Project Manual and Technical Specification

for

Refurbishment and Completion of the UP Baguio Cultural Hub (Bulwagan Juan Luna) Phase 2

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01 00 00 GENERAL REQUIREMENTS

01000 Equipment and Tools

ESTIMATING

Includes moving costs, rentals, small tool purchases, vehicle expenses, fuel, oil and maintenance cost.

01000 Safety Provision

ESTIMATING

Includes systems, equipment and manpower gears to ensure the health and safety in construction procedures.

01100 Permits

The Contractor shall secure all necessary permits at his own expense and pay all corresponding government fees and taxes.

01020 SUMMARY OF MATERIALS AND FINISHES

01000 GENERAL REQUIREMENTS

1.01 RELATED SECTIONS

All applicable provisions of the different divisions of the Specifications for each work trade shall apply for all items cited in this Summary.

1.02 INFERRED ITEMS AND WORK

Materials and workmanship deemed necessary to complete the works but NOT specifically mentioned in the Specifications, Working Drawings, or in the other Contract Documents, shall be supplied and installed by the Contractor without extra cost to the Owner. Such materials shall be of the highest quality available, and installed or applied in a workmanlike manner at prescribed or appropriate locations.

1.03 SPECIFICS

Materials specifically mentioned in this Summary shall be installed following efficient and sound engineering and construction practice, and especially as per manufacturer's application for installation specifications which shall govern all works alluded to in these Specifications.

1.04 ON-SITE ITEMS

Materials and finishes for onsite improvements and facilities as listed below are part of the scope of work and shall be supplied and installed by the Contractor without extra cost to the Owner.

A. Installation of engineered and drainage fills for building and landscaped areas where specified.

B. Construction of:

1. Concrete driveways, walks, ramps, steps, posts, and miscellaneous slabs;
2. Concrete splash slabs, steel or hard plastic gratings;
3. Below grade utility structures such as septic vaults, cisterns, handholes, and manholes;
4. Above-grade utility structures such as electrical poles, concrete pedestals, and the like; Exterior utility lines, raceway system, fixtures, breakers, switches, buzzers, controls including fittings and accessories as required by the specialty trades under plumbing, electrical and communication works. Pumps, tanks and other necessary equipment and facilities.

1.05 OFF-SITE ITEMS

Off Site improvements shall generally be under the responsibility of the Owner and not included in the Contract, with the exception of the following which shall be part of the Contractor's Work:

A. Concreting of entry slabs. This work shall neatly make connections to the existing roads or curbs, if any, and shall incorporate necessary utility ways under such as required. Access road drainage system and other existing utility lines must be kept in working condition.

B. Installation of concrete drainage pipes to neatly receive connections from the storm drainage system of the site to access road and/or to existing drainage system.

C. Permanent connections to the local utility lines for electrical, water, drainage, sewer and telephone lines including equipment, facilities, materials, fees, and/or work which utility companies or authorities may require of the applicant Owner, such as electrical transformers, electric poles, service laterals and drops, etc. by their respective Specialty Contractors.

1.06 OWNER SUPPLIED ITEMS

Owner supplied finishing accessories, furnishing and fixtures such as wall clocks, picture frames, movable furniture etc., shall be installed by the Contractor at no cost to the Owner.

02200: EARTHWORK

A. FILL MATERIALS

1. General Fill for structures and under spread footings, pavers, or concrete slabs on grade shall conform to the general requirement for soil materials above and shall be classified as GW, GM, GP, SW, SM by the

ASTM 2487 and conform to the following.

a) Liquid Limit – shall not exceed 25% when tested in accordance with ASTM 423.

b) Plasticity Index – shall not exceed 12 % when tested in accordance with ASTM 424.

c) Under Buildings, no more than 25% by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D 1140.

Granular Fill shall conform to the general requirements for soil material above and shall be clean, crushed stone or gravel conforming to ASTM C 33, size 67 and with a sand equivalent of not less than 50% when tested in accordance with ASTM D 2419. Backfill material behind walls shall consist of free-draining granular fills, sized in particular to provide a filter media around subsoil drainage system.

Drainage Fill: Fill material shall clean, well graded, free draining sand conforming to ASTM C 33 for Fine Aggregate.

Borrow: If additional material is required for fill in excess of that obtained by excavation at the site, obtain same from sources acceptable to the Owner's Engineer. All arrangement for obtaining borrow from off-site shall be the responsibility of the Contractor and all costs thereof shall be borne by the Contractor. Acceptable borrow will consist of suitable material for fills as herein before specified. Representative of each type of borrow materials considered suitable shall be delivered to the Testing Laboratory and tested prior to placement. Any borrow material not meeting the standard herein specified, or considered unsuitable by the Owner's Engineer will be rejected at the site.

RIPRAP: Rock Boulders, natural, hard rock, high density, from 400 mm to 800 mm in diameter.

BATTER BOARDS: Second class, pest free lumber assembled and rendered secure for proper delineation of building lines and grades.

02520: ROADS AND PARKING - CONCRETE CURBS, GUTTER, AND PAVED WALKS

CEMENT: shall be as per ASTM Standard Specifications for Portland Cement (ASTM C-150: latest revision) for Type 1 Portland Cement.

CONCRETE AGGREGATES

Aggregates shall be well-graded, clean, hard particles or gravel or crushed rock conforming to the STANDARD SPECIFICATION FOR CONCRETE AGGREGATES (ASTM Designation C-33: latest revision).

SAND: shall be coarse sand free from injurious materials such as shells or earth or organic materials. Sand from salt water is not allowed.

WATER: shall be clean and free from injurious amounts of oils, acids, alkali, organic materials or other deleterious substances.

FORMS: shall be either wood or steel.

CONTROLLED STRENGTH OF CONCRETE: Concrete shall develop a minimum of 28-day cylinder strength of 21 Mpa (3,000 PSI).

02700: SITE DRAINAGE

A. DRAINAGE PIPE:

1. Plain concrete drain pipes and fittings: 250 mm (10") and below in diameter: T & G conforming to ASTM C1459.
2.Reinforced concrete pipes fittings: 300 mm (12”) and bigger: Centrifugally cast or vibrated T & G conforming to ASTM C7659 T.

B. JOINING MATERIAL: One part cement to two parts sand.

C. BUILDING STORM DRAIN CONNECTION TO MAIN: Concrete wye branch and clean out, T & G or use junction boxes.

D. AREA DRAIN CATCH BASIN: Loadbearing 4.8 Mpa (700 PSI) concrete hollow blocks (CHB) or reinforced concrete with cover as shown on the drawings.

E.CATCH BASINS OF JUNCTION BOXES: Loadbearing 4.8 Mpa (700 PSI) concrete hollow blocks (CHB) or reinforced concrete as indicated in the drawings, with solid reinforced concrete cover.

02900: LANDSCAPING

TREE AND SHRUB MATERIALS

General: Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous, and stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for types of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to the Landscape Architect, with a proportionate increase in size or roots or balls.

Shade Trees: Single-stern trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, conforming to ANSI Z60.1 for type of trees required. Branching height shall still be 1/3 to ½ of tree height.

Small Trees: Small upright or spreading type, branched or pruned naturally according to species and type, and with relationship of caliper, height and branching recommended by ANSI Z60.1, and multi-stem form of clump, with 2 or more main stems.

GROUND COVER MATERIALS: Provide ground covers established and well rooted in removable containers or integral peat pots and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size indicated.

GRASS MATERIALS: Paspalum conjugatum (Carabao Grass) Sod Sprigs: Healthy living stems, rhizomes or stolons with a minimum of 2 nodes and any attached roots free of soil.

TOPSOIL: ASTM D 5258. pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth.

SOIL AMENDMENTS: Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth. Mix with approved soil on site at the rate of 1 part manure per 1 part soil.

FERTILIZER: Commercial Fertilizer. Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic source of urea-form, phosphorus, and potassium in the following composition: 0.5 kg per 100 sqm (1 lb per 1000 sq. ft.) lawn area of actual nitrogen, 4 percent phosphorus, and 2 percent potassium, by weight.

MULCHES

Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of wood and bark chips.

Peat Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH range of 4 to 6 and a water-absorbing capacity of 1100 to 2000 percent.

STAKES AND GUYS

Upright and Guy Stakes: Solid bamboo poles, sound, pressure-preservative-treated, free of holes and other defects, 3 pieces per tree as shown in the Plans, 32 mm to 50 mm dia. by length indicated, pointed at one end.

Guy and Tie Wire: ASTM A 641 (ASTM A 641M), Class 1, galvanized-iron wire, 2-strand, twisted, 2.7 mm (0.106 inch) in diameter.

Rope: Abaca rope tied loosely to horizontal bars.

CONSOLIDATED PLANT LIST: Refer to Plans.

EXISTING TREES: Contractor shall secure the necessary environmental permits required to ball-out, or cut down affected existing trees with 100mm or more in trunk diameter. Cut down trees shall be the property of the Owner. All costs and logistics of the transportation and transfer of balled-out trees to the new site shall be the responsibility of the contractor.

03000 CONCRETE

03100: CONCRETE FORMWORK

A. FORMS:

TYPE OF FORMS: Use phenolic boards for exposed and unexposed concrete works, Armourply brand or approved equal, for all cast in place and precast works.

SCAFFOLDS: Use metal scaffolding whenever necessary. Wood nor coco lumber are not allowed. Formwork, shoring, temporary bracing, staging, construction of temporary facilities, and any other measures needed to support the structural elements or provide shelter from debris during construction shall be the responsibility of the builder.

03200: CONCRETE STEEL REINFORCEMENT

STEEL BARS: Use locally manufactured deformed billet-steel bars conforming to Philippine standard, Intermediate Grade of 275.8 Mpa (Fy = 40,000 psi) for bars 10mm diameter or smaller, and High Strength Grade of 415 Mpa (Fy = 60,000 psi) for bars 12mm diameter and larger. Use standard-sized deformed steel conforming with ASTM A615 / PNS 49 standards, for concrete and masonry reinforcements. Upgrade to next bigger size if specified standard sizes are unavailable.

TIE WIRES: Use Ga.16 Galvanized Iron (G.I.) tie wires at joints or laps of placed reinforcements.

03300: CAST IN PLACE CONCRETE

GENERAL: Concrete shall be composed of Portland cement, fine and coarse aggregates, water and admixture as specified, all thoroughly mixed and brought to the proper consistency, uniformity and temperature for final placement. Strength requirements shall be (see Sheet S-01):

24 MPa (3500 psi) for footings, retaining walls, footing tie beams, cistern and suspended slabs.
24 MPa (3500 psi) for columns, girders, beams and RC gutters;
20 MPa (3000 psi) for slab-on-grade, partitions, walks, & other non-structural members;
10.5 MPa (1500 psi) for lean concrete, or as required by the Engineer.

CEMENT:

Cement shall be Portland cement, conforming to the Standard Specifications for Portland Cement (ASTM Designation C-150 latest revision) for type 1 Portland Cement. Use only one brand of cement throughout.

FINE AGGREGATES:

Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof. If the fine aggregate shall be a combination of separately processed sizes, or if hatching shall result in a combination of natural and manufactured sand, the different components shall be batched separately.

Fine aggregate shall consist of hard, tough, durable, uncoated particles. The specified percentages of fines in the sand may be obtained either by the processing of natural sand or by the production of a suitably graded manufactured sand. The shape of the particles shall be generally rounded or cubical and reasonably free from flat or elongated pieces. The use of beach sand shall be prohibited. The fine aggregate shall conform to the following specific requirements:

In addition to the grading limits shown above, the fine aggregates, as delivered to the mixer shall have a fineness modulus of not less than 2.3 nor more than 3.0 and during normal operations, the grading of the fine aggregate shall be controlled so that the fineness modulus of at least nine (9) of ten (10) test samples of the fine aggregate as delivered to the mixer shall not vary more than 0.20 from the average fineness modulus of all samples tested during the preceding 30-day period. The fineness modulus can be determined by dividing by 100 the sum of the cumulated percentages retained on U.S. Standard Sieves Nos. 4, 8, 16, 30, 50 and 100. At the option of the Contractor, fine aggregate may be separated into two or more sizes or classification, but the resulting combined sand shall be of uniformed grading within the limits specified above. It can be generally assumed that fine blending sand may be required to meet the above grading.

COARSE AGGREGATES:

Coarse agreement shall consist of gravel, crushed gravel or rock, or a combination thereof. The coarse aggregate as delivered to the batching plant shall have a uniform and stable moisture content. The approval of deposits shall not be construed as constituting the approval of all the materials taken from the deposits and the Contractor shall be held responsible for the specified quality of all such materials used in the work. Coarse aggregate shall consist of hard, tough, durable, clean and uncoated particles. All foreign materials and dust shall be removed by adequate processing. The particle shape of one of the smallest sizes of crushed coarse aggregate shall be generally rounded or cubical, and the coarse aggregate shall be reasonably free from flat and elongated particles. A thin, flat and elongated particle can be defined as a particle having a maximum dimension greater than five times the minimum dimension. The coarse aggregate shall be well graded from fine to coarse. It shall be separated into size groups.

Use 19 mm (3/4) coarse aggregate for slab-on-grade, columns, beams, suspended slabs, tie beams.

Use 38 mm (1 ½") coarse aggregate for footings

WATER:

Water shall be clean and free from injurious amounts of oils, acids, alkalis, salts and organic materials, or other substances that may be deleterious to concrete or steel.

ADMIXTURES:

Admixtures shall be subject to prior approval by the Engineer. The admixtures shall be capable of maintaining essentially the same composition and performance throughout the work.

Plasticizing admixtures shall be free from chlorides and shall conform to ASTM C494. The admixtures shall be used in concrete mixtures in accordance with the manufacturer's instructions.

Use POSSOLITH 3R or DARATARD 17 or approved equal in the amounts as recommended by the manufacturer, with the approval of the Architect.

Air-entraining admixtures - DAREX AEA or approved equal to improve workability or durability of concrete mixes.

Accelerators - DAREX SET ACCELERATOR or approved equal.

Water Reducing Retarders - DARATARD 17 or approved equal.

Integral Waterproofing Compound - SIKA or approved equal. For canopy slab. Use one kilo pack per forty kilo bag of Portland cement.

Calcium chloride is not allowed. Secure approval of the Engineer prior to using any other additives.

B. EPOXY BONDING COMPOUND:

ASTM C881, 2-component materials suitable for use on dry or damp surfaces; material type, grade and class to suit project requirements. For bonding new to old concrete, repair of cracks, bonding grout.

NOTE: Placement Drawings: Shop drawings of each reinforcing steel detail and placement drawings shall be submitted for approval in accordance with the requirements of the General Conditions. Any material fabricated before final approval of the shop drawings will be done at the Contractor's risk, but no material shall be placed until shop drawings have final approval. Shop drawings shall be in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI 315).

03350: POLISHED CONCRETE FINISHING:

Kuma Concrete KPS 5-PENTRA- SIL HD

HARDENER/DENSIFIER + HIGH-SPEED BURNISHING

POLISHED CONCRETE VS OTHER FLOORING SOLUTIONS

	Wall-to-wall Carpet	Vinyl or Linoleum	Ceramic Tile	Wood or Wood Laminate	Polished Concrete
Available in a wide spectrum of design options	Yes	Yes	Yes	Yes	Unlimited
Longevity and performance options	Poor	Good	Good	Good	Excellent
Ease of maintenance	Poor (needs frequent vacuuming; stains easily)	Good	Good (linoleum may need occasional waxing)	Good	Excellent
Can radiate heat and store solar energy	No	No	No	No	Yes
Vulnerable to humidity and moisture damage	Yes	No	Yes	Yes	No
Average lifecycle cost	High	Low	Intermediate	Intermediate	Extremely low

NANO LITHIUM (KUMA CONCRETE) VS SODIUM (OTHER)

- ✔ Dust-proofer
- ✔ Resistant to stain, abrasion and deterioration
- ✔ Environmentally friendly
- ✔ Easy to maintain
- ✔ Stronger and more impenetrable
- ✔ Easy one coat application
- ✔ Can be applied on fresh concrete, newly troweled and tilt-up construction slab
- ✔ No white salty spots visible after application
- ✔ Will create immediate sheen on surface

- ✔ Dust-proofer
- ✖ Extensive maintenance program is required during the first 6-12 months, to keep surface free from damage and satin
- ✔ Environmentally friendly
- ✖ Sodium and potassium causes Alkali Silica Reaction (ASR) and results micro-cracking after 12 months or so.
- ✖ White crystal, salty spots are common on surface after& application
- ✖ Sheen will develop only after extensive use and washing

03400: ARCHITECTURAL PRECAST CONCRETE

MOLD MATERIALS: Metal, plastic or wood that is non-reactive with concrete and will produce required finish surface.

REINFORCING MATERIALS:

1. Reinforcing bars: ASTM A 414 MPA, Grade 60 deformed.
2. Reinforcing bars: ASTM A 420 MPA, Grade 60 deformed.
3. Steel-Welded Wire Fabric: ASTM A 185, plain, cold drawn.

C. CONCRETE MATERIALS:

1. Portland Cement: ASTM C 150, Type 1. Use only one brand, type, and color of cement from the same mill throughout Project.

2. Normal-Weight Aggregates: ASTM C 33, with coarse aggregates meeting Class 5S and MNL-117 requirements.

a) Face-Mix Coarse Aggregates: Selected, hard, and durable; free of materials that reacts with cement or causes staining. Uniformly graded.

b) Face-Mix Fine Aggregates: Selected, natural or manufactured sand of the same material as coarse aggregate, unless otherwise acceptable to the Architect.

3. Coloring Agent: C 979, synthetic, mineral oxide pigments or colored water-reducing admixtures, color-stable, non-fading, resistant to lime and other alkalis.

4. Water: potable; free from deleterious material that may affect color stability, setting, of strength of concrete.

5. Air-entraining Admixture: ASTM C 260, certified by the manufacturer to be compatible with other required admixtures.

6. Water-Reducing Admixture: ASTM C 494, Type A.

7. Retarding Admixture: ASTM C 494, Type B.

D. CONNECTION MATERIALS:

1. Steel Shapes and Plates: ASTM A 36M.

2. Malleable Iron Castings: ASTM A 47M

3. Carbon Steel Plates: ASTM A 283M.

4. Carbon-Steel Bolts and Studs: ASTM F 568, Property Class 4.6; carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.

5. Welded Headed Studs: AWS D1.1, Type B headed studs, cold-finished carbon-steel bars.

6. Deformed-Steel Wire Bar Anchors: ASTM A 496.

7. Welding Electrodes: Comply with AWS standards.

8. Accessories: Provide clips, hangers, plastic shims, and other accessories required to install architectural pre-cast concrete units.

E. BEARING PADS: Elastomeric pads; AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 shore A durometer, minimum tensile strength 15.5 Mpa (2250 psi) per ASTM D 412.

F. GROUT MATERIALS: Cement Grout; Portland Cement, ASTM C 150, Type 1 and clean, natural sand, ASTM C 404. Mix at a ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

G. CONCRETE MIXES:

1. Normal-Weight Concrete Face and Back-Up Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, using materials to be used on the Project, to provide normal weight concrete with the following properties:

a) Compressive Strength (28-day): 20.7 Mpa (3000 psi).

b) Maximum Water-Cement Ratio at Point of Placement: 0.40.

2. Lightweight Concrete Back-Up Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.2, using materials to be used on the Project, to provide lightweight concrete with the following properties:

a) Compressive Strength (28-day): 34.5 Mpa (5000 psi).

b) Unit Weight: Calculated equilibrium unit weight of 1842 kg/cum (115 lb/cuft), plus or minus 48 kg/cum (3lb/cuft), according to ASTM C 567.

SikaGrout®-212

GENERAL PURPOSE CEMENTITIOUS GROUT

PRODUCT DESCRIPTION

SikaGrout®-212 is a one-component, ready to mix, free flowing, non-shrink, cementitious grout with a unique 2-stage shrinkage compensating mechanism.

