connectors.

1.02 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Conform to Code for construction, nailing and connections except as exceeded by requirements on the Drawings or in the Specifications.

1.03 PRODUCT DELIVERY AND STORAGE: Store lumber materials, plywood, MDF and metal items off ground, protected from rain, dampness and other foreign materials such as soil and organic matter.

PART 2 – PRODUCTS

2.01 MATERIALS: Where materials, products or equipment are specified by reference to a specific standard or by reference to a specific manufacturer, materials, product or equipment which ensures an equal or higher quality than the standards of manufacturers mentioned will also be acceptable. It will be incumbent on the General Contractor to verify the equal or higher

quality and submit comparative data for review by the Owner.

2.02 LUMBER: S4S unless otherwise shown or specified, manufactured, graded, kiln dried, and bearing grade mark of local National Standards, Standard Grading Rules, moisture content at time of installation not over 15% or less than 7%. Certificate of origin and treatment, certifying to net retention of preservatives used, species of lumber treated shall be submitted by the Contractor.

A. General: For blocking, nailers use nonstressed, standard, utility grades lumber. Lumber should be free of knot holes, loose knots, sap, shakes and other imperfections impairing its strength, durability and/or appearance.

B. Kind of Lumber:

1.	Light framing	general framing	- Tanguile
		Blocking, bracing, nailers	- Tanguile
2.	Blocking	load-bearing	- Guijo
		Non-load beading	- Tanguile
3.	Structural Framing		- 50mm-100mm thk wide guijo or yakal

4. Backboards for mechanical, electrical & other miscellaneous equipment: Marine plywood 20mm thick minimum.

C. Grades: Use grades as schedule or required

D. Plywood: Exterior type grade marked, grades as noted on Drawings

E. MDF: Medium Density Fiber, 40 to 50 lb/sq.ft conform to ANSI A208.2

F. Glue: Shall be waterproof glue resorcinol formaldehyde synthetic resins; glue as used in the manufacture of plywood shall be of malemineura type, suitable to hot press process.

1. Pressure Preservative Treatment: Pressure treat wood items resting on or embedded in concrete or masonry, and blocking and nailers for flashings, with waterborne preservative such as Wolman Salts, Boliden Salts, Tanalith H-R, or approved equal, each piece of treated lumber bearing mark of approved testing agency. Do not use creosote. Re-dry as necessary to maximum 14% moisture content.

   a. Boliden Salts: 1.00 lb. dry chemical per cu.ft. of wood.
   b. Wolman Salts: 0.70 lb. dry chemical per cu.ft. of wood.
   c. Tanalith Salts: 0.75 lb. dry chemical per cu.ft. of wood.

2. Fire-Retardant Treatment: Required for all blocking and nailers in metal framed walls, partitions, and ceilings, and where required by the Building Code. Pressure treat to flame spread rating of 25 or less and fuel contribution of 30 or less when tested in accordance with ASTM E84, each piece bearing the UL label of conformance. Re-dry to maximum 14% moisture content.

G. ROUGH HARDWARE: Provide rough hardware required to complete

Work shown and specified. Rough hardware includes bolts, nuts, nails, washers, lag screws, washers, plates, post and beam anchors, wood connectors, and similar hardware used for construction of the Work of this Section. Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for type, grade, and class required. Non-standard steel framing connectors are specified in Division 5 and installed under this Section.

1. Nail: Provide common wire nails, sizes as indicated, smooth shank, zinc coated of local manufacture.
2. Bolts and Nuts: ASTM A307, galvanized for exterior or exposed, provide bolts and nuts of weathering steel to match connectors furnished under Section 05500, Grade A.

3. Machine Screws: Shall be brass or cadmium plated steel, FS FF-S-92
4. Wood Screws: Flat head carbon steel, FS FF-S-111
5. Plain Washers: Round, carbon steel, FS FF-W-92
6. Drilled in Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VII {anchors, expansion, non-drilling, Type I (internally threaded tubular expansion anchor)}; and machine bolts complying with FS FF-B-575, Grade 5.
7. Lock Washers: Helical spring type carbon steel, FS FF-W-84
8. Toggle Bolts: Tumble wing type, FS FF-B-588, type class and style as required.
9. Wires: Shall be galvanized wires.
10. Lag bolts: Square head type, FS FF-B-561

H. FABRICATION: Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel an iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structure. Straight bolts and other rough hardware items as specified. Fabricate items to sizes, shapes and dimensions required.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS: Fabricate, size, install, connect and fasten, bore, notch, and cut wood and plywood with joints true, tight, and well nailed, screwed, or bolted as required, all members with solid bearing without being shimmed. Set all horizontal members subject to bending with the crown up. Splices are not permitted between bearings. Use full lengths except as detailed. The notching or splicing of any member is not permitted without prior approval. Replace wood members damaged by erroneous cutting. Wherever necessary to avoid splitting, sub-drill for nails and screws with diameter of hole smaller than that of nails or screws.

3.02 NAILING: Use nails or spikes of such lengths that penetration into second piece of wood is not less than one-half nail or spike length, except 16d nails may connect pieces of 2" nominal thickness. Set nails no closer together than one-half nail length, nor closer to wood edges than one-fourth the nail length. Sub-drill holes where necessary to prevent splitting.

3.03 LAG SCREWS: Place by screwing; do not hammer drive into place. Install screws with anchorage embedment into piece lagged of not less than 60% of

screw length or 8 diameters. Provide standard malleable iron or steel plate washers under heads. Bore a hole of same diameter and depth as the shank. For threaded portion of the screw, bore the hole with a bit not larger than the base thread.

3.04 BOLTS: Clamp wood members together and bore holes true to line and 1/32" larger than the bolt diameter. Provide standard malleable iron or steel washers under heads and nuts when bearing on wood. Draw nuts up tight as installed and again just prior to being enclosed with other materials or at completion.

3.06 NAILING STRIPS AND PLATES: Provide wood blocking, nailing strips, plates, and the like as shown or required, securely nailed or screw fastened in place. Bolt wood strips and plates to metal. Use treated lumber for wood on concrete or masonry.

SECTION 07115
ELASTOMERIC SHEET MEMBRANE WATERPROOFING

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Install elastomeric type sheet membrane waterproofing, complete including concrete topping. As specified in this Section, the term "sheet waterproofing" means "elastomeric sheet membrane waterproofing" unless otherwise defined or specified.

A. Work In This Section:

1. Submittal
2. Preparation of surfaces.
3. Sheet waterproofing membranes required for areas and surfaces, as indicated:

   a. Under interior tile in toilets as indicated in plans.
   b. Roof Decks, roof over decks and balconies
   c. Canopies, parapets
   d. Utility room
   e. Open Decks, and open deck over basement parking.
   f. All other sheet waterproofing indicated or required.

B. Related Work Not In This Section:

1. Cast-in-place Concrete
2. Concrete Finishing
3. Concrete Masonry Unit
4. Sealants and Calking
5. Plastering
6. Tile Flooring

1.02 QUALITY ASSURANCE:

A. Qualifications of Sheet Waterproofing Subcontractor: Employ experienced and skilled Subcontractor and mechanics specifically trained and approved by the manufacturer of sheet waterproofing system to install all sheet waterproofing.

B. Manufacturer's Participation: Start installation of sheet waterproofing under observation of a technical representative of waterproofing manufacturer who shall verify existing conditions as specified in Section 01400, and observe preparation of substrate and installation of sheet waterproofing to the extent required to ensure the waterproofing

installation conforms to the manufacturer's specifications and instructions. Notify the manufacturer's representative not less than 4 working days in advance of readiness for observation.

C. Pre-Waterproofing Conference and Inspection: After approval of submittal but prior to starting installation of Work of this Section, the Contractor shall hold a meeting at the site attended by representatives of the Owner and Contractor to describe in detail all the waterproofing systems to be installed. Contractor shall prepare a detailed memo of this meeting and furnish copies to Owner.

1.03 SUBMITTAL: Refer to Section 01300 for procedures.

A. Product Data: Submit sheet waterproofing manufacturer's specifications including technical data, full preparation and application instructions covering all installation conditions, and recommendations specific for the Work including sample of each material to be used.

B. Certificate: Submit sheet waterproofing manufacturer's certificate that Subcontractor for Work of this Section is authorized and approved by the sheet waterproofing manufacturer.

1.04 PRODUCT DELIVERY AND HANDLING: Deliver material to the site in original unbroken packages bearing manufacturer's label showing brand, type, and weight. Store materials at site under cover and maintain in dry condition.

1.05 JOB CONDITIONS: Wherever waterproofing systems abut or lap unto surfaces to remain exposed, apply non-staining pressure-sensitive masking tape to prevent staining or marring and install additional coverings to supplement the tape as required. Protect waterproofing membrane systems from injury during application and until completed installations are approved.

1.06 WARRANTY: Refer to Section 01740. Warranty work of this section against defects in materials, workmanship, and leakage for a period of at least 10 years.

PART 2 – PRODUCT: Contractor-supplied and installed.

2.01 ELASTOMERIC SHEET MEMBRANE WATERPROOFING: 3mm for interior application 4.0-4.5mm thick for exterior application, unless otherwise indicated, waterproofing membrane for structural concrete. Provide solvents, adhesives, and related installation materials including urethane polymer sealant of the same brand.

PART 3 – EXECUTION

3.01 INSPECTION: Refer to Section -1400, Article "Verification of Conditions", and report to the Owner in writing conditions that interfere with or prevent correct installation of Work of this Section. Do not start sheet waterproofing installation until such adverse conditions have been corrected. Use proper ways to clean concrete/masonry consult ASTM Standard D4261-83 (Standard Practices for Surface Cleaning Concrete Unit masonry for Coating). D-4258-83 (Standard Practices for Surface Cleaning Concrete for Coating). Always consult Material

Safety Data Sheets prior to use. Verify that surfaces to receive waterproofing are clean and free from dust, dirt, oil, grease, and other deleterious substances and stains, and latency of efflorescent. Repair cracks or holes over 1/16" size.

3.02 SHEET WATERPROOFING INSTALLATION: Conform to waterproofing manufacturer's directions and requirements herein:

A. Concrete: Verify that the work done under other Section meets the following requirements:

1. That the concrete surface is free of ridges and sharp projections.
2. That the concrete was cured for a minimum of 28 days with minimum compressive strength of 3000 psi. Water-cured treatment of concrete is preferred.
3. That the concrete was finished by a power or hand steel trowel followed by soft hair broom to obtain light texture or "sidewalk" finish.
4. That the concrete does not contain voids or gaps, or "honeycomb" surfaces.
5. That the surfaces to receive fluid-applied waterproofing are free off dirt and debris.

B. Preparation: Clean surfaces contaminated with oil or grease by vigorously scrubbed with a power broom and strong non-sudsing detergent. Thoroughly wash, clean and dry. Visible hairline cracks shall be cleaned and treated with polyurethane coating material large cracks shall be routed out and sealed. Sealant shall be applied to inside area of crack only not on surface.

C. Laps and Splices: lap waterproofing sheets not less than 2" at splices. Make splices in accordance with the manufacturer's instructions, including solvent cleaning of splice area, roughening bonding area, pressing splice firmly together while the bonding area is fully solvent wetted and softened, rolling to expel air and excess solvent, and curing for not less than 24 hours or by applying heat to shorten curing time. Work on the lapped splices only 2 to 3 feet at a time.

D. Expansion Joints: Extend the waterproofing sheet into expansion joints to full depth of the joints as indicated in Drawings by folding and insertion without cutting waterproofing sheet. After finish materials are set, fill all expansion joints with polyethylene backing rod and specified urethane sealant tooled smooth.

E. Drains: At recessed drain receiver and clamping ring form a shaped collar by heating a section of sheet waterproofing as required and splice to adjoining sheet waterproofing. Extend sheet waterproofing into the receiver, fully embed in urethane sealant, top coat sheet with the same sealant under clamping ring, and securely tighten the clamping ring.

F. Parapets: Extend the waterproofing sheet up to parapets and/or adjoining wall at least 300mm or as indicated in Drawings by folding and insertion without cutting waterproofing sheet. After finish materials are set, fill all expansion joints with polyethylene backing rod and

specified urethane sealant tooled smooth.

3.04 CONCRETE TOPPING: Provide at least 50mm concrete topping for traffic' areas such as Roof Decks, Balconies, etc. For areas that will receive other finish over sheet waterproofing such as tiles, coordinate with involved subcontractor.

3.05 CLEAN UP AND COMPLETION: Conform to Section 01700. Clean up and remove equipment and surplus materials from the site, and remove temporary protection. Clean all waterproofing materials from surfaces not to receive waterproofing and restore the finish as required. If surfaces adjoining waterproofing are stained and cleaning is not acceptable, remove the affected Work and provide new Work as directed and approved, at no extra cost to the Owner.

SECTION 07192
MOISTURE BARRIERS

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide Polyethylene sheet moisture barrier under all slabs on grade as indicated in drawings or required, complete.

1.02 QUALITY ASSURANCE: Provide long lasting moisture barrier system, inclusive of all flashings and other elements required to produce a moisture-tight performance under slab on grade or as indicated in drawings. Provide damp proofing materials of each type required from a single manufacturer as much as possible. Provide secondary materials only as recommended by manufacturer of primary materials. Applicators shall be factory trained and qualified personnel by damp proofing material manufacturer. General contractors and other supervisory personnel shall familiarize themselves with surface requirements and installation procedure prior to commencement of Work in this Section, conforming to Code. Employ manufacturer's authorized applicator to perform preparation and installation of system.

1.03 SUBMITTAL: Refer to Section 01300 for procedures.

A. Product Data: Submit moisture barrier manufacturer's technical materials, systems, preparation, application data, and specifications. Prepare specifications specifically for conditions shown on the Drawings. Include a typed list of at least five (5) installations with owner's names and addresses, on which proposed system have been in service for at least three (3) years without failure of any kind.

B. Samples: Submit 300mm square Samples of each system prepared on a rigid board including finished flooring.

C. Applicator's Qualifications: Submit evidence that either manufacturer will install moisture barrier or that applicator is licensed and approved by manufacturer.

1.04 PRODUCT DELIVERY: Deliver materials to site in sealed factory containers, seals unbroken, labels intact and bearing date of manufacture and brand name.

1.05 JOB CONDITIONS: Coordinate with wood flooring contractor and other related trades; verify surfaces to be applied are correctly finished and dry. Provide temporary protection to prevent staining or marring of adjacent surfaces.

1.06 WARRANTY: Refer to Section 01740. Contractor and the moisture barrier manufacturer shall furnish to Owner a joint and several warranty against defects in materials or workmanship for 5 years covering damp proofing performance of the systems full warranty period and accepting responsibility for any ruptures caused by cracking. Defects covered under the warranty shall include, without limitation, loosening, abrasion, blistering, loss of adhesion or cohesion, delamination, and penetration of water to slag on grade.

PART 2 – PRODUCTS

2.01 POLYETHYLENE SHEETS: ASTM C171, 8mil thick plain polyethylene damp proofing sheet, or as required. Provide non-toxic sheets, with resistance to potable water including chlorinated drinking water, solventless, and conforming to local Health Department requirements. The completed installation shall conform to the manufacturer's published data sheet. Provide types of adhesive compound and tapes recommended by dampproofing sheet manufacturer, for bonding to substrate (if required), for sealing of seams in membrane and for sealing of joints between membrane and flashings, adjoining surfaces and projections through membrane.

2.02 SUBSTRATE: The surface of the concrete substrate shall be smooth, free of cracks, unevenness or protuberances. All corners shall be rounded to a radius of 20mm. Surface should not have standing water.

PART 3 – EXECUTION

3.01 INSPECTION: Refer to Section 01400, Article "Verification of Conditions", and verify that substrate are correctly finished and are dry. Report to Owner in writing any condition that prevents or interferes with the correct installation of the Work of this Section. Do not proceed with installation until such adverse conditions have been corrected. Installing of any system indicates acceptance of surface for warranty purpose; this does not relieve the Contractor and applicator from full responsibility for proper preparation of surfaces.

3.02 PREPARATION OF SURFACES: Conform to moisture barrier manufacturer's directions and broom sandblast, acid etch and neutralize, mechanically clean, or perform other cleaning operations as necessary to produce clean, sound dry surfaces in correct condition for the damp proofing. All surfaces must be free of oil, grease and moisture. All penetrations shall be completely installed and secured by the responsible contractor. Control joints running within the moisture proofing system shall be avoided wherever possible. If joints must be installed, the degree of movement must be determined for proper design of bridging system. The joint shall be designed to be as level with the substrate as possible.

3.03 APPLICATION: Leveling layer shall be applied if necessary and upon recommendation of manufacturer. Waterstops, if required, shall likewise be laid according to plans. The polyethylene sheet, with required thickness should be applied to cleaned surfaces as soon as possible to prevent contamination; a 300mm overlap shall be allowed for seams, filled with adhesive. Use equipment designed for the system. Produce a uniform installation, free of sags, lap marks, or other defects, matching approved Samples. All edges or terminations shall be sealed using manufacturer's

approved details. If temporary terminations are required, it is recommended that the manufacturer be notified. Extend damp proofing sheet and flashings as shown to provide complete membrane over area indicated to be damp proofed. Seal to projections through membrane and seal seams. Bond to vertical and horizontal surfaces as per manufacturer's recommendations.

3.04 PROTECTION & COMPLETION: Institute required measures for protection of completed installation during and after application of damp proofing system and throughout the remainder of the construction until such time as finish overlay is applied by Finish Contractor. Do not allow traffic of any kind on unprotected membrane. Remove protective coverings and clean materials from abutting surfaces affected; restore damaged A. Aguirre Inc Building finish as required. If surfaces adjoining the barrier are stained and cleaning is not approved, remove all affected Work and provide new conforming as directed, at no extra cost to the Owner.

SECTION 07210
BUILDING INSULATION

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Install glass wool-type, blanket type or batt thermal insulation, as well as safing and firestopping materials as required, complete.

A. Work In This Section: Principal items include:

1. Insulation under roof.
2. All other insulation required or indicated in Drawings.

B. Related Work Not In This Section:

1. Gypsum
2. Concrete Finishing
3. Wall Tiles finish.
4. Ceiling Suspension System
5. Insulation for mechanical systems.

1.02 SUBMITTAL: Refer to section 01300 for procedures.

A. General Materials: Submit each insulation and prong anchor manufacturer's printed specifications and instructions.

B. Insulation Materials: Submit manufacturer's detailed product data and installation instructions covering all conditions of the Work, with copies of UL approvals.

C. Submit Shop Drawings to the Owner based on manufacturer's recommended details, indicating installation method and fixing of batts or blankets.

1.03 REFERENCES:

ASTM E84	Surface Burning Characteristics of Building Materials
ASTM E162	Surface Flammability of Materials using a Radiant Heat Energy Source
ASTM E286	Surface Flammability of Building Materials using an 8 Foot Tunnel Furnace
ASTM E119	Fire Tests of Building Construction and Materials
ASTM E152	Fire Tests of Door Assemblies
ASTM E163	Fire Tests of Window Assemblies

UL 263 Standard Fire Test

PART 2 – PRODUCT

2.01 MATERIALS: Contractor- supplied and installed

A. Thermal Glass Wool Insulation: For interior application, Comply with ASTM C665, Type 1, UL rated, where required by Code, provide insulation having facing bearing labeled flame spread of 25 or less and smoke developed of 50 or less or ASTM E84 test, Class A interior finish, Method of Test of Surface Burning Characteristics of Building Materials. Approved type is ACI Insulation by ACI Philippines, Inc. Refer to Section 01600 for substitutions.

B. Spindle Anchors Acoustic Seals: Use seals and adhesives of correct type for substrate and type of anchor as required.

C. Staples: Stainless steel, monel, or copper coated steel size directed by batt manufacturer or required by Code.

D. String Wires: Minimum 18 gage galvanized steel wire.

E. Tape: 50mm wide, aluminum pressure sensitive tape for sealing of joints and edges of foil-faced insulation batts/blanket. Approved type, Vapastop Tape

F. Sealant backer rod: Soft reticulated closed cell backer rod which does not absorb water and is non-gassing when punctured.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION: Install insulation in dry state. Where cutting is necessary, use a sharp knife and a straight edge. Butt together firmly. Fit tightly around roof protrusions, outlet boxes, vent pipes, etc. Fill all gaps with off-cuts to avoid heat leakage. Install batts with close fit, free of gaps, holes, or sagging. Supplement the installation with wire ties, adhesive, spindle anchors, or staples where required to prevent sagging. Provide spindle anchors where shown or necessary in accordance with manufacturer's instructions, including required setting time, spaced at maximum 300mm centers both ways.

SECTION 07570
LIQUID APPLIED ELASTOMERIC WATERPROOFING

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Apply liquid applied elastomeric waterproofing for concrete, complete including concrete topping if required. As specified in this Section, the term "waterproofing" means "liquid applied waterproofing" unless otherwise defined or specified. Work in this Section includes preparation to receive waterproofing specified herein, with respect to required finished floor elevation as indicated in Construction Plans.

A. Work In This Section:

1. Submittal
2. Preparation of Surfaces
3. Waterproofing materials for the following areas and surfaces:
    a. Service areas
    b. All other interior areas classified as "intermittently wet"
    c. Exterior CHB
    d. Plant boxes
    e. Firewalls and other exterior cast-in-place concrete walls
    f. All other liquid applied elastomeric paint, waterproofing indicated to receive Acrytex or Plexibond.

B. Related Work Not In This Section:

1. Cast-in-place concrete
2. Concrete Finishing
3. Unit Masonry
4. Tile Finish
5. Floor finish
6. Painting

1.02 QUALITY ASSURANCE

A. Employ experienced and skilled labor. Conform strictly to most recent manufacturer's product catalogue.

B. Pre-waterproofing Conference and Inspection: After approval of submittal but prior to start of application of Work of this Section, the Contractor shall hold a meeting at the site attended by representatives of the Owner. The Contractor shall prepare a detailed memo of this meeting and furnish copies to the Owner. The Owner shall

inspect the substrate to receive Work in this Section and report all defective conditions to the Contractor for correction; see Article "Verification of Conditions" in Section 01400. Starting work of this Section indicates the waterproofing sub-contractor's approval of substrate and waivers of claim substrate are defective as pertains to required warranty.

C. Preliminary Test:

1. Preliminary Tests at Site: Waterproofing manufacturer and Subcontractor for Work of this Section shall make tests on the surface to be treated to establish the actual application rates required to fully waterproof involved surfaces and meet warranty requirements. Tests shall demonstrate waterproofing does not adversely affect substrate and that surfaces to be treated "are dry. Application rates established must not be less than those recommended in manufacturer's technical data for the kind of material and orientation of surfaces.

2. Preliminary Test Repeating: If surfaces to be treated with waterproofing are found to be soiled by dust, dirt, smog, fumes or other deleterious substances, as evidenced by dirt or stain marks developing from sealer "run-down", during the preliminary site tests, Contractor shall clean all surfaces to receive waterproofing until all such deleterious substances are entirely removed and shall allow the washed surfaces to fully dry. Preliminary tests at the site shall then be repeated as specified above.

D. Source Quality Control: From the waterproofing manufacturer's containers stored at the site (see "Product Delivery" hereafter), Owner will designate a container to be opened by Contractor and the Owner assisted in obtaining a one (1) quart sample of waterproofing in a glass container furnished by the Owner, for record purposes. Owner may elect to have this sample tested by the Testing Laboratory; refer to Section 01400.

1.03 SUBMITTAL: Refer to Section 01300 for procedures.

A. Samples and Product Data: Submit samples of waterproofing accompanied by manufacturer's technical data, surface preparation and application instructions, recommended coverage rates for the types of surfaces to be treated, and evidence that the waterproofing conforms to all requirements specified. With Product Data, include a calculation of the total number of gallons required to seal all surfaces to be treated.

B. Test Report: Submit written test reports for preliminary testing at the site.

1.04 PRODUCT DELIVERY AND HANDLING: Receive for storage and safekeeping delivered waterproofing materials to site in original, unbroken packages bearing manufacturer's label showing brand, type and weight. Store in

original containers and keep under cover and in dry condition at site. Do not stack bags more than two (2) pallet high.

1.05 JOB CONDITIONS:

A. Protection: Protect waterproofing systems from injury or contaminations of foreign matter that may inadvertedly affect its chemical and mechanical bond and quality during application and until completion and curing.

B. Weather Conditions: Do not apply waterproofing during adverse weather conditions.

1.06 WARRANTY: Refer to Section 01740. The Contractor and subcontractor shall jointly and severally warrant that waterproofing treated surfaces will remain free of water intrusion for at least ten (10) years, and that they will immediately repair and correct deficiencies or leaks that appear in the treated surfaces during warranty period at no cost to the Owner. Waterproofing manufacturer shall warrant to furnish all materials required to correct leakage that appears within ten (10) years from date of Substantial Completion at no additional cost to the owner. Leakage caused by structural cracking or movement are expected from the warranty:

PART 2 – PRODUCTS General Contractor-supplied and installed

2.01 LIQUID-APPLIED ELASTOMERIC WATERPROOFING MATERIALS: Furnish waterproofing materials conforming to the requirements specified herein. Approved brands are the following, Refer to Section 01600 for substitutions:

A. For non-traffic ledges, Service Areas and all other areas classified as "intermittently wet"

1. "Sonoshield HLM-5000" manufactured by Sonneborn International and represented by Essicor Incorporated.

2. "Thoroseal" manufactured by Thoro System Products and represented by Jardine Davies, Inc.

3. "Nitroproof RS" manufactured by Fosroc and represented by Fosroc Philippines Inc.

4. "Quicseal 1 02" manufactured by ML Management & Supplies Pte Ltd represented by Gloscore Philippines, Inc.

B. For Firewalls, Exterior CHB and RC walls not to receive cladding, tiling paint or other finish, parapet walls, color as approved by Owner:

1. "Quicseal 1 03" manufactured by ML Management & Supplies Pte Ltd. represented by Gloscore Philippines, Inc.

2. "Bird & Son Elastomeric Waterproofing" manufactured by Bird & Son Inc., represented by Essicor Incorporated.

3. "Nitroproof RS" manufactured by Fosroc and represented by

Fosroc Philippines Inc.

4. "Thorolastic A+" manufactured by Thoro System Products and represented by Jardine Davies, Inc.

5. "Aqua Seal", manufactured by Quickwall represented by Quickcoat Construction Supply and Services.

6. "Plexibond", manufactured by Davies

7. "Acrytex", Manufactured by Davies

PART 3 – EXECUTION

3.01 INSPECTION: Refer to Section 01400, Article "Verification of Conditions", and report to Owner in writing conditions that prevent or interfere with the correct installation of Work of this Section. Do not start waterproofing application until such adverse conditions have been corrected.

3.02 SURFACE PREPARATION: Use proper ways to clean concrete/masonry consult ASTM Standard 04261-83 (Standard Practices for Surface Cleaning Concrete Unit masonry for Coating). D-4258-83 (Standard Practices for Surface Cleaning Concrete for Coating). Always consult Material Safety Data Sheets prior to use. Verify that surfaces to receive waterproofing are clean and free from dust, dirt, oil, grease, and other deleterious substances and stains, and latency or efflorescence. Treat any apparent alkali or efflorescence with appropriate neutralizing compound as recommended by concrete or brick supplier/manufacturer. Repair cracks or holes over 1/16" size. Mask and fully protect adjoining surfaces.

3.03 APPLICATION: Conform strictly with waterproofing manufacturer's instructions and the most current product catalogue specifications.

A. Concrete: Verify that the work under other section meet the following requirements:

1. That the concrete to receive waterproofing treatment must be clean and have an open capillary system to ensure chemical penetration and mechanical bonding, and free of all structural and surface defects.

2. That the concrete was cured for a minimum of twenty eight (28) days and should have gained sufficient strength for its support waterproofing application without damage of delamination, with a minimum compressive strength of 3000 psi. Water-cured treatment is preferred.

3. That the concrete does not contain voids or gaps or "honeycomb" surfaces. Remove all protrusions, work back to sound concrete, chiseling out any honeycombed or damaged areas.

B. Preparation:

1. All surfaces to be coated must be clean. Chip, sand or shot blast to remove all foreign matter, dust, dirt, paints, oils, grease, coatings, laitance or any other contaminants. Clean and roughen all chiseled out areas, form-tie holes, etc. Form ties and other metal fragments must be removed and patched.

2. All mortar joints should be in sound condition. Construction joints and shrinkage cracks, voids or honeycombing exceeding 0.3mm should be routed out to a minimum depth of 20mm.

3. Water leakage must be stopped according to the manufacturer's Plugging specification.

4. Prior to waterproofing, rinse carefully all surfaces to be waterproofed and prewater with clean, potable water. Prewater several times so that the concrete is thoroughly saturated. However, carefully determine means of protecting space immediately below where waterproofing is to be applied, from any damage caused by subsurface preparation and testing.

C. BOND TEST: New concrete should have gained sufficient strength to support waterproofing system without damage or delamination. If any doubt exists about the suitability of substrate to receive waterproofing application, then a bond test should be carried out. Clean and prepare an area or areas that are representative of the full site to be coated. Mix and apply waterproofing according to manufacturer's instructions. Allow to cure for about seven (7) days Using a hammer and chisel, attempt to remove the coating. If coating cannot be readily removed without damage to itself and the substrate, then a full application should be possible. If the coating delaminates cleanly from the substrate there may be clear contaminants. If the coating delaminates with substrate adhered then the substrate may be weak or friable. In either case, special cleaning and/or application techniques may be necessary according to the recommendation of the technical representative of the manufacturer.

D. MIXING: Cementitious waterproofing may be mixed by hand or by using a power mixer as recommended by manufacturer. Mix with clean water to the consistency specified in Product Data Sheets.

E. APPLICATION: Strictly conform with manufacturer's

3.04 CONCRETE TOPPING: Provide at least 50mm concrete topping for floors such as Kitchen, Service areas, etc. For areas that will receive other finish over waterproofing such as tiles, coordinate with involved Specialty Contractor.

3.05 CLEAN-UP & COMPLETION: Conform to Section 01700. Clean up and remove equipment and surplus materials from the site, and temporary protection. Clean all waterproofing materials from surfaces not to receive waterproofing and restore the finish as required. If surfaces adjoining waterproofing are stained and cleaning is not acceptable, remove affected work and provide new work as directed and approved, at no extra cost to the Owner. Remove surplus materials, tools, equipment, containers, waste, and protection

materials from the site. Leave all treated surfaces and adjoining Work clean and free of damage or soiling that may result from Work of this Section.

SECTION 07600
FLASHING AND SHEET METAL

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Install flashing and sheet metal items, complete.

A. Work In This Section:

1. Sheet metal flashings in connection with roofing.
2. Reglet and counterflashing assemblies.
3. Miscellaneous metal flashing and counterflashing required, except where provided by mechanical and electrical trades.
4. Coping caps.
5. Pitch pockets.
6. Aluminum louvers with insect screens.
7. Drip flashings.
8. Scuppers.
9. Shop priming and field touch-up.
10. Calking
11. Sheet metal flashings in connection with plumbing, airconditioning and electrical.

B. Related Work Not In This Section:

1. Metal accessories for drywall, lathing and acoustical treatments.
2. Sleeves for embedded items.
3. Finish painting
4. Curtain Wall back pan.

1.02 QUALITY ASSURANCE: Drawings and requirements specified govern. Conform to current sheet metal manufacturer's manuals for conditions not indicated or specified for general fabrication of sheet metal.

1.03 SUBMITTALS: Refer to Section 01300 for procedures. Submit Shop Drawings for fabricated sheet metal showing details, methods of joining, anchoring and fastening, thicknesses and gages of metals, concealed reinforcements, expansion joint details, sections and profiles. Submit such product data and samples for materials or assemblies as Owner may request.

PART 2 –PRODUCTS: eneral Contractor-supplied

2.01 BASIC MATERIALS:

Galvanized Steel:	ASTM A525 with coating G90, mill phosphatized for paint adhesion, 24 gage unless otherwise shown or specified.
Aluminum Extrusions:	ASTM 8221, 6063-T5 or T6
Aluminum Sheet:	ASTM B209, Alclad or 5052 alloy
Solder:	ASTM B32, B284
Solder Flux:	Standard brand non-corrosive acid-base type.
Fasteners:	Zinc or cadmium coated steel or stainless steel.
Felt:	ASTM 0226, 15-pound type
Primer:	Conforming to Section 07920.

2.02 RELATED MATERIALS:

A. Reglets and Counterflashings: Flashing systems complete with unions and preformed corners of necessary types for particular locations or gage 24 galvanized steel, as required by Drawings and Details.

2.03 GENERAL FABRICATION REQUIREMENTS: Fabricate items to avoid distortion and overstressing of fastenings due to expansion or contraction. Provide expansion joints where necessary in continuous runs of sheet metal, constructed watertight and spaced nine (9) meters apart maximum. Lock and solder corners and blind hem exposed edges. Make joints with 100mm lap and solder unless otherwise shown or specified. Fill single lock seams with sealant where soldering is not feasible. Run flanges 100mm minimum onto roof and wall surfaces. Fabricate sheet metal items in nominal 2.40m lengths unless otherwise shown or specified.

A. Soldering: Do soldering slowly immediately after application of flux, all seams showing evenly flowed solder. Clean and neutralize finished soldering.

B. Shop Priming: Clean completed items, apply pretreatment and prime all exposed surfaces with specified primer.

C. Joints in Sheet Aluminum: Lock all joints, rivet where required for strength and fill joints with polymer sealant supplied or recommended by the metal manufacturer. Soldering is not permitted.

2.04 FABRICATED ITEMS: Of gage 24 galvanized steel unless otherwise indicated or required.

A. Coping Caps: Corner units having maximum 450mm long legs and joints locked and soldered watertight, intermediate joints spaced at maximum 2.40m centers and equally spaced Make intermediate joints of the flush butted type, edges spaced about 6rnm apart and centered over a 200mm long backing plate of the same profile and gage as the cap, set in a 12mm wide bead of sealant. Secure both edges of the caps with 37.5mm wide gage 20 galvanized steel cleats spaced maximum 800mm centers and locked into drip hem.

B. Drip Flashings: Hemmed exposed edges, 1-piece lengths.

C. Scuppers: All joints locked and soldered watertight, flanges extending at least 100mm into roofing, outer edges hemmed.

D. Pitch pockets: Or gage 20 galvanized, sides doubled, joints locked and soldered watertight.

PART 3 – EXECUTION

3.01 INSTALLATION REQUIREMENTS: Install sheet metal items as shown, according to approved submittals, and as required completing the entire work. Securely fasten and assemble, and make watertight and weathertight.

A. Coordination: Coordinate sheet metal items in connection with roofing and curtain wall construction for correct installation, furnish in sufficient time to avoid delays in construction. Install roofing sheet metal simultaneously with roofing. Refer to Section: Curtain Wall.

B. Calking: Provide sealant calking as indicated or required to seal and complete work of this Section. Conform to Section 07920.

C. Isolation: Isolate sheet metal from contact with concrete or masonry with one layer of roofing felt, except embedded items.

3.02 COMPLETION: Examine installed sheet metal items, water test if necessary or directed and correct damaged or defective work.

SECTION 08410
ALUMINUM DOORS & WINDOWS

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide aluminum type doors and windows, complete, to be supplied and installed by Specialty Aluminum awl Glass Contractor.

A. Work In This Section: Principal items include:

1. Aluminum framed windows.
2. Aluminum jamb of glass doors.
4. Hardware for Aluminum and Glass works.
5. Factory finishes on aluminum surfaces.
6. Caulking and Sealing.
7. Installation and supply of hardware for aluminum entrance doors.
8. Installation and supply of hardware for aluminum operable windows.

B. Related Work Not In This Section:

1. Furnishing finishes hardware for aluminum entrance doors.
2. Glass and Glazing.
3. Plastering
4. Architectural Door Frame - Section 08100

1.02 QUALITY ASSURANCE

A. Quality Standards: In addition to Code, provide Work of this Section so designed that glass installations conform to ANSI Z97.1, as applicable.

B. Performance Standards: Provide all work of this Section so designed that when installed and glazed, the construction conforms to the following performance criteria:

1. Thermal Movement and Clearance: System provides for thermal movement within a surface temperature range as determined by Engineer with additional clearance allowed for erection tolerance, slab and beam deflection, and long term creep of the building structural frame.

2. Air Infiltration: When wall system is tested according to ASTM E283, air infiltration at perimeter of operating doors does not exceed 0.25 cubic

feet per minute per foot of sash perimeter with total air infiltration from all other sources, including fixed doors and windows, not over 0.06 CFI per square foot of wall area. In calculating wall area, areas of operating doors and windows are not included.

3. Structural Properties: Deflection of members does not exceed 1/175 of span under a design load of 35 PSF acting inward and outward normal to the plane of the wall, members using allowable stress with safety factor of 1.65 minimum.

4. Reference Sections: Requirements specified in Section 05030 and Section 07920 are a part of this Section, including submittal and warranty requirements.

1.03 SUBMITTAL: Refer to Section 01300 for procedures.

A. Shop drawings: Submit for all Work of this section, prepared and approved prior to fabrication. Show complete details for all materials, finishes, sizes, profiles, moldings, dimensioned locations of hardware items with reinforcement, methods of anchoring, assembly, erection, internal drainage, isolation, glazing and reglazing procedures and materials, and caulking. Include the manufacturer's technical and structural data. Include complete structural calculations showing that materials proposed for use conform to deflection requirements specified in Paragraph "Performance Standards" above.

B. Sample and Product Data: Obtain Owner's instruction and submit the following:

1. Aluminum doorjamb sections with the specified finish, color, corner and intersecting jointing construction, fasteners, and accessories.

2. Wall showing Horizontal aluminum louvers, each type with specified finish, intersecting jointing construction, fasteners, and security plate.

3. Cured sealant clogs.

C. Conformance Data: Submit satisfactory evidence and copies of test records demonstrating proposed storefront, window walls, and entrances, when installed and glazed, conform to requirements of Article "Quality Assurance" including the performance standards therein.