USES

- General purpose grouting
- Machine and column base plates
- Anchor rods, bearing plates
- Ram in place as a dry pack
- Trowel-apply as a medium flow
- Pour or pump as high flow
- Bedding joints in pre-cast concrete sections
- Filling cavities, voids, gaps and recesses
- On grade, above and below grade
- Indoors and out

CHARACTERISTICS / ADVANTAGES

- Easy to use (ready to mix powder)
- Shrinkage compensated properties in both the plastic and hardened states
- Multiple fluidity with a single component
- Good bond to concrete
- Non-metallic, will not stain or rust
- Contains no chloride
- Blend of shrinkage-reducing and plasticizing/water-reducing agents
- Low heat build-up
- Excellent for pumping: does not segregate, even at high flow. No build-up on equipment hopper
- Superior freeze/thaw resistance
- Resistant to oil and water

APPROVALS / STANDARDS

- Meets ASTM C-1107 (Grade C)
- Shows positive expansion when tested in accordance with ASTM C-827
- SikaGrout®-212 is USDA certifiable

PRODUCT INFORMATION

Chemical Base	Cement, selected fillers and aggregates, special additives
Packaging	50 lb (22.7 kg) bag
Appearance / Color	Gray powder
Shelf Life	12 months from date of production if stored properly in original, unopened and undamaged sealed packaging
Storage Conditions	Store dry at 40–95 °F (4–35 °C) Protect from moisture. If damp, discard material

TECHNICAL INFORMATION

Compressive Strength		**Plastic**	**Flowable**	**Fluid**	(ASTM C-942) 73 °F (23 °C) 50 % R.H
	1 day	4,500 psi (31 MPa)	3,500 psi (24.1 MPa)	2,700 psi (18.6 MPa)	
	7 days	6,100 psi (42 MPa)	5,700 psi (39.3 MPa)	5,500 psi (37.9 MPa)	
	28 days	7,500 psi (51.7 MPa)	6,200 psi (42.7 MPa)	5,800 psi (40 MPa)	
Flexural Strength	28 days	1,400 psi (9.6 MPa)	1,200 psi (8.2 MPa)	1,000 psi (6.8 MPa)	(ASTM C-293) 73 °F (23 °C) 50 % R.H
Splitting Tensile Strength	28 days	600 psi (4.1 MPa)	575 psi (3.9 MPa)	500 psi (3.4 MPa)	(ASTM C-496) 73 °F (23 °C) 50 % R.H
Tensile Adhesion Strength	28 days	2,000 psi (13.7 MPa)	1,900 psi (13.1 MPa)	1,900 psi (13.1 MPa)	(ASTM C-882 modified) 73 °F (23 °C) 50 % R.H
Expansion	28 days	+0.021 %	+0.056 %	+0.027 %	(ASTM C-1090) 73 °F (23 °C) 50 % R.H.

APPLICATION INFORMATION

Mixing Ratio

Plastic	**Flowable**	**Fluid**
6 pt	6.5 pt	8.5 pt

Coverage

0.44 ft³ (0.01 m³) at fluid consistency

(Coverage figures do not include allowance for surface profile and porosity or material waste)

Layer Thickness

Min.	**Max.**
1/2" (12.7 mm)	4" (101.6 mm)

Thicker applications can be achieved. Contact Sika® Technical Services Department for further information.

Flowability

Plastic[1]	**Flowable**[1]	**Fluid**[2]	(ASTM C-1437[1] ASTM C-939[2])
100–124 %	124–145 %	20–40 sec	

Product Temperature

65–75 °F (18–24 °C)

Ambient Air Temperature

> 45 °F (7 °C)

Substrate Temperature

> 45 °F (7 °C)

Pot Life

~15 minutes

As the temperature will affect the pot life, application temperature:
- Above 73 °F (23 °C) will reduce the pot life and flow
- Below 73 °F (23 °C) will extend the pot life and flow

Set Time	**Plastic**	**Flowable**	**Fluid**	(ASTM C-266) 73 °F (23 °C) 50 % R.H
Initial	3.5–4.5 h	4.0–5.0 h	4.5–6.5 h	
Final	4.5–5.5 h	5.5–6.5 h	6.0–8.0 h	

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

- Remove all dirt, oil, grease, and other bond-inhibiting materials by mechanical means.
- Anchor bolts to be grouted must be de-greased with suitable solvent.
- Concrete must be sound and roughened to a CSP 4 or higher to promote mechanical adhesion.
- Prior to pouring, surface should be brought to a Saturated Surface Dry (SSD) condition.
- Steel should be cleaned and prepared thoroughly by blastcleaning to a white metal finish.
- Follow standard industry and Sika® guidelines for use as an anchoring epoxy.
- Where grout-tight form is difficult to achieve, use SikaGrout®-212 in dry pack consistency.

FORMING

- For pourable grout, construct forms to retain grout without leakage.
- Should be lined or coated with bond-breaker for easy removal.
- Should be sufficiently high to accommodate head of grout.

MIXING

- Pour the water in the recommended proportion into a suitable mixing container.
- While mixing slowly, add the powder to the water.
- Mix thoroughly for 3 minutes with low speed (< 500 rpm) hand drill mixer to avoid entraining too much air and until homogenous with no lumps.

EXTENSION WITH AGGREGATES

- For deeper applications (plastic and flowable consistancy only), 25 lbs. of 3/8" (9.5 mm) coarse aggregate can be added.
- The aggregate must be non-reactive (reference ASTM C-1260, C-227 and C-289), clean, well graded, saturated surface dry, have low absorption and high density, and comply with ASTM C-33 size number 8 per Table 2.
- Variances in aggregate may result in different strengths.
- Add pea gravel after the water and SikaGrout®-212.

APPLICATION

- Within 15 minutes after mixing, place grout into forms in normal manner to avoid air entrapment.
- Vibrate, pump, or ram grout as necessary to achieve flow or compaction. SikaGrout®-212 must be confined in either the horizontal or vertical direction leaving minimum exposed surface.
- SikaGrout®-212 is an excellent grout for pumping, even at high flow.
- For pump recommendations, contact Technical Service.
- After grout has achieved final set, remove forms, trim or shape exposed grout shoulders to designed profile.

CURING TREATMENT

Wet cure for a minimum of 3 days or apply a curing compound which complies with ASTM C-309 on exposed surfaces.

CLEANING OF TOOLS

Clean all tools and application equipment with water immediately after use.

LIMITATIONS

- Not to be used as an overlay in unconfined spaces
- Not to be used as a patch repair
- Avoid application in direct sun and/or strong wind
- Apply only to sound, prepared substrate
- Do not add additional water after application as this may cause cracking
- Protect freshly applied material from freezing and frost
- Keep exposed surfaces to a minimum
- As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur® Hi-Mod 32.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

LOCAL RESTRICTIONS

Note that as a result of specific local regulations the declared data and recommended uses for this product may vary from country to country. Consult the local Product Data Sheet for the exact product data and uses.

ECOLOGY, HEALTH AND SAFETY

Keep container tightly closed. Keep out of reach of children. Not for internal consumption. For industrial use only. For professional use only. For further information and advice regarding transportation, handling, storage and disposal of chemical products, users should refer to the actual Safety Data Sheets containing physical, ecological, toxicological and other safety related data. Read the current actual Safety Data Sheet before using the product. In case of emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

DIRECTIVE 2004/42/CE - LIMITATION OF EMISSIONS OF VOC

0 g/L (EPA Method 24)

Construction

SikaGrout-215

Pumpable Shrinkage Compensated Cementitious Grout

Description

SikaGrout-215 is a shrinkage compensated self levelling, cementitious grouting mortar with extended working time to suit local temperature.

Uses

SikaGrout-215 is suitable for repairs to concrete structures and the following grouting works with clearance of 10mm or more:

- Machine foundations
- Rail beds
- Columns in Precast construction
- Concrete anchors
- Bridge bearings
- Cavities
- Gaps
- Recesses

Characteristics / Advantages

- Highly early strength
- High ultimate strength
- Extended working time
- Dense, non-shrink
- Non-toxic, non-corrosive
- Chloride and iron-free
- High final strength

Instruction for Use

Surface Preparation

Surface Preparation
Concrete surfaces should be clean, sound and free from oil, grease, cement laitance and all loosely adhering particles. Metal surfaces (iron and steel) should be free from scale, rust, oil and grease. Absorbent substrates must be saturated thoroughly, but there should be no standing water.

Mixing
The pre-mixed powder is added to water to suit the desired consistency. For flowable consistency, approximately 4.2 litres of water per bag is required. Mix mechanically for 2-3 mins with a slow speed drill (max. 500 RPM) until a smooth even consistency is achieved.

Application
After mixing, allow the mortar to rest for a while, stirring lightly to ensure that air displayed by the grouting is allowed to escape. When carrying out base plate grouting, ensure that sufficient pressure head is maintained to keep mortar flow uninterrupted. Make sure that the necessary formwork is firmly in place and kept water light. SikaGrout-215 may be placed in thickness up to a maximum of 50mm at one pour.Where large areas are to be placed, it is important to maintain a continuous flow throughout. It is necessary to organize the work sequence properly (manpower, materials, etc.) to ensure an uninterrupted flow. In such large areas, SikaGrout-215 may also be pumped. A heavy duty diaphragm pump is recommended for this purpose. Screw feed and piston pumps may also be used.

Specific Application
Grouting under base plate: Use flowable consistency
Grouting Anchor bolts: Use trowellable consistency
Grouting large volumes: For sections thicker than 50mm it is necessary to fill the SikaGrout-215 with graded 10mm **sil**t-free aggregate to minimize temperature rise. The quantity of aggregate should not exceed 1-part SikaGrout-215 by weight. For such mixes, a conventional concrete mixer and pump may be used.

Cleaning
Clean all tools and equipment with water immediately after use. Hardened mortar can only be mechanically removed.

Construction

Important Recommendations	Use SikaGrout-215 for repairs to concrete structure and grouting only. Minimum Gap: 10mm Maximum Gap: 50mm Minimum Application Temperature: 10 0C At temperature lower than 20 0C setting time and strength gain will be slower. Cure exposed mortar surface for at least 3 days with Anitsol curing compound or use other approved curing methods.

Coverage/Consumption (approx.)			
SikaGrout	1.84 kg	25 kg	74 x 25 kg bag
Water (Litre)	0.31	4.2	309
Volume Mortar	1 lit.	13.6 lit.	1 m3

Performance	Flow (British Standard Cone): 280 - 320 mm after 3 minutes 260 - 300 mm after 30 minutes (Keep on stirring slightly) Comprehensive Strength in MPa (N/mm2): (Water content: 4.2 liters/25 kg bag. Testing & storge at 25 0 C under water) 1 day 38 3 days 45 7 days 55 28 days 70

Technical Data

Form	Powder
Color	Grey
Bulk Density	1.64 kg/l
Wet Density	2.10 - 2.20 kg/l
Storage Condition	Store in a dry place
Shelf Life	12 months when unopened

Legal Notice

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

Construction

Sikadur®-752

Low Viscosity Epoxy Resin Injection

Product Description	A solvent-free, 2-component super low viscosity-liquid, based on high strength epoxy resins. Specially for injecting into cavities and cracks in concrete. Complies with A.S.T.M C 881-78 Type I, Grade 1, Class B + C	
Uses	To fill and seal cavities and crack in structural concrete such as columns, beams, foundations, decks and water-retaining structures.	
Advantages	■ Tenacious crack sealing grout ■ Super – low viscosity ■ Suitable in both, dry and damp conditions ■ High mechanical and adhesive strength ■ Hard, but not brittle ■ No shrinkage	
Coverage	Theoretical yield is 9.25 litres / 10 kg set	
Technical Data		
Colour	Yellowish	
Mix Ratio	Comp. A : B = 2 : 1 by weight/volume	
Mix Density	Approx. 1.08 kg/l	
Viscosity	180 ± 25 cps	
Pot Life 30° C	35 minutes	
Tensile Strength 28 days	270 kg/cm^2	(ASTM D-638)
Flexural Strength 28 days	40 N/mm^2	(ASTM D-790)
Bond Strength		
To concrete, 28 days	>20 kg/cm^2 (concrete failure, over mechanically prepared concrete surface)	
To steel, 28 days	>90 kg/cm^2 (steel surface blast cleaning to SA 2 ½)	
Compressive Strength		(ASTM D-695)
7 days	62 N/mm^2	
28 days	64 N/mm^2	

Construction

Modulus Of Elasticity	10,600 kg/cm^2
Coefficient of thermal expansion	89 x 10^{-6} per ° C (-20°C to +40° C)
Shelf Life	2 years when unopened
Packaging	10 Kg set
Storage	Dry, cool, shaded place

Instruction for Use

Surface Preparation	Surface must be clean and sound. It may be dry or damp, but free of standing water.
Mixing	Pre-mix each component. Proportion 2 part Component A to 1 part Component B into a clean pail. Mix thoroughly for 3 minutes with a paddle on low - speed (400-600 rpm) drill until uniformly blended. Mix only quantity that can be used within its pot life.
Application	To gravity feed crack – pour Sikadur®-752 into vee-notched crack until completely filled. To pressure inject cracks – use automatic injection equipment or manual method. Seal parts and cracks with Sikadur®-731, after cured inject Sikadur 752 with steady pressure.
Limitations	Maximum crack width 5.0 mm. Minimum age of concrete must be 28 days prior to application
Caution	Wear protective clothing , goggles, gloves and or barrier cream. In case of contact with skin, wash plenty of water immediately and consult a physician.
Handling Precautions	■ Avoid contact with skin and eyes ■ Wear protective gloves and eye protection during work ■ If skin contact occurs, wash skin thoroughly ■ If in eyes, hold eyes open, flood with warm water and seek medical attention without delay

Legal Notes

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04 00 00 MASONRY

04000 MASONRY

04100: MORTAR

A. PORTLAND CEMENT: Use only one brand of cement throughout. Portland cement shall conform to the Standard Specifications for Portland Cement (ASTM Designation C-150 latest revision) for type 1 Portland Cement.

SAND: ASTM C 35 – 67, clean, washed river sand, strong, free from organic and other deleterious materials. Sand from salt water or lahar is not allowed.

WATER: Fit for drinking, free from injurious amounts of oil, acids, alkali, organic materials and other deleterious substances.

CONCRETE MORTAR COMPRESSIVE STRENGTH: (f'c) = 13.8 Mpa (2000 psi).

ADHESIVE MORTAR: Use adhesive mortar for laying vitrified ceramic tiles, with dispersion compound as an additive to adhesive mortar.

GROUT: Use grout premixed drywall filler for floor and wall tile joints either glazed or semi-glazed tiles. Masonry concrete grout compressive strength (fc') = 13.8 Mpa (2000 psi). For tile works.

PLASTER BOND: 25mm smooth sand cement plaster finish on both sides for S2 & S3 Exterior Walls.

MORTAR TOPPING & PLASTER REINFORCING FIBER: For plaster works thicker than 25mm (1") and for mortar topping over membrane waterproofing for roof decks and balconies.

3-5mm Thk high-Performance Acrylic Render (Konstrukt Permaplast K 222 Render or equivalent) for all exposed beams and columns.

04200: UNIT MASONRY

CONCRETE HOLLOW BLOCKS (CHB):

1. Use 150 mm x 200 mm x 400 mm (6" x 8" x 16") and 100 mm x 200 mm x 400 mm (4" x 8" x 16") Non-Load Bearing Concrete Hollow Block Units of standard manufacture, machine vibrated with even texture and well defined edges, steam-cured, conforming to PNS16 Type 1, Class A, with a minimum compressive strength of 2.5 MPa (350 psi) for building exterior and interior walls and septic tank retaining wall around open court and wherever else specified. Note: For interior walls, use 4" CHB from floor to bottom of slab or bottom of beam, with 10mm dia. reinforcing bars at 600 mm o.c. bothways. Anchor to floor by embedding vertical bars 75mm deep into the floor slab. Anchor to slab or beam by providing 10mm dia. dowels. Provide stiffener columns and beams as required in the general notes.

REINFORCING BARS: Masonry reinforcing steel yield strength (fy) =228 Mpa (33,000 psi), Grade 33 bars, conforming to ASTM Specifications A615 / PNS 49 of sizes shown in Plans. Use standard sizes; upgrade to next bigger size if specified standard sizes are unavailable.

TIE WIRES: Gauge 16 Galvanized Iron (G.I.) tie wires.

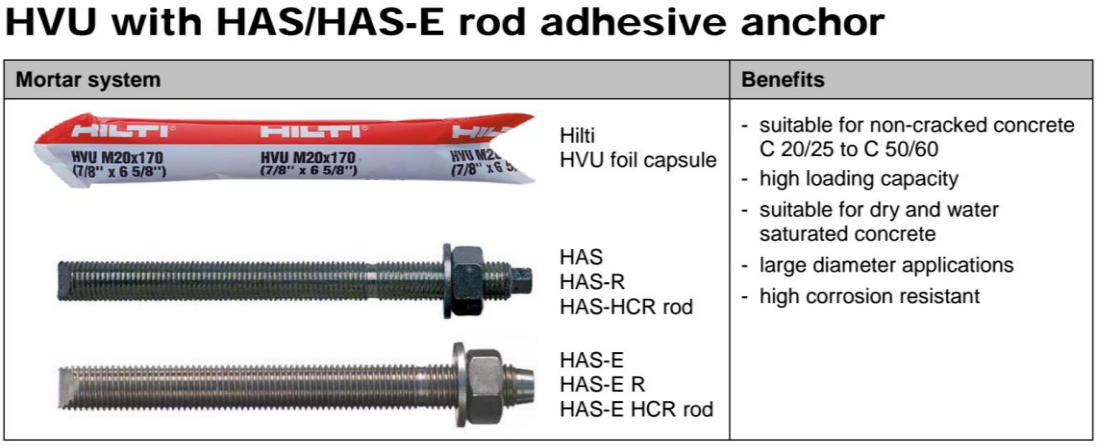
05 00 00 METALS

05000 METALS

05090 Metal Fastenings

05090 Anchor rod, with HVU Adhesive

PRODUCT: Hilti HVU HAS-E M8X80/54 with HAS-E rod adhesive anchor or equivalent



05100: STRUCTURAL STEEL

Owner/Architect – approved manufacturer/sub–contractor. Conform all materials and workmanship to the requirements of the American Institute of Steel Construction "Specifications for Design, Fabrication and Erection of Structural Steel for Buildings" as amended to date or as may be specifically modified by the drawings or by these Specifications.

PLATES, SHEETS AND CONNECTORS: Conform to ASTM Designation A36 with specified yield point of 248 MPa (36,000 psi). From mild steel sheets or plates with standard thickness, size, shape and design as indicated in the plans. For miscellaneous stiffener, bearing anchorage and connector plates or straps. Upgrade to next higher / bigger size and thickness if specified sizes & thicknesses are unavailable.

A. Weathering steel roof and wall -

1. 4'X8'X 3mm Atmospheric Corrosion Resistant Plates (COR-TEN steel) for Wall type EPW-06 & EPW-07
2. 4'X8'X 6mm Atmospheric Corrosion Resistant Plates (COR-TEN steel) for Wall type EPW-05
3. 4'X8'X 12mm Atmospheric Corrosion Resistant Plates (COR-TEN steel) for Planter Boxes @ Multi Purpose Roof Top

B. Hollow Steel Section (HSS) - Galvanized Gauge 40

STANDARD SOLID SECTION: Conform to ASTM A36 with specified yield point of 248 MPA (36000 psi). Mild steel angles, flat bars, square bars, channels, U and other sections. For structural steel trusses, purlins, building eaves framing, overhead anchorage of roll-up doors, grillworks, miscellaneous fabricated mounting brackets, straps, dowels, frames and connectors. Upgrade to next higher/bigger size and thickness if specified sizes and thickness are unavailable.

HIGH STRENGTH BOLTS, NUTS AND WASHERS: Conform bolts to the Specification for High Strength Bolts ASTM A 325, Type 1. See structural connection details for location of bearing-type and friction-type bolts.

ANCHOR BOLTS:

1. 12 Ø 150mm Length Anchor Bolt ASTM A325N Bolts with Nut and washer
2. 16Ø x 100mm Wedge Expansion Bolt
3. 10mmØ x 3" High Tensile Hex Machine Bolt, w/ Nut and Washer

WELDING ELECTRODES: Conform welding electrodes to AWS D1.1:2000 Structural Welding Code – Steel, E-60XX for structural welding.

GROUT: Conform non-shrink grout to ASTM C827. Grout shall be non-metallic. Use Non-shrink flowable cementitious grout. Apply using manufacturer's standards strictly.

G. STRUCTURAL STEEL PRIMER PAINT: Epoxy zinc chromate primer except as otherwise recommended by the manufacturer of the coating for all structural steel surfaces.

H. FIRE COVER: Cementitious Fireproofing System. Refer to Section 07251 Sprayed-On Fireproofing, whenever necessary.

05200: MISCELLANEOUS METALS

A. STANDARD SOLID SECTION: Conform to ASTM 611 with specified yield point of 228 Mpa (33,000 psi). Mild steel flat bars, square bars, overhead anchorage of roll-up doors, grill work, miscellaneous fabricated mounting brackets, straps, dowels, frames and connectors. Upgrade to next higher / bigger size and thickness if specified sizes & thickness are unavailable.

B. BRACING RODS: Standard structural grade steel rods with turnbuckles whenever required ex. for roof framing.

C. PAINTING: Epoxy Resin Bonding Agent, Solvent-Free,Thixotopic, 2-component strucutral epoxy resin adhesive[Sikadur 752,5kg/set or equivalent] for all architectural steel components only. For field painting, use only approved epoxy paint.

E. STAINLESS STEEL: Pipes, tubes, square bars, and other sections. Manufactured and installed with guarantee. Provide shop drawings for approval by the Architect before fabrication/installation.

a. Roof Gutter: 1.2 mm (gauge 18) thick, Stainless Steel Sheets, Type 304 bent to design shape. For all other gutters aside from RC gutters. To be approved by Architect before installation
b. RC Precast Anchors: 10mm Stainless Steel Plain Bars
c. Stair, ramp and corridor railings.
d. Grab bars for toilets (where applicable).
e. Note: Upgrade to next bigger size if specified standard sizes are unavailable.