D. Fill-Sized Glass Samples: Refer to Section 08800

1.04 JOB CONDITIONS: Protect all the Work of this Section until completion and final acceptance of the entire Work. Repair or replace all damaged or defective Work to original specified condition at no additional cost to Owner. Damaged or defective Work includes surfaces which cannot acceptably clean or repaired.

1.05 WARRANTIES: Refer to Section 01740.

A. Tempered Glass Doors: Warranty for five (5) years. Warranty shall guarantee to replace or repair defective materials or workmanship for entire warranty period. Defective materials and workmanship include abnormal deterioration, aging or weathering of Work, structural failure of any components as result of exposure to pressure and forces up to specified limits, failure of operating parts to function normally, deterioration or discoloration of applied finishes in excess of allowable limits, glass breakage and secondary glass damage or breakage due to falling glass fragments, failure of sealants, sagging and twisting or failure of the construction to fulfill other specified performance requirements. Warranty does not cover damage due to vandalism or natural conditions exceeding the performance requirements; however, warranty does include failure or defects for which a cause cannot be determined. This warranty and its enforcement shall not deprive the Owner of other action, right, or remedy available to the Owner.

B. Windows: Warranty the same as glass doors.

C. Paint Finish: Warranty in accordance with Section 05030

D. Caulking and Sealants: Warranty in accordance with Section 07920.

PART 2 – PRODUCT

2.01 TYPES: Provide for thermal movement through the surface temperature range specified in Paragraph "Performance Standards" above. Details shown in Drawings establish required sizes, types, and appearance.

A. Manufacture: Minor modifications in non-essential details to accommodate the use of manufacturer's standard sections of same sizes, profiles, and glazing features indicated are acceptable, Subject to approval.

B. Members: Provide complete extruded aluminum door and window frames as indicated and required, including all glass setting bars, transom bars, trim, mullions, glass frames, louvers, and door and window frames. Provide necessary setting accessories, including screws, fittings, and anchors. Design all joints and connections for flush watertight hairline fitting and to allow for structure and thermal movement and deflections without loss of glass edge clearance, grip, or watertight integrity.

C. Load and Deflection: Provide aluminum members of section thickness and structural properties, minimum 0.125" thickness where stressed and 0.0625" thickness elsewhere, designed to withstand Code required loading without buckling, distortion, or distress, as determined by Structural Engineer. Provide additional bent plate or rolled steel internal stiffeners where necessary to meet deflection requirements Pre-coat stiffeners with a heavy bituminous coating to electrically isolate from aluminum. Conform glass edge bearings, laps, and clearances to Code, but minimum 12mm glass bite in any case glass retained by metal stops.

D. Fasteners: Place no fasteners on exposed surfaces unless approved on the Shop Drawings, exposed fasteners with flat Phillips head and finished to match adjoining surface.

E. Slip Pads: Nylatron, high impact polystyrene, or equal, between moving parts at expansion connections, minimum 3mm thick. Do not use nylatron in close proximity to a field weld.

F. Miscellaneous Items: Provide all extruded aluminum drywall adapter trims ceiling and wall trims, sills, covers, closures, and similar items indicated or required for complete installations; fully detail in Shop Drawings.

G. Glass Doors: Framed type, unless otherwise indicated, with dead bolt lock, floor closers and door push/pull bars or deadbolt lock lever type handle, as indicated in Section 08710 or as required.

H. Hardware Preparation: Provide factory-applied concealed reinforcement for hardware in entrance doors and frames, minimum 3/16" thick aluminum. Cut, mill, reinforce, drill, and tap rails and reinforcements for application of the finish hardware from templates furnished by the hardware supplier. Use minimum 9 gage stainless steel for reinforcements in stainless steel door rails.

I. Windows: Provide fixed type or operable windows as indicated in drawings. Fabricate anchors, clips and window accessories as per Owner's approval, designed to have sufficient strength to withstand design pressure required. Provide necessary operating device, balance support arms with sliding pivots, lever handle and cam type lock for awning windows and ball bearing and track for sliding windows.

J. Aluminum Louvers: Provide factory assembled horizontal ventilating mullions, without exposed fasteners, fully weather stripped and provide rotational adjustment for desired air circulation, as shown in Drawings, extruded aluminum 6063-T5 alloy and temper. Weathering shall be hard backed silicone treated polypropylene. When the unit is fully opened or closed, there shall be no projections beyond the interior and exterior planes of the unit. The exterior appearance of the unit shall remain unchanged regardless of the position of the ventilator. Provide insect screen and security plate as shown in Drawing. Approved type is Revolv-O-Vent by Vistawall Architectural products.

2.02 ALUMINUM FINISH: For all exposed aluminum surfaces, provide clear anodized or powdercoated finish as indicated in drawings, architectural class, as approved by Owner, unless otherwise required or indicated in Drawings, in accordance with Section 05030.

PART 3 – EXECUTION

3.01 INSPECTION: Refer to Section 01400, Article "Verification of Conditions", and report to Owner in writing all conditions that interfere with or prevent correct installation of Work of this Section. Do not proceed with the involved installation until all such adverse conditions are corrected. Consult and

coordinate with other trades to establish finish floor grade for door thresholds and opening clearances. It shall be the responsibility of the Aluminum contractor to make sure all aluminum doors/windows are aligned and fit according to the requirements of the drawings.

3.02 GENERAL INSTALLATION REQUIREMENTS: Conform to approved submittals and the other requirements herein.

A. Aluminum Isolation: Isolate aluminum from dissimilar metals and materials other than non-magnetic stainless steel. At metals, apply on both contacting surfaces a heavy brush coat of zinc chromate primer made with a synthetic resin vehicle, followed by two heavy brush coats of spar varnish based aluminum metal and masonry paint; or apply a heavy coat of alkali-resistant bituminous paint; or separate the surfaces with non-absorptive exterior quality polyvinyl chloride tape gasket, or coat both surfaces with a fluid-applied neoprene or urethane membrane material. Coat both contact surfaces with alkaliresistant bituminous paint at concrete, masonry, plaster, tile, and cementitious materials. Conceal all isolation in the finished Work.

B. Caulking: Provide non-staining caulking and sealants as shown and required to make all Work of this Section watertight and properly finished, including joints between aluminum frames and adjoining Work. Install sealants of selected and approved colors. Conform to Section 07920 including warranty.

3.03 INSTALLATION: Member or miter framing member joints with hairline sealed joints. Securely anchor to tile building structure. Set frames level, plumb and in true alignment. All units shall be installed plumb and square into adjacent frame members prepared by the glazing contractor. All units shall be securely anchored with all perimeter joints fully caulked to insure a watertight seal.

3.04 HARDWARE: Install finish hardware on entrance doors according to hardware manufacturer's instructions and installation templates, and adjust all items for correct operation. Set thresholds in sealant.

3.05 FILLED QUALITY CONTRIL:

A. Inspection: Shop and field materials and workmanship may be inspected by the Owner anytime. Such inspection does not relieve Contractor from the obligation to provide materials and construction conforming to Contract Documents and approved submittals, and Contractor shall correct all deficiencies reported and shall effect quality control measures and procedures for materials, whether or not inspected.

3.06 COMPLETION: Conform to Section 01700. Wash all soiled surfaces with mild soap solution, rinse with clear water, and wipe dry. Do not use harsh cleaning agents, abrasives, or caustics for cleaning. Leave Work free of dirt, streaks, and labels.

3.07 CLEANING: Upon completion of construction, the aluminum and glass specialty contractor shall be responsible for cleaning a/l aluminum and glass, employing cleaning methods recommended by the manufacturer. Anodized

aluminum shall be cleaned with plain water containing a mild detergent, or a petroleum product such as white gasoline kerosene or distillate. No abrasive agent shall be used.

SECTION 08710
FINISH HARDWARE

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Install all Contractor-supplied finish hardware, complete. Provide all trim, attachments, and other fastenings specified or required for proper and complete installations. Include hardware under this Section that is not specified in other Sections, whether or not such hardware is herein scheduled.

A. Related Work Not In This Section:

1. Installation of finish hardware.
2. Rough hardware
3. Hardware for toilet installs doors.
4. Toilet room accessories.
5. Hardware for portion Work with factory built and installed hardware.

1.02 QUALITY ASSURANCE:

A. Document Review: While the following hardware list is intended to cover all doors and other movable parts of building, and establish a type and standard of quality, it is the specific duty and responsibility of Contractor and finish hardware supplier to examine Drawings and Specifications and furnish the proper hardware for all openings, whether listed or not. If there are any omissions in the specified hardware groups in regard to regular doors or openings, notify the Owner for Instructions. Otherwise, the list will be considered complete.

B. Qualifications of Supplier: Hardware supplier shall be a duly-recognized distributor or dealer of the make of hardware bid upon. Supplier shall furnish a qualified employee acceptable to Owner, available for consultation and service to Owner and Contractor as required.

C. Installation Quality Control: During installation of the finish hardware, a periodic inspection shall be made by the Owner. Hardware improperly installed shall be removed and reinstalled at the Contractor's expense. At the completion of the Work, a final inspection shall be made. Make all adjustments recommended by the Owner.

D. Code and Listing: Conform all finish hardware to Building and Fire Codes, all UL labeled for rated openings. Exit doors and doors leading to exits shall be provided with hardware in full compliance with the

National Fire Code of the Philippines and all Codes applicable to the Work. Exit doors shall be operable at all times from the inside without the use of a key or any special knowledge or effort. Remove all finish hardware furnished or installed not meeting the requirements of Local Codes having jurisdiction of the Work and provide proper conforming items at no extra cost to the Owner.

E. Bitting List: Furnish key bitting list to Owner, with key bitting listed opposite the key code number. Forward the list directly from the factory to the Owner.

1.03 SUBMITTAL: Refer to Section 01300 for procedures.

A. Hardware List: Within 30 days after award of Contract, prepare and submit a hardware list (7copies) for approval. In list, identify each hardware item by manufacture, manufacturer's catalog number, and exact location in the Work. Prepare hardware list in a suitable form that facilitates ready checking by the Owner. Approval of the hardware list by the Owner does not relieve the Contractor and hardware supplier of the responsibility for furnishing hardware for the complete Work.

B. Product Data: When directed, submit catalog cuts of every item proposed to be furnished for the Work. Include all finishes, sizes, catalog numbers, and pictures. Explain fully all abbreviations.

C. Samples: When directed, submit a Sample of each and every proposed item of hardware.

D. Closer Certification: Submit a certificate executed by an authorized representative of the door closer manufacturer certifying that all closers have been inspected and adjusted, are operating as designed, and have been installed in accordance with the manufacturer's instructions.

E. Manuals and Maintenance Materials: Conform to Section 01700. Furnish the Owner one set of adjusting tools and maintenance manuals for all locksets, door closers, floor hinges, and panic devices.

1.04 PACKING, MARKING AND DELIVERY: Individually package each hardware unit, complete with proper fastenings and all required appurtenances, and clearly mark each package on the outside to show the hardware contents and specific location in the Work. Except where otherwise specified, deliver all hardware to the job site.

1.05 JOB CONDITIONS:

A. Templates: In order to ensure proper placement and fit, furnish hardware for metal doors or metal frames made to template. Furnish templates or physical hardw3re items to all manufacturers involved and deliver sufficiently in advance to avoid delay in the Work.

1.06 WARRANTY: Conform to Section 01740. Warranty all hardware for two years. Correct defects in materials or workmanship occurring during the warranty period to the complete satisfaction of Owner.

PART 2 - PRODUCT-General Contractor-supplied and installed

2.01 FINISH OF HARDWARE: As herein specified. Take special care to coordinate finish of various manufacturers to ensure a uniform acceptable finish. Finish of all hardware shall match the finish of locksets unless otherwise specified.

A. Head Seals and Jamb Seals: Seals (noted in the Specifications as USP finish) shall be furnished in US28 finish and shall be painted to match color of the door frame.

2.02 LOCK UNIFORMITY: Except where otherwise specified, locksets, latch sets, padlocks, cylinders and component parts, as specified hereinafter, shall be the products of one manufacturer.

2.03 LOCK STRIKES: Provide boxed lock strikes with a curved lip of sufficient length to protect the trim and jamb; provide with wrought boxes.

2.04 KEYING AND MASTERKEYING: Key, master key, and grand master key locksets, padlocks, and cylinders at the factory. Establish and maintain keying records at the factory, as directed.

A. Identification: Identify master keys and grand master keys with registry number; DO NOT stamp with "MASTER" or letter "M". Do not stamp individual room keys with key cut but with a plain identification number. Factory cut all keys and stamp "DO NOT DUPLICATE".

B. System:' In order to maintain the existing master key system; furnish all cylinders, locksets, and padlocks with keyways to match keyway of record.

C. Construction Keying: Construction key locksets, padlocks, and cylinders; furnish 15 construction master keys.

D. Permanent Keys: The Contractor and hardware supplier are responsible for permanent keys until all are delivered to the Inspector or otherwise cleared to the Owner's complete satisfaction.

E. Keying Schedule: Arrange a meeting with the Owner to establish the Keying Schedule in order to provide correct Grand Master Keying.

F. Grandmaster and Master Keys: Deliver to the Owner.

2.05 DOOR CLOSERS: Install door closers attached to mineral core or particle board filled doors with six bolts. Provide drop brackets, mortise shoes, and long arms, as required. Adjust door closer for spring setting, latch and sweep speeds, and back check, and conform adjustments to barrier laws and regulations.

5.0 pounds for interior doors
8.5 pounds for exterior doors
15.0 pounds for fire doors

2.06 DOOR HARDWARE: Furnish hand of all locks as indicated. If the door hand is

changed during construction, make necessary changes in hardware at no extra cost to the Owner.

2.07 DOOR BUTTS: Furnish full-mortise template-type hinges unless half mortise hinges are required. Furnish hinges with non-rising loose pins, ball or oilite bearings, and flat button tips, unless otherwise specified. Where necessary to keep the door leaf clear of walls, casings, jambs, or reveals in door openings, furnish wide throw hinges of approved type. Furnish sherardized steel exterior door butts. For out swinging doors, furnish hinges having a set screw in barrel to prevent pin removal when door is closed. For doors over 2250mm high, furnish one extra hinge for each 750mm feet of additional door height.

2.08 MAINTENANCE RELATED ITEMS: Contractor shall provide one set of Adjusting Tools, one set of Maintenance Manuals for Locksets, Door Closers, Floor Hinges and other hardware devices, direct to the Owner's representative in charge of maintenance.

2.09 MATERIALS LIST: Refer to Schedule of Doors and Windows.

SECTION 08800
GLASS & GLAZING

PART 1 –GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide glass, glazing, and glazing accessories including but not limited to windows, glass doors and vision panels, glass railing, spandrel glass, interior glass partitions, mirrors, not included in Aluminum & Glass Contractor's Package, complete. Some work in this Section shall form part of the Work of the Aluminum & Glass Specialty Contractor as indicated in the Scope of Work.

A. Related Work Not In This Section:

1. Window and door frames.
2. Metal fabrication.
3. Metal finishes.
4. Caulking and sealants.
5. Aluminum Frames

1.02 QUALITY ASSURANCE

A. Quality Standards: Glass installations shall comply with ANSI Z97.1, as applicable. Federal Specification DD-G-451 d, all architectural glass products shall be produced to meet the requirements of the CPSC 16 CFR 1201 safety standards. Glass shall exceed requirements of ASTM E-774 and 773. Glazing shall be in accordance with the current glazing recommendations published by AAMA, FGMA or SIGMA. Patterned glass shall follow ASTM C1036.

B. Glass Manufacturer's Usage Recommendation: Furnish the Owner with manufacturer's written analysis of glass usage for the glass installations regarding adverse conditions and other problems that may occur as a result of the glass use and glass exposures, with recommended solutions. If no such problems are anticipated by a glass manufacturer, the pertinent written analysis shall so state. Contractor shall obtain from the glass manufacturer certification of correct or recommended glass usage for the Project.

1.03 SUBMITTAL: Refer to Section 01300 for procedures.

A. Samples and Product Data: Obtain color instructions from the Owner. Submit the following:

1. Samples of various glasses, 300mm square with smooth edges,

properly tagged and labeled.

2. Each glass manufacturer's detailed recommendations and instructions for preparation of glazed openings and installation of glass. With the instructions, submit glass manufacturer's written recommendations for setting blocks and shims, jamb blocks and shims, wedge glazing gaskets, and fixed glazing gaskets to be used for installation of the manufacturer's glasses, thickness recommendation and calculations as per Code requirements; include type and placement for each item.

3. Glazing channels or gasket, 300mm long.

4. Manufacturer's technical data for glazing gasket, weathering gaskets, tapers, separators, setting and side blocks, and other glass setting material showing conformance with requirements specified, including warranties, coordinated with glass manufacturer's recommendations and instructions.

5. Samples of cured glazing sealants in designated colors, with technical Product Data.

6. Unframed wall mirrors, 300mm square with manufacturer's data for mirror, primer and adhesive, and warranty.

B. Full-Size Samples: Install full-size Samples of glasses specified below. Samples installed in the frames forming a part of the Work, locations designated by the Owner. Glass showing defects, including excessive distortion, which detract from artistic effect, appearance, and design concept of the building, in the Owner's opinion, shall be removed and acceptable glass installed at no extra cost to the Owner. Approved Sample installations establish the standard of quality required for all glass installations of the same kinds and types. Full-size Samples shall be provided as required by the Owner.

C. Certificates: Submit from manufacturer stating the quality, thickness, and type of all unlabeled glass delivered to the site for field cutting. Submit required certification.

1.04 JOB CONDITIONS: Protect glazing until completion and final acceptance of the Work. Repair or replace damaged or defective glazing to original specified condition, at no extra cost to the Owner. Damaged or defective glazing includes glass that cannot be properly cleaned. Glass received in cases shall be unpacked immediately. Do not place radiators, or vents from heating sources in close proximity to glass.

1.05 WARRANTY: Refer to Section 01740. Warranty glass installations against loosening, air or water leakage, glass pop-outs, deterioration, and all other defects for 10 years.

A. Glass: Warranty for ten (10) years after acceptance of the Work by the Owner, against breakage due to defects in glass materials, fabrication and installation. The Contractor shall include with his bid a copy of the proposed warranty. Tempered and Heat Strengthened glass shall

likewise be guaranteed against breakage for a period of ten (10) years after acceptance of the Work by the Owner. Warranty shall guarantee to replace or repair defective materials or workmanship for entire warranty period. Defective materials and workmanship include abnormal deterioration, aging or weathering of Work, structural failure of any components as result of exposure to pressure and forces up to specified limits, failure of operating parts to function normally, deterioration or discoloration of applied finishes in excess of allowable limits, glass breakage and secondary glass damage or breakage due to falling glass fragments, failure of sealants, sagging and twisting or failure of the construction to fulfill other specified performance requirements. Warranty does not cover damage due to vandalism or natural conditions exceeding the performance requirements; however, warranty does include failure or defects for which a cause cannot be determined. This warranty and its enforcement shall not deprive the Owner of other action, right, or remedy available to the Owner. Low E and Laminated glass shall carry a warranty of ten (10) years from acceptance of the Work by the Owner, by manufacturer against delamination, obstruction of vision by fogging up and collection of dust and dirt, cracking, peeling, bubbling or flaking of coating.

B. Glazing Channels and Gaskets: Warranty for ten (10) years against all defective material or deterioration including, without limitation, shrinkage causing loss of seal and physical failure due to elements and other air pollution and commercial glass cleaners.

C. Unframed Wall Mirrors: Warranty against silver spoilage for ten (10) years.

PART 2 –PRODUCT

2.01 GLASS MATERIALS: Conforming to Fed Spec DD-G_ 4510 and Fed Spec DD-g-1403B(1), or its equivalent specification in the Philippines, except total distortion tolerances therein do not govern over requirements in this Section, and to ANSI Z97.1. Label all factory cut panes and do not remove labels until directed. Do not cut unlabeled glass delivered to site as material for field cutting until glass is approved by the Owner. Clear glass unless otherwise indicated or required.

A. Float Glass: Use for all windows above ground floor, unless otherwise indicated or required. Float glasses as shown, required by Code, or required to meet performance requirements. Handle and size glass according to manufacturer's instructions. Furnish 12 mm thick or thicker as required to meet structural requirements, clear, or as otherwise indicated, specified, or required. Clear Float glass shall meet ASTM C1 036, Type 1, Class 1 requirements.

B. Tempered Glass: Provide tempered glass for glass doors, partitions, interior glass spandrel, stair and balcony railing, as shown, required meeting load, safety, design, or performance requirements. Use 12mm thick tempered glass, to conform to design, structural and performance requirement. Handle and size glass according to manufacturer's instructions. On each sheet of tempered glass, provide an inconspicuous visible label fused to glass placed in a lower corner,

identifying tempered glass.

1. Process: Perform tempering by the horizontal roller gas hearth process only. Process that produces gripper mark is not acceptable.

C. Mirrors: Follow ASTM C1036 standards for thickness, dimensional tolerances, and qualities of flat glass mirrors. Mirror quality float glass, 6mm thick, edges finished and polished, double silvered with electrodeposited copper coating plus an organic protective coating. Follow Fed. Spec. DD-M-411 standards for mirrors and mirror frames.

2.02 GLASS SETTING MATERIALS:

A. Glazing Channels and Gaskets: Extruded neoprene conforming to AAMA SG-1, meeting five (5) year warranty requirements, colors as approved, sponge units having 40 2± Durometer shore A and designed to provide 20% to 35% compression, dense units having 70±5 Durometer Shore A for hollow profiles and 60 2:,5 for solid profiles. Provide units designed to produce glass edge pressure of 4 pounds minimum and 10 pounds maximum per linear inch. Silicone seal must be non-degradable by direct ultraviolet light. This must be of a type specifically recommended by the sealant manufacturer for the type of glass specified. In no case shall glazing be performed with any oleoresinous or oil-based compounds, nor shall any sealant be diluted or thinned with any solvent. Sash with neoprene or structural neoprene gaskets must have a supplementary wet seal applied between the gasket and the glass at the sill and 150mm up on each jamb.

B. Blocks and Spacers: Setting blocks of solid neoprene 01 silicone rubber having 85 ± Durometer Shore A, block length equal to 0.1" per square foot of glass area but minimum 100mm length with length increased as required to eliminate point loading, width not less than width of glazing pocket less 3mm, profiled and secured not to slip during installation and not to obstruct proper drainage of glazing cavity. Provide shims of same material, hardness, width, and length as the setting blocks. Provide neoprene or silicone rubber side blocks of 55±5 Durometer Shore A. For glass widths of 600mm or more, the setting blocks should be a minimum of 100mm long and wide enough to fully support the glass. For glass widths less than 600mm, a setting block of 50mm minimum length can be used.

C. Glazing Sealants: For use at glazing perimeters, select appropriate sealants as approved by the Owner, for joint size, movement, and substrate; Polybutylene, oleoresinous, asphalt and oil base sealants are not allowed for any use. Provide sealants of approved colors that are non-staining.

D. Sealant for Structural Silicone Joints: Furnish silicone sealant manufacturer's recommended cleaning and preparation agents of types that are non-staining and do not injure metal finish. Provide sealant of designated colors.

E. Mirror Setting Materials: Provide adhesive, primer and backing

paints as approved by the Owner.

F. Channels: Provide a continuous 1.5mm thick aluminum channels to exposed bottom edges of glass as indicated in drawings or as required. Place no fasteners on exposed surfaces unless approved on shop drawings, exposed fasteners with flat phillips head and finished to match adjoining aluminum surface.

2.03 SASH: All framing members must be specifically designed to accept the specified glass and must have adequate structural strength to support the weight of the glass without deformation. As a design criterion, a framing member should not deflect more than 1/175 of its span, with a maximum deflection of 20mm when under load. Appropriate edge and face clearance must be provided to ensure that the glass is free-floating. Sash must be level, plumb, square, and in plane, free of any glazing obstructions that could result in glass damage during installation. An adequate bite must be provided to ensure retention of the glass in the opening under all conditions of wind loading, building movement and thermal effects. Frame member extension shall be minimum to reduce likelihood of breakage.

PART 3 – EXECUTION

3.01 GLAZING: Employ skilled and experienced glaziers. Glazing shall be done in accordance with the recommendations of SIGMA, AAMA or FGMA. All surfaces to be sealed must be completely clear and dry. Check glazing sealing systems manual for proper cleaning procedures. For proper application and adhesion, the temperature of the glass and sash surfaces must be above 40F during glazing and curing. Set glass airtight and true with glazing channels or gaskets according to the glass manufacturer instructions, and as required herein to obtain weatherproof and waterproof installations. Conformed glass edge clearances, and face and edge laps (bite), to Code and manufacturer's requirements and requirements herein. Set glass in rabbets with glazing blocks and spacers so glass does not contact frame and to preclude looseness and rattling. Use glass with straight, smooth-finished edges free cracks, chips, swiping, seaming, stress, or any other defects on surfaces or edges for all g: installations. Avoid direct contact of moisture to the edge seal. Wrap-around gaskets must be properly perforated and the material used must be compatible with the seal.

A. Edge and Face Clearance and Nominal Cover: Adequate edge and face clearance mu: provided to allow the specified glass to "float freely in the opening", without undue restriction b framing members. Special consideration must be given, if the specialized glass is heat strengthened tempered, to assure that the glazing system will accept the normal warpage and still provide ad£' face clearance. Adequate cover (bite) is mandatory to retain the glass in the opening under live I(and deformation of the framing members.

B. Setting Blocks: Unless otherwise recommended by glass manufacturer for type c installation, provide setting blocks of the correct size located at the bottom quarter points of each glass pane, and side blocks in both jambs in upper half of panes retained by metal caps.

C. Glazing Gaskets and Channels: Compress at least 15% by stops and at

least 5% lengthwise to prevent corner pullout, but do not exceed allowable compressive forces on glass.

D. Glazing Sealant: Ensure sealant installations form a continuous airtight seal for entire perimeter of each glass pane. For glass secured by metal frames or stops on two or more edges, hold glazing gaskets or channels back at least 3mm from the sight lines and f:1l the voids with glazing sealant finished flush with stops, sealant installed on interior side of glass.

E. Exposed Glass Edges or Butt Glazing: Provide glass with the exposed edges ground straight, smooth, and slightly rounded where edges remain exposed or are butt glazed with sealant. Where sealant is indicated at interior installations, set joints close but not in contact and fill with glazing sealant of approved color, free of bubbles or voids and tool slightly concave. Immediately remove smears from glass.

F. Structural Silicone Sealant Joints: Provide glass with the edges ground straight, smooth and free of sharpness or defects. Clean and prepare glass and supports, install silicone rubber setting blocks and spacers, apply sealant, and assemble joints according to the recommendations and requirements. Ensure that structural silicone sealant fully contacts entire edge of the pane and contact surface between glass and supports. Provide silicone rubber glazing channels, gaskets, and other glazing accessories where contacting structural silicone sealants, of durometers recommended by structural silicone sealant manufacturer.

G. Mirrors: Clean backings, apply primer, and allow to dry. Verify organic coating on the backs of mirrors is compatible with the adhesive; if not, apply the mirror adhesive manufacturer's recommended backing paint and allow to dry. Conform to the adhesive manufacturer's instructions and apply adhesive in spots that, when compressed, will cover not less than 60% of the mirror area. Allow 3/16" space between mirror back and substrate. If the mirror is cut from a larger mirror sheet, apply backing paint in cut backing edge. Brace installed mirrors in place until adhesive is fully set.

3.03 SURFACE PROTECTION: Necessary precautions shall be taken to protect all glass during construction. After installation, the glazed area should be identified with signs or streamers hung from the framing. Do not mark on or fasten materials to any glass. Construction dust and metal rust can combine with moisture and undesirably stain or etch the glass. The glass should be protected during construction with loosely hung plastic sheeting and cleaned frequently. All glass should be protected from nearby welding, sandblasting, and acid washing. Glass must be flushed immediately if exposed to acid washing. Any glass damaged by welding splatter shall be replaced. Protect all glass from concrete, mortar, plaster, and paint splatters. Glass subjected to such should be flushed immediately with clean water to avoid damage. Oily or greasy substances shall be removed using a solvent such as acetone, toluene, naphtha or mineral spirits, immediately followed by washing with clear water.

3.04 COMPLETION: Conform to Section 01700. Do not use any harsh or abrasive cleaning agents, caustics, or acids for cleaning. Wash and polish vision glass both sides and leave glass free of soiling, streaks and labels. Wash and polish mirrors.

SECTION 09100
METAL SUPPORT SYSTEMS

PART 1 – GENERAL

A. Work In This Section: Principal items include:

1. Metal framing and anchor clips for gypsum wall and ceiling.
2. Metal framing and anchor clips for fiber cement boards.
3. Metal framing for interior glass panels.
4. Metal backing plates and anchors for securing materials of other trades.
5. Backer plates and anchors for lavatory as required or recommended by manufacturer.

B. Related Work Not In This Section:

1. Building insulation.
2. Furnishing access panels for mechanical, electrical, and other trades and not shown on Architectural Drawings.
3. Painting
4. Gypsum Ceiling
5. Metal Fabrication
6. Metal Door and Window frames.
7. Section 07920: Sealant & Caulking.
8. Section 08800: Glass & Glazing

PART 2 – QUALITY ASSURANCE

A. Code: Conform all installations to manufacturer's instructions. If conflict occurs between the Contract Documents and manufacturers, the more stringent requirements shall govern. Conform to Code and AISC Code of Standard Practice for Steel Buildings and Bridges; AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings; AISC Steel Construction manual; and AWS 01.1, Structural Welding Code. Comply with ASTM standards.

B. Tolerances: Erect ceiling, walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10-foot straightedge for its entire length at any location within a 6mm tolerance. Erect horizontal framing level within a tolerance of 6mm in 300mm in any direction. Erect sloped framing in true planes to same tolerance as horizontal framing.

2.01 SUBMITTALS & MOCK-UP SECTIONS: Refer to Section 01300 and 01430 for

procedures. Submit Shop Drawings showing details for each typical wall, partition, ceiling system, and Product Data for all Materials in this Section. Submit such Samples Owner may request. Provide mock-up sections of designated areas listed below or as called out in the drawings:

A. Shop Drawings: Submit shop drawings for typical wall and ceiling installation.

PART 3 – PRODUCTS

MATERIALS: General Contractor- Supplied and Installed

3.01 Gypsum & Fiber Cement Ceiling and Wall: Provide metal support system compatible with and as recommended by gypsum and cement board wall and ceiling manufacturer, glass manufacturer and lavatory manufacturer. Refer to structural specifications and Drawings for further requirements.

3.02 Gypsum Wall:

A. Screw-on Drywall Studs: ASTM C645 and following requirements:

1. Standard Drywall Studs: Roll-formed from 0.6mm electro galvanized steel with punched utility openings and knurled flanges 4" wide, "C" type, with flange returns. Furnish 25 gage studs and tracks and 20 gage or heavier where specified or required, unless otherwise require in structural specifications. Punch-outs - 25mm diameter at 600mm on centers.

2. Stud Height: Gages specified above are minimum. Where required stud height exceeds Code approvals or risk structural stability, provide heavier gage studs and/or decrease stud spacing as necessary to conform to Code requirements, at no extra cost to the Owner. Refer to structural specifications for further requirements.

3. Stud Accessories: Provide standard related accessories including top and bottom tracks, clips, fasteners, braces and like items, of same manufacturer as each type of stud specified, as required for complete installations.

4. Top & Bottom tracks: Wall stud track shall be roll-formed from 0.6mm electro galvanized steel. Flanges are angled 8 degrees to provide friction fit to hold studs in place until plasterboard is fixed. Furnish 25 gage studs and tracks and 20 gage or heavier where specified or required, unless otherwise require in structural specifications. Punchouts, 25mm diameter at 600mm on centers.

5. Deflection Head Channel: Ceiling channel for deflection head assembly, roll-formed from a.6m hot dipped galvanized steel with 25mm x 19mm cut outs spaced 6mm apart

6. Deflection Head Angle: Ceiling angle for alternative deflection head assembly. Roll-formed from 0.6m hot dipped galvanized steel.

7. Deflection Head Top Track: Wall stud top track, roll-formed from 0.6mm

hot-dipped galvanized steel. Legs are extended to 50mm to accommodate anticipated slab deflection.

8. Expansion Joint Components: Double sided PVC Closed Cell Foam Sealant 5.5mm square. Round inset, 5.5mm diameter, to be removed before plaster sets.

B. Furring and Runner Channels: Hot-rolled or cold-rolled steel, coated with rust-inhibitive paint, weight per 1,000 lineal feet before coating not less than:

Size	Hot-Rolled	Cold-Rolled
3/4"	300 lbs	300 lbs
1-1/2"	1120lbs	475 lbs
2"	1260lbs	590 lbs

C. Screw-on Drywall Furring Channels: ASTM C645, minimum 0.022" thick zinc coated steel, face, base span, and furring depth as indicated or recommended by manufacturer.

D. Wires: Soft-annealed galvanized steel wire, of gage specified for hanger wires and 12 gage for framing unless otherwise specified.

E. Tape Seals: As per manufacturer's recommendation, compatible with substrate, and approved by the Owner.

F. Sealant: Sealant as per manufacturer's recommendation, compatible with substrate, and approved by Owner. Refer to Section 07920 for requirements.

G. Metal Primer: Zinc chromate red oxide type.

H. Steel Backing Plates: Minimum 4" wide by 16 gage steel unless otherwise indicated. Apply shop coat of metal primer.

3.03 Gypsum and Fiber cement board Ceiling Suspension System: Lightweight noncombustible ceiling system Concealed Metal Furring System, Direct Hung T, framing shall be electro galvanized steel screw-attached to furring channels; spacing as recommended by manufacturer or as shown in drawings or required for structural stability. Framing shall comply with ASTM 2785; conform strictly to manufacturer's installation instructions. Suspension system shall be classified as light or medium duty as recommended by ceiling manufacturer. Matching wall molding, corner beads, j beads, trims, etc. shall detachably match support framing. Refer to structural specifications for seismic design and other requirements. The following shall be the standard frame schedule but not limited to the list. Provide all accessories and framing section of size and shape as required by actual conditions. Some materials and fasteners designated in numbers are based on Boral Suspended Ceiling System standard details:

Main Runners:	63mm "C" channel cold-formed Ga.16
Cross Furring Channel:	50mm "C" channel cold formed Ga.16
Vertical Tie Wires:	Ga.8 minimum galvanized tie wire
Adjustable Suspension Rod:	Adjustable Suspension Rod Joiner No. 254

Suspension Clip:	Suspension Clip No. 253 or No. 124
Screws:	25mm Screws
Angle Bracket:	Angle Bracket No. 247 fixing to masonry
Joiner:	Joiner No. 138
Locking Clip:	Locking Clip No. 139
Direct Fixing Clip:	No. 229
Corner Bead:	Corner Bead No. P32

3.04 Access Panel: Provide removable/hinge access panels, as indicated in drawings, for maintenance at gypsum ceiling as required and approved by Owner. For fire-rated walls, provide fire rated access doors bearing UL 1-1/2 hour fire-resistive label.

Steel shapes:	ASTM A36
Steel tubing:	ASTM A36 or ASTM A500, Grade B
Weathering Steel:	ASTM A242
Steel sheet, strip:	ASTM A611, Sheet and Strip, Cold Rolled Structural Quality.
Aluminum:	ASTM B221, 5050/6061 or Alclad 3004m, T5 or T6 alloy.
Stainless Steel:	ASTM A167, Type 302 or 304, 18-8, brushed finish, sheet and strip gage 18 or thicker as required.
Stainless Steel Fasteners:	Type 305
Stainless Steel bar Stock:	ASTM A276, Type 302
Bolts and Nuts:	ASTM A307
Electrodes:	AWS D1.1, E70XX Series as required for intended use.
Primer:	Red oxide or zinc chromate type metal primer.Non-shrink grout: Non-gas forming type grout, free of oxidizing catalysts and inorganic accelerators, nonstaining, non-rusting type in exposed areas, conforming to all current Code requirements.
Galvanizing:	ASTM A 123 hot dip with 2.0 ounces psf on actual surface and 1.8 ounces psf minimum on any specimen, and as specified herein.
Galvanizing repair	Hot applied repair material, or anodic zincrich galvanizing repair paint.

3.05 Suspension System for Metal Ceiling: Supply and fix metal suspension system for metal ceiling as recommended by metal ceiling manufacturer. Comply strictly to ceiling manufacturer's installation instructions. Panel carrier shall be rows of black, 0.95mm thick stove enameled aluminum roll formed carriers shall be installed at spaces recommended by ceiling manufacturer or as required, center to center by means of a leveled suspension of sufficient strength and rigidity to provide resistance to wind pressure/wind suction. Carriers provided with prongs to hold panels in a module which is a multiple of 75mm. Panels are locked to carrier by crosswise installed separate locking clips. Carriers shall be suspended at centers as determined by wind load requirements. Utilize washer set approved by metal ceiling manufacturer to

isolate dissimilar metals.

PART 4 - EXECUTION: Verify all conditions at the site and from Construction Plan.

4.01 GENERAL FABRICATION REQUIREMENTS: Conform to approved submittals, Article "Quality Assurance" above as applicable to the Work, and requirements herein. Fabricate and form the Work to meet actual installation conditions as verified at the site. Obtain necessary templates and information and provide all holes and drilling indicated or required for securing Work of other trades to metal fabrications.

A. Welding: Conform to AWS 01.1 as modified by referenced AISC Standards, and as indicated or noted on Drawings. Unless otherwise indicated or specified, weld joints by the shielded electric-arc method. Grind exposed welds to smooth surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finishing treatment is required for concealed welds. Cut out all defective welding and replace.

B. Shop Priming: Clean metal surfaces according to SSPC SP6-82 Commercial Blast Cleaning for metal items to remain exposed and finish painted; according to SSPC SP3-82 Power Tool Cleaning or SP7-82 Brush-Off Blast Cleaning for metal items to be concealed, or consult local code requirements in preparation of metal surface for shop priming. Promptly apply shop coat of metal primer to minimum 1.0 mil dry film thickness. Work primer into joints. Do not prime metal surfaces embedded in concrete or masonry. Shops prime all ferrous metal items not to be galvanized unless otherwise indicated or specified.