F. GALVANIZED IRON:

1. Yard Hose Bibbs: G.I. Pipes: schedule 40, painted with Epoxy Enamel Paint.

a. Hangers: Gauge 10 G.I. wire hanger.
b. Laundry Rods: Provide 6 laundry rods spaced 6 inches apart on the level of the balcony railing such that laundry is properly ventilated and concealed by railings.

G. BRASS NOSING: 3 mm thk. x 38 mm wide brass nosing for every stair tread and for every change in floor elevation, unless otherwise indicated or any approved equivalent by architect.

H. FASTENINGS: Commercial types, except where special types are shown or required. Fastenings for all exterior work shall be non-ferrous, unless otherwise shown. Fastening for stainless steel and aluminum and other interior work, where exposed shall match the fastened metal.

I. STRUCTURAL METAL FRAMING :

1. W10X45 @12m Wide Flange Structural Metal Framing ASTM A992 for elevator shaft.
2. W10X45 @12m Wide Flange Structural Metal Framing ASTM A992 for elevator beam and column.

06 00 00 WOOD AND PLASTICS

06100: ROUGH CARPENTRY

Note: For K.D. Tanguile, plywood inner sides and for cut ends of Apitong joints, nailers, and framings, supplever called for, with size, shape and type to ensure a rigid connection for laminated items and at cabinet framing joints.

06200: FINISH CARPENTRY (See 9.02 and 9.03 for all DRYWALL and CEILING Finishes)

Lumber:

GUIJO: quarter-sawn, sound and free from imperfections impairing its strength and finish. Kiln-dried (max. moisture content: 12%), with the same shade and color for assemblies or sets of assemblies, warp-free, treated, S4S and fine sanded lumber. For louver slats of doors and edgings, when required.

MEDIUM DENSITY FIBERBOARD (MDF): 19mm (3/4”). For free span shelves, and for miscellaneous components of cabinets, overhead cabinets and closet housing; for all doors and exposed and unexposed sides of closets and kitchen cabinets/overhead cabinets.

FIBER CEMENT BOARD: Use 6mm thick for ceiling boards and backing of mirrors; 9mm thick for wall boards; 1200 mm x 2400 mm. Install as per manufacturer’s instructions.

FIBER CEMENT SOFFIT: Wood-grain, 300mm wide x indicated length. Install and paint per manufacturer’s instructions. Fixings shall be rust-proof screws or nails. For all roof eaves or any approved soffit material by architect

HARDWARE AND FASTENERS: Use metal nails, screws, plates, straps, miscellaneous fasteners or anchorage; concealed or countersunk whenever called for, with size, shape and type to ensure a rigid connection for laminated items.

ASSEMBLY MATERIALS: Approved water-resistant glue, and nails, screws and bolts of appropriate type, shape and size for all types of joints.

TRADEMARK: Each separate lumber piece or assembly is required to bear an official mark of the millworks supplier.

06220.B1 PRESSURE TREATED TIMBER SLATS

The treated timber should be sourced from a FSC certified or equivalent certification that ensures the sustainability of the forest the timber is sourced from.

PRODUCT:

1. Finnwood or equivalent 21x45 Pressure Treated Pine (Pinus sylvestris) for exterior wall finish.
2. Finnwood or equivalent 21x46 Pressure Treated Pine (Pinus sylvestris) for multi function hall.
3. Finnwood or equivalent 48x200mm Finnwood Natural Laminated Structural Beam include painting of extra durable woodstain UV and water resistant (SADOLIN EXTRA Durable wood protection-UV with dark brown sayin or equivalent)
4. Finwood or Equivalent 75x225mm Polarwood Treated Natural Sawn Rough Planks include painting of extra durable woodstain UV and water resistant (SADOLIN EXTRA Durable wood protection-UV with dark brown sayin or equivalent)
5. Finwood or Equivalent 47x147mm Polarwood Treated Natural Sawn Rough Planks include painting of extra durable woodstain UV and water resistant (SADOLIN EXTRA Durable wood protection-UV with dark brown sayin or equivalent)
6. Finwood or Equivalent 47x150mm Polarwood Treated Natural Sawn Rough Planks include painting of extra durable woodstain UV and water resistant (SADOLIN EXTRA Durable wood protection-UV with dark brown sayin or equivalent)

07 00 00THERMAL AND MOISTURE PROTECTION

07100: WATERPROOFING AND DAMPPROOFING

Apply with surface preparation, methods application and density as per manufacturer's specifications. To be installed only by authorized Applicator with guarantee.

WATERPROOFING COMPOUND: Applied as per manufacturer's specifications for all concrete sub-roofs, concrete gutters and suspended floor toilets.

FLUID APPLIED WATERPROOFING. Synthetic rubber, cold-vulcanized, liquid applied waterproofing membrane. Applied 1mm thick following manufacturer's specifications; for positive application on concrete gutter and planter boxes, with 3m8mm conc. topping, to be installed only by authorized Applicator or by the Architect's approved applicator.

SINGLE PLY WATERPROOFING MEMBRANE: Pre-formed, self-adhesive rubberized bitumen with cross-laminated PVC plastic facing, for suspended toilets; at least 6mm bituminous Sheet waterproofing for all decked Roof tops structure 1 entrance, and cantilevered staircase; May use Paraflex Brand, Elmich Polyflex 180 or approved equal

EXPOSED TYPE LIQUID MEMBRANE WATERPROOFING: Single pack liquid rubber compound for concrete ledges.

ICE & WATER SHIELD or approved equal: Underlay Waterproofing Membrane – self-sealing and self-adhering rubberized membrane for all concrete deck roofs and canopies.

EPOXY SYSTEM WATERPROOFING: Fabric-reinforced, Hi-Built, food-grade, epoxy-based lining for slabs and walls of cistern.

TORCH-ON WATERPROOFING MEMBRANE: Sika Bituseal T-140SG or equivalent 4mm Thk, Torch-on, Sheet Waterproofing membrane based on APP modified, reinforced bitumen, with sand broadcast surface,include laps and seams on Bituminous Primer[Shell Flintkote Black Primer or equivalent]

POLYESTER FLEECE WITH LIQUID APPLIED MEMBRANE: 4 coats Liquid Applied Roof Waterproofing with Fleece Reinforcement Mesh (Sikalastic 560 with Fleece or equivalent, quantity includes edge seams and overlaps)

DAMP-PROOFING: Vapor barrier, one layer at six mils (0.006) thick. For slabs on fill at the building interior. Provide 300 mm overlapping.

WATERSTOP: PVC, for all concrete joints wall and floor construction below grade.

07130 LIQUID PAINT FILM WATERPROOFING

PRODUCT

Castle PME-901 and PME-202 or equivalent

1.00 PRODUCTS SPECIFICATION

The product shall comply with the JIS standard and must have the certificate or testing result.

1.01 MACRO-MOLECULAR POLYMER (PRIMER) – Macro-Molecular Polymer, Mortar Intensifier mix with water with the ratio of 1:1.5 (1 gallon of Primer mix with 1.5 gallon of water) (4kg/gallon) PME-901 or equivalent

Area Coverage : 1 gallon of PME 901 = 30 to 40 m2 (single coat only)

1.02 MULTI-COPOLYMERIZED RESIN – Shall be use to waterproof and seal all leaks. Multi-Copolymerized resin/Adhesive, Non-toxic and Non-flammable (4kg/gallon), PME-202 or equivalent with area coverage of 4 square meter per one (1) gallon of PME-202. Three (3) coatings of 1.0 to 1.20mm thick or equivalent to.

Technical Data:

Adhesion to Surface : 18 kg/cm2 (JIS.K6848)
Pulling Resistance force : 29kg/cm2 (JIS.K6301)
Tensibility Ratio : Above 450% (JIS.K6301)
Permeability test : 13.7mg/cm2 (JIS.Z0208)
Main Content : Multi-Copolymerized Resin

Materials: Shall be 100% rubber.
Elongation/Tensile Strength: Shall be at least 400 to 650% elongation.
Adhesion: Shall meet the minimum requirements per JIS.K6848.

2.00 EXECUTION (Concrete wall)

2.01 Ensure that the area to receive waterproofing has a smooth finish. New concrete must be properly water
2.02 For old concrete, remove dust, dirt, and other deleterious substance just before and during application.
2.03 Rectification of visible concrete cracks. (Concrete crack that is 2mm to 3mm wide should be rectify)
2.04 Apply mortar intensifier (To be mixed with cement and fine sand.)
2.05 Areas to receive to waterproofing should be dry prior to priming.
2.06 Apply clear macro-molecular polymer as primer and to waterproof concrete. cured for at least 14 days. Surfaces must be completely dry at the time of application.
2.07 Application of 1st
Drying Time: Outdoor – 40 minutes. to 1 hour Indoor – 2 hours onward
2.08 Application of 2nd
Drying Time: Outdoor: 1 hour Indoor : 2 hours onward
2.09 Application of 3rd coat of multi-copolymerized resin PME-202 or equivalent
Drying Time: Outdoor: 1 hour Indoor : 2 hours onward
(Application 4th coat of multi-copolymerized resin PME-202 or equivalent coat of multi-copolymerized resin PME-202 or equivalent coat if necessary or If required) Drying Time: Outdoor: 1 hour Indoor : 2 hours onward
2.10 Leave the site clean, tidy and in order.

07210: BUILDING AND ROOFING INSULATION

A. For inaccessible concrete roof deck of machine room and main stairways: Use extruded polystyrene board covered with 60mm concrete topping. Installation by Architect-approved manufacturer, with guarantee.

B. METAL ROOFING INSULATION: Thermal Barrier INSULATION. For all metal roofing, installed directly under timber purlins.

1. Thermal Barrier INSULATION
2. G.I. Strap Liner
3. G.I. Tie Wire
4. G.I. Screw

07210.E2 50mm x 1200mm x 15000mm Roof Thermal and Acoustic Glass Fiber Batt Insulation include attachments to roof sheathing

PRODUCT: SCG TMA50 Thermacoustic Insulation or equivalent

TECHNICAL PROPERTIES: Density 24Kg/m³, Thickness 75mm, Size: 600mmx100m, K-Value 0.035 W/m.K, R-Value 2.1 m².K/W

INSTALLATION (SCG or equivalent):

07210.E2 50mm Wall Thermal and Acoustic Glass Fiber Batt Insulation

A non-combustible, lightweight Green-3 glass wool batt insulation.

PRODUCT: SCG TMA50 Thermacoustic Insulation or equivalent

TECHNICAL PROPERTIES: Density 24Kg/m³, Thickness 50mm, Size: 400mmx100m, K-Value 0.035 W/m.K, R-Value 1.4 m².K/W

INSTALLATION (SCG or equivalent):

Stage 1. Install the galvanized ceiling and floor tracks. Then install the vertical galvanized metal studs. Make sure these are installed straight before final fixing. Install a horizontal stud when building the galvanized wall this will help when installing the Thermacoustic™ in Stage 3.

Stage 2. Install SCG Smartboard or similar to one side of the wall. Install from the bottom to the top and stagger each board.

Stage 3. Lay Thermacoustic™ on a flat surface measure and cut to length. Measure the Thermacoustic™ slightly larger than needed as to hold itself in place. Install from the bottom to the top of the wall.

Stage 4. Finally install the 2nd side of SCG Smartboard or similar to the stud, making sure adequate fixings are used to hold the SCG Smartboard in place.

DRAINAGE SHEET AND FILTER

When necessary, use Drainage Sheets and Geotextile Filter to cover all underground exterior walls and slabs fastened Hilti DX 36M with 6.8/11 yellow cartridge case with DN 37 P 8 nail and washer or equivalent. Use stop pins, or Butyl on sheeting overlaps and DELTA-MS Profile or equivalent on top edge of sheeting; Installation by Architect-approved manufacturer with guarantee.

7.04 PROTECTION BOARD:

4.5mm (3/16”) thick Fiber cement board for basement walls on positive applied membrane waterproofing to be applied by an Architect-approved installer and or supplier.

ROOF GUTTERS AND METAL END FASCIA at eaves and gable 0:.6 mm (Gauge 24) thick, Stainless Steel Sheets, Type 304 bent to design shape as shown in the Plans.

FASTENERS AND FIXATION: Use corrosion-resistant nails, anti-UV treated washer-caps, corrosion-resistant hook bolt connectors in areas as recommended by the manufacturer and approved by Architect. Paint all exposed fixation and fastening devices with the same color as roof.

CONCEALED CLIPS: Concealed clips shall be designed to meet the wind uplift requirements. Clips will provide for thermal expansion and contraction and will not abrade the panel against the clips, substrate or fasteners. Clips shall be stainless steel or galvanized steel for steel applications.

STRAINER: Use Brass Dome Strainers for gutters.

SALT SPRAY TEST: A sample of the sheets shall withstand a salt spray test for a minimum of 1000 hours in accordance with ASTM B 117, including the scribe requirement in the test. Immediately, upon removal of the panel from the test, the coating shall receive a rating of 10, no blistering, as determined by ASTM D 714; and a rating of 7, 1/16-inch failure at scribe as determined by ASTM D 1654.

07251: SPRAYED ON FIREPROOFING:

CEMENTITIOUS FIREPROOFING SYSTEM conforming to UL 263/ ASTM E 119 to be applied to all structural steel, with fire rating of 2-hours for structural beams and girder, 3-hours for columns. Apply with surface preparation, method of application and density as per manufacturer's specifications. Installation by an Architect-approved manufacturer or supplier with guarantee.

07810: TRANSLUCENT PVC ROOFING (PLASTIC UNIT SKYLIGHT)

PVC Ribbed Roofing Sheets, 2.5 mm thick, Translucent for Skylights. To be installed by an Architect-approved manufacturer or supplier with guarantee.

07900: JOINT SEALANTS

SILICON SEALANT: Use as a general purpose, neutral cure sealant. Contractor must guarantee watertightness of all joints even during strong winds. Use also as sealant for acoustic-treated walls in between classrooms.

CO-POLYMER CLEAR SEALANT: For roofs, awnings, roof flashings, skylights, gutters and downspouts.

SOLVENT-BASED SYNTHETIC RUBBER CONTACT TYPE ADHESIVE: For bonding wood, plastic laminate, concrete, steel aluminum and hardwood, rubber and glass.

ACRYLIC LATEX GAP SEALANT: For use between windows or door frames and walls, along skirting boards, around cornices, between countertops and splashboard. In corner or between the wall and ceiling or where shrinkage or movement causes rigid fillers to crack.

ACID CURE SILICON: For use on non-porous surfaces such as glass, ceramics and porcelain.

08000 DOORS AND WINDOWS

08100: METAL DOORS AND WINDOWS

08110 STEEL DOORS AND FRAMES, STEEL DOOR HEAD AND JAMBS:

STEEL JAMBS AND HEADER: 1.4mm (gauge 16) thick x 50mm x 100mm single rabbet and 1.4 mm (gauge 16) thick x 50mm x 150mm double rabbet; fabricated cold-rolled steel; epoxy paint finish.

STEEL DOOR TYPES: Use manufacturer's standard details.

Plain, full flush design, Positive/Negative Pressure; 45mm panel thickness, lightweight, minimum 1.0 mm (gauge 20) thick galvanized aluminum - high carbon steel sheet faces with honeycomb chemically treated core, lockformed edge; conforming to NAAMM/HMMA 861-06 and ANSI/SDI A250.8-2003 (LEC Steel Doors or Equivalent). Complete with stainless steel flag-type hinges and locksets. Provide optional accessories when required.

For steel doors with glass: use 6mm thick wired glass on aluminum snap on frame and as shown in the plans.

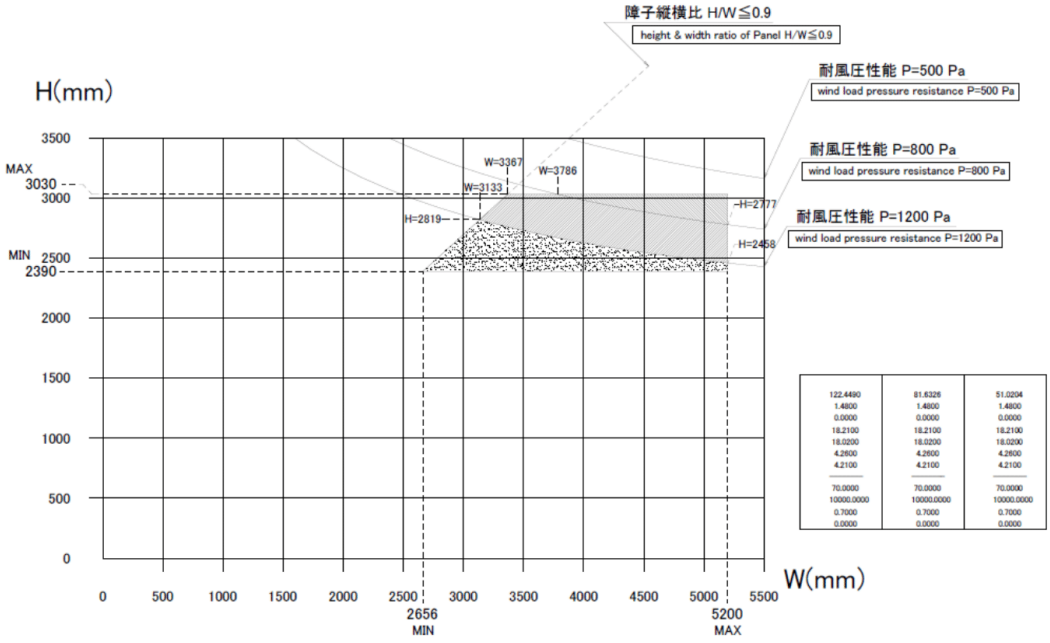
08160 SLIDING METAL DOORS

Use extruded aluminum 6063-T5 alloy for aluminum window frame sections. Use steel-strengthened aluminum for exterior windows, 44mm x 100mm x 2.388mm thk. minimum dimensions or able to withstand a Design Wind Velocity of 250 km/h at project site.

PRODUCT: Lixil Tostem Pl Panoramic Type Folding Aluminum Door (P7 Tostem or equivalent Door, 8mm Tempered Glass or equivalent)

P7 4 PANELS SLIDING DOOR (LARGE TYPE)

Performance Chart



Glass size calculation formula		
gh	gw	Quantity
H – 218	W/4-88	4

Wind Load (Pa) JIS	Air Tightness (m^3/m^2h) JIS	Water Tightness (Pa) JIS
S-1 (800)	A-4 (2)	W-3 (250)

08520: GLAZED ALUMINUM FIXED, CASEMENT AND AWNING WINDOWS:

WINDOWS: Provide and install all windows with complete locksets, hinges and accessories.

Use extruded aluminum 6063-T5 alloy for aluminum window frame sections. Use steel-strengthened aluminum for exterior windows, 44mm x 100mm x 2.388mm thk. minimum dimensions or able to withstand a Design Wind Velocity of 250 km/h at project site.

ALUMINUM CASEMENT WINDOW - Use high quality aluminums on 100mm Frame (Lixil Tostem P7 series or approved equal)

Skylight - 12mm Laminated Safety Glass with Tubular aluminum : Frameless Fixed Window gap - 20mm clear tempered glass on aluminum 25mm U channel at top and bottom

STORM RESISTANT FIXED STEEL LOUVER: For louvers under skylights, use 1.4 mm (gauge 16) thick G.I. jamb, header and mid frames and 1.2mm (gauge 18) thick G.I. louver blades as per manufacturer's standards and details; powder coated finish (2.4 Mw).

08200: WOOD AND PVC DOORS

A. WOOD DOORS: All wood from stock, sound and free from imperfections impairing its strength and finish. Kiln-dried (max. moisture content: 12%), with the same shade and color for assemblies or sets of assemblies, warp free, S4S and fine sanded lumber.

B. HIGH DENSITY FIBER DOOR (HDF DOOR) :

1. 40mm thick Honeycomb core, 90 minutes fire rating, Latimco or approved equal include: 4pcs -3-1/2"x4"x 3mm Ball bearing Hinges 300mmx800mm Stainless Steel 304 Pushplate & Pull plate Key-in Lever type Lockset,Satin Finish,Industrial Heavy Duty(Dorma DL or equivalent)

2. HDF-02- 0700mm x 2100mm x 40mm HDF Solid Core Single Flush Door w/ Louver, 90min Fire Rated with 2"x4" Wood Door Jamb - Single Rabbet (Latimco or equivalent)

3. 0800mm x 2100mm x 40mm HDF Solid Core Flus Door, 90min Fire Rated with 2"x4" Wood Door Jamb - Single Rabbet (Latimco or equivalent)

4. 0900mm x 2100mm x 40mm HDF Solid Core Single Flush Door 90min Fire Rated with 2"x4" Wood Door Jamb - Single Rabbet (Latimco or equivalent)

5. 1500mm x 2100mm x 40mm HDF Solid Core Double Flush Door, 90min Fire Rated with 2"x4" Wood Door Jamb - Single Rabbet (Latimco or equivalent)

6. 1700mm x 2400mm x 40mm HDF Solid Core Double Flush Door, 90min Fire Rated with 2"x4" Wood Door Jamb - Single Rabbet (Latimco or equivalent)

7. 1800mm x 2400mm x 40mm HDF Solid Core Double Flush Door w/ Vision Panel, 90min Fire Rated with 2"x4" Wood Door Jamb - Single Rabbet (Latimco or equivalent)

STEEL JAMBS AND HEADER: 1.4mm (gauge 16) thick x 50mm x 100mm single rabbet and 1.4mm (gauge 16) thick x 50mm x 150mm double rabbet; fabricated cold-rolled steel; epoxy paint finish.