C. Galvanizing: Galvanize all items after fabrication and installation is completed, repair all damaged coatings and produce coatings free of roughness, whiskers, unsightly spangles, icicles, runs, barbs, sags, droplets, and other surface blemishes.

D. Miscellaneous Items: Fabricate items not specifically mentioned according to the Drawings, approved Shop Drawings, and as required to complete the entire Work. Galvanize exterior items and shop prime interior items unless otherwise shown or specified and finish paint according painting schedule or as directed by the Owner. Furnish required submittals and secure Owner's approval on all painting finish samples.

E. Forming: Stainless Steel and other metal for architectural applications may be cut be shearing and sawing. Extrusions shall be as required by manufacturer.

F. Anchoring System for glass wall finish: Non-standard Connectors, Plates and Shapes (by Aluminum Contractor & Glass Contractor): Fabricate as detailed or required of ASTM A36 steel, weathering type, or as required by Glass manufacturer and installer. Refer to Section 08800 and 08900 for further requirements.

4.02 GENERAL INSTALLATION REQUIREMENTS: Install metal support system plumb and true, free of warping and twisting, using procedures recommended by panel manufacturer. Use fasteners in accordance with panel manufacturer's

recommendations, and conform to approve Shop Drawings.

A. Cutting, Trimming and Drilling: Use diamond or carbide tipped blades. Use procedures conforming to manufacturer's instructions.

B. Installation to Framing: Support all panel edges by framing or furring. Before attaching panels to framing, apply a bond breaker tape to framing as required.

C. Trims & Closures: Provide as indicated or required for complete installation. Embedded trims shall be coordinated to be in anchored in place before tiling.

D. Fasteners & Flanges: Provide heavy-duty fastener, flanges and connectors of approved types as required for the installations, whether or not indicated. Provide galvanized items for exterior use.

E. Isolate aluminum from dissimilar metals and materials other than nonmagnetic stainless steel. At metals, apply on both contacting surfaces a heavy brush coat of zinc chromate primer made with synthetic resin vehicle, followed by two heavy brush coats of spar varnish based aluminum metal and masonry paint; or apply a heavy coat of alkaliresistant bituminous paint; or separate the surfaces with non-absorptive exterior quality polyvinyl chloride tape or gasket, or coat both surfaces with a fluid applied neoprene or urethane membrane material. At concrete, tile and cementitious materials, coat both contact surfaces with alkali-resistant bituminous paint. Conceal all isolation in the finished Work. Provide metallic type flouropolymer paint finish an all exposed surfaces in accordance with Section 05030.

4.03 SUSPENDED CEILINGS, SOFFITS, AND FURRING: Comply strictly with manufacturer's installation instructions and as shown in drawings and as required and indicated in structural specifications and details. Install suspension system according to ASTM C636, Provide hanger wires secured to the structure above according to Code and approved submittal. Allow sufficient length for two or more complete turns or saddle turns around the runner channels at proper ceiling height.

A. Suspended Framing: Conform strictly to manufacturer's installation manual and standard details and as shown in drawings. Suspended ceilings shall not support materials or building components other than grilles, light fixtures, small electrical conduits, small ducts and the like. All such components shall be supported either directly from main runners or by supplemental framing which is supported by main runners. No vertical loads other than gypsum board dead load shall be applied to cross furring.

Provide continuous nesting track screwed to 63mm Ga.16 flanges with #12 screws, tru-bolted at structural slab with 8mm diameter bolts with 50mm embedded in concrete slab, spaced at 900mm on center as shown in drawings. Main runners shall be spaced at 900mm on center. Main runner shall be placed within 200mm of parallel walls and the end of main runners at walls shall be supported by hanger wires within 200mm maximum from the wall. Splicing of main runners shall be made by lapping their ends 300mm minimum with the flanges of the channels

interlocked and securely tying near each end of the splice with double loops of tie wire.

Cross furring shall be spaced 600mm on centers, saddle-tied to the main runners with one strand of tie wire to prevent twisting and turning. Cross furring shall be spliced by lapping and interlocking the flanges 200mm minimum and tying near each end with double loops of Ga.16 wire. Main runners and cross furring shall not come in contact with abutting partitions.
Provide vertical tie wires at discontinuous framing or at change framing or as shown on details.

Hanger wires shall be saddle-tied around main runners to develop full strength of the hangers and prevent twisting and turning. Twist hanger wire around itself a minimum of three times within 65mm. Provide hanger wires at maximum 1200mm centers; secure furring channels to the runner channels with Code approved galvanized steel clips or wire ties. Attach suspension rod brackets that are anchored to structural framing or concrete soffit, at 1200mm maximum centers in each direction.

Each suspension rod bracket fastening must be capable of supporting a weight of at least 225kg. Adjust the rails to a true and level plane. Position furring channels at 600mm maximum centers for 13mm plasterboard or 450mm maximum centers for 10mm plasterboard, and attach to top cross rails with a locking clip at each intersection. Join lengths of furring channels with furring channel joiners, ensuring the joints are staggered. Extra suspension components must be provided for lighting fittings and other fixtures. Form and frame all openings for recessed light fixture and diffusers.

B. Connections: Turn twice or saddle tie hanger wires around runner channels and twist three times around standing wire. Adjust hanger wire to bring furring and ceiling to level and true plane.

C. Metal Ceiling: All materials shall be installed in strict compliance with all local codes, ordinances and manufacturer's recommendations including specific additional requirements as may be called for in the specifications or shown in drawings or as required to complete the installation correctly.

4.04 BACKING PLATE AND ANCHORAGE:

A. Types and Locations: Provide backing plates and attach to furring for anchoring various items indicated or specified under other Sections. Remove all fixtures, partitions; store, protect and/or reinstall as called for on the Construction Documents. Comply with the approved submittals specified under other Sections as applicable to steel backing plates. Backing plates may be omitted if anchorage for wallhung items is directly into steel studs of 18 gage or heavier, or items are furnished with equal mounting devices. Install backing plates of lengths to span over at least two supports, equipped with two countersunk machine screws at each stud or support except plates may be welded to 18 gage or heavier studs and supports. Wall-mounted and wall-hung

items that require backing plates include, without limitation, the following:

1. Toilet compartments and urinal screens.
2. Toilet room accessories.
3. Wall-hung and base cabinets and millwork.
4. Plumbing Fixtures and equipment.
5. Wall mounted door stops.
6. Sink backer plates, anchoring as recommended by sink manufacturer or as required.

4.05 ACCESS PANELS: Install and rigidly connect to metal framing. Coordinate the exact required locations with related trades. Install the panels to align with and maintain the grid pattern. Check all other Sections of Specifications for access panels specified to avoid duplication.

SECTION 09220
PLASTERING

PART 1 – GENARAL

1.01 DESCRIPTION: Division 1 applies to this section. Provide plastering, complete.

A. Work In This Section: Principal items include:

1. Portland Cement Plaster

B. Related Work Not In This Section:

1. Concrete Finishing: Section 03345
2. Painting: Section 09900
3. Waterproofing: Section 07110
4. Building Insulation: Section 07210
5. Gypsum Board

1.02 QUALITY ASSURANCE:

A. Requirements of Regulatory Agencies: Conform all Work of this Section to Building Code except as exceeded herein. In event of conflict between any code, law, ordinance, and requirements herein, comply with better or most restrictive requirement. Install and maintain scaffolds, staging, trestles, and planking in conformance with applicable laws and ordinances.

B. Reference Standards: Conform Work of this Section to the following Reference Standards except as otherwise specified; Refer to Section 01090:

1. Cement Plaster Texture: ASTM C9266

2. ASTM Specification

A525 General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
C150 Portland cement
C206 Finishing Hydrated Lime
C897 Aggregate for Job-Mixed Portland Cement-Based Plasters
C926 Application of Portland Cement-Based Plaster

E84 Surface Burning Characteristics of Building Materials

C. Tolerances: Produce completed plaster surfaces not deviating from plumb, straight, and plane more than 3mm in 3000mm at any location and any direction when tested with a straightedge or string line. In addition, produce finished surfaces free of abrupt offsets, waviness, or unsightly conditions when viewed in any lighting condition, as determined by the Owner, even though the area or surface may be within the measured tolerance.

1.03 SUBMITTAL: Refer to section 01300 for procedures.

A. Preliminary Samples: Prepare plaster texture and finish sample, 600mm square, at site, for approval of the Owner for the standard of the work.

B. Final Wall Sample: Based on approved Preliminary Samples, prepare on full unit of the plaster with Sample at least 2400mm square, for final approval. The approved Final Sample shall remain in place if meeting all other requirements and is so approved. Incorporate typical accessories and any reveals or banding, and to be placed facing the sun, with sufficient clear viewing space in front.

PART 2 – PRODUCTS

2.01 PLASTER MATERIALS:

A. Portland Cement: ASTM C150, Type II, low alkali.

B. Hydrate Lime: ASTM C206. Type S.

C. Sand: For cement plaster base coats, washed natural sand conforming to ASTM C897 including gradation.

D. Water: Clean, potable and form domestic source

E. Waterproofing Admix: As required and approved by the Owner.

F. Plaster Bonding Agent: ASTM C932, as recommended by manufacturer for each specific use.

2.03 PLASTER PROPORTIONS AND MIXING: Plaster proportions are by volume unless otherwise specified. Use calibrated measuring boxes for proportioning. Use of "shovel measure" is not permitted.

A. Portland Cement Plaster: Portland cement plaster base coat shall contain waterproofing admix in proportion recommended by manufacturer. Sand proportions are based on sum of the volumes of the Portland cement and lime in the mix

PART 3 – EXECUTION

3.01 PORTLAND CEMENT PLASTER APPLICATION

A. Pre-Plastering Conference: After approval of submittal and samples but prior to starting of work of this Section, the Contractor shall hold a meeting at the site attended by the Owner or his representatives to

establish agreement. Contractor shall prepare a detailed memo of this meeting and furnish copies to the Owner. Contractor shall inspect the substrate to receive Work of this Section, including walls with existing finishes to be removed and restored to receive new finish, and report all defective conditions to the Owner for correction; see Article "Verification of Conditions" in Section 01400.

B. Preparation: Before plastering work is started, the surface shall be prepared as follows:

1. Surfaces to receive plaster shall be cleaned of projections, dust, loose particles, grease bond breakers and other foreign matter. Remove all existing wall finishes as indicated in the Demolition Plan and restore to receive new finish, re-plaster and instructed by the Owner.

2. For concrete surfaces, remove skin with bladed hammer until coarse aggregate is exposed. Random hammering is not acceptable. Scrubs with acid etch solution on previously-wetted surface and rinse thoroughly with clean water. Repeat the application if necessary to obtain adequate suction and mechanical bond of plaster (where dash coat or bonding agent or additive is not used).

3. For masonry surfaces, wet surface thoroughly with fog spray.

4. Apply dash-coat on concrete surfaces indicated for direct Portland cement plaster application. Moisture-cure dash-coat for at least twenty (24) hours after application before plastering.

5. Install temporary grounds and screeds as necessary to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

6. Surface Conditioning: Immediately before plastering, dampen the surfaces of concrete and masonry which are indicated for direct application of plaster, except where a bonding agent has been applied. Experiment with moisture application to determine degree of saturation which will result in optimum suction for plastering.

C. Application: Apply Portland cement plaster materials, compositions and mixes to comply with ASTM C926. Sequence plasters application with the installation and protection of other work, so that neither will be damaged by the installation of the other.

1. Do not use excessive water mixing and application of plaster materials.

2. Plaster flush with metal frames and other built-in metal items or accessories which act as a plaster ground, unless otherwise indicated. Where interior plaster is not terminated at metal by casing beads cut basecoat free from metal before plaster sets and groove finish coat at the junctures with metal.

3. Corners: Make internal corners and angles square; finish external corners flush with corners square and true with plaster faces on exterior work.

4. Number of Coats: Apply Portland cement plaster, of composition indicated, to comply with the following requirements:

   a. Use two-coat work over the following plaster bases: Concrete masonry and concrete, cast-in-place when surface condition complies with ASTM C926 for plaster bonded direct to solid base.

5. Application of Base Coats: Apply a fine fog spray of water as soon as the plaster base coats are set enough to prevent injury. Do not let plaster dry out between water applications.

6. Brown Coat: Set temporary wood or metal spot or strip grounds. Bring plaster to true planes between metal screeds. Apply brown coat plaster not less than 9mm thick and bring surfaces to a straight, plumb, and true condition. As each area is applied, check surfaces with string lines or equivalent and before brown coat sets, correct all low or high areas and excess build-ups at screeds, joints, corners, and angles. After straightening, remove temporary grounds and fill the voids with brown coat plaster. Float the surface to proper texture for the finish coat, keep moist for seventy-two (72) hours, and allow to air cure for at least five (5) days before applying finish coat

D. Application of Finish Coat: Recheck brown coat surfaces for straight and true before applying the finish coat and correct defects. Apply finish coat at least 8 days after application of brown coat. Dampen surfaces of brown coat for uniform suction. Layout the finish coat to permit completion of an entire area between joints and screeds and carry to a natural break point. Work the top and bottom of walls and all other areas within screeds at the same time, without dry laps, producing uniform finish and appearance flush with the screeds and joints, and free of lap and tool marks, low or high spots, crazing, checking, waviness, offsets, or other defects.

   1. Sand Float Finish: Apply fine sand float finish using wood or carpet type float as required or shown in Drawings to match approved Sample. Produce finish of uniform texture free of directional marks, swirls, slick spots, or other defects.

   2. Smooth Trowel finish as per Schedule of Finishes and as per Owner's approved methods to comply with ASTM C926.

3.02 CURING OF PLASTER: Keep each coat of plaster thoroughly wet to the full coat depth for three days after application with a regulated spray of water. After initial set, prevent surface drying at any time during curing process. Test plaster surfaces by spraying with a water spray bottle; if plaster absorbs spray, increase the application of curing water until test spray is not absorbed by the

plaster.

3.03 GROUTING OF HOLLOW METAL FRAMES: Grout fill all hollow metal frames unless otherwise indicated or directed; install one layer of specified metal lath in frame before grouting.

3.04 PLASTER PATCHING: Plaster containing cracks, blemishes, blisters, trowel marks, pits, checks, discoloration, or other defects is not acceptable. Remove defective plaster and replace with conforming plaster as approved. Restore all surfaces damaged, stained, or defaced by plastering as directed and at no extra cost to the Owner.

3.05 CLEANING UP: Conform to Section 01700. Remove all plaster droppings-and waste or unused materials. Leave all surfaces clean and in proper condition for subsequent materials or finishes. Remove temporary covering and whatever other provisions were made to minimize spattering of finishes on other work. Promptly remove finishes from door frames, windows and other surfaces which are not to be plaster finished. Repair surfaces which have beer stained, marred or otherwise damaged during the Work. When work is completed, remove unused materials, containers and equipment and plaster debris. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures work being without damage or deterioration at time of substantial completion.

SECTION 09250
GYPSUM BOARD

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Install gypsum board, complete, conforming to Construction Drawings.

A. Work In This Section: Principal items include:

1. Gypsum board on ceilings and walls.
2. Joint, edged, corner, reveals and fastener finishing.
3. Plaster & Drywall moldings.

B. Related Work Not In This Section:

1. Metal support framing.
2. Fire & sound insulation in gypsum partitions & ceiling.
3. Painting
4. Structural Steel.
5. Plastering

1.02 SUBMITTAL & MOCK-UP SECTIONS: Refer to Section 01300 and 01430 for procedures. Submit Shop Drawings showing details for each typical wall, partition, ceiling system, and Product Data for all Materials in this Section. Submit such Samples Owner may request. Provide mock-up sections of designated areas listed below or as called out in the drawings:

A. Product Data : Submit gypsum board installation, including finish accessories, finishing materials, sealing, and gypsum board manufacturer's written installation instructions with copies of code approvals for each wall, ceiling, and shaft system, including fastener types and spacing. Submit manufacturer's detailed preparation and installation instructions for Portland cement backer board and gypsum sheathing. Submit shop drawings for special wall and ceiling conditions for Owner's approval. Refer to Section 01010; "Design Build Procedure".

B. Samples: Submit two (2) sets minimum 200mm x 200mm square gypsum board, each type in selected colors and finish. Submit such additional samples Owner may request.

C. Mock-ups: Provide section mock-ups showing corner beads, reveals and termination conditions, gypsum board, accessories, joint conditions as requested by the Owner.

D. Plaster and drywall moldings: At least 300mm of each type, for final

approval. Incorporate typical accessories and joint details.

1.03 JOB CONDITIONS: Make a detailed inspection of all areas and surfaces to be enclosed or covered by gypsum board and arrange for correction of defective workmanship or materials. Coordinate with works of other trades affected by ceiling. Determine specific location of walls and ceiling to receive insulation as indicated in Plans. Ascertain that all other Work enclosed by gypsum boards has been inspected and approved before starting installation; otherwise, uncover as directed at no extra cost to Owner. Conform to manufacturer's recommendations for special wall and ceiling conditions such as curved surfaces.

A. Qualifications for Gypsum Board Installer: Employ experience and skilled labor contractor and mechanics specifically trained and approved by the manufacturer of gypsum board to install all gypsum board. Conform strictly to most recent manufacturer's product catalogue.

B. Pre-installation Conference and Inspection: After approval of submittal but prior to start of application of Work of this Section, the Contractor shall hold a meeting at the site attended by representatives of the Owner. See Article "Verification of Conditions" in Section 01400.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Gypsum Ceiling: 12mm recessed edge gypsum board screw-attached to galvanized furring channels, flush jointed. Refer to Section 01600 for substitutions. Conform strictly to manufacturer's most current technical Manual particularly for special curved features and other special conditions.

Fasteners :	Screw shall be corrosion resistant, Bugle Head No. 8 x 25mm
Joint Treatment :	B330, Basebond 60 or Basebond 90 as recommended by gypsum manufacturer.
Paper Tape :	Slotted paper tape, 50mm wide.

B. Screws: ASTM C1002, corrosion-resistant self-tapping bugle-head spiralthreaded type, minimum 1" long, lengths to penetrate all supporting metal at least 3/8". Furnish taping and finishing materials. Nails to secure to metal studs shall not be permitted.

C. Metal Trim, Corner Beads and Molding Accessories: Electro-galvanized steel with taping flanges, as manufactured or recommended by drywall manufacturer, corner beads at outside corners and other moldings for abutments, terminations and reveals as required or shown in drawings.

D. Control Joints: USG Control Joint #093 or as recommended by gypsum

manufacturer.

E. Finishing Materials: ASTM C475, joint tape, bedding compound, finishing compound, adhesive, and laminating compounds supplied by wallboard manufacturer.

F. Caulking Compound: Permanently non-hardening acoustical sealant supplied or recommended by wallboard manufacturer.

G. Compression Seals: At unbraced wallboard partition, provide neoprene, or approved equal, compression seals, sizes adequate to completely seal the space between top of partition and the bottom of the ceiling grid spline, color as selected.

PART 3 – EXECUTION

3.01 INSTALLATION OF GYPSUM BOARD: Perform all gypsum board installation and finishing according to ASTM C840 and conform strictly to manufacturer's Technical Manual and instructions. Do not install gypsum board until building is weathertight. Conform to fire-rating requirements, Building Code approvals, and requirements herein. Nailing to metal support system shall not be permitted. Install and secure all gypsum walls up to structural slab unless otherwise indicated. Apply deflection heads for slab deflection.

A. Temperature: Maintain minimum 65 degrees F temperature in building during gypsum board installation and furnish ventilation to eliminate excessive moisture.

B. Fasteners: Install with heads below the surface without breaking surface paper or stripping steel framing member around the fastener. The space is according to code approvals.

C. Openings: Accurately cut and fit the gypsum board at openings such as power outlet penetrations according to manufacturer's instructions and details. At openings, cut wallboard to continue across area above opening head.

D. Ceiling Recesses: Continue gypsum board layers behind light boxes, lighting fixtures and other equipment and finish items as indicated and as required to maintain wall fire resistance ratings indicated or required by Code.

E. Suspension System: Refer to Section 09100 and comply with manufacturer's instructions. Attach suspension rod brackets that are anchored to structural framing or concrete soffit, at 1200mm maximum on centers in each direction. Each suspension rod bracket fastening must be capable of supporting a weight of 225 kg. Attach suspension clips to top cross rails, and fit suspension clips to rods. Adjust the rails to a true and level plane. Position furring channels at 600mm maximum centers for 13mm gypsum board, or 450mm maximum centers for 10mm gypsum, and attach to top cross rails with a locking clip at each intersection. Join lengths of furring channels with furring channel joiners, ensuring the joints are staggered. Extra suspension components must be provided to support light furring and other fixtures.

F. Suspended Ceilings: Set gypsum board with the long dimension across furring channels, and joints staggered and centered on furring channels. Use gypsum boards of maximum practical length to minimize end joints and properly support around cutouts and openings. Secure with screws. Screws are placed no closer than 10mm or further than 16mm from board edges and ends. Butt joints must be staggered, and fall on furring channels. Allowance shall be made for an expansion gap of 20mm per 6 meters run in furring and top cross rails.

G. Control Joints: Provide in straight walls where runs exceed 30-feet and in ceilings where runs exceed 40-feet, with locations as approved.

3.02 JOINT TREATMENT AND FINISHING: Apply tape bedding compound, tape, and at finishing material on all exposed joints, and other joints required for sound insulated or fire-rated walls. Treat all inside corners with joint cement, tape, and finishing cement. Cover outside corners and angles with corner beads and finishing cement. Provide casing bead at gypsum board edges which abut ceiling, wall, or column finish, and elsewhere as shown or required such as openings, offsets, etc. Produce non-apparent joints, trims, and fasteners after application of paint or other finishes; correct defects as directed at no extra cost to Owner. Seal the raw edges of plumbing openings and of boards that have been cut to fit with manufacturer's recommended sealant brushed on. Sanding of taped joints and fastener heads on wallboard concealed in above-ceiling or attic spaces is not required. When the entire installation is completed and prior to installation of finish materials by other trades, correct and repair all broken, dented, scratched, or damaged gypsum board. Finish at ceiling perimeter with cornice or alternatively install a metal wall angle.

3.03 AIR SEALING: Seal the connections between shaft walls, ducts, plenums and building structure airtight with specified caulking compound or tape and cement, including vertical shafts.

3.04 CAULKING: At insulated partitions, caulk between edges and walls, and at structure above other than acoustical ceilings with above acoustical caulking compound, forming a complete perimeter seal; caulk both layers at multilayer walls. Calk around outlet boxes and other penetrations in same manner.

3.05 FINISH: Apply paint finish after joint and fastener finishing is completed, as required, smooth and free of marks. When dry, sand where required to remove any marks or other defects and produce smooth uniform surfaces free of sanding or fastener depressions. Apply at least Level 4 finish level where light textures or wall coverings are to be applied, Level 5 if required by Owner for gloss and semi-gloss paints and enamels are applied or where severe lighting conditions occur:

A. Level 4: Joints and interior angles with tape embedded in joint compound. Three separate coats joint compound over joints, angles, fastener heads and accessories. Joint compound smooth and free of tool marks and ridges.

B. Level 5: Joints and interior angles with tape embedded in joint compound. Three separate coats of joint compound over joints, angles, fastener heads, and accessories. A thin skim coat of joint

compound, or other product made for this purpose, shall be applied to the entire surface. Joint compound smooth and free of tool marks and ridges;

3.06 COMPRESSION SEALS: Install according to manufacturer's instructions to partition top but use an approved sealant conforming to Section 07920, or combination of such sealant and mechanical fasteners.

SECTION 09300
TILE

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Install Owner-approved ceramic, homogeneous tile finish for floors, walls and stairs and to conform with the Drawings.

A. Work In This Section: Principal Items Include:

1. Tiles.
2. Expansion joints
3. Thresholds at tile floors.

B. Related Work Not In This Section:

1. Gypsum Board backing for tile walls and bases.
2. Concrete sub-slabs.
3. Waterproofing.

1.02 QUALITY ASSURANCE

A. Reference Standards: Conform to the following standards unless otherwise required herein:

1. American National Standards Institute (ANSI)

A108.1	Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile Installed with Portland cement Mortar.
A108.4	Ceramic Tile Installed With Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
A108.5	Ceramic Tile Installed With Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
A108.6	Ceramic Tile Installed With Chemical-Resistant, Water Cleanable Tile-Setting and Grouting Epoxy.
A108.10	Installation of Grout in Tilework.
A108.11	Interior Installation of Cementitious Backer Units.
A118.3	Chemical-Resistant Water-Cleanable Tile Setting Grouting Epoxy, and Water-Cleanable Tile-Setting Epoxy Adhesive.
A118.6	Ceramic Tile Grouts.
A136.1	Organic Adhesives for Installation of Ceramic Tile
A137.1	Standard Specifications for Ceramic Tile.

2. American Society for testing and Materials (ASTM)

C373	Water Absorption

C485	Measuring Warpage of Tile
C499	Facial Dimensions and Thickness of Tile
C501	Resistance to Wear
C648	Breaking Strength of Tile
C650	Resistance of Tile to Chemical Substances

1.03 SUBMITTALS: Refer to section 01300 for procedures.

A. Shop Drawings: Submit drawings showing dimensioned layouts for all tiled wall and floor surfaces. Show locations of tile joints, cuts, and trimmers. Identify trimmers and accessory units by the type number stated in the approved Product Data.

B. Samples: Obtain the Owner's instructions and submit the following for selection and approval:

1. Each type, shape, and trimmer of tile unit in each color proposed for use.
2. Each type, stair treads with anti-slip edge.
3. Grout colors for each type of tile.
4. Cured sealant colors for expansion joints in tile.
5. Thresholds strip, lengths in accordance with the Drawings, with one end cut and finished to fit typical door jamb.

C. Grade Certificates: Submit for each lot of tile before installing.

1.04 PRODUCT DELIVERY AND STORAGE: Safekeeping and Storage of delivered tile materials to site in unopened factory containers, tile sealed with Grade Seals bearing printed name of manufacturer and the words "Standard Grade" Shall be the responsibility of the General Contractor. Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used. Provide 2% of amount installed as maintenance materials.

PART 2 – PRODUCT

2.01 BASIC MATERIALS

Portland cement:	ASTM C1S0, Type I or II, low alkali.
Organic Adhesive:	ANSI A136.1, Type II
Epoxy Mortar:	ANSIA118.3
Dry-Set Portland Cement:	ANSIA118.1
Hydrated lime:	ASTM C207, Type S.
Mortar Sand:	ASTM C144, at least 4% passing No.1 00 sieve.
Joint Sand:	Same as mortar sand except all passing the No.30 sieve.
Water:	From domestic potable source.
Waterproofing admix:	As required and approved by the Owner.
Color pigments:	Pure ground mineral oxides, non-fading, alkali and lime proof, factory weighed and packaged.

2.02 TILE MATERIALS: Standards Grade conforming to ANSI A137.1 and of following types. Refer to Section 01600 for substitution.

A. Restrictions:

1. Under no circumstances will glazed tile installations be accepted if any part of unglazed tile body of any unit remains exposed after tile is installed. Provide matching tile trimmers and bases of all types required to prevent such condition.

2. Epoxy Mortar should not be applied to gypsum board.

B. Wall Tile: For toilets, 300mm x 300mm x 5.0mm indicated as Class "A" wall and floor tiles, ceramic homogeneous tiles, type, colors/design as selected, dust pressed and white body, square edged, two integral joint spacing lugs on edges, installed by approved tile adhesive as recommended by manufacturer.

C. Homogeneous Floor Tile: For Lobby and hallways, stairs and stair treads, all levels, 600mm x 600mm x 9.0mm unless otherwise indicated, imported highly-polished homogenous porcelain tiles, colors/design as selected by Owner, square edged, installed by adhesive unless otherwise indicated. Provide matching homogeneous granite tiles for all stair treads with non-slip edging.

D. Unglazed Vitrified Floor Tile: For interior floors, 600mm x 600mm x 7mm Ceramic Floor tiles anti-slip pattern, unless otherwise indicated. Colors and patterns as selected and approved by Owner, cushion or allpurpose edges, size and type as shown or specified.

2.03 2.03 SETTING BED AND JOINT MORTAR: Tile installation method shall be either thick bed or thin set methods, with preference for the latter in conditions where finish wall thickness and floor elevation is limited and conform strictly to manufacturer's instructions, as approved by Owner. Refer to Section 01010: Summary of Work. Coordinate with adjacent area for required finish floor levels and termination of different floor finishes. Comply with ANSI A108-1 standards for conventional Portland cement mortar bed. Machine mix mortar after first dry mix mixing materials. Mix all mortar not less than 5 minutes after water is first added. Accurately measure materials using calibrated measuring boxes; shovel measurement is not permitted

A. Mixing: Place half of the required water and sand in an operation machine mixer; then add Portland cement, remainder of sand and water, and then hydrated lime and admixes. Machine mix not less than 10 minutes when all ingredients are charged.

2.04 BOND COAT: White or gray Portland cement mixed with water and latex admix to a creamy consistency. Do not add water or cement after initial mixing, and discard material not used prior to initial set.

2.05 TILE JOINT GROUT: 1.5mm grout joints, compatible with tile and setting bed, cement grout consisting of waterproofed Portland cement (depending upon the Owner's approved color), admix, and color pigment, sure dry color matching approved Samples. Include silica sand passing No. 30 sieve over 1/8" wide, not over twice the volume of Portland cement.

2.06 THRESHOLDS: 1-piece units, accurately cut 3mm stainless steel strips, satin finish

or as selected, matching approved Sample.

PART 3 - EXECUTION: Conform strictly to manufacturer's technical manual and requirements for preparation of substrate, mortar or adhesive performance requirements and compatibility, and laying of tiles. Refer to Drawings for termination of floor tiles abutting stone floor finish and height of wall tiles in Ladies' and Men's' room.

3.01 PREPARATION: Clean substrates of dust, dirt, oil, grease, and deleterious substances. Chip, restore and level substrates to a condition ready to receive new tile finish in required floor elevation as indicated in Drawings. Conform to applicable Reference Standards and to recommendations of manufacturers of materials used. Conform to applicable Reference Standards and to recommendations of manufacturers of materials used.

A. Concrete Slabs to Receive Mortar Setting Beds: Keep concrete damp for at least 8 hours and scrub with a neat Portland cement slurry just before placing setting bed mortar.

B. Tile Wetting: Soak mortar-bed set glazed tile in clean water according to Reference Standards. Dampen other tile according to Reference Standards or tile manufacturer's instructions. For thin-set installation, tilewetting is not required.

C. Screeds: Accurately set temporary screeds to control the finish of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

3.02 TILE INSTALLATION: Arrange tile surfaces according to patterns detailed or approved. Accurately set" all tile with flush well-fitted joints, finished in true planes, plumb, square, sloped or level as required. Neatly cut and fit units close against abutting surfaces. Construct joints of uniform width. Form all corners, returns, and exposed edges with approved trimmers. Drill and cut units without marring. Carefully grind and joint all edges and cuts. Fit tile close around outlets, pipes, and fixtures so that escutcheons or collars overlap tile. Arrange surfaces so that not less than half-size units occurs. Drill holes for pipe penetrations through wall tile; do not cut or split tile and set with tight ungrouted joint.

A. Thick Bed Set: Shall be applied where slopes in floors are required and mortar bed can generally achieve the slope without adjusting the structural system.

B. Thin-Set Method: Shall be applied where conditions are feasible and where limitations in floor elevation and wall thickness is of importance. Type of thin-set method shall be based on the Owner's requirements as indicated in Construction Plans. Tile-wetting is not required for thin-set bedding.

1. Organic Adhesive: Installation of tile in organic adhesive is governed by ANSI A108.4

2. Dry-set Mortar: Installation of tile with this method shall be performed following ANSI A 108.5 3. Epoxy Mortar: Installation shall comply with ANSI A108.6.

3. Epoxy Mortar: Installation shall comply with ANSI A108.6

C. Joint Size: Install tile with uniform joint widths as follows:
   1. Glazed wall tile, 1/16" with maximum 1/8" at any location.
   2. Floor tile, 1/16" with maximum 1 /8" at drains and any other location.

D. Ceramic Tile Joint Grouting: Grout tile joints full after washing out and saturating it clean water. Mix grout with water to a thick creamy consistency and force into joints for entire joint depth, flush with surface. Clean off all excess and fill skips and gaps before grout sets. Provide dampness for minimum 3-day curing and polish with clean dry cloths.

E. Caulking: Calk penetrations through wall tile with latex mortar or sealant conforming to Section 07920, concealed by collars or escutcheons.

3.03 EXPANSION JOINTS - MORTAR SET HORIZONTAL SURFACES: Extend the expansion joints down for entire depth of mortar setting beds. Use joint backing and 1/4" to 3/8" deep sealant conforming to Section 07920, sealant color to match joint grout. Provide expansion joints where indicated and where tile abuts a rigid structure. Install expansion joints at toe of cove base where base occurs. If not shown, provide expansion joints in same manner at maximum 192" centers both ways in the areas, locations as directed. Provide sealant joints matching color and appearance of grouted joints but minimum 1/8" wide

3.04 CLEANING: Remove stains, cement, grout, and foreign matter after grouted joints are fully set. Do not use any acid for cleaning. Repair all defective joints as approved.

3.05 MAINTENANCE MATERIALS: At completion, deliver the following maintenance materials to the Owner in unopened factory containers or in sealed cartons with labels identifying the contents, matching installed materials. Provide 2% of the amount installed.

SECTION 10810
TOILET FIXTURE & ACCESSORIES

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide fixtures and accessories for toilet rooms, complete.

1.02 SUMBITTALS: Refer to section 01300 for procedures.

A. Shop Drawings: Submit showing installation details and required backing plate locations.

B. Samples: Submit samples as the Owner's may request, which will be returned to Contractor. Only approved samples may be installed in the Work.

PART 2 – PRODUCT

2.01 MATERIALS: General Contractor-supplied Plumbing fixtures and fittings for Male and Female Toilets shall be as follows:

A. Watercloset: Shall be floor-mounted flush type vitreous china with cover complete with fittings and accessories. Model make and color shall be submitted for approval by the Owner prior to the purchase and delivery at jobsite by the Contractor.

B. Urinal: Shall be vitreous china, floor stand type wash out urinal with extended shields and integral flush spreader, concealed wall hanger pockets 19 mm top spud complete with fitting and mounting accessories model make and color shall be approved by the Owner.

C. Floor drain: Shall be made of stainless steel beehive type of dimension appropriate for the receiving P-trap, and provided with detachable stainless strainer expanded metal lath type.

D. Faucets: All faucets shall be made of lever type chromium-plated stainless steel.

E. Toilet Tissue Holder: Shall be made of stainless steel and wall-mounted

F. Grab Bars for Handicapped: Shall be made of tubular stainless steel pipe provided with safety grip and mounting flange

G. Lavatory: Shall be vitreous china, wall-hung with rear over flow and

cast-in soap dishes, pocket hanger with integral china brackets, complete with twin faucets, supply pipes, P-trap and mounting accessories. Where indicated on the plans to be counter top model, make and color shall be approved by the Owner.

H. Shower head and fitting shall be movable cone type with excutcheon arm complete with stainless steel shower valve and control lever, all exposed surface to be chromium finish.

I. Kitchen sink shall be made of high quality 18-gauge stainless steel self rimming, single or double compartment as shown in the plan, complete with supply fittings, strainer traps, control lever and other accessories.

J. Pipes and fitting for potable water lines shall be polypropylene pipes (PPR) and shall be made of virgin materials conforming to specification requirements defined in ASTM D-2241 and PNS 65: 1986.

K. Pipes and fitting for sanitary shall be unplasticized polyvinyl chloride (UPVC) and shall be made of virgin materials conforming to specification requirements defined in ASTM D-2241 and PNS 65: 1986. Fittings shall be molded type and designed for solvent cement joint connection for water lines and rubber O-ring seal for sanitary lines

3.01 INSTALLATION: Install all fixtures and accessories square, plumb, and level. Comply with manufacturer's installation instructions. Securely anchor by mechanical means using only stainless steel fasteners. Conform to rough-in and installation templates. Exact locations shall be as indicated or directed by the Owner.

3.02 QUALITY CONTROL: Inspect each installed fixture and fitting for damage. Replace damaged units or components. Test fixtures and fittings and accessories to demonstrate proper operation upon completion of installation and after units are pressurized. Replace malfunctioning fixtures and fittings and accessories or components, and re-test. Repeat until all units are operating properly.

3.03 ADJUSTING AND CLEANING: Operate and adjust faucets and controls. Replace damaged units. Adjust water pressure at faucets and valves and flushometers having controls to provide proper flow and stream of water. Replace washers for leaks and drips. Clean fixtures, fittings and accessories and spout and drain strainers with manufacturer's recommended cleaning methods and materials.

3.04 PROTECTION: Provide protective covering for installed fixtures and fittings. Close off water supply until turnover and do not allow use of fixtures and fittings for temporary facilities. Close off area completely if possible.

SECTION 10990
MISCELLANEOUS SPECIALTIES

PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applied to this Section. Prove miscellaneous specialties, complete.

A. Work In This Section: Principal Items include:

1. Fire extinguishers and cabinets.
2. Self-illuminating exit signs.

B. Related Work Not In This Section:

3. Tile work
4. Painting
5. Division 15, Mechanical
6. Division 16, Electrical
7. Toilet Partition.
8. Finish Carpentry
9. Gypsum Wall & Ceiling Work.

1.02 SUBMITTALS: Refer to Section 01300

A. Shop Drawings and Samples: Submit for various items as specified herein. Show materials, finish, characteristics, construction and fabrication details and procedures, layout and erection diagrams, methods of anchorage to building construction, templates for backing or anchorage and other criteria.