SOLID WOOD PANEL DOOR: Double-leaf swing, 44mm (1-3/4") thick. For main doors of all studio units.

PVC SWING DOOR: Single-leaf, 44mm (1-3/4") thick. For toilet doors of all studio units, and other toilets, if any.

C. STEEL DOORS

700 x 2100mm Single Panel Steel Door; Positive/Negative Pressure;45mm Thick Galv Panel with insulation, Galv Single Rabbet Jamb; in accordance with and conforming to NAAMM/HMMA 861-06 and ANSI/SDI A250.8-2003(LEC Steel Doors or Equivalent) (include 2"x 4.5mm Steel angle bar door stiffener around door jamb connected to floor and ceiling)

08410: ALUMINUM DOORS:

Use extruded aluminum 6063-T5 alloy for aluminum door frame sections. Use steel-strengthened aluminum; 44mm x 100mm x 2.388 mm thk. minimum dimensions or able to withstand a Design Wind Velocity of 250 km/h at project site. Complete with all components and hardware, glazing and all its accessories.

08700: FINISH HARDWARE

ALUMINUM DOOR AND WINDOW HARDWARE: Install all main entrance and studio unit glass doors and glazed aluminum windows, complete with all components and hardware. See Main Specifications For main entrance door handle: use Stainless Steel, 350 mm, or approved equal.

08712 Door Latchsets/Locksets

DOOR LOCKS AND LOCKSETS: U.S. original. Note: Provide 4 pcs Master Keys for all cylindrical locksets and deadbolt locking device.

Cylindrical Locksets:

a) Entrance Lock, (satin chromium finish), U.S. original, or approved equal. Turn-button locking in inside knob; requires use of key at all times until button is manually restored to unlock position.

b) Privacy Lock, (satin chromium finish), U.S. original, or approved equal. Push button locking in inside knob. Can be opened from outside by screwdriver or similar tool or by turning inside knob.

PRODUCT: Toyo or equivalent
Technical Specification : Meet the ANSI 156.2 Grade 2 Standard 400,000 Cycle Test
Certification. Meet ADA requirements and is UL listed. 6-Pin tumbler cylinder
Locksets are adjustable for 1 3/8" - 2" Door Thickness
Latches are 2 3/4" backset
Finishes : Satin Chrome

Image:

Deadbolts: Deadbolt Lock, (satin chromium finish), U.S./Japan original, heavy duty, or approved equal. Deadbolt thrown or retracted by key from outside or by inside turn unit. Bolt automatically deadlocks when fully thrown.

HINGES: U.S./Japan original, or approved equal: 88.5mm x 88.5 mm (3-1/2” x 3-1/2”) plain bearing, stainless steel, loose pin or fixed pin, button tip, four (4) pieces per door panel for steel doors where specified.

Gravity Pivot Hinge: U.S./Japan original, Gravity Pivot Hinge, or approved equal. 2 pieces, plain bearing, for all toilets stall doors.

DOOR CLOSERS: Door Closers, or approved equal, 40 kg. max. door weight, satin chrome finish.

DOOR STOP / DOOR HOLDER: U.S. original, chrome finish, floor / wall mounting. Attached securely to floor/wall to prevent door knob from hitting the wall. (Ives WS65 3.75" US27 door stop - aluminum or equivalent)

DOOR PULLS: 203mm x 408mm (8” x 16”) Push Plate, 152mm x 405mm (6” x 16”) Pull Plate, Stainless Steel. For doors requiring the hardware.

DOOR COORDINATORS: UL/cUL Listed : Fire Door Coordinator, Device evaluated in accordance with Standard UL 10C

CABINET ACCESSORIES:

1. Pulls: Chrome finish: For all cabinet, closets and drawers.
2. Self Closing Hinges: For all cabinet and closet doors.
3. Drawer Runners: Use extended design mechanism where necessary. For all drawers.
4. Cabinet and Drawer Locks: Chrome finish. For all cabinet doors and drawers..

FLUSH BOLTS: U.S. original, chrome finish or approved equal. For all double-leaf doors. Install at top and bottom at reveal of all active leaf.

J. PADLOCK: U.S. Made, heavy duty, solid brass, general purpose padlock.

K. FIRE EXTINGUISHER CABINET LOCK: U.S. original, chrome finish for all fire extinguisher cabinets.

08800: GLAZING

CLEAR FLOAT GLASS: 6 mm (1/4inch) thick. Heat-Treated Float Glass: ASTM C 1048, Kind FT (fully tempered), Type 1 (transparent). Provide products of thickness indicated that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to CPSC 16 CFR, Part 1201 for Category II materials. Complete with all components and hardware. For all exterior Aluminum Windows; must be able to withstand a Design Wind Velocity of 250 km/h at project site.

CLEAR FLOAT GLASS: 6 mm (1/4 inch) thick Heat-Treated Float Glass. For all interior aluminum fixed windows and aluminum doors.

C. CLEAR FLOAT GLASS: 3 mm (1/8 inch) thick. For all fire extinguisher cabinets.

D. TEMPERED GLASS SMOKED used in Canopies , use 8'mm Thick Glass

D. MIRRORS: 6 mm (1/4") thick plate glass mirror, distortion-free with felt paper on 4.5 mm (1/2") thick FCB backing installed on satin-finish anodized aluminum frame. For all toilets.

E. BULK COMPOUND FOR GLASS INSTALLATIONS:

Mastics – Elastic compounds and non-skinning compound.

Putties – Wood sash putty, metal sash putty.

Sealants – one component, two components.

F. PREFORMED SEALANTS:

Synthetic Polymer – base sealants – resilient or non-resilient type.

Pre-formed gaskets – compression type, structural type.

G. CAULKING: Silicon Building Sealant or approved equal. For all joint gaps between aluminum frames and concrete.

H. GLASS TO TIMBER ADHESIVE - 12mm (w) 3M™ VHB™ Structural Glazing Tape (or equivalent) on 32mm x1.5mm aluminium flat bar screwed to timber every 125mm with 6x32mm

09000 FINISHES

The wall contractor is aware that the space beneath the access floor will be used as an air delivery plenum and as such will take the necessary precautions when installing their work so as not to impact the integrity of the plenum space specific to air leakage and cleanliness. Any penetrations or holes in the underfloor plenum created for or resulting from the work performed by the division 9 wall contractors are required to be properly sealed to prevent air leakage.

09200: PLASTER

PLAIN CEMENT PLASTER FINISH: Consisting of the scratch and finish coats, both consisting of one (1) part Portland cement and two (2) parts of clean, washed sand, measured by volume. For all interior and exterior wall surfaces where plastering is essential to complete the work.

WOOD TROWEL FINISH: Provide score joints whenever required. For exterior and interior surfaces to be painted.

STEEL TROWEL FINISH: Provide score joints whenever required. For curbs, catch basins, septic tank.

BURLAP FINISH: Achieve consistent texture pattern through proper selection of burlap material and application of consistent pressure on surface. Provide 50mm plain concrete borders at all edges and at approximately every 1.00 m on center, for all exterior corridors, ramps, steps, and sidewalks.

PLASTERING GUIDE SYSTEM: Use for interior and exterior grooves, drip moulds, construction joints and surface wall plastering.

LIGHT METAL FRAMES FOR WALL ASSEMBLIES: For all Drywalls. Use 35mm x 102 mm x .4mm thick metal studs at 0.40 M on center and 35mm x 102mm x .4mm thick Metal tracks and noggings, knurling stiffeners, side assemblies, bullnoses, corner beads, utility holes and others to complete. Submit mock-up on site before installation.

09120.A6 CEILING BOARDS

METAL CEILING ASSEMBLY: Use 19mm x 50mm x 0.5 mm thick G.I. furring channel and 0.6 mm thick J-type-wall angle with 12mm x 38mm x 1.0 mm thick G.I. carrying channel, 6 mm diameter hanger rod, suspension clips, rod joiners, steel angles, furring clips, fastening devices and others to complete. Submit mock-up on site, with ceiling boards, before installation. For main ground floor common areas.

METAL SUSPENSION SYSTEMS
A. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

a. Structural Classification: ASTM C 635 normal duty
b. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
c. Acceptable Product: Prelude Plus XL FireGuard 15/16" Exposed Tee as manufactured by Armstrong World Industries

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.
D. Edge Moldings and Trim:
780036 - 12ft Hemmed Angle Molding
E. Accessories
ALBERC2 - aluminum systems - 2" Aluminum Beam End Retaining Clip
BERC2 - steel - 2" Beam End Retaining Clip
BERC - Beam End Retaining Clip
SJMR15 - Seismic Joint Clip - Main Beam - 15/16" Suspensions
SJMR09 - Seismic Joint Clip - Main Beam - 9/16" Suspensions
SJCG - PeakForm Suspension - Seismic Joint Clips CT
SJCSI - Square Bulb Suspension - Seismic Joint Clip CT
ES4 - for 15/16" Prelude Expansion Sleeves
ES49 - for 9/16" Suprafine
ES76004 for 1/4" Silhouette Suspension
ES76008 - for 1/8" Silhouette Suspension
STAC - Single Tee Adapter Clip
7445 - 48" Stabilizer bar - not required when using the BERC2
7425 - 24" Stabilizer bar - not required when using the BERC2
7902 - 15/16" Shadow Reveal Transition Molding

09250 GYPSUM BOARD

PRODUCT: Gyproc Gypboard Plasterboard

Characteristics: Standard board product (Gypsum core firmly bonded with strong paper liners)

Application:
Suitable for most applications where normal fire, Structural and acoustic levels are specified.

Applicable Standard: IS 2095 (Part 1):2011

Properties:
Thermal Conductivity: 0.16 (w/m^{o}K)
Thermal resistance: 0.059 for 9.5mm thick board
0.078 for 12.5mm thick board
0.093 for 15mm thick board

Board Colour: Brown face paper
Brown reverse side paper

Edges: Taper edge along length of board
Square edge along width of board

Flexural breaking load of Gypboard® Plain as per IS 2095 (Part 1):2011

Width mm	Length mm	Transverse Direction (N)	Longitudinal Direction (N)
9.5mm board			
1219	1829	140	360
12.5mm board			
1219	1829	180	500
1219	2438	180	500
15mm board			
1219	1829	220	650
1219	2438	220	650

07460.B3 FIBER CEMENT BOARD

PRODUCT: Decorative Fibercement Wall Panel

Material Safety Data Sheet Conclusion Modeena

Trade name : Fiber Cement Board and Sub wood

Chemical Formula :

Composition	Modeena
Cement	35
Sand	50
Cellulose	10
Admixture	5
Total	**100**

Special Protection Information

Respiratory Protection Type: Mask for dust protection while drilling or Cutting

Hand Protection : Fabric gloves

Eyes Protection : Safety glasses while drilling or Cutting

First Aids

Skin : Use water and soap clean exposure area if still irritation consult physician

Eyes : Use clean water flow for 15 minutes if still irritation consult physician

Breathing : Bring exposure person to good ventilation area

Special Instruction

Handling and Storing: Handling with care beware broken material from dust.

Spill and Leak Procedures: In case of broken use spray water for reduce dust before sweeping or dust collector.

Disposal Methods: Disposal by community landfills.

Extinguishing Media : Use proper extinguishing media for surrounding environment

Material Safety Data Sheet(MSDS) for Fiber Cement Board

1. Product Data	
1.1 Trade Name	Fiber Cement Board
- Chemical Name	Fiber-cement, Fiber-reinforced cement
- Chemical Formular	Not Applicable

2. Chemical Classification	
2.1 U.N. Number	Not Applicable
2.2 Cas. Number	Not Applicable
2.3 Carcinogenicity	Not Carcinogen free from Asbestos

3. Hazardous Ingredients			
Substances	**Percent (%)**	**Safety standard**	
		TLV	**LD_{50}**
Crystalline Silica(Quartz) (CAS Number:14808-60-7)	15-50%	-	-

4. Physical and Chemical Data	
4.1 Boiling Point (°C)	Not Applicable
4.2 Melting Point (°C)	Not Applicable
4.3 Vapour Pressure (KPa)	Not Applicable
4.4 Solubility in water	Not Applicable
4.5 Specific gravity (H_2O=1)	Not Applicable
4.6 Evaporation rate	Not Applicable
4.7 Appearance color and odor	Solid substance
4.8 pH-Value	Not Applicable

5. Fire and Explosion Hazard Data		
5.1 Flash point (°C)	Not Applicable	
5.2 Exposure Limit	**Lower LEL (%)**	Not Applicable
	Upper UEL (%)	Not Applicable
5.3 Auto ignition temperature (°C)		Not Applicable
5.4 Chemical Reactivity		Stable for chemical reactivity
5.5 Materials to avoid		Not Applicable
5.6 Hazardous Decomposition Products (at decomposition temperature : > 1000°F)		No

6.Health Hazard Data	
6.1 Ways of exposure	Nose, Skin, Eyes
6.2 Local Effects skin, eyes, Mucous Membrane	May cause irritation in case of drilling or cutting
6.3 Effects of Over exposure short-term	Not Applicable
6.4 Effects of over exposure Long-Term	Not Applicable
6.5 Safety Standard: TLV (TLV-TWA)	Crystalline Silica (Quartz) lower than 0.025 mg/m3, For Respirable dust lower than 10 mg/m3 with zyclone

7.1 Special Protection Information	
7.1.1 Fire and Explosion Prevention	Not fire and explosion
7.1.2 Ventilation	Not Applicable
7.1.3 Respiratory Protection Type	Mask for dust protection while drilling or Cutting
7.1.4 Hand Protection	Fabric gloves
7.1.5 Eyes Protection	Safety glasses while drilling or Cutting
7.1.6 Other Protection	Not Applicable

7.2 First Aids	
7.2.1 Incase of skin exposure	Use water and soap clean exposure area if still irritation consult physician
7.2.2 Incase of eyes exposure	Use clean water flow for 15 minutes if still irritation consult physician
7.2.3 Incase of breathing	Bring exposure person to good ventilation area
7.2.4 Other Information	Not Applicable

8. Special Instruction	
8.1 Handling and Storing	Handling with care beware broken material from dust
8.2 Corrosiveness	Not Applicable
8.3 Spill and Leak Procedures	In case of broken use spray water for reduce dust before sweeping or dust collector
8.4 Disposal Methods	Disposal by community landfills
8.5 Extinguishing Media	Use proper extinguishing media for surrounding environment

09300: FLOOR TILES

Finish shall be clean, plumb and true to line. Avoid odd-size tiles. Serojos should be more than half the tile size. Provide one (1) box containing 20 pcs. of each tile type for Owner's stock upon Final Acceptance.

09310.A2 300mm x 600mm x 10mm R11 Rating Non-Slip Homogenous Stain Resistant Ceramic Floor Tile -

High Quality - Class 1 (White Horse or equivalent brand) (include grout and Tile Adhesive + Silicone Expansion Joints)

09310.A3 600x300mmx10mm HOMOGENOUS FLOOR TILE

PRODUCT: NON SLIP Stain Resistant High Quality HUANQIU 30X60CM (36L-1002F) SLATE SILVER GREY or equivalent. Silicone expansion joints all round edges to walls and at 4m x 4m grids.

IMAGE REFERENCE:

09900: PAINTING

Use one brand all throughout. All exposed finish hardware, lighting fixtures and accessories, plumbing fixtures and accessories, glass surfaces and the like shall be adequately protected against stains from paint and other painting materials prior to painting works. All other surfaces which would be endangered by stains or paint marks should be taped and covered with craft paper or equal.

A. EXTERIOR:

1. ACRYTEX PLAIN FINISH; for all concrete/masonry surfaces, fascias and all exterior FCB fascias; for all front sides of concrete parapets, concrete ledges and projections.

After waterproofing:

Surface Preparation: Masonry Neutralizer #44; Putty surface imperfections with Acrytex Cast # 1711; or approved equal

1st Coat: Acrytex Primer or approved equal

2nd and 3rd Coats: Acrytex Topcoat Semi-gloss Finish or approved equal.

2. SEMI-GLOSS LATEX, or approved equal; for underside of concrete ledges, exposed sides of retaining walls, concrete railing of ramps, stepped platform at front and all other minor surfaces unless otherwise specified.

Surface Preparation: Masonry Neutralizer #44 or approved equal;

1st Coat: Concrete Sealer #705 White or
Latex #701 White or approved equal
Putty minor cracks and surface imperfections with
Patching Compound or approved equal.

2nd and 3rd Coats: Semi-gloss Latex#715 or approved equal. Tint to get the required color with Latex Colors

B. INTERIOR:

1. ACRYTEX PLAIN FINISH or approved equal; for all interior concrete, masonry and FCB wall and column surfaces, from floor line to 2.40m height, of Lobbies and Corridors.

Surface Preparation: Masonry Neutralizer #44 or approved equal; Putty surface imperpections with Acrytex Cast # 1711 or approved equal

1st Coat: Acrytex Primer or approved equal
2nd and 3rd Coats: Acrytex Topcoat Semi-gloss Finish or approved equal

2. SEMI-GLOSS LATEX #715 or approved equal. For all interior concrete, masonry and FCB upper wall and column surfaces above 2.40m in height up to bottom of slab, of Lobbies and Corridors. For wall areas of all other rooms; for walls above toilet tiles; for beams, girders, all ceilings including bottom of slabs and gypsum boards; for exposed walls at upper part of atrium; for maintenance offices, deck roofs and all other miscellaneous concrete areas unless otherwise specified.

Surface Preparation: Masonry Neutralizer #44 or approved equal
1st Coat: Concrete Sealer #705 White or
Latex #701 White or approved equal. Putty minor cracks and surface imperfections with Patching Compound or approved equal.

2nd and 3rd Coats: Semi-gloss Latex#715 or approved equal. Tint to get the required color with Latex Colors

Note: Provide painted baseboards, latex or acrytex as required, 100mm wide, for all interior walls and stair walls without PVC baseboards, even if not indicated in the elevations/sections.

AUTOMOTIVE LACQUER #1300, or approved equal; for Steel Doors and Frames, and Steel Plate Supports. These shall be shop-applied.

Surface Preparation: Lacquer Spot Putty # 306 or approved equal
1st Coat: Lacquer Primer-Surfacer # 305 or approved equal
2nd Coat: Lacquer Spot Putty # 306 or approved equal as required
3rd Coat: Lacquer Primer-Surfacer # 305 or approved equal on puttied areas.
Top Coat: Automotive Lacquer # 1300 or approved equal in required Coats

CLEAR DEAD FLAT LACQUER #1253, or approved equal; for all exposed interior wood surfaces and wood doors and jambs and where applicable:

Surface Preparation: Wood Paste Filler #60 or
Lacquer Wood Tite #61 or approved equal
1st Coat: Lacquer Sanding Sealer #1254 or equal
Oil Wood Stain Series #2700 or equal
2nd & 3rd Coats: Clear Dead Flat Lacquer #1253 or equal
Solvent/Cleaner: Lacquer Thinner or equal

FLATWALL ENAMEL #800 or approved equal; for minor unexposed wood surfaces, where applicable.

1st Coat: #300 White Interior Primer & Sealer of
Flatwall Enamel #800 or equal
#311 White Glazing Putty or equal

2nd & 3rd Coats: Flatwall Enamel #800 or equal
Thinner: Paint Thinner or equal

C. METAL SURFACES:

1. EPOXY ENAMEL, or approved equal; for ferrous surfaces such as all structural steel surfaces, steel grille, steel louvers, steel and roof framing and other exposed steel surfaces unless otherwise specified.

Surface Preparation: Masonry Neutralizer #44 or equal
1st Coat: Epoxy Red Lead Primer #2270 or
Zinc Chromate Primer #2260 or equal
2nd and 3rd Coats: Epoxy Enamel or equal. Tint to get the
required color.
Thinner: Epoxy Reducer or equal

01000 _ SPECIALTIES

10400: IDENTIFYING DEVICES

STAINLESS STEEL SIGNAGE: Type 304, built-up, 3 mm (1/8") thick front plate and 1.0 mm (gauge 20) thick side plates, 25 mm average stroke. Size of anchorage dowels shall be as required for the fixation of masonry surface. For main building identification lettering at facade, to be approved by Architec.

ROOM NUMBERS: Acrylic letters with borders and background. Fabricated from plastic materials with standard size and dimensions. Colors, design and size to be approved by Architect.

FIRE EXIT SIGNS: White acrylic letters and green acrylic background; 2 Hours duration; complete with 1 X 8 W Fluorescent lamp and Sealed Maintenance-Free Nickel Cadmium Battery. For all fire exit doors.

10520 FIRE PROTECTION SPECIALITIES

Recessed Firehose Cabinet 610mmx860mm with Fire Extinguisher Assembly,with Stainless Steel Cover .8mm thick Brushed Satin Finish

10800: TOILET ACCESSORIES.

A. TOILET PAPER HOLDER: Vitreous china, one (1) beside every water closet in private toilets, white color.

B. SOAP HOLDER: Vitreous china, white color, one (1) set for each lavatory in private toilets.

D. LIQUID SOAP DISPENSER: Piston and spout-type soap dispenser. One (1) set for each public toilet .

F. STAINLESS STEEL GRAB RAIL: 38 mm (1-1/2") diameter, at toilets for the disabled.

G. MIRRORS: 6 mm (1/4") thick plate glass mirror, distortion-free with felt paper on 12 mm (1/2") thick Weatherproof Marine Plywood backing installed on satin-finish anodized aluminum frame. For public toilets, 1000m ht x width of lavatory counter; for all private toilets, provide size 1000mm ht. x 400mm wdth.

01100 _ EQUIPMENT

11.01 PUMPING EQUIPMENT:

Refer to the Plumbing (P) and Fire Protection Plans.

14000 CONVEYING EQUIPMENT

14200 ELEVATORS

A. Public Elevator 1(PE 1) - 1000kg Rated Capacity,Machine Room Less Elevator One/Simplex Grouping Control , 7.2kW Motor Power Output , 1.0m/s Speed, 5 stops, 5 door openings, 14.85m Travel, Flat Belt Traction Media, 400 Power Supply (Main), 30kVA AVR Rating, Stainless Steel AISI 304, 50x40 Door Frames

Landing Position Indicator: Combined with LOP

Landing Operating Panel: Touch Sensitive

LOP Version: Surface Mounted

Shaft: 2100mmx1800mmx1100mmx4200mm (Width, Depth, Pit, Headroom)

Floor Designations: 1,2,3,5 & 6

Car:

2100x900mm Door, Center-Opening, 1600x1400mm (Car Width, Depth)

Side Walls, Rear Wall, Car Door & Front Finish: Stainless Steel AISI 304

Car Operating Panel Buttons: Touch Sensitive

COP Version: Surface Mounted

Ceiling: Stainless Steel [Schindler S3300 AP or equivalent] LABOR, TAXES, IMPORTATION INCLUDED

01500 _ MECHANICAL / SANITARY

15400: PLUMBING SYSTEMS

A. PIPES AND FITTINGS:

COLD AND HOT WATER LINES: Main risers and branches; Polypropylene Pipe, made in Italy, Turkey or Germany.

PPR pipes and Fittings equivalent to PN20

PPR PIPE PN20	
NOMINAL SIZE	Min. PIPE THICKNESS
20mm	3.4mm
25mm	4.2mm
32mm	5.4mm
40mm	6.7mm
50mm	8.3mm
63mm	10.5mm
75mm	12.5mm
90mm	15.0mm
110mm	18.3mm

SEWER AND WASTE PIPES:

a) Main Lines and Stacks: POLYVINYL CHLORIDE PIPES AND FITTINGS Equivalent to Series 1000, Class 35.

b) Branches Only: POLYVINYL CHLORIDE PIPES AND FITTINGS Equivalent to ASTM D2729. Rigid (uPVC) pipe and drainage pattern fittings or approved equal conforming to ASTM D2564.

c) Vent Pipes: POLYVINYL CHLORIDE PIPES AND FITTINGS Equivalent to Series 1000, Class 35.

STORM DRAINAGE SYSTEMS:

a) Downspouts: POLYVINYL CHLORIDE PIPES AND FITTINGS Equivalent to Series 1000, Class 35.

b) Storm Drainage: CONCRETE PIPES: Sizes as required, conforming to Class IV.1, reinforced for 300 mm Φ and larger.
AIR-CON DRAIN: POLYVINYL CHLORIDE PIPES AND FITTINGS, Equivalent to Series 1000, Class 35, with Elastomeric Closed Cell Insulation.

PIPE AND FITTINGS: All PVC sewer pipe and fittings shall be manufactured in accordance with one of the following Standard Specifications:
a. ASTM D3034, "Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings"
b. ASTM F679, "Standard Specification for Poly (Vinyl Chloride) (PVC) LargeDiameter Plastic Gravity Sewer Pipe and Fittings"
c. ASTM F794, "Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter"
d. ASTM F949, "Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings"
e. ASTM F1336, "Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings"
f. ASTM F1760, "Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content"
g. ASTM F1803, "Standard Specification for Poly (Vinyl Chloride) (PVC) Closed Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter" All fittings shall be compatible with the pipe to which they are attached.
JOINTS: All PVC pipe joints shall be gasketed, bell-and-spigot, push-on type conforming to ASTM D3212, "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals." Since each pipe manufacturer has a different design for push-on joints, gaskets shall be part of a complete pipe section and purchased as such. Gaskets may be factory installed or field installed as recommended by the pipe manufacturer. Lubricant shall be as recommended by the pipe manufacturer.
PIPE STIFFNESS: All PVC sewer pipe shall have a minimum pipe stiffness that equals or exceeds 46 lbs / in-in.
INSTALLATION: Pipe and fittings should be installed in accordance with ASTM D2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications."
EMBEDMENT REQUIREMENTS: The method for calculating loads and determining embedment requirements for PVC sewer pipe shall be in accordance with the latest published edition of one of the following:
a. ASCE Manual No. 60 / WPCF Manual FD-5, "Gravity Sanitary Sewer Pipe Design and Construction." b. The Handbook of PVC Pipe, Design and Installation available from the Uni-Bell PVC Pipe Association.
c. UNI-TR-1, "Deflection: The Pipe/Soil Mechanism" available from the Uni-Bell PVC Pipe Association.

VALVES:

Valves: ASTM B-61 & 62, ASTM A-197, U.S. made. For gate valves and check valves, cast brass, sizes as required in the drawings.
Gate valves and check valves for hydropneumatic pumps piping shall be tested at 150 psi for a period of 2 hours. As required for rehabilitation of existing pump.
Rubber Seated Check valves for hydropneumatic pumps, use swing check valve. As required for rehab of existing pump.

Size	2" diameter
Fits Flanges	
Pressure Class	150 ANSI
Pressure Ratings	275 psi
Temperature Range	Resilient vitron rubber seat 446 degrees F
Fluid	Water
Standard Materials	Valve Body -- Cast Iron ASTM A-48
	Valve Trim -- Stainless Steel ASTM 304

C. INDIVIDUAL WATER METERS: Provide Owner-approved individual water meter for each studio unit. Locate at designated utility cabinet or at meter center per floor.

TRAPS AND CLEANOUTS:

Cleanout plugs for PVC pipes shall be cast brass ferrule with countersunk tap screw cover.

DRAINS: ASA, METMA, as indicated or approved equal.

1. Roof Gutter - M-319-16, ASA or equal
2. Floor/Shower - M-210, ASA or equal
3. Deck - M-319-36, ASA or equal
4. Canopy - M-319-34, ASA or equal
5. Trench Drain - M-319-34, ASA or equal
6. Cleanout - M-240, ASA or equal

F. FAUCETS: See Section 15450 Plumbing Fixtures.

G. HOSE BIBBS:

Hose Bibbs: Chrome plated faucet for toilets and shall be size 20 mm hose thread connection, and for other faucet with bronze body as indicated in the plans shall be brass, made of male inlet threads, hexagon shoulder and three quarter inch hose connections.

H. PIPE SLEEVES:

Wrought iron or steel pipe schedule 40 for sleeves in walls and partitions.

FIRE SUPPRESSION

A. DRY FIRE SPRINKLER SYSTEM

Black Iron Pipe,150PSI hydrostatic tested

B. WET FIRE SPRINKLER SYSTEM

Chlorinated Polyvinyl Chloride(cPVC) see data below

Steel pipe schedule 40 for sleeves in concrete beams or concrete fireproofing.

Galvanized steel pipe schedule 40 for sleeves through floors.

Steel pipe sleeves in footings shall be not less than four inches larger in diameter than the pipe to be installed.

Direct-driven Fire Pump(with auxillary pump)

25 in 1 Intergrated Direct Driven Horizontal Fire Pump

ATLANTA TS 25 (or equivalent) in 1 Intergrated Direct Driven Horizontal Fire Pump, 50HP, 3550 rpm, 230 Volts, 60Hertz, 4" water outlet, complete with 5HP Jockey Pump, Electric Motor, Pressure Tank, Water Filling Tank, Control Panel, Base Stand, Water Flow Testing Pipe, Flow Meter, Drain Valve, Pump Water Filling Pipe, Temperature Guard System, Water Filling Inlet, Overflow Drain Outlet, Water Level Detector, Pressure Exhaust Valve, Pressure Check Valve, Pressure Gauge, Pressure Tank Pipe, Expansion Joint, Outlet Control Valve, Outlet Check Valve, Pump Exhaust Valve, Drain Valve, Differential Pressure Gauge, Coupling, and Bearing Frame

1 ADVANTAGES & SPECIFICATION

ADVANTAGES

ATLANTA INDUSTRIES had introduced a line BlazeMaster CPVC Fire sprinkler piping system.
BlazeMaster CPVC piping system is design specifically for fire sprinkler piping sytem are based on more than 40 years of proven performance.

- Overall cost efficient
- Increased hydraulic capabilities (C- factor = 150) and superior flow characteristics
- No precutting and expensive tools required for installation.
- Can be easily connected to other sprinkler piping systems and easily repaired.
- Flexibility in the pipes for greater ease of installation and reduce installation cost.
- Resistant to rust, scale and foreign contaminant build up.
- Greater resistance to seismic activity than copper or steel systems.
- Maintenance free.
- 50 year life expectancy with a safety factor of 2.

BLAZEMASTER APPROVED LISTINGS

"Wet" system applications only
Listed by UL, UL of Canada, and Loss Prevention Certification Borad (LPCB)

- NFPA
- NFPA 13 Light Hazard
- NFPA 13R
- NFPA 13D
- NFPA 24 Underground Water Service
- NFPA 90A Air plenums

Factory Mutual (FM) Research Approved
Listed by NSF-pw for potable water usage
Meets the requirements of all major model building codes

BLAZEMASTER CPVC PIPE SPECIFICATION

BlazeMaster CPVC sprinkler pipe conforms to the requirements of ASTM F442 and carries the making of British LPCB and national Sanitation Foundation (NSF) for use in potable water systems.

BlazeMaster Pipe Dimensions (SDR 13.5) -Inches (Millimeters)

Nominal Size		Outside Diameter (D)				Wall Thickness (t)				Allowable Water Pressure Rating at 73°F / 22.7°C
		Average		Tolerance		Minimum		Tolerance		
in.	mm.	mm.		mm.		in.	mm.	in.	mm.	
1/2"	(15)	0.840	(21.3)	±0.004	(0.10)	0.062	(1.57)	+0.02	(0.51)	315 PSI (22.2kg/cm²)
3/4"	(20)	1.050	(26.7)	±0.004	(0.10)	0.078	(1.98)	+0.02	(0.51)	
1"	(25)	1.315	(33.4)	±0.005	(0.13)	0.097	(2.46)	+0.02	(0.51)	
1-1/4"	(32)	1.660	(42.2)	±0.005	(0.13)	0.123	(3.12)	+0.02	(0.51)	
1-1/2"	(40)	1.900	(48.2)	±0.006	(0.15)	0.141	(3.58)	+0.02	(0.51)	
2"	(50)	2.375	(60.3)	±0.006	(0.15)	0.176	(4.47)	+0.021	(0.53)	
2-1/2"	(65)	2.875	(73.0)	±0.007	(0.18)	0.213	(5.41)	+0.026	(0.66)	
3"	(80)	3.500	(88.9)	±0.008	(0.20)	0.259	(6.58)	+0.031	(0.79)	
4"	(100)	4.500	(114.3)	±0.009	(0.23)	0.333	(8.46)	+0.04	(1.02)	

NOTE: SDR 13.5 (Standard dimensional ratio 13.5) means the ratio of outside diameter to wall thickness (ASTM F442)

PHYSICAL AND THERMAL PROPERTY OF BLAZEMASTER

Property		CPVC	ASTM Test Standard
Specific Gravity	"Sp.Gr."	1.55	D792
IZOD Impact (ft.lbs/inch, notched)		30	D256A
SvTensile Modulus @73oF, Psi	"E"	$4.23x10^5$	D638
Tensile Strength,, Psi		8,400	D638
Compressive Strength, Psi	"O"	9,600	D695
Poisson's Ratio	"O"	.35~.38	-
Stress @73oF, Psi	"S"	2,000	D1598
Hazen Williams "C" Factor	"C"	150	-
Coefficient of Thermal Expansion inch/(in°F)	"e"	$3.4x10^{-5}$	D696
Heat Conductivity BTU/hr/ft2/°F/in	"k"	0.95 900	C177
Flash Ignition Temperature	°F	60%	D1929
Limit Oxygen Index	"LOI"	None	D2863
Electric Conduction			

P.S. The size on the chart is mainly for the tapered sockets for fittings.

FRICTION LOSS IN PIPE

A great advantage that **BlazeMaster** Pipe enjoys over its metallic competitors is a smooth inner surface which is resistant to scaling and fouling. This means that friction pressure losses the beginning and do not significantly increase as the system ages, as can be the case with metal pipes subject to scaling. The Hazen-Williams formula is the generally accepted method of calculating friction head losses in piping systems. The values in the following fluid flow tables are based on this formula and a surface roughness constant of C=150 for BlazeMaster pipe.

Constant (C)	Type of pipe
150	CPVC pipe, new-40 years
130-140	steel/cast iron pipe, new
125	steel pipe, old
120	cast iron, 4-12 years old
110	galvanized steel/cast iron 13-20 years
60-80	cast iron, worn/pitted

Surface roughness constant for other piping materials are given below:

$$f=0.2083\left(\frac{100}{C}\right)^{1.85}\frac{g^{1.852}}{d^{4.8655}}$$

Where f= friction head in feet of water per 100 feet of pipe
d= inside diameter of pipe in inches.
g= flow rate in gallons per minute
c= pipe surface roughness constant

Allowance for Friction Loss in Fittings (Equivalent Feet Pipe)

SIZE / FITTINGS	1/2"	1/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Tee Branch	3	3	5	6	8	10	12	15	20
Elbow 90°	7	7	7	8	9	11	12	13	15
Elbow 45°	0.8	1	1	2	2	2	3	4	5
Coupling	0.8	1	1	1	1	1	2	2	3
Tee Run	0.8	1	1	1	1	1	2	2	3

SUPPORT & HANGER SUGGESTIONS

The hangers designed for metal pipes are mostly suitable for Atlanta BlazeMaster pipes. The Hangers shouldn't have a rough or sharp edges which can come in contact with the pipe. And don't use the hangers which are too small for pipes. Choose the proper sized hangers according to pipes. (ie. 1-1/2" hangers are suitable for 1-1/2" pipes) Listed as follows:

Nominal/Support Spacing (m)

Nominal Pipe Size (inches)	Maximum Support Spacing (feet)	(meters)
1/2" - 3/4"	5-1/2	1.7
1	6	1.8
1-1/4"	6-1/2	2.0
1-1/2"	7	2.1
2	8	2.4
2-1/2"	9	2.7
3	10	3.0
4	12	3.6

VERTICAL RESTRAINT

When a sprinkler head activates, strong reactive force occurs. The reactive force will reflect on pipe, especially when the system pressure is larger than 100 psi. Therefore, if the pipe is not fixed properly, the force will push the pipe vertically upward, especially if the Sprinkler drop is from a small pipe. The hangers should tightly fix the pipe to prevent the upward reactive force. There are many ways to tightly fix the pipe. For example, use the standard band hangers and keep the bottom of the bolt 1/16 inch-high above the pipe.

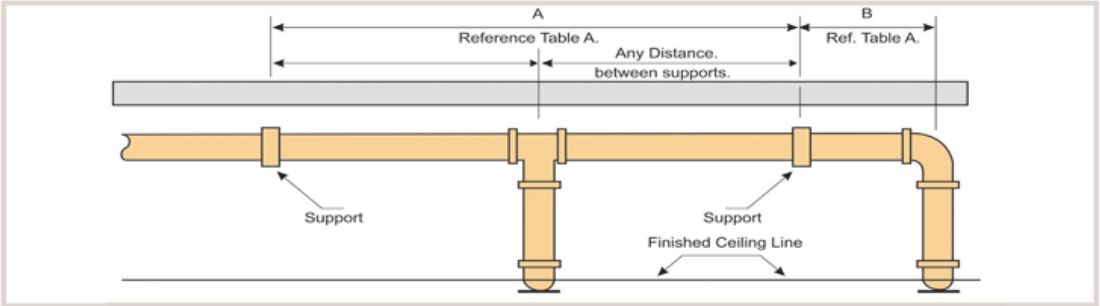


TABLE A

Maximum Support Spacing Distance
End Line Sprinkler Head Drop Elbow

Nominal Pipe Size	Less than 100 psi	More than 100 psi
1/2"-3/4"	9"	6"
1"	12"	9"
1-1/4"	16"	12"
1-1/2" - 4"	24"	12"

TABLE B

Maximum Support Spacing Distance
with an In Line Sprinkler Head Drop Tee

Nominal Pipe Size	Less than 100 psi	More than 100 psi
1/2"-3/4"	4"	3"
1"	5"	4"
1-1/4"	6"	5"
1-1/2" - 4"	7"	7"

HANDLING & STORAGE

Handling

Compared with other metal pipes, CPVC pipe have lower impact strength. Pipes and fittings packed in cartons or not, should never be tossed or thrown to the ground (eg. When unloaded from the cargo truck). And they should remain boxed until ready to use. Impact cracks, splits, and scratches will weaken and damage the pipe and fittings.

Please avoid throwing heavy or sharp objects into CPVC pipe and fittings.
When Handling the pipes, please make sure that they are well fixed and try to avoid looseness and droop.
In very low temperature, the plastic pipes will become very brittle. Therefore, please handle them carefully to avoid damage. Before installation, check pipe and fittings thoroughly to see if they are damaged or not. If there are cracks, splits, scratches, or other damage caused by improper transportation or storage, these pipe and fittings shouldn't be used. Using the technique of cutting plastic pipe can cut off the damaged part of the pipe.

Storage

If Atlanta BlazeMaster pipe needs to be stored in outdoor environment for a long time, please use opaque object to cover them. Because long time exposure to direct sunlight on the work site may result in color fade but will not affect physical properties. It will be a good Idea to put them in the original containers to prevent dust and reduce the chance of damage.

When stored indoors, they should be put in the more ventilated place and keep them away from the vapor pipe lines orother heat sources.

Atlanta BlazeMaster pipe & fittings should be kept in the original packaging before use to prevent color fading or other damage. The pipes should be put on the clean and flat surface so that it will provide balanced support for the pipes. When put on the shelf,it should have continuous or close support arms to prevent the pipe from loosening or dropping. The fittings should be kept in cartons which were put on the pallet and use plastic cloth to wrap them to prevent collapse caused by moisture. Plastic pipes and fittings shouldn't be kept with metal pipe and fittings in the same box in order to avoid grease or oil pollution from the metal products.

FLAMMABILITY & PRODUCT COMBUSTION

Flammability

BlazeMaster is suitable for wet, automatic, fire sprinkler system because of its excellent balance of properties such as lightweight, excellent corrosion resistance, low friction loss, and easy installation. It is unique in that it offers outstanding resistance to fire and low smoke generation qualities. Because of these characteristics, ***BlazeMaster*** system is approved for use in plenum spaces as defined by NFPA 90A (American national standard for installation of air conditioning and ventilating system).

Ignition Resistance

CPVC has flash ignition temperature of 900°F which is the lowest temperature at which sufficient combustible gas is evolve that can be ignited by a small external flame. May other combustibles such as wood ignite at 500°F or less. Accordingly, BlazeMaster systems cannot be the ignition source of a fire.

Heat of Combustion

CPVC has a significantly lower heat of combustion at 7700 BTU's/lb. Compared to Douglas fir at 9040 BTU's/lb. Materials with a high heat of combustion perpetuate a combustible mixture which ignites creating more heat and the burning process becomes self-sustaining.

Burning Resistance

CPVC will not sustain burning. It must be forced to burn due to its very high Limiting Oxygen Index (LOI) of 60. LOI is the percentage of oxygen needed in an atmosphere to support combustion. Since earth's atmosphere is only 21% oxygen, CPVC will not burn unless a flame is constantly applied and stops burning when the ignition source is removed.

Products of Combustion

BlazeMaster **CPVC** is an organic thermoplastic material. All organic materials, either natural or synthetic, generate toxic gas when exposed in heat and fire. The products of combustion of BlazeMaster CPVC are carbon monoxide (CO), carbon dioxide (CO2), hydrogen chloride (HCl). The results of tests on BlazeMaster CPVC sprinkler pipe, using the New York State modified University of Pittsburgh test protocol for determining the toxicity of combustion products, conclude the BlazeMaster sprinkler pipe is "no more toxic than wood, and less toxic than common materials, such as wood or cotton. "In addition, the California Draft Environment Impact Report concludes "the smoke toxicity of plastic pipe is low compared with that of common building and finish materials present in homes." Because of the unique characteristics, BlazeMaster sprinkler systems doesn't pose an unusual threat to life safety. In fact, BlazeMaster sprinkler systems have a track record of success better than national statistics. Without the benefit of flame retardants and smoke inhibitions, BlazeMaster CPVC inherently exhibits outstanding fire performance characteristics in terms of limited flame propagation and low smoke generation. When coupled with its excellent balance of improved hydraulics, light weight corrosion resistance and ease of fabrication. BlazeMaster sprinkler systems provide an affordable solution to life safety and property protection.

JOINING OF BLAZEMASTER CPVC PIPE SYSTEM

Before commencing installation, a user should understand & confirm applicable National Fire Protection Association(NFPA) guidelines & national, state & local codes, & installation requirements for CPVC fire sprinkler systems.

Cutting

BlazeMaster pipe can be easily cut with a ratchet cutter, wheel type plastic tubing cutter, a power saw or fine toothed saw. To ensure the pipe is cut square, a miter box must be used when using a saw. Cutting the pipe as squarely as possible provides the surface of the pipe with maximum bonding area. If any indication of damage or cracking is evident at the pipe end, cut off at least two (2) inches beyond any visible crack. Do not use ratchet cutters below 50°C.

Deburring

Burrs and filings can prevent proper contact between pipe and fitting during assembly, and must be removed from the outside and the inside of the pipe. A champering tool or file suitable for this purpose. A slight bevel shall be placed at the end of the pipe to ease entry of the pipe into the socket and minimize the chances of wiping solvent cement from the fitting.

Fitting Preparation

Using a clean, dry rag, wipe loose dirt and moisture from the fitting socket and pipe end. Moisture can slow the cure time and at this stage of assembly, excessive water can reduce joint strength. Check the dry fit of the pipe and fitting. The pipe should enter the fitting socket easily 1/4 to 3/4 of the way. At this stage, the pipe should not bottom out in the socket.

Solvent Cement Application

Joining surface shall be penetrated and softened. Cement shall be applied with an applicator 1/2 size of the pipe diameter. Apply a heavy, even coat of cement to the outside pipe end. Apply a medium coat to the fitting socket to pipe. Size 1-1/4 inches and above shall always receive a second cement application on the pipe end. (Apply cement on the pipe end, in the fitting socked, and on the pipe again.) Only use solvent cements that have been specifically investigated and tested for use with BlazeMaster CPVC and approved by the pipe and fitting manufacturers. Special care shall be exercised when assembling BlazeMaster systems in extremely low temperatures (below 40°F) or extremely high temperatures (above 100°F). Extra set time shall be allowed in colder temperatures. When cementing pipe and fittings is extremely cold temperatures, make certain that the cement has not "gelled". Gelled cement must be discarded. In extremely hot temperatures, make sure both surfaces to be joined are still wet with cement when putting them together.

Assembly

After applying cement, immediately insert the pipe into the fitting socket, while rotating the pipe 1/4 turn. Properly align the fitting for the installation at this time. Pipe must bottom to the stop. Holding the assembly for 10 to 15 seconds to ensure initial bonding. A bead of cement should be evident around the pipe and fitting juncture. If this bead is not continuous around the socket shoulder, it may indicate the insufficient cement was applied. If insufficient cement is applied, the fitting must be cut out and discarded. Cement in excess of the bead can be wiped off with a rag. Care shall be exercised when installing sprinkler heads. Sprinkler head fittings shall be allowed to cure for a minimum of 30 minutes prior to installing sprinkler heads, be sure to anchor or hold the pipe drop securely to avoid rotating the pipe in previously cemented connections, previously cemented fittings shall also be permitted to cure for a minimum of 30 minutes.

One-Step Solvent Cement Requirements Estimation	
Fitting Size (inch)	Solvent Cement Number of joints per quart
1/2"	400
3/4"	270
1"	180
1-1/4"	130
1-1/2"	100
2"	70
2-1/2"	50
3"	40
4"	30

The minimum cure time prior to pressure testing

When installing procedure is completed, according to the following requested cure time, the system can proceed 200psi/2hrs pressure test or an excessive 50psi of the maximum working pressure. Before the pressure test, please fill up water in the sprinkler system and suck out air in the highest and farthest sprinklers. Please don't use air or condensed gas for the pressure test. If there is leak, cut off the fitting, throw it away and join it again.

Combination of BlazeMaster CPVC products with other BlazeMaster CPVC products and solvent cements.

BlazeMaster CVPC fittings are UL listed for use in systems containing other manufacturer's UL Listed BlazeMaster CPVC products.

NOTICE: Specific application approvals may not be the same among manufacturers. It is the installer's responsibility to verify suitability of products used in combination according to each manufacturer's installation instructions. Contact Atlanta Industries if you have questions on any application not addressed in this manual

One-Step Solvent Cement

Atlanta Industries recommends the use of HVC-500 One-Step Solvent Cement. However, Ipex BM-5, Thompson Plastic Inc. TPI-50 and TYCO Fire Products TFP-500 CPVC Solvent Cements can also be used in the assembly and BlazeMaster CPVC fire sprinkler products are not listed for outdoor use. BlazeMaster CPVC Fire Sprinkler products must never be used in a system using compressed air or other gases. National Fire Protection Association standards NFPA 13, 13R and 3D must be referenced and followed for design and installation requirements in conjunction with this design manual.

CONNECTION TO OTHER MATERIALS

A. Align the bolt holes of the mating flanges by rotating the flange into position.
B. Insert gasket.
C. Insert all gasket bolts and nuts.
D. Before screwing tightly, the flange should be able to contact gasket.
E. Tighten the units in the flange diametrically opposite each other using a wrench. According to the size of the flange, find out the proper torque. ***(Please refer to the following Table.)*** Correspondent torque with the flange can reduce the leak of the gasket. Unnecessary excessive torque will damage the flange.

Keep the pipe joined with the flange in a straight line to avoid stressing the flange. The pipe should be fixed well to avoid horizontal movement because it will also cause pressure to damage the flange. Joining method and procedure are listed below:

Size of flange (inch)	Diameter of Bolt (inch)	Torque (foot/lb)
1/2~1-1/2	1/2	10-15
2~4	5/8	20-30

With BlazeMaster piping, penetrating Fire rated wall and protection. *Please refer to the construction rule. Many fire-stop-system can use with CPVC as it containing water based entumesents will not harm the CPVC compound.*

CATCH BASINS/JUNCTION BOXES: 140 kg/cm2 RC with C.I. grating cover M-452 E. In-site and pre-cast reinforced slabs, with concrete hollow block walls, details as shown in the drawings. For drain terminals discharge, and generally at all intersecting points of pipes.

OVERFLOW DRAIN: 50 mm dia. G.I. pipe with polished brass hub adaptor or approved equal.

JOINTING:

Flanged Joint Gasket – GARLOCK or equal
Screwed Joints – U.S. Federal Specifications GG-P-251
PVC Pipes and Fittings – PVC cement or as per Manufacturer's recommendations.
Dissimilar Pipes – Adopter fittings shall be used.
Concrete Drain Pipe – Cement mortar
HYDRO-PNEUMATIC WATER TANK
STAINLESS STEEL ELEVATED WATER TANKS:
DUPLEX TYPE CENTRIFUGAL END SUCTION PNEUMATIC PUMPS:

C. Intelligent Photoelectronic Smoke Detector

I-9102

Description:

Intelligent Photoelectronic Smoke Detector

Key Features

- Aesthetically pleasing low profile design
- 8 Bit intelligent processor with A/D converter
- Built in algorithm maps for false alarm rejection
- Electronically addressed
- Twin LED for 360o vision
- With Remote Indicator output

Technical Specifications

- Operating Voltage: 24VDC
- Operating Current:
  - Standby Current: 0.8mA
  - Alarm Current: 5.0mA
- Operating Environment:
  - Temperature: -10℃ ~ +50℃
  - Relative Humidity: 95%
- Dimensions: Diameter 100mm, Height 56mm

15450: PLUMBING FIXTURES

Note: Verify roughing in dimensions and installation procedures from manufacturer before proceeding with final set of pipe inlets and mounting hardware.

PLUMBING FIXTURES: All plumbing fixtures and accessories with approval from the Architect.

WATER CLOSET: Institutional Model. Flush valve low consumption 6 lpf round front water closet, innoglaze finish, with seat and cover, for all toilets. Use Flush Valve, supply pipe assembly and all other fittings to complete. One (1) set for each toilet stall. White color.

WALL-HUNG LAVATORY: Wall-Hung Lavatory innoglaze finish, white color. Use Single Lever Ceramic Disc Faucet, chrome, with angle valve, steel braided flexible hose, strainer, P-trap, and all other fittings to complete. For all private toilets.

KITCHEN SINK: Stainless Steel, single drain bowl, with overall size of 560mm x 635mm (22" x 25"), for all kitchenettes or approved equal. Provide chrome finish single lever kitchen faucet with P-trap, angle valves, strainers and all other fittings, or approved equal to complete.

FLOOR DRAINS: Stainless Steel, 100mm x 100mm (4" x 4"). For all floor drains and slop sinks.

ESTIMATING

Includes supply, installation and testing of all plumbing fixtures.

10800.P1 Water Closet

Close-coupled push button dual flush water closet 6L per flush max [Pozzi or Equivalent]

10800.P2 Urinal

Mini Washbrook White W/strainer Wall Hung [Pozzi or equivalent] - include angle Flush Valve [American Standard model 9803.OP1 or equivalent]

10800.P3 Lavatory with Pedestal

Lavatory with Pedestal[Pozzi PLK-1025 or equivalent]

10800.P4 High Spout Basin Mixer

Matt Nickel Finish with Tail Piece(Kasch or Equivalent)

10800.P5 2-Bowl Kitchen Sink with waste kit

940mmx510mmx218mm 18/10 Stainless Steel Type 304 [Franke, Prussia, Haffele Sink or equivalent]

10800.P5a Single Lever Kitchen Mixer

Matte Stainless(Franke CT906C or equivalent)

15700: VENTILATING EQUIPMENT

15700 Ceiling Mount (Sirroco Fan) Exhaust Fan

177x177mm 50CFM 26dB(A) Noise Ceiling-mounted [KDK Model 17CUF or equivalent]

■ MAIN PARTS LIST

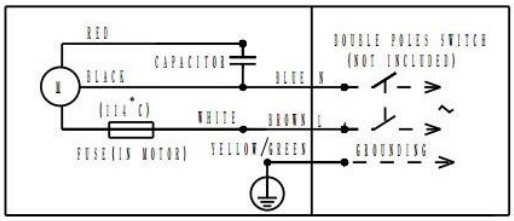
No.	Part Name	Material
1	Adapter assy.	Galvanized steel
2	Wire cover	PP
3	Power Cord	0.75mm²X 3
4	Frame	Galvanized steel / black
5	Louver	ABS / white
6	Casing	PP
7	Blade	PP
8	Motor	-
9	Double orifice	PP

■ SPECIFICATIONS

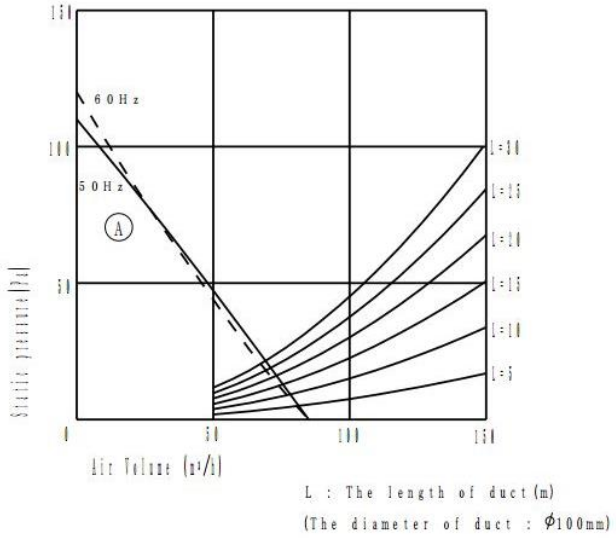
Power Rating		1 Phase 110-140T～ 50Hz / 110-130T～ 60Hz
Air Volume	m^3/h ±10%	85-90/85-85
Power Consumption	W ±15%	11-13/11-12
Current	A ±15%	0.052-0.057/0.052-0.055
Noise	dB (A) +3 -5	26-29/28-29
Max Static Pressure	Pa ±10%	110-110/120-130
(B) ~~Weight~~ Net Weight	kg	~~2.8~~ 1.9 (B)
Ambient Temperature		-10°C up to 40°C
Duct model		100mm dia.

This product is complyed with IEC 60335-1 & IEC 60335-2-80.

■ WIRING DIAGRAM



■ AIR VOLUME-STATIC PRESSURE CURVE



15700 Range Hood, Twin Motor Design,730cum/h air volume,sirocco fan, 40W LED equipped(KDK HQUA or equivalent)

Switch 按鈕		Soft Touch	Rocker Switch
Rated Voltage (V) 電壓		220	
Frequency (Hz) 頻率		50	
Speed 風速		Super / High / Low	High / Low
Power Consumption 耗電量 (without lamp) (不連電燈)	Super	140	–
	Hi	95	140
	Lo	72	72
Air Volume (m^3/h) 風量	Super	730	–
	Hi	530	730
	Lo	430	430
Left/Right Separate On/Off 左右獨立開關		X	O
Noise Level dB(A) 音量		53	
Prolonged Off-Timer 延遲關機設計		O	X
Colour 顏色		Silver, White	
Lamp 電燈（瓦特）		40W	
No. of Motor / Fan 馬達／風扇數量		2 / 2	
Fan Type 風扇種類		Sirocco Fan 千翼渦輪	
Dimension (mm) 尺寸		700 (W) x 120 (H) x 535 (D)	
Net Weight 重量		17.5kg	
Air Duct Dia. (mm) 導管直徑		150	

16000 _ ELECTRICAL

16100: BASIC ELECTRICAL MATERIALS AND METHODS:

A. WIRES AND CABLES: No conductor shall be less than 3.5 mm2 in size unless otherwise specified.

B. CONDUITS: As indicated in the Electrical (E) Plans.

1. Non-Metallic Conduit (PVC): smooth wall non-metallic conduit conforming to Philippine National Standards No. 14 for PVC Pipes. Conduit shall be in standard length of 3.05 meters including coupling

C. OUTLET BOXES AND FITTINGS:

1. Convenience Outlets: White color, Wide-Series, Universal outlet, 220V, with amperage as required. For general building interior use.
2. Weatherproof Outlets: Double device plate with cover receptacle, heavy duty. For outlets inside pump room and other exterior-located outlets, as indicated in the plans.
3. Boxes: Metal utility boxes Ga. 16, sizes and shapes as required.

D. INDIVIDUAL ELECTRIC METERS: Provide Owner-approved individual electric meter for each studio unit. Locate at designated utility cabinet or at meter center per floor.

E. SWITCHES, PANELBOARDS AND CIRCUIT BREAKERS:

1. Switches: With amperage as required. Suited to location and intended purpose. Approved type by architect.

a. For 3-Gang with 3-Way Switch consider using model BTICINO-SA32301TBA Single Pole Switch

SAE2301TBA

with 16A 250V or equivalent

b. For 1-Gang with 1-Way Switch consider using model BTICINO-SAE2001TBA Single Pole Switch with 16A 250V or equivalent

SAE2001TBA

c. For 2-Gang with 1-Way Switch consider using model BTICINO-SA2001TB15A Single Pole Switch with 16A 250V or equivalent

SAE2001TB15A
SAE2003TB15A

d. For 3-Gang with 1-Way Switch consider using model BTICINO-SA32301TBA Single Pole Switch with 16A 250V or equivalent

SAE2301TBA

2. Circuit Breakers: GA 16 bolt-on type, pre-painted, surface mounted, with latch lock.

a. Terasaki Circuit Breakers or equivalent

1. FIELD-INSTALLABLE ACCESSORIES

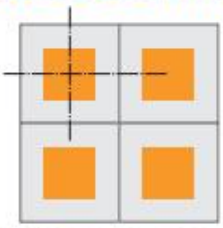
- Accessories can be fitted by the switchboard builder or added by the end-user. All internal accessories are common for TemBreak 2 MCCBs.
- Handles and motor operators can be rapidly fitted using the locking pegs. It takes **less than 10 seconds to secure a handle or motor** to the MCCB – a great time saving compared to alternative products.
- All accessories are endurance tested to the same level as the host MCCB.

2. SAFETY LOCK FOR PLUG-IN VERSIONS

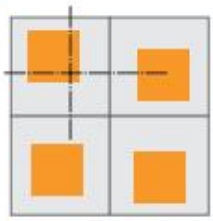
Plug-in MCCB and base *Plug-in connection kit, including safety lock*

The plug-in MCCB is locked to the base when the toggle is ON. It cannot be removed unless the toggle is OFF or TRIPPED. The safety lock prevents a trip occurring as the MCCB is being removed from the base.

3. SYMMETRICAL DOOR CUTOUT PATTERNS



Using TemBreak 2 Operating Handles



Using other MCCB Operating Handles

Door cutout patterns for handles are symmetrical, even when breakers are mounted in opposite directions.

4. SUPERIOR TEMPERATURE PERFORMANCE

All TemBreak 2 MCCBs are fully rated for use in tropical environments.

Overheating is the most common cause of failure in electrical switchgear. You can reduce the likelihood of overheating by using switchgear with superior temperature performance.

5. MODULAR SIZES

All current ratings up to 630A can be supplied in 2 sizes: the 250A and 630A sizes.

The compact 125A size offers the same features and performance but with reduced dimensions and cost.

3. Magnetic Starter: With casing, surface mounted with latch lock.
4. Metal Enclosures and Cabinets: FUJI-HAYA, ALLIED, MACROPOWER or approved equal.

5. Emergency: ATS – 1200A, 3P, Breaker Type, 240V, High Interrupting; EMDP – Main 1200AT – use Fixed Type.

6. Distribution Panels

a. Powerbox - Panel Board or equivalent

*All materials galvanized,
* guarantee minimum of 5 years.
* State of the art 3D modeling Software, to produced precised & accurate design.
* Fully-bolted construction (MODULAR TYPE), CNC TRUMPH MACHINE Fabricated .
* Phospetised metal parts, Powder Painted w/ Epoxy Polyester a minimum thickness of 80 microns.
* EPOXY FULL POLYESTER FOR OUTDOOR PANEL/ENCLOSURE Guaranteed not to fade & not to pulvurized.
* TIN PLATED Copper busbars.
* Copper busbars are of oxygen-free high conductivity. ETP Grade - C103.
* Quality/manufacturing procedures as per ISO Standards.
* Non-tracking, busbar insulators.
* Complete w/ mechanical terminal lugs at line side main & load side branches .
* Engraved nameplate, black background, white letters.
* Claw-type, screw type side and rear covers (For free standing panels only)
* PANELBOARD design screw type or hinged type deadfront.
* Detachable top & bottom plate for panelboard

F. HANGERS AND SUPPORTS:

1. For all suspended conduits: Angle bars with 12mm dia. hangers at 1-m intervals. Prime and finish-painted.. Joints of conduits on a staggered position. Submit shop drawings for approval.

16410: ELECTRICAL SERVICE SYSTEM

a. Transformers, Transformer cables and posts:

Provide as needed and/or as recommended by the local electrical cooperative. All components shall be provided by the local electrical cooperative upon representation and full payment by the Contractor.

16500: LIGHTING

A. Lighting Fixtures and Accessories: Samples of lighting fixtures, complete with lamps and accessories, shall be submitted for approval by the Architect and University prior to fabrication and purchase.

16510: INTERIOR LUMINAIRES

LED DOWNLIGHTS:

16510.A For LED Surface Mounted Round lighting consider using model **JS-PL003-18W-5J**- Star Lighting Electronics or equivalent. Directional White 200mm diameter downlight.. Housing made of aluminum alloy material, electrostatic coating compact design. Warm white or neutral white color temperature 6watts lumen output 4000lm

16510.B. For square reflector consider using model RIO DM101IC/D10011 Cebu Oversea head slice gimble downlights, metal plate and aluminum inner ring with universal lamp holder and 150mm silicon wire; Size: 112mmx112mm, complete with Megaman LR0705 WFL PAR16 LED Bulb Warm white GU10 5watts Lumen Output: 4000lm. Pure white or warm white color temperature.

16510.C. For Mini Wall Mounted Lighting consider using (OM) FMGL Francy E27 wall lamp, white casement complete with Megaman LG2603.5 LED Bulb Warm white 3.5watts Lumen Output:. Pure white or warm white color temperature.

IMAGE	DESCRIPTION
	(OM) FMGL FRANCY E27 WALL LAMP BLK / WHT
	MEGAMAN LG2603.5 LED E27 3.5W WW

16516. For Brushed Aluminum Pendant Lighting consider using model Spun Aluminum Pendant by Elk Lighting or equivalent, dimension 5.75"H x 5.5"W, aluminum casement complete with Megaman LG2603.5 LED Bulb Warm white 3.5watts Lumen Output:. Pure white or warm white color temperature.

16520: EXTERIOR LUMINAIRES

GROUND LIGHTS

1620.A. Description

:• Recessed luminaire for outdoor installation in wall, ceiling or floor.

• Configuration: die-cast aluminium structure EN AB-47100 (low copper content) available in round and square version.

• Double layer coating for high resistance to corrosion: chemical conversion coating on the aluminium surface followed by a first layer of epoxy powder and a second finishing layer of polyester powder.

• The luminaire is composed of a wiring unit connected to an emitting unit with different designs: onlyglass-round and square; anodized aluminium frame-only round. The glass is fixed tothe aluminium structure through a robitic gluing system.

• Tempered transparent or sandblasted glass.

• Protection rating: IP67.

• In compliance with EN 60598-1 standards.

• Class of insulation: III.

• Warning! Use IP68 connectors to avoid water ingress from the cable.

END OF SECTION 01020

01250 SUBSTITUTIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for requesting approval of proposed substitutions.
B. The requirements of this section govern the use of "Substitution Request Form - Section 01251".

1.02 LIMITATIONS ON SUBSTITUTIONS

A. Substitutions will not be considered unless the "Substitution Request Form - Section 01 25 10" attached in this Project Manual is used and the requirements of this section and Section 01 25 10 are fully complied with. Other types of forms are not acceptable.
B. Substitutions will not be considered when indicated on shop drawings or product data submittals without separate formal request complying with "submittal procedures" specified in this section.
C. Substitutions will not be considered unless submitted through the Contractor.
D. Additional studies, investigations, submittals, redesign and/or analysis by the Architect caused by the requested substitutions shall be paid by the Contractor at no expense to the Owner.
E. Substitute products shall not be ordered or installed without written acceptance.
F. Only one request for substitution for each product will be considered. When substitution is not accepted by the Architect, provide the specified product.
G. Architect will determine the acceptability of all substitutions.

1.03 REQUESTS FOR SUBSTITUTIONS

A. Contractor's Representation
1. Request for substitution constitutes a representation that the Contractor has investigated the proposed product and has determined that it is equal to or superior in all respects to the specified product.
2. Request for substitution constitutes a representation that the Contractor will provide same type of warranty for substitution as for specified product. Contractor's warranty shall be in writing guaranteeing all substituted products have same or superior performance as the product specified.
3. Request for substitution constitutes a representation that the Contractor will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
4. Request for substitution constitutes a representation that the Contractor waives all claims for additional costs related to substitutions which consequently become apparent.
5. Request for substitution constitutes a representation that the cost data is complete and includes all related cost under his Contract, but excludes any approved Architect's design fees required by substitution.
6. Request for substitution constitutes a representation that the Contractor has thoroughly investigated the proposed substitute to determine if license fees and royalties are pending on the proposed substitute, for compliance with General Conditions of the Contract/AIA 201.
B. Requests for substitutions shall be submitted on "Substitution Request Form - Section 0125 1" attached in this Project Manual. Legible copies of this form shall be complete with data substantiating compliance of proposed substitution with requirements of Contract Documents including the following information:
1. Project title and Architect's project number.
2. Identification of product specified including Specifications Section and Paragraph Number.
3. Identification of proposed substitute complete with manufacturer's name and address, trade name of product, and model or catalog number. Attach product data as specified in Section 01330.
4. List of fabricator and supplier (with address and phone number) for proposed substitute.
5. The effect of substitution on dimensions, material thicknesses, wiring, piping, duct work, etc. indicated in Contract Documents.

6. The effect of substitution on other trades.
7. The effect of substitution on construction schedule.
8. Differences in quality and performance between specified product and proposed substitute.
9. Comparison of manufacturer's guarantees of specified product and proposed substitute.
10. Availability of maintenance services and replacement materials for proposed substitute.
11. Cost data comparing proposed substitute with specified product, and amount of net change to Contract Sum.

END OF SECTION

01251 SUBSTITUTION REQUEST FORM

PROJECT TITLE & NO. _____
_____
_____

To: Aris Go
Consultant Architect
UP Baguio

SPECIFIED ITEM _____
Item Number in BOQ _____
PROPOSED SUBSTITUTE _____
_____

Attach complete description, catalog, spec data, and laboratory tests if applicable.
1. What effect will substitution have on dimensions, gauges, weights, etc. indicated in Contract Documents?
_____
2. What effect will substitution have on wiring, piping, ductwork, etc. indicated in Contract Documents?
_____
3. What effect will substitutions have on other trades? _____
4. What effect will substitution have on construction schedule? _____
5. What are the differences in quality and performance between proposed substitute and specified product?
_____
6. Manufacturer's guarantees of the specified products and proposed products are:
Same: _____ Different (Explain) _____
7. List (on separate sheet) the availability of maintenance services and replacement materials for proposed substitute.
8. List (on separate sheet) names, addresses and phone numbers of fabricators and suppliers for proposed substitutes.
9. If the substitution request is accepted, it will result in: ▢ No cost impact

▢ Credit (How much) _____ ▢ Added cost (How much) _____
10. The undersigned shall pay for additional studies, investigations, submittals, redesign and/or analysis by the Architect/Engineer caused by the requested substitutions.

SUBMITTED BY: (Contractor)
Firm _____
Address _____
_____
Signature _____
Telephone No. _____ Date_____
Submitted for review by Architect.

Date: _____

ARCHITECT/ENGINEER'S REVIEW COMMENTS: ▢ Accepted	Signature:_____ Date _____

▢ Accepted as Noted (see attached copy) ▢ Rejected due to incomplete form. Resubmit. ▢ Not Accepted ▢ Received Too Late	Remarks_____ _____ _____

01251 COST REPORTING AND PAYMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Procedural requirements for processing the following:

1. Schedule of Values.
2. Cash flow projections for the project.
3. Unit Prices.
4. Payment applications.
5. Payments at substantial completion.
6. Payment at final completion.
7. Identification of substitutions and alternatives in payment requests.
8. Accounting of Change Order amounts and allowances, and similar cost and pay-out related requirements.

1.02 UNIT PRICE SCHEDULE

A. General:

1. Refer to individual sections of specifications for the definitions of units of work where the establishment of unit prices is required; the methods of measurement and pricing are specified therein.
2. It is recognized that the utilization of unit prices is solely by means of Change Orders as specified in General and Supplementary Conditions, and that established unit prices contain total costs as defined therein, and include each entity's margins for overhead and profit.

B. Prepare Schedule of Established Unit Prices to show generic name, unit of measure, price per unit, related specification sections, subcontractor (if any) assigned to the work so named, comments applicable to the Agreement terms which established it.

1. Indicate whether add-prices are established to be different from deduct-prices.

C. The Architect reserves the right to reject the Contractor's measure of work-in-place which involves the use of established unit prices, and at Owner's expense to have the work measured by independent surveyor acceptable to Contractor.

1.03 SCHEDULE OF VALUES

A. General:

1. Prepare the Schedule of Values, as required by General Conditions.
2. Correlate the line items of the Schedule of Values with other administrative schedules and forms required for the work, including the following:
    a) Progress schedule.
    b) Payment request form.
    c) Listing of subcontractors.
    d) Listing of products and principal suppliers and fabricators.
    e) Schedule of submittals.

3. Provide breakdown of Contract Sum in sufficient detail to facilitate continued evaluation of payment requests and progress reports.
4. A breakdown of principal subcontract amounts will be required (several line items).
5. At Contractor's option, values may be rounded off to nearest whole dollar, but total must equal the Contract Sum.
6. Submit 3 copies of Schedule of Values to Architect for submittal to the Owner.

B. Time Coordination:
1. In the coordination of initial submittals and other administrative "start-up" activities, submit the Schedule of Values to the Architect no later than 7 days before the initial payment request is to be submitted.

C. Listing:
1. Arrange schedule with columns to indicate the generic name of the item, related specification sections, subcontractor, supplier/manufacturer/fabricator, Change Orders (numbers) which have affected the value, peso value of item, and percentage of Contract Sum (to nearest one-hundredth percent and adjusted to total 100 percent).

D. Schedule Updating:
1. Update and resubmit Schedule of Values related to Change Orders affect the listing and whenever the actual performance of the work involves necessary changes of substance to the values previously listed.
2. Coordinate resubmittal times with progress reports and payment requests.

1.04 PAYMENT REQUESTS

A. General:
1. Except as otherwise indicated in the Contract Documents, comply with the procedures and requirements of the General Conditions and the Supplementary General Conditions, including the submittal of supporting documentation and waivers or releases of lien.
2. Refer to Supplementary Conditions for requirements concerning "retainage" on payment.
3. Except as otherwise indicated, sequence of progress payments shall be made on a regular basis, and each must be consistent with previous applications and payments.

B. Application Preparation:
2. Except as otherwise indicated, complete every entry provided for on the form, including the notarization and execution by authorized persons.
3. Incomplete applications shall be returned by the Architect without action.
4. Entries must match current data of both the Schedule of Values and progress schedule and report.
5. Listing must include amounts of Change Orders approved prior to the last day of the "period of construction" of the application.

C. Initial Payment Application:
The following must be received by the Architect prior to submittal of the first payment application.
1. Listing of subcontractors and principal suppliers and fabricators.
2. Schedule of values.
3. Progress schedule.
4. Schedule of principal products.
5. Schedule of unit prices.
6. Schedule of submittals.
7. Listing of Contractor's staff assignments and principal consultants.
8. Copies of acquired building permits and similar authorizations and licenses from governing authorities for the current performance of the work.
9. Initial progress report, including report of preconstruction meeting.

D. Application at Time of Substantial Completion:

1. Following the issuance of the Architect's "Certificate of Substantial Completion", and also in part as applicable to prior certificates on portions of completed work as designated, a payment application may be prepared and submitted by the Contractor.
2. The principal administrative actions and submittals which must precede or coincide with such special applications are specified in the General Conditions, and elsewhere in the Contract Documents.
3. Those specifically related to the application can be summarized as follows, but not limited to these:

a) Occupancy permits and similar approvals or certifications by governing authorities and franchised services, assuring Owner's full access and use of the completed work.
b) Warranties, guarantees, maintenance agreements and similar provisions of the Contract Documents.
c) Test/adjust/balance records, maintenance instructions, meter readings, start-up performance reports, and similar change-over information germane to the Owner's occupancy, use, operation and maintenance of the completed work.
d) Final cleaning of the work.
e) Application for reduction of retainage, and Consent of Surety.
f) Advice to Owner on coordination of shifting insurance coverages, including proof of extended coverages as required.
g) Listing of incomplete work (Punch List) recognized to be completed by the Contractor, as exceptions to the Architect's Certificate of Substantial Completion.
h) Final project photographs.

E. Final Payment Application:

1. Completion of project closeout requirements.
2. Completion of items specified for payment application at time of substantial completion (regardless of whether such application was made).
3. Assurance, satisfactory to Owner, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.
4. Transmittal of required project construction records to Owner.
5. Proof, satisfactory to Owner, that taxes, fees and similar obligations of the Contractor have been paid.
6. Removal of temporary facilities, services, surplus materials, rubbish and similar provisions.
7. Consent of Surety for Final Payment.

F. Application Transmittal:

1. Submit four executed copies of each payment application, one copy of which is completed with waivers of lien and similar attachments.
2. Transmit each copy with a transmittal form listing those attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.
3. Transmit to Architect to ensure receipt within 3 days.

END OF SECTION

01311 PROJECT COORDINATION

PART 1 - GENERAL

1.01 SCOPE:

A. Minimum administrative and supervisory requirements necessary for coordination of Work on the Project include, but not limited to:

1. Coordination and meetings.
2. Administrative and supervisory personnel.
3. Surveys and records or reports.
4. Limitations for use of site.
5. Special reports.
6. General installation provisions.
7. Cleaning and protection.
8. Conservation and salvage.
9. Work of other contractors outside the scope of this Contract but working in the immediate vicinity of this Site.

1.02 COORDINATION AND MEETINGS:

A. Prepare a written memorandum on required coordination activities. Include such items as required notices, reports and attendance at meetings. Distribute this memorandum to each entity performing work at the Project site. Prepare similar memorandum for separate contractors where interfacing of their work is required.
B. Coordination drawings: Prepare coordination drawings where work by separate entities requires fabrication off site of products and shall indicate how work shown by separate shop drawings will interface, and shall indicate sequence for installation. Comply with all requirements of the "Submittals" section.
C. Monthly coordination meetings: Hold monthly general Project coordination meetings at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular Project meetings and special pre-installation meetings. Request representation at each meeting by every party currently involved in coordination or planning for the Work of the entire Project. Conduct meetings in a manner which will resolve coordination problems. Record results of the meeting and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1. At Contractor's option, monthly coordination meetings can be held integrally with monthly progress meetings as specified in other sections of this specification.

1.03 LIMITATIONS ON USE OF THE SITE:

A. Limitations on site usage as well as specific requirements that impact site utilization are indicated on the Drawings and by other Contract Documents. In addition to these limitations and requirements administer allocation of available space equitable among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the Project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

1.04 SPECIAL REPORTS:

A. Submit special report directly to the Owner within one day of an occurrence. Submit a copy of the report to the Architect and other entities that are affected by the occurrence.
B. Reporting unusual events: When an event of an unusual and significant nature occurs at the site, prepare and submit a special report. List chain of events, persons participating, response by the Contractor's personnel, an evaluation of the results or effects and similar pertinent information. Advise the Owner in advance when such events are known or predictable.
C. Reporting accidents: Prepare and submit reports of significant accidents, at site and anywhere else work is in progress. Record and document data and actions. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

3.01 GENERAL INSTALLATION PROVISIONS:

A. Pre-installation conferences: In addition to other pre-installation requirements indicated throughout the Contract Documents, hold a pre-installation meeting at the Project site well before installation of each unit of work which requires coordination with other work. Installer and representatives of the manufacturers and fabricators who are involved in or affected by that unit or work, and with its coordination or integration with other work that has preceded or will follow shall attend this meeting. Advise the Architect of scheduled meeting dates.

1. At each meeting review progress of other work and preparations for the particular work under consideration including specific requirements for the following:
   a. Contract Documents.
   b. Options.
   c. Related change orders.
   d. Purchases.
   e. Deliveries.
   f. Shop drawings, project data and quality control samples.
   g. Possible conflicts and compatibility problems.
   h. Time schedules.
   i. Weather limitations.
   j. Manufacturer's recommendations.
   k. Compatibility of materials.
   l. Acceptability of substrates.
   m. Temporary facilities.
   n. Space and access limitations.
   o. Governing regulations.
   p. Safety.
   q. Inspection and testing requirements.
   r. Required performance results.
   s. Recording requirements.
   t. Protection.
   u. Other contractors performing work outside of the scope of this Contract.
2. Record significant discussions of each conference, and record agreements and disagreements, along with the final plan of action. Distribute the record of meeting promptly to everyone concerned, including the Owner and Architect.
3. Do not proceed with the Work if the pre-installation conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene pre-installation conference at the earliest feasible date.

B. Installer's inspection of conditions: Require the installer of each major unit of work to inspect the substrate to receive work and conditions under which the work is to be performed. The installer shall report all unsatisfactory conditions in writing to the Contractor. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

C. Manufacturer's instructions: Where installations include manufactured products, comply with the manufacturer's applicable instructions and recommendations for installation, to the extent that these instructions and recommendations are more explicit or more stringent than requirements indicated in the Contract Documents.

D. Inspect each item of materials or equipment immediately prior to installation. Reject damaged and defective items.

E. Provide attachment and connection devices and methods for securing work. Secure work true to line and level, and within recognized industry tolerances. Allow expansion and building movement. Provide uniform joint width in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable

visual-effect choices to the Architect for final decision.
F. Recheck measurements and dimensions of the work, as an integral step of starting each installation.
G. Install each unit-or-work during weather conditions and Project status which will ensure the best possible results in coordination with the entire Work. Isolate each unit of work from incompatible work as necessary to prevent deterioration.
H. Coordinate enclosure of the Work with required inspections and tests, so as to minimize the necessity of uncovering work for that purpose.
I. Mounting heights: Where mounting heights are not indicated, mount individual units of work at industry recognized standard mounting heights for the particular application indicated. Refer questionable mounting height choices to the Architect for final decision.

3.02 CLEANING AND PROTECTION:

A. During handling and installation of W ork at the Project site, clean and protect Work in progress and adjoining work on the basis of continuous maintenance. Apply protective covering on installed work where it is required to ensure freedom from damage or deterioration at time of substantial completion.

1. Clean and perform maintenance on installed work as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
2. Coordinate with the requirements of Section 01740.

B. Limiting exposures of Work: To the extent possible through reasonable control and protection methods, supervise performance of the Work in such a manner and by such means which will ensure that none of the Work, whether completed or in progress, will be subjected to harmful, dangerous, damaging or otherwise deleterious exposure during the progress of the Work. Such exposures include, where applicable, but not by way of limitation the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Puncture.
12. Abrasion.
13. Heavy traffic.
14. Soiling.
15. Insect infestation.
16. Combustion.
17. Electrical current.
18. High speed operation, improper lubrication, unusual wear or other misuse.
19. Incompatible interface.
20. Destructive testing.
21. Misalignment.
22. Excessive weathering.
23. Unprotected storage.
24. Improper shipping or handling.
25. Theft.
26. Vandalism.

3.03 CONSERVATION AND SALVAGE:

A. It is a requirement for supervision and administration of the Work that construction operations be carried out with the maximum possible consideration given to conservation of energy, water and materials. In addition maximum consideration shall be given to salvaging materials and equipment involved in performance of the work but not incorporated therein. Refer to other sections for required disposition of salvage materials which are the Owner's property.

- END OF SECTION -

01311.9 PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

A. General: This section specifies requirements for project meetings including:

1. Pre-Construction Meetings
2. Progress Meetings
3. Pre-Installation Meetings

B. Contractor's Responsibilities:

1. Schedule and administer meetings throughout duration of work.
2. Prepare agenda for meetings.
3. Distribute written notice of each meeting seven days in advance of meeting date.
4. Make physical arrangements for meetings.
5. Preside at meetings.
6. Record the minutes; include all significant proceedings and decisions.
7. Reproduce and distribute copies of minutes within 5 days after each meeting.
8. Provide one copy to:
    a) All participants in the meeting, including the Architect and Owner.
    b) All parties affected by decisions made at the meetings.

C. Participants:

1. Qualified representative of Contractors, and Suppliers authorized to act on behalf of the parties they represent.
2. Owner at Owner's option.
3. Architect.

1.02 PRE-CONSTRUCTION MEETING

A. Schedule meeting within the early stages of Construction as determined by the Architect or Contractor

B. Suggested Agenda: Prepare written material, distribute lists, and discuss the following:

1. Identification of Contractors and Suppliers.
2. Projected construction schedules. This shall additionally include the Owner requested detailed work schedule. See Section 01 11 00 (as applicable).
3. Critical work sequencing.
4. Major equipment deliveries and priorities.
5. Project coordination including designation of responsible persons.
6. Procedures for, and processing of:
    a) Field decisions.
    b) Proposal requests.
    c) Submittals.
    d) Change orders.
    e) Applications for payments.
7. Adequacy of distribution of Contract Documents.
8. Procedures for Maintaining Record Documents.
9. Use of premises:
    a) Office, work and storage areas.
    b) Owner's requirements.
10. Construction facilities, construction aids, and controls.

11. Temporary utilities.
12. Safety and first aid procedures.
13. Security procedures.
14. Housekeeping procedures.
15. Working Days/hours.

1.03 PROGRESS MEETINGS

A. Contractor shall schedule regular weekly meetings and as necessary, schedule additional meetings.

B. Suggested Agenda:

1. Review and approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede construction schedule.
5. Review of off-site fabrication, delivery schedules.
6. Corrective measures and procedures required to regain projected schedule.
7. Revisions to construction schedule.
8. Plan progress and schedule for succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Review proposed changes for:
    a) Effect on construction schedule and on completiondate.
    b) Effect on other contracts of the Project.
13. Other business.

1.04 PRE-INSTALLATION MEETINGS

A. When required in individual Specification Section, the Contractor shall schedule a pre-installation meeting at the job-site prior to starting the work of the Section.

B. Require attendance of entities directly affecting, or affected by, the work of the Section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda, preside at meeting, record the minutes and distribute copies within 5 days after the meeting as follows:

1. To Architect: One copy.
2. To Participants: One copy each.

E. Suggested Agenda: Review the progress of other related construction activities and preparations for the particular activity under consideration, including requirements for:

1. Contract Documents.
2. Shop Drawings, Product Data and quality control samples.
3. Possible conflicts.
4. Compatibility problems.
5. Time Schedules.
6. Weather limitations.
7. Manufacturer's recommendations.
8. Acceptability of substrates.
9. Temporary facilities.
10. Space and access limitations.
11. Governing regulations.
12. Inspection land testing requirements.
13. Required performance results.

14. Recording requirements.
15. Protection.

END OF SECTION

01321.6 CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 SUMMARY

A. Procedures for preparation, submission and review of Construction Schedules for entire work and periodic updating.
B. By submitting a proposal the Contractor agrees that his work, or various activities of this work, will be completed within the overall requirements of the Project Construction Schedule.

1.02 SUBMITTALS

A. Submit within 20 days after award of Contract a network analysis diagram of the Work using the Critical Path Method (CPM) or PERT method of scheduling.
B. The Contractor's schedule shall be considered a supplement to the Project Construction Schedule for the benefit of the Contractor and the Project and not one instead of the Project Construction Schedule.

1.03 CONTENTS OF SCHEDULE

A. Show pertinent activities with durations along with:
1. Early start date.
2. Late start date.
3. Early finish date.
4. Late finish date.
B. Show the Work by a sequence of activities with the relationship and dependency of each activity properly indicated.
C. Show submittal times for shop drawings, product data and samples, including those provided by the Owner and those under allowances. Show approval times as allowed by the Contract Documents and delivery times of material and equipment.
D. The critical activities and the critical path are to be clearly identified an the network diagram.
E. In preparing his schedule, the Contractor must take into consideration the work of other contractors and the dependency each has on the other for the proper and efficient execution of all work on the Project.
F. Schedules which do not meet the requirements stated herein will not be considered as acceptable.

1.04 ARCHITECT'S ACTIONS

A. The schedule provided by the Contractor will be reviewed with respect to the Project Construction Schedule and the Contractor will be advised that:
1. His schedule is acceptable and meets the overall objectives of the Project Construction Schedule.
2. His schedule does not meet the overall objectives of the Project Construction Schedule, but will be reconsidered if certain revisions are made.
3. His schedule does not meet the requirements of the Contract documents and is rejected.
B. If the Architect rejects the Contractor's schedule the Contractor shall, within 15 days after notification that the schedule is rejected, resubmit his schedule to meet the requirements of the Contract Documents.

END OF SECTION

01330 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

PART 1 - GENERAL

1.01 SUMMARY

A. Procedures for processing:

1. Shop Drawings
2. Product Data
3. Office Samples
4. Mock-up Samples
5. Certificate of Compliance

1.02 GENERAL PROCEDURES

A. The approval of submittals does not constitute a Change Order.

B. All items shall be submitted under Contractor's transmittal letter, and shall include the following information:

1. Project by title and Architect's project number.
2. Contractor's contract number.
3. Work and products by Specifications Section and Article number.

C. The Contractor shall transmit to the Architect a completed "Submittal Information and Schedules" form.

D. Resubmittals: When Architect requires that a submittal be "resubmitted", comply with requirements of this section.

1. Identify changes made since the previous submittal.

E. Notify the Architect in writing at time of submittal, of any deviations from the requirements of Contract Documents.

F. Make all submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.

1. Review Time: In scheduling, allow at least 10 working days for Architect's review.
2. Delays caused by the tardiness of the Contractor in preparing and forwarding of submittals will not be an acceptable basis for extension of the Contract completion date or for consideration of alternate products which do not meet the specified requirements of this Project Manual.

3. The Architect will review submittals with reasonable promptness so as to cause no delay. The Architect's review and/or corrections refer only to the general arrangement and conformance of the subject of the submittals with the design concept of the project and with the information given in the contract documents. Under no conditions should the Contractor consider the review to include the dimensions, quantities, and details of the items nor the approval of an assembly in which the item functions. The Architect review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the contract documents unless the Contractor has informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation; nor shall the Architect's review relieve the Contractor from responsibility
for errors from the shop drawings.

G. Fabricating products before receiving Architect approval and before submittals are returned to Contractor, shall be at Contractor's risk.

H. Starting work which requires submittals to be approved by Architect before Architect approves and submittals are returned Contractor shall be at Contractor's risk.

I. Where used in the Contract Documents, the words "or equal" shall be defined as "refer to substitution requirements"

1.03 SHOP DRAWINGS

A. Reproduction of any portion of the Architect's Construction Documents for use as submittals for shop drawings is not acceptable, such submittals will be returned unreviewed.

B. Submit shop drawings in a clear and thorough manner.

1. Title each drawing with Project name and Architect's project number.
2. Identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.

C. Identify the following:
1. Requirements of the individual section of Project Manual.
2. Field measurements.
3. Field construction criteria.
4. Relation to adjacent or critical features of the Work or products.
5. Conformance of submittal with requirements of Contract Documents.

D. Each sheet of shop drawings shall be stamped and signed by Contractor before submitting to Architect. Review for compliance with requirements of Contract Documents.

E. Fabricating products or beginning the work before shop drawings are approved by Architect and returned to Contractor shall be at Contractor's risk.

F. Required Printing: One set of sepia prints and 3 sets of blueline prints, for all architectural submittals and 4 sets of blue line prints for structural, mechanical and electrical submittals.

G. A copy of the marked, Structural Shop Drawings with the Structural Engineer's review stamp is to be maintained at the job site.

1.04 PRODUCT DATA

A. Submit only pages which are pertinent.
1. Mark each copy of standard printed data to identify pertinent products, referenced toSpecification Section and Article number.
2. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.

B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable.

C. Each set of manufacturer's product data shall be stamped and signed by Contractor before submitted to Architect to certify compliance with requirements of Contract Documents.

D. Number of Copies Required: See paragraph 1.03, F.

1.05 OFFICE SAMPLES

A. Submit full range of manufacturer's standard finishes except when more restrictive requirements are specified, indicating colors, textures, and patterns, for Architect's selection.

B. Submit samples to illustrate functional characteristics of products, including parts and attachments.

C. Approved samples which may be used in the Work are indicated in the Specification section.

D. Label each sample with identification required for transmittal letter.

E. Number Required: As specified in individual specifications section.

1.06 MOCK-UP SAMPLES

A. Where mock-up samples and similar samples are indicated in the individual specifications sections, comply with requirements for "Office Samples", and process transmittal forms for mock-ups to provide a record of activity.

1.07 CERTIFICATES OF COMPLIANCE

A. Contractor submit "Certificates of Compliance" certifying that all materials used in the Work comply with all specified provisions thereof.

1. Submit in the form of a letter or company standard forms.

2. If test reports are submitted with "Certificates of Compliance", test reports shall include data or dates of testing and results of testing.

1.08 TEST REPORTS

A. Test reports certified by an independent testing laboratory must be made available upon request by

Architect.

1.08 ITEMS FOR SUBMISSION BY THE CONTRACTOR FOR THE ARCHITECT'S APPROVAL PRIOR TO ORDER, PURCHASE, WORK OR MANUFACTURE

The following section is a listing of materials and construction documents for the Architect's appreciation to ensure that design objectives for the intended class of construction are met. It is designed to avoid waste such as when the Contractor installs specific materials or systems which are not acceptable for the project.

SAMPLES

04000 MASONRY

○ All specified sizes and types of unit masonry	1 piece each
○ Others (if required by Architect / Owner)	1 unit each

05000 METALS

○ All specified sizes of structural steel sections	1000 mm length
○ All specified sizes of steel reinforcements per bulk delivery	1000 mm length
○ All aluminum & stainless steel sections	150 mm length
○ Brass nosing section	150 mm length
○ Others (if required by Architect / Owner)	1 unit each

06000 WOOD AND PLASTICS

○ Wood Section Samples	300 mm length
○ Hardware and Fasteners	1 piece each
○ Others (if required by Architect / Owner)	1 unit each

07000 THERMAL AND MOISTURE PROTECTION

○ All waterproofing & damp proofing products	300 mm x 300 mm swatch
○ Roofing sheets and accessories	1 piece each
○ Joint sealants	1 tube each
○ All insulation products	300 mm x 300mm swatch
○ Others (if required by Architect / Owner)	1 unit each

08000 DOORS & WINDOWS

○ All corner sections of metal doors, jambs and hardware	1 unit each
○ All aluminum door and window panels complete with operating mechanisms, locksets and all other hardware	1 panel each
○ All glass panes & glazing compounds	1 panel each
○ Aluminum and Steel Storm Resistant Fixed Louver	1 panel each
○ All finishing hardware: locksets, hinges, door stopper/holder, closer, chain lock, eye, deadlock, cabinet & drawer pulls, locks, butt hinges and aluminum door hardware	1 piece each
○ Others (if required by Architect / Owner)	1 unit each

09000 FINISHES

○ All plaster types	1 panel mock-up
○ PalmEco board or other equivalent	1 panel each
○ Homogenous Tiles	1 piecel each
○ All specified sizes and types of stones	1 piece each
○ All colors of vitrified tiles	1 piece each
○ All paints and lacquers	Sample swatches for all types and colors (300 mm x 300 mm)
○ Others (if required by Architect / Owner)	1 unit each

010000 SPECIALTIES

- Identifying Device Letter Size — 1 piece each
- All toilet accessories — 1 piece each
- Others (if required by Architect / Owner) — 1 unit each

015000 MECHANICAL / SANITARY

- All plumbing pipes, fittings, meters and accessories — 1 of each type
- All fire alarm system components and accessories — 1 of each type
- All exhaust fans — 1 unit each
- All valves — 1 unit each
- Others (if required by Architect / Owner) — 1 unit each

016000 ELECTRICAL

- All conduits, fittings, wires, cables, meters and accessories — 1 of each type
- All junction box, pull box and accessories — 1 of each type
- All LED lighting fixtures, switches and convenience outlets — 1 complete set each
- All fire alarm wiring devices — 1 of each type
- Others (if required by Architect / Owner) — 1 unit each

MOCK-UPS

NOTE: All mock-ups are for Architect's approval before final installation.

1. Stone pavers on sand bed
2. Stainless steel railing assembly
3. Aluminum horizontal devices assembly
4. All waterproofing materials in place
5. All types of wall board assemblies
6. All types of ceiling board assemblies
7. All types of wall and floor tile and stone finish
8. All paint finishes
9. All types of cabinetries and closets
10. Model of complete studio unit including toilet
11. Cement and Natural Stone Paving showing setting bed, joint sizes, laying patterns, colors, textures, one unit area per plan
12. Natural Stone Wall Finish showing waterproofing, joint sizes, laying patterns, colors, textures, 0.50 x 1.00m area
13. Others (if required by Architect / Owner)

TECHNICAL CATALOGUES AND BROCHURES

1. Roofing System
2. Fire alarm system
3. Fire Extinguisher
4. All Pumps
5. Electrical panel distribution
6. Exhaust & Ventilating fans
7. Others (if required by the Architect / Owner)

DETAILED SHOP DRAWINGS

1. All structural steel framing joints and steel decking
2. Roofing Installation
3. Structural steel trusses, frames, its connection system and sequence of erection
4. Fireproofing
5. All architectural pre-cast units
6. All door, window panels including all operating devices, locksets and other hardware
7. Aluminum and Stainless Steel Sections, Framing, and Cladding
8. Waterproofing and Insulation installation methods
9. Installation method and details of building I.D. letters
10. Complete Natural Stone Finish installation method with waterproofing and stainless metal anchors
11. Others (if required by the Architect / Owner)

LABORATORY TEST CERTIFICATES

1. Structural Steel strength
2. Reinforcing Steel strength
3. Welding tests
4. Concrete (bases on batch mix for specified phases of pouring works)

a. Concrete mix design
b. Concrete test results

5. Compaction tests on fill materials
6. Fireproofing tests
7. Waterproofing tests
8. Leak test for all plumbing and water pipes
9. Analysis of imported topsoil
10. Others (if required by the Architect / Owner)

GUARANTEES / WARRANTIES

Submittals for Environmental Performance

1. Termite Poisoning
2. Wood treatment
3. All Waterproofing Materials
4. Roofing System
5. Aluminum Doors and Windows
6. Pumps
7. Fire alarm systems and fire extinguishers
8. Fire doors
9. All trees, palms, shrubs, ground covers, lawns (when needed)
10. Others (if required by Architect / Owner)

END OF SECTION

01400 Quality Requirements

RESPONSIBILITIES

A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction.

Costs for these services are included in the Contract Sum.

1. **Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.**

2. **Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.**
   a. Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless agreed to in writing by the Owner.

B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.

1. **The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.**

C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. **Provide access to the Work.**
2. **Furnish incidental labor and facilities necessary to facilitate inspections and tests.**
3. **Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.**
4. **Provide facilities for storage and curing of test samples.**
5. **Deliver samples to testing laboratories.**
6. **Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.**
7. **Provide security and protection of samples and test equipment at the Project Site.**

D. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the Architect and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. **The agency shall notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.**
2. **The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.**
3. **The agency shall not perform any duties of the Contractor.**

E. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. **The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.**

SUBMITTALS

A. The testing agency shall submit a plan, in writing, from the testing agency, stating how they intend to perform these services of special inspections stated above and submit to the Building Inspectors office as required by Chapter 17 of the 2002 K.B.C. The testing agency shall submit reports to the Architect for review, and record.

B. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. **Submit additional copies of each written report directly to the governing authority, when the authority so directs.**
2. **Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:**
   a. Date of issue.
   b. Project title and number.
   c. Name, address, and telephone number of testing agency.
   d. Dates and locations of samples and tests or inspections.
   e. Names of individuals making the inspection or test.
   f. Designation of the Work and test method.
   g. Identification of product and Specification Section.
   h. Complete inspection or test data.
   i. Test results and an interpretation of test results.
   j. Ambient conditions at the time of sample taking and testing.
   k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
   l. Name and signature of laboratory inspector.
   m. Recommendations on retesting.

REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes.

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

01520 TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. The Contractor shall pay all energy costs for the temporary electricity, heat and ventilation used for the Work of the Project. This shall include the costs of installation and maintenance of temporary equipment, which costs shall be the responsibility of the Contractor. The Contractor shall remove all temporary equipment at the end of each work phase.
B. Use of alternate temporary facilities is Contractor's option, subject to the Architect's acceptance.
C. Comply with Federal, State and local codes/regulations.

1.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Temporary lighting and power shall be of adequate size to properly service the requirements of the Work, including adequate feeder sizes to prevent excessive voltage drop. Temporary work to be installed in a neat and safe manner in accordance with the National Electrical Code, Article 305, and as required by OSHA or applicable local safety codes. Panelboard shall be equipped with ground fault and be tested daily to ensure proper function of ground fault.
B. Provide approved construction type power cords or approved wiring as necessary for the performance of this work. Power cords or wiring that does not comply with codes/regulations will not be allowed under any circumstances.
C. If higher voltages are required, make arrangements with local electric power company, make connections to primary source, and pay installation fees and meter charges.
D. The Contractor will see to the provisions of temporary lighting for construction operations.
E. Permanent lighting may be used during construction.

1.04 TEMPORARY TELEPHONE/COMMUNICATION SERVICE

A. The Contractor shall provide telephone/communication service for his and the Architect's use.

1.05 TEMPORARY WATER

A. The Contractor shall make provisions for temporary water service required for construction operations.
B. Provide branch piping, hoses for their own use.
C. Be responsible for providing drinking water in approved sanitary containers and disposable cups for their workers.

1.06 SANITARY FACILITIES

A. Make provisions for temporary toilet facilities for the use of all contractors.

1.07 CONSTRUCTION AIDS

A. Provide hoisting equipment, scaffolding, etc. as needed to properly perform his work.

1.08 PUMPING AND DEWATERING

A. Provide and operate drainage and pumping equipment as may be necessary for the proper performance of this work. In doing so he must maintain the site, the construction work area and adjacent areas free from water resulting from their operation.

1.09 BARRICADES

A. Make provisions for barricades to surround the areas of work. Maintain these barricades when the operations are adjacent to and confined within these barricades. Should the Contractor find it necessary to remove a portion of the barricades in the performance of his operations, then the Contractor shall provide all necessary warnings, temporary guard rails and other safety measures required, and shall place the temporary barricade back to its proper conditions as soon as practical, but in any case at the end of each work day. Should the Contractor fail to replace the barricade as required, then the Architect, if he deems it necessary, may do so without notice to the Contractor, and charge the Contractor the full cost thereof.
B. Provide barricades and warning lights at locations where their operations present a hazard to the Owner.

1.10 PROJECT IDENTIFICATION

A. Provide a project identification sign designed by the Architect. See Drawings for size and requirements.

B. Other signs will not be permitted.

1.11 FIELD OFFICE AND SHEDS

A. Provide a temporary field office for Contractor's, the Owner and the Architect's use.

B. In accordance with his needs to properly perform work, provide a temporary field office for this own work.

C. Provide a weather tight structure, with heat and ventilation for products requiring controlled conditions, with adequate space for organized storage and access, and lighting for inspection of stored materials.

D. The location, appearance and type of temporary field office and storage facilities must be approved by the Architect prior to its use.

1.13 SITE SECURITY

A. In addition to placing the permanent fire protection facilities in operating condition at the earliest feasible date, provide fire extinguishers of types and sizes recommended by NFPA No. 10 for the general construction areas. The extinguishers will be located on each story of construction, near each entrance and stairway.

B. Provide similar fire extinguishers for specific areas of work.

C. Smoking will not be allowed except in marked, non-hazardous areas.

D. Employ and pay for watchman services as he deems appropriate and necessary.

1.14 PROTECTION OF FINISHED WORK

A. Be wholly responsible for the protection of the finished Work, except to the extent covered by Property Insurance to be maintained by Owner.

B. Upon completion of the Work and before acceptance, the Contractor shall, without extra compensation, repair an/or refinish his work that may have been damaged.

1.15 REMOVAL

A. Be responsible for the removal of temporary materials, equipment, services, and construction at such time as to allow the work on the Project to proceed according to the established Construction Schedule.

B. Repair damage caused by installation and use of temporary facilities.

C. Restore existing facilities used during construction to specified or to original condition.

1.16 ESTIMATING

Includes field office for Contractor and Owner's Representative, material storage, barracks, security, temporary fences, barricades, first aid, fire extinguishers, toilets, project signage.

END OF SECTION

01660 TRANSPORTATION AND HANDLING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies requirements for transportation and handling of packaged and unpackaged products, equipment and components.

1.02 PACKAGING AND TRANSPORTATION

A. Require supplier to package products in boxes or crates for protection during shipment, handling and storage. Protect sensitive products against exposure to elements and moisture.
B. Protect sensitive equipment and finishes against impact, abrasion and other damage.

1.03 DELIVERY

A. Arrange deliveries of products in accordance with construction schedules and in ample time to facilitate inspection prior to installation.
B. Coordinate to avoid conflict with work and conditions at the site. Specifically coordinate to determine:
1. Work of the Owner.
2. Work of other contractors.
3. Availability of equipment and personnel for handling products.
4. Owner's use of premises.

C. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
D. Clearly mark partial deliveries of component parts of equipment to permit easy accumulation of parts and to facilitate assembly.
E. Immediately on delivery, inspect shipments to assure:
1. Compliance with requirements of Contract Documents and approved submittals.
2. Quantities are correct.
3. Containers and packages are intact and that labels are legible.
4. Products are properly protected and undamaged.

1.04 PRODUCT HANDLING

A. Provide equipment and personnel to handle products, including those provided by the Owner, by methods to prevent soiling or damage to products or packaging.
B. Provide additional protection during handling as necessary to prevent scraping, marring, or otherwise damaging products or surrounding spaces.
C. Handle products by using methods that will prevent bending or over stressing.
D. Lift heavy components only at designated lifting points.

END OF SECTION

017400 CLEANING

PART 1 - GENERAL

1.01 SUMMARY

A. In addition to the General Conditions regarding Cleaning up, this Section specifies general requirements for cleaning of premises during construction and for final cleaning.

1.02 CLEANUP - GENERAL

A. Maintain premises and public properties free from accumulation of waste, debris, and rubbish caused by operations.
B. Keep streets clean from mud, dirt, debris and other materials. Promptly remove from streets, mud

and dirt tracked by vehicles.
C. At completion of Work, Phase or Critical Area, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials. Clean all sight-exposed surfaces. Leave work clean and ready for construction work to follow or for final cleaning as applicable.
D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
1. Do not burn or bury rubbish and waste materials on project site.
2. Do not dispose of volatile waste in storm drains or sanitary sewers.
E. Comply with rules/regulations regarding hazardous materials and:
1. Store volatile wastes in covered metal containers and remove from premises daily.
2. Prevent accumulation of waste which might cause hazardous conditions.
3. Provide adequate ventilation during use of volatile and noxious substances.

1.03 DURING CONSTRUCTION
A. Keep building, grounds, and public properties free from accumulation of waste materials and rubbish.
B. Wet down dry materials and rubbish as necessary to prevent dust. Schedule cleaning operation so that dust and debris resulting from the cleaning process does not damage other work.
C. Do not drop or throw materials from heights.
D. Unless otherwise stated, provide on site containers for collection of waste materials, debris, and rubbish. Containers must have adequate capacity to accommodate Contractors needs. Provide for removal of containers at appropriate intervals so that containers do not overflow.
E. Provide containers at workers break and lunch area. Police area daily.

1.04 FINAL CLEANING THE WORK, PHASE OR CRITICAL AREA
A. Final cleaning prior to Architect's final inspection will be the responsibility of the Contractor.
B. In addition to cleanup requirements stated elsewhere shall:
1. Perform cleaning operations as may be specifically required by the Specifications