B. Actual Sample of fire extinguisher cabinets showing facing, gage, thickness, base metal thickness Door, finish and glazing.

C. Actual sample of self-illuminating exit signs, showing material facing, gage thickness of housing, anchorage supports.

D. Product Data: Submit catalogue data for all standard manufactured items and as applicable to shop-fabricated or shop-assembled items.

E. Written Guarantee

PART 2 – PRODUCT

2.01 MANUFACTURE: Use products of only one manufacturer throughout for each specialty item specified unless otherwise noted as approved.

2.02 FIRE EXTINGUISHERS AND CABINETS: submit Shop Drawings for each typical cabinet installation, Product Data, and Samples of all natural metal finishes. Provide cabinets of correct size for extinguishers specified.

A. Recessed Cabinets: Full recessed extinguisher cabinets with flat frame trim unless otherwise specified. Provide cabinets from one manufacturer, stainless steel door and flat frame #8 mirror polish finish on exposed surfaces, box interior having factory paint, finish of color to be designated by glass glazing. Where the wall depth prevents full recessing of cabinets, provide 37mm, 62mm or 112mm return trim of same metal and finish as door and frame trim. Provide recessed cabinets except as otherwise indicated or specified.

B. Surface Mounted Cabinets: Provide cabinets as specified above except the doors and frames shall be aluminum with clear anodized satin texture finish and box shall have manufacturer's standard white enamel finish inside and out and be reinforced for wall mounting. Door shall be "break glass" type and glazed with minimum 4.5mm thick tempered float glass, with a red "Fire Extinguisher". Equip each cabinet with continuous hinge, catch, and cylinder lock, all locks keyed alike; deliver 10 keys to the Owner. Provide surface mounted cabinets as specified and indicated in Drawings.

C. Fire Extinguisher: See Section 1500 for further requirements

1. Cabinets: For all fire extinguishers cabinets, provide UL labeled 4A:60BC multi-purpose dry chemical fire extinguisher.

2. Utility Areas: In mechanical and electrical rooms, elevator machine rooms, and similar non-public utility areas, provide the same fire extinguishers mounted with wall bracket.

D. Quantities and location: Provide cabinets and fire extinguishers in the locations shown and if not indicated, provide in quantities and locations as required by Code and governing Fire Department.

2.03 SELF-ILLUMINATING EXIT SIGNS: Requiring no battery or external power source, with borosilicate glass sealed tube internally coated with zinc sulphide phosphor or equal, and filled with tritium gas, minimum life of 15 years, UL listed, vandal resistant, single phase, anodized aluminum frame, face color as selected by the Owner, no directional arrow, EXIT legend, and 319mm x 206mm x 25mm.

2.04 ENTRANCE MATTING: Provide roll-up, hard-wearing entrance matting, dirt falls between the ribs with mat chassis from rigid aluminum with underlaid impact sound insulation. Tread surface shall be recessed, resistant, weather-proof and grooved coarse-fiber ribs, replaceable, combined with cassette profiles fitted with bristle bundles arranged in a parallel pattern. Color of cassette profile shall be black, bristle bundle gray, Rib colors as selected by Owner.

A. Connection: by plastic coated, galvanized steel wire
B. Mat height: 17mm, with support profile clearance of 5mm.
C. Spacer width: rubber spacers.

2.05 INSTALLATION: Conform to approved submittals and various manufacturers' most current written instructions.

MECHANICAL WORKS
AIR CONDITIONING

1200.1 Description

This item shall consist of furnishing and installation of air conditioning , inclusive of necessary electrical connections, grilles, pipes and all other necessary accessories, ready for service in accordance with the Plans and Specifications.

1200.2 Material Requirements

The air conditioning unit (ACU) shall be of high quality, known and recognized brand, and approved by the owner. The type of ACU shall an inverter, single split type and indoor model. The types, sizes, capacities, quantities and power characteristics shall be as specified or as shown on the Plans.

1200.2.3 Pipe Insulations

Insulations shall be preformed fiberglass or its equivalent. The insulating materials shall be covered with 100 mm. x 13 mm. thick polythelene film which shall be overlapped not less than 50 mm. Pipe insulations shall be adequately protected at point of support by means of suitable metal shield to avoid damage from compression. Insulated pipes, valves and fittings located outdoors shall be provided by metal jackets.

200.2.10 Electrical Works

Power supply shall be provided by the Contractor. All electrical works shall comply with the latest edition of the Philippine Electrical Code with the applicable ordinance of the local government and all the rules and requirements of the local power company.

1200.3 Construction Requirements

The air conditioning system shall be entirely automatic in operation and shall not require the presence of an attendant except for period inspection for lubrication. All equipment and materials shall be inspected upon the delivery and shall be tested after installation. Piping shall not be buried, concealed, or insulated until it has been inspected, tested are approved. Walls, floors and other parts of the building and equipment damaged by Contractor in the execution of the work shall be replaced as shown as the Plans.

1200.3.1 Operating Tests

Operating test of complete air conditioning system shall be 6-hours minimum for each system. Tests of air flow, temperature and humidity shall be made to

demonstrate that each complies with the requirements of the plans and specification.

1200.3.2 Guarantee and Service

All equipment, materials and workmanship shall be guaranteed for a period of one (1) year from the date of completion at anytime within the period of guarantee and upon notification the Contractor shall repair and rectify the deficiencies, including replacement of parts or entire units.

1200.3.3 Miscellaneous

The owner shall be provided with three (3) bound copies"AS-BUILT" diagrams, shop drawings, part lists, serial number and inventory of equipment including manufacturers operating and maintenance manuals. All standard tools and equipment shall be furnished for proper and regular maintenance of installed equipment.

CLOSED CIRCUIT TELEVISION

1. General Introductions and Requirements

    1.1 IP based CCTV system is required to monitor and record all activities inside and outside the DILG RO Building, and store the recordings for a period of not less than 30 days at maximum resolution.

    1.2 New IP Network Video Recorders (NVR) shall be provided each zone. The existing ACTI servers shall be used as cold backup network video recorders.

    1.3 All Existing IP cameras installed should be compatible with the new IP Network Video Recorder's communication protocols.

    1.4 Provide portable handheld cctv monitor for maintenance.

    1.5 The Network Video Recorders Workstations, Digital Keyboard with Joysticks and Color Monitors must be installed inside the new CCTV room including operator tables and chairs.

2. High Resolution color IP PTZ Dome Camera

    2.1 The IP PTZ camera shall be of high performance with minimum camera motorized lens zooming at (18x), panning (360 degrees continuous) and tilting (180 degrees) .The camera shall be Charge Couple Device at minimum of 1/3" (CCD) size and of the low light level type.

    2.2 The IP PTZ Dome Camera communication protocol shall be based on IP.

    2.3 The connectivity of all cameras with the monitoring station can be through armored fiber cable or CAT-6 wherever is required for completion of project.

    2.4 The camera can operate in a temperature between 5˚C to 50˚C and can be stored in a temperature between 0˚C to 60˚C.

    2.5 The PTZ camera is compatible with NTSC/PAL Multi- system.

    2.6 The PTZ camera is designed to perform over a wide range of environmental and lighting conditions and automatically adjusts from daytime to nighttime operation.

    2.7 Compression format – H.264 and Mjpeg video stream

2.8 Resolution - minimum of 2 Megapixel

2.9 Focus – Automatic with manual override

2.10 Iris – Automatic with manual override

2.11 Enclosure
Outdoor - Dome Tinted rugged weatherproof case.
Indoor - Dome Tinted rugged case.

2.12 Surge Suppression – Peak current 10KA
Peak power 1000W

2.13 Power Supply should be Power over Ethernet (PoE) format.

3. High Resolution Color IP Camera (Fixed Camera)

General Requirements

3.1 The camera shall be Charge Couple Device at minimum of 1/3" (CCD) size and of the low light level type.

3.2 The IP PTZ Dome Camera communication protocol shall be based on IP.

3.3 The connectivity of all cameras with the monitoring station can be through armored fiber cable or CAT-6 wherever is required for completion of project.

3.4 The camera has a capability to view up to 50m.

3.5 Minimum of 60˚ angle lens optical field of view.

3.6 The camera can operate in a temperature between 5˚C to 50˚C and can be stored in a temperature between 0˚C to 60˚C.

3.7 The connectivity of all cameras with the monitoring station can be through armored fiber cable/CAT-6/ and Optical Fiber cable wherever is required for completion of project. The Bidder shall submit the schematic diagram of the system.

3.8 Power Supply should be Power over Ethernet (PoE) format.

3.9 Compression format – H.264 and Mjpeg video stream

3.10 Resolution - minimum of 2 Megpixel

3.11 Focus – Automatic with manual override

3.12 Iris – Automatic with manual override

3.13 Enclosure
Outdoor - Dome Tinted rugged weatherproof case.
Indoor - Dome Tinted rugged case.

3.13 Surge Suppression – Peak current 10KA Peak power 1000W

Indoor Cameras : Maximum resolution – 2 Megapixel
CMOS Camera Board
Supports motion detection
Night Vision
With audio input
VANDALPROOF, WEATHERPROOF

Outdoor Cameras : Maximum resolution – 2 Megapixel
CMOS Camera Board
Supports motion detection
Night Vision
Weatherproof Cameras

Command Center : The computer set will be used for recording and archiving of video.
Operated under a LICENSED IP VIEWING SOFTWARE
Recording can be programmed on a SCHEDULED BASIS, or Motion Detection

CPU – Intel Core I7
HDD – 2 terabyte
Monitor – 40" Flatscreen

Operator Console : (Optional)
The computer set will be used for live viewing.
Operated under a LICENSED IP VIEWING SOFTWARE
CPU – Intel Core I5
HDD – 500 Gb
Monitor – 24"

4. Network Video Recorder (NVR)

4.1 New Network Video Recorders with 46" Full HD LED monitor shall be provided for each zone (Arrival, Chek-In and Pre- Departure Areas) at DMIA – PTB.

4.2 Can transmit/receive Video Signals over an IP Network - LAN or WAN with H.264 / MPEG4 or MJPEG compression.

4.3 Images can be viewed, or accessed directly through the workstations.

4.4 The Network Video Recorder shall combine multiplexing, alarm/event detection, video recording.

4.5 The Network Video Recorder must simultaneously record, play back and archive video and audio while using sophisticated search

functions to define and find only those important events that meet certain criteria.

4.6 The NVR shall be capable of keeping minimum of one (1) month recording at maximum resolution.

4.7 The Network Video Recorder shall provide network access through an internal network and internet connections that supports 100BaseT (100 Mbps) network operation.

4.8 The Network Video Recorder should record all video outputs of existing IP (ACTI) cameras installed.

4.9 The Network Video Recorder shall have a DVD writer and USB port for back-up storage

4.10 Using the integrated DVD writer, the System shall allow users to save video, audio, and text to a standard recordable CD or DVD. The option to include the player software on the CD or DVD shall be available so that no additional software needs to be purchased. The unit must include the ability to export the latest video, audio, and text to a CD or DVD until the CD or DVD is full.

4.11 The operators' workstation shall be easy to use, and be provided in English language for all dialogues.

4.12 The recording shall take place in digital format.

4.13 The removable storage media shall be re-writeable DVD for archiving, administrative and other purposes. The media should provide the highest possible storage capacity without jeopardizing the reliability, to allow for fast and random access in playback.

4.14 Playback must be possible in real time monitoring, from the instant ory, and from any archive media without interruption of the recording process, and for a time of at least one hour without any loss of data recorded.

4.15 Extensive and comfortable search tools shall be provided to quickly and easily allocate communications in the memory and the archive media by the call associated data (date, time, channel, durations, etc.).

4.16 The Network Video recorder shall have an input voltage of 220 VAC, 60 Hz and an operating voltage tolerance of +10% (242 VAC) and -10% (198 VAC).

4.17 The Network Video recorder shall have the ability to control both fixed and PTZ cameras.

4.18 The Network Video Server shall operate in a temperature range of 0˚ top 50˚ Celsius.

4.19 Video compressor, technology, low power consumption, high resolution.

4.20 Motion detector, alarm triggered camera action, text insertion, smart search, pre-alarm recording multi-screen playback.

4.21 The Network Video recorder monitors must be installed inside the CCTV room.

5. CCTV Monitors

Multi-Display Monitors and Spot Monitors General Requirements

5.1 The monitor must be at least LED type, with full high definition.

5.2 The size of the multiple display monitor must be 46"- inches for NVR

5.3 The size of the spot monitor must be 32"-inches.

5.4 The monitor shall be NTSC/PAL multi-sys compatible.

5.5 The monitor shall be designed to be used in, rack, or wall mounted applications..

5.5 The monitor shall have an input voltage of 220VAC, 60Hz.

5.6 Capable of multi-screen display.

5.7 Provide minimum of Three (3) units 46" LED monitor for Network Video Recorders installed to accommodate all IP camera outputs in each sector.

5.8 Provide minimum One (1) unit of 32" LED monitor RDC Building Entrance.

5.9 The monitor must have a high performance, high resolution color display monitor which includes a comprehensive lineup of professional features.

5.10 The monitor shall be NTSC/PAL multi-sys compatible.

5.11 The monitor shall be designed with rack, or wall mounted applications.

5.12 The monitor shall have an input voltage of 220VAC, 60Hz.

6. Workstation for Video Management System

General Requirements

6.1 The PC provided should be able to provide high graphics display that will not affect the total performance of the CPU and should come preloaded with Video Management System Software from the manufacturer with DVD-writer, mouse and Digital keyboard with Joy stick

6.2 6.2 Provide compatible Graphic Accelerator for faster Video processing and outputs.

6.3 Should be connected to CIAC Local Area Network and internet for remote viewing purposes.

6.4 Three sets of operator workstation positions shall be configured to every sector with individual spot monitor to utilize multiple spot monitor configurations.

6.5 Monitors for workstations shall be at 19" minimum size LED type.

6.6 The PC Workstations, Digital keyboard with Joystick, LED color monitors must be installed inside the New CCTV room including tables and chairs for workstation.

6.7 Network Switches with Poe ports shall be use for all fixed and PTZ IP cameras.

7. Video Management Software

7.1 An operating system (OS) shall be provided to handle the proposed system and must be the latest version.

7.2 The proposed OS shall organize the work in the system under normal operation and it shall be designed to handle other modes of operation to include but not limited to:

7.2.1 Reduce system operation, normally as a result of automatic or manual initiation of system configuration either due to a detected system malfunction or due to a desire to change the allocation of system components.

7.2.2 Multi-tasking for execution of other programs e.g. software modifications, program production, printout etc.

7.2.3 During normal operation the system control software shall have the capability to accept orders from a console terminal (or PC) regarding system reconfiguration, output data distribution, etc.

7.2.4 Off-line system operation, when no operational functions will be carried out in the system.

7.2.5 Network function through TCP/IP with client software should be provided for remote control.

7.2.6 Data transmission to and from data processing equipment shall be monitored for presence.

7.2.7 In case full normal operation cannot be maintained it is envisaged that the system has an inherent fail-soft capability.

7.2.8 Erroneous data shall never be able to confuse the system. Such data shall be rejected and an appropriate error indication shall be initiated.

7.2.9 All detected abnormal conditions shall be time stamped and logged on non-volatile medium.

7.2.10 Switching from normal system configuration shall be possible, both manually and automatically.

7.2.1 Return from reduced system configuration to normal system shall be easy to perform.

7.2.12 The software shall have the capability to display multiple channels in a single monitor and view a single channel on a separate monitor.

7.3 The CCTV System must include support for Remote Configuration via LAN or Internet and Management software to allow a user to remotely configure the unit, view live video, or select video segments by time, date, alarm, or search results. The operator must have the ability to save, annotate, and organize copied video into "incident folders" to aid with investigations.

7.3.1 The remote management software must allow live video sessions, allowing the operator to view up to different cameras, from remote sites, simultaneously.

7.3.2 The remote management software shall also allow the exporting of video clips to play on any Microsoft Windows based PC. The software shall have the ability to enhance, print, or convert the individual images to standard formats.

7.3.3 The remote management software shall allow an operator to select units, cameras, and timeframes for automatic retrieval of video clips to an operators PC. This allows for downloads to be scheduled during times that network traffic restrictions are not an issue.

7.4 The Video Management Software shall allow:

1. Live display of cameras
2. Live display of camera sequences
3. Control of PTZ cameras
4. Playback of archived video
5. Retrieval of archived video
6. Instant Replay of live video

Use of procedures

1. Configuration of system settings
2. Multiple levels of authority (user, administrator etc)
3. Remote Access
4. Multiple Camera layouts and Spot Monitoring

5. Alarm outputs
6. Analysis, recording and replay can be done at different rates and different image sizes

7.5 System Diagnostic Programs

7.5.1 The system shall be provided with on-line diagnostic program(s) for detection of system malfunctions. The program shall regularly check the majority of system components for possible malfunctions. Detected malfunctions of emergency nature.

7.5.2 To provide for more effective security management, the Digital Video Management System must also allow for audits of the activity log to monitor changes to the settings and configurations. The activity log shall include, but not necessarily be limited to, the following information:

1. User Name – Login name of the user
2. Date/Time – Date and Time the action was performed
3. Access Loc – Whether the action was local to the unit or done through remote software
4. Category – The actions category
5. Activity – The action performed within the category
6. Data – Description of the action

7.5.3 The operator shall have the ability to export the entire log file, export the displayed log file, print the log file, or print the displayed log file locally and remotely through Network Client software.

7.5.4 The Contractor shall give a detailed description of the on-line diagnostic program(s).

7.5.5 The Contractor shall give a detailed description of the on-line diagnostic program(s).

7.5.6 The system shall provide off-line diagnostic program(s) for preventive and corrective maintenance.

7.5.7 The off-line diagnostic program(s) for preventive and corrective maintenance.

7.5.8 The Contractor shall describe the off-line diagnostic program(s), the procedures and results to be achieved by the program(s)

7.6 System Software/Hardware Administration

7.6.1 The employer has no intention to purchase a complete system development environment for the systems software. The Contractor shall clearly state all software whether accessible or not to operators and local maintenance/ engineers. Limitations on access of this software shall be also being stated.

7.6.2 The delivery shall include one Hand held Video Monitor which will be used for maintenance as well as for monitoring purposes.

7.6.3 All software shall be delivered on the same kind of CD in two (2) sets. One (1) set of emergency back-up copy of software shall also be provided.

7.6.4 The media shall be labeled in an unambiguous and consistent way.

7.6.5 An installation program which administers the whole installation phase shall be delivered.

7.6.6 The Contractor is further required to recommend all the necessary tools for a software maintenance environment

C. INSTALLATION

1.1 The Contractor shall perform the installation, testing and commissioning of all equipment. All necessary tests, services and inspections to assure the system functions and shall be checked and approved before the acceptance test. Consideration shall be given to the fact that installation or tests of other systems within the same building may be carried out during the same period.

1.2 The proposal shall include a detailed time schedule not to cause interruptions in the operation of existing air traffic service.

1.3 CIAC technical personnel shall have the right observe the installation procedures.

1.4 The standard installation shall be in accordance with the existing rules and regulations of the Philippines.

1.5 The Contractor shall prepare and furnish fully dimensioned scaled drawings of builder's work arising from the installation of the equipment and system as well as for the plant and equipment layout plans at various locations.

1.6 The work drawings shall show:

1.6.1 The expected size of the equipment

1.6.2 The general arrangement of cabinets and other facilities in the equipment areas as well as the operational area

1.6.2 The general arrangement of cabling within the system.

1.6.4 All plants and equipment supplier under this Contract shall be manufactured and installed according to Approved Drawings. Approval of the Work Drawings shall not relieve the Contractor of his obligations under the contract. The Contractor shall be responsible for any mistake of manufacture as any deficiency in the system operation and defect in the system.

1.6.5 As soon as the commissioning of the equipment and system have been completed, the Contractor shall amend or correct all his Approved Drawings, if so required, furnish six (6) sets of prints of all "Asbuilt"

drawings showing the works as finally installed and commissioned. These drawings shall be furnished in hard binding cover/covers.

1.6.6 The "As-built" drawings shall show the general arrangement of all plants, equipment and auxiliaries, positions of all electrical outlets, fittings, switches, switch-boards and control panels, cables, pipes, ducts runs, markers and underground ducts, inter-wiriness, schedules, plant manufacturers name plates, models and type numbers and other information necessary to facilitate routine inspection and maintenance of installation.

1.6.7 Two (2) sets of the "As-built drawings" shall be delivered on CD ROM media, The Contractor shall also provide licensed and updated software used in the preparation of the drawings.

1.6.8 The complete schematic diagrams shall be provided, read and understood.

1.6.9 The Contractor shall, apart from equipment, deliver all necessary materials for the installation such as cables, cable ducts, connectors etc.

1.6.10 All special tools necessary in the operation and maintenance of the system including test cables and accessories shall be provided by the Contractor.

1.6.11 It is the Contractor's sole responsibility that the installation meets all contractual obligations.

1.6.12 Outdoor cables shall be, in principle, installed underground through galvanized steel pipe or of IMC conduit. The cable conduits shall be sealed properly at both ends for protection of cables against rodents and inner edge at both ends shall be chamfered to avoid damage to cables during installation.

1.6.13 No cables shall be installed until the inside of the conduit pipes have been cleaned.

1.6.14 Roughing-ins including supports, boxes, fittings, cover plates, mounting brackets should be provided by the contractor.

5. Inspection and Testing

Before the final acceptance of the work, the Contractor shall test the system to demonstrate compliance with contract requirements. The whole system shall be subjected to complete functional and operational tests. When these tests have been completed and corrections made as necessary, the Contractor shall submit a signed and dated certificate with a request for formal inspection and test.

STEEL REINFORCEMENT

1. Scope of Work

   Steel reinforcement shall be provided for all concrete structure with all necessary tie wire, spacers, support and other necessary devices.

2. Cutting and Bending

   Reinforcing steel shall be accurately cut and bent in accordance with the approval detailed reinforcement drawings. Reinforcing steel shall not be straightened or re-bend in a manner that will injure the material. Bars with kinks or with bends not shown on the approved detailed reinforcement drawings or with cracks or splits of the bends shall not be used. All bars shall be bent cold. The Contractor shall provide, maintain and operate a small cutting and bending shop on the site. This provision is to take care of minor revisions and additions in an expeditious manner.

3. Placing of Reinforcement

   Reinforcing steel shall be accurately placed in accordance with approved detailed reinforcement in the drawings and shall be adequately secured against displacement by using specified tie wires or approved clips at all intersections. After it has been installed, reinforcing steel shall be inspected by the Project Engineer for compliance with requirements as to size, shape, length, splicing, position and number. Concrete or metal supports, spacers or metal hangers, except for surfaces exposed to the ground or to the weather. At surfaces where an attractive appearance is required, the supports shall be of type, which shall not cause subsequent staining or marring of the exposed surface.

4. Methods of Measurements

   The quantities shall be in accordance with the dimension in the plan or as otherwise direct the measurement of completed work. The quantities to be paid for under this section shall be measured as follows;

   a) The quantities for reinforcing steel to be paid for shall be the final quantity placed and accepted in the completed structure.

   b) Payment for the accepted quantities for the reinforcing steel shall be deemed to include the cost of tie wires, separators, wire,

supports, hangers, chairs and other materials necessary to complete the work.

5. Basis of Payment

The quantities measured as provided in Sub-Section 3.5.1, Method of Measurement, shall be paid for at the contract price for each of the pay item, which price and payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

WALLING

1. Scope of Work

The work includes furnishing, placing of concrete masonry units (CHB and concrete louvers) and GI walling in conformity with the lines, grades and cross-sections shown on the drawings and in accordance with the specifications.

Applicable Documents:

The latest edition of the following specifications and standards shall form part of this specification to the extent required by the references thereto.

ASTM	American Society for Testing Materials
C144	Standard Specification for Aggregate for Masonry Mortar
PSA	Product Standards Agency Publications (Philippines)
	PNS 16 Specification for Concrete Hollow Blocks

2. Materials Requirements

2.1 Concrete Hollow Blocks

Concrete hollow blocks shall be a standard product of recognized manufacturer or manufactured on site 100mm x 200 mm x 400 mm for the masonry wall of the warehouse and office, guard house and toilet of durable quality, the mixture to be approved by Owner, and concrete louvers 150 mm x 150 mm for ventilation. ,

2.2 Cement, Reinforcing Steel, and Water

Cement, reinforcing steel and water shall be as specified in (Concrete Works) Section.

2.3 Plastering/Finishing – plastering should not be less than 12 mm and not more than 20 mm. thick cement plaster.

3. Construction Requirements

3.1 Workmanship

Masonry walls shall be placed level and plumb all around. One section of the walls shall not be placed in advance of the others. Unfinished work shall be stepped back for joining with new work. Heights of

masonry shall be checked with an instrument at sills and heads of openings to maintain the level of the walls. Doors and window frames, louvered openings, anchors, pipes, and conduits shall be installed in carefully and neatly as the masonry work progresses. Spaces around doorframes shall be filled solidly with mortar. Skilled workers shall perform drilling, cutting, fitting and patching in order to accommodate the work of others. Bolts, anchors, inserts, plugs, ties, and miscellaneous metal work specified elsewhere shall be placed in position as the work progress. Top of exposed walls and partitions, not being worked on, shall be covered with a waterproof membrane, well secured in place. Walls and partitions shall be structurally bonded or anchored to concrete wall beams, and columns.

3.2 Mortar Mixing

Mortar materials shall be measured in approved containers to ensure that the specified proportions of materials are controlled and accurately maintained during the progress of the work. Unless specified otherwise, mortar shall be mixed in proportions by volume. The aggregates shall be introduced and mixed in such a manner that the materials will be distributed uniformly throughout the mass. A sufficient amount of water shall be added gradually and the mass further mixed, not less than 3 minutes, until a mortar of the plasticity required for the purpose intended shall be obtained. The mortar shall be mixed in a manner such that the quality of water can be controlled accurately and uniformly. Mortar boxes, pans of mixing drums shall be kept clean and free of debris or dried mortar. The mortar shall be used before the initial setting of the cement has taken place; retempering of mortar in which cement has started to set shall not be permitted.

3.3 Proportion of Mortar Grout

Fine mortar grout shall be mixed in the volumetric proportion of one part Portland cement and 3 parts sand. Coarse grout shall be mixed in proportion of one part Portland cement, 3 parts sand and 3 parts pea gravel passing a 3/8 inch sieve.

3.4 Use of Fine & Coarse Grout

Fine grout shall be used in grout spaces less than 50 mm in my horizontal dimension or when clearance between reinforcement and masonry unit id less than 17 mm. Coarse grout shall be used in grout spaces more than 50 mm in all horizontal dimensions or where clearance between the reinforcement and masonry is more than 17 mm.

3.5 Mortar Joints

Mortar joint shall be uniform in thickness, and the average thickness of any three consecutive joints shall be 9.50 mm. Changes in coursing or bonding after the work has started shall not be permitted. The jointer shall be slightly larger than the width of the joints, so that complete contact is made along the edge of the units, compressing and sealing the surface of the joint. Joints in masonry, which will not be exposed, shall be trucked flush. Joints shall be brushed to remove all loose and excess mortar. All horizontal joints shall be on level and vertical joints

shall be plumbed and aligned from the top to the bottom of the wall with a tolerance of plus or minus 12 mm.

3.6 Concrete Masonry Unit

The first course of concrete masonry unit shall be laid in full bed of mortar, for the full width of the unit; the succeeding courses shall be laid with broken joints. Concrete masonry units with the cells verticals shall have bed-joints formed by applying the mortar to the entire top surfaces of the inner and outer face shell, and the head joints formed by applying the mortar of a width of about 25 mm to the ends of the adjoining units laid previously. The mortar for joints shall be smooth, not furrowed, and shall be of such thickness that it will be forced out of joints as the units are being placed in position. Where anchors, bolts, ties and reinforcing bars occur within the cell of the units, such cells shall be solidly filled with mortar or grout as the work progresses.

3.7 Reinforcement

Reinforcement shall be continuous and provided in the longest available lengths. Reinforcement above and below openings shall extend and be embedded into the columns, unless otherwise shown on the drawings. Splices shall overlap not less than 150 mm. Reinforcement shall be embedded in the mortar joints in the manner that all parts shall be protected by mortar. The two top courses of filler block walls shall have their cores filled with grout when placed in position.

3.8 Bonding and anchoring

Masonry walls and partitions shall be accurately anchored or bonded at points where they intersect, and where they abut or adjoin the concrete frame of the building. All anchors shall be completely embedded in mortar.

3.9 Grout Placement

Grout shall be performed on the interior side of wall, except as approved otherwise; Sills, ledges, offsets and other surfaces to be left exposed shall be protected from grout falling on such surfaces and shall be removed immediately. Grout shall be stirred before placing to avoid segregation of the aggregate and shall be sufficiently fluid to flow into joints and around the reinforcement without leaving any voids. Grout shall be placed by pumping or pouring from buckets equipped with spouts, in lifts not exceeding 1.2 meters high. Grout shall be puddle thoroughly to eliminate voids without displacing the masonry units from its original position. Masonry units displaced by the grouting operation shall be removed and relaid to its proper alignment using fresh mortar grout.

3.10 Plastering Works

a) Portland Cement

Cement shall conform with the "Standard Specifications for Portland Cement" (ASTM C-150, Type I).

b) Sand

Fine aggregates used in the composition of concrete shall consists of sand, stone screening and other inert materials with similar characteristics or a combination thereof, having clean, hard, strong, durable uncoated grains, and free from injurious dust, organic matter, loam or clay. Fine Aggregates for plastering shall be natural sand and shall be retained between No. 50 and No. 100 sieves.

c) Water

Water used in mixing shall be reasonably clean and free of oil, salt, acids, alkali, grass or other substances injurious to the finished product.

4. Method of Measurement and Basis of Payment

4.1 Method of Measurement

Measurement of the quantity of masonry units installed and plastered for payments, the dimensions to be used shall be in area of masonry wall/quantities of CHB and GI walling.

4.2 Basis of Payment

The quantity of concrete masonry wall and GI walling determined as provided in sub-Section 5.1, measurements shall be paid for at the contract unit price shown in the bid schedule, which payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

STEEL TRUSSES, FRAMING, AND OTHER STEEL STRUCTURES

1. Scope of Work

   The work includes the furnishing, fabrication, erection or installation of structural steel roof framing, husk storage and miscellaneous metal work in accordance with this specification and as shown in the drawings.

2. Applicable Specifications & Standard

   The latest edition of the following specifications and standards referred to hereinafter by basic designation shall form part of this specification:

ASTM	American Society for Testing and Materials
A36/A36M	Specification for Structural Steel
A307	Bolts and Studs, 60,000 psi Tensile Strength
A325	Standard Specification, high Strength Bolts for Joints
AWS	American Welding Society
D1.1	Structural Welding Code, Steel

AISC	American Institute of Steel Construction, Specification for the Design, Fabrication & Erection
AISI	American Iron Steel Institute, Specification for the Design of Light Gage Cold-Formed Steel Structural Members

3. Material Requirement

   3.1 Structural Steel Shapes Plates and Bars

   Unless otherwise shown or specified on the drawing, structural steel shapes plates and bars shall conform to ASTM specification A36/A6M.

   3.2 Bolts, Nuts, and Washer

   It shall conform to specification STM A370, with a minimum yield point of 33,000 psi, with size as shown in the drawings. Heavy hexagonal structural bolts and nuts, and hardened washers, shall be quenched and tarpapered medium-carbon steel bolts, nuts and washers complying with ASTM A325.

   3.3 Screw and Expansion Bolts

   Screw and expansion bolts shall be of standard commercial grade and of the sizes and types specified in the schedule of materials or as

approved by the Owner.

3.4 Electrodes

Electrodes for welding shall be conforming to E60 or E70/ AWS D1.1.

3.5 Miscellaneous Metals

Miscellaneous metal includes fasteners, anchorages and incidentals not specifically mentioned herein or in other section of this specifications but are required to complete the work, for which there are no detailed drawings, shall be provided and installed in accordance with standard practice of the trades as approved by the Owner.

3.6 Delivery, Storage and Handling

Fabricated materials delivered to job site shall be stored in clean and protected dry areas in manufacturer's protective package. Structural steel materials to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Skids placed near enough together to prevent injury from deflection shall support long members, such as purlins and chords. The Contractor shall check the quantity and quality of materials turned over to him against the delivery list and report promptly in writing any shortage or damage discovered.

4. Construction Requirements

4.1 General

The Contractor shall furnish all labor, tools, falsework, scaffolding and other equipment necessary for the fabrication and erection of steel roof framing (trusses and purlins), husk storage so that they are completely ready for use. Fabrication and erection of structural steel shall be in accordance with AISC specification for the design.

4.2 Fabrication of Steel Structure

The work shall be well formed at the shape and size shown and assembled as detailed. Structural members shall be fabricated and assembled in the shop to the greatest extent possible. Shearing and punching shall be produced in clean, true lines and surfaces with burrs shall be removed. Nuts shall be drawn up tight and joints, which are to be exposed to the weather, shall be watertight. Holes shall be cut, drilled or punched at right angles to the surface of the metal. Holes in base or bearing plates shall be drilled.

Welding

Surface to be welded shall be free from loose scale, slag, heavy ruts, grease, paint, and any other extraordinary material except tightly adherent mill scale. Such surfaces shall be smooth, uniform and free from fins, seams, and other defects that adversely affect proper welding.

All welds in the Structural steel shall be made in a manner ensuring complete fusion with the base metal, within the limits specified for each joint and shall be welded accordance with the standard code of Arc and Gas Welding in Building Construction of the American Welding Society. Qualified welders shall perform all welding work only.

Shop Painting

Unless otherwise specified of and indicated in the drawings, all structural steel work shall be given a shop coat of red lead or red oxide primer.

4.3 Erection

The steel structure shall be erected true to line and grades. Bracings and supports shall be introduced whenever necessary to take care of all the loads to which the structure may be subjected. Such bracings shall be left in place as long as may be required for safety reasons. As erection progresses, the work shall be securely bolted to take care of all the dead loads, wind and erection stresses. No reaming of undersize bolt holes shall be permitted, and erection bolts shall not be used for lining up members.

1. Drift Pins

   Drift pins may be used only to bring together several parts; they shall not be used in such manner as to distort or damage the metal.

2. Gas Cutting

   The use of gas cutting torch in the fields for correcting fabrication errors shall not be permitted on any major member in the structural framing. Its use may be permitted only when the member is not under stress, and subject to the approval of the project management office.

3. Base Plates and Bearing Plates

   Base plates and large bearing plates shall be supported on steel wedges until the supported members have been plumbed, following which the entire bearing and shall be grouted with no-shrink cement grout.

4. Grouting Mortar for Setting Base Plates

   Concrete grout shall be a mixture of Portland cement, well graded fine aggregate, and water. If adopted, the approved product shall be delivered to the site of the work in original sealed container bearing the trade name of the manufacturer. Surfaces to receive the mortar shall be clean and moistened thoroughly before placing the mortar. Exposed surfaces of mortar shall be water cured for at least seven (7) days.

5. Setting Up

   Steel shall be erected plumbed, leveled and properly guyed. In setting or erecting structural steel, the individual piece shall be considered plumbed or leveled.

6. Inspection

   The Contractor shall give the Owner at least fifteen (15) days' notice prior to the start of work at the mill or shop, so that the required inspection may be made. The term "mill" means any rolling mill, shop or foundry where material for the work is to be manufactured or fabricated. No materials shall be rolled or fabricated until said inspection has been provided. The Contractor shall furnish all facilities for inspection and the Owner shall be given free access to the mill or shop and premises at all times.

   Inspection at the mill or shop is intended as a means of facilitating the work and avoiding errors. It is expressly understood that it will not relieve the Contractor from any responsibility for imperfect materials or workmanship and the necessity for replacing the same.

5. Method of Measurement and Basis of Payment

5.1 Method of Measurement

The lump sum quantities of structural steel roof framing (trusses, purlins), steel trusses/columns, buckets (husk storage), steel gate, and number of quantities for the steel doors (roller type), to be paid for shall be the quantities of each item completed in-place and accepted. Payment for the accepted quantities shall be deemed to include the cost of steel plates, angular bars, anchor bolts, turn buckles, sag rods, cross bracing, purlins, welding rod, primer paint, paint brush, mounting accessories and other works necessary to complete this work item.

5.2 Basis of Payment

The quantity determined as provided above shall be paid for the contract price for each for the pay item listed above which price and payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

WATER SUPPLY AND PLUMBING WORKS

1. Description

   This item shall consists of furnishing all materials, tools, equipment and fixtures required as shown on the drawings for the satisfactory performance of the entire water supply and plumbing system including installation in accordance with the latest edition of the National Plumbing Code, and this Specification.

2. Construction Requirements

   The Contractor before any installation work is started shall carefully examine the plans and shall investigate actual structural and finishing work condition affecting all the works. Where actual condition necessitates a rearrangement of the approved pipe layout, the Contractor shall prepare a plan for the proposed lay-out.

3. Water Supply Pipes and Fittings

   Pipes and fitting materials shall for water lines in shall be polypropylene pipes (PPR) and shall be made of virgin materials conforming to specification requirements defined in ASTM D-2241 and PNS 65: 1986.

4. Septic Tank

   Two septic tanks shall be provided as shown in the plans including all pipe vents and fittings. The various construction materials such as concrete and masonry works shall conform to the corresponding Items of these Specifications. Inlet and outlet pipes shall conform to the latest edition of the National Plumbing Code. Concrete mixture for the septic tank cover is 2,500 psi.

   The Contractor shall construct the septic tank in accordance with the size and dimension shown on the detailed plans. Septic tank shall be constructed with two chambers; the primary sedimentation chamber, which serves as a digestion chamber and the final sedimentation chamber which, receives the overflow water from the digestion chamber. The effluent from the final sedimentation chamber shall be discharged, whenever practicable, to the surface wastewater infiltration system. In some cases / or as shown on the drawings, the final sedimentation chamber will be designated as leaching chamber i.e., with open bottoms/flooring with gravel for leaching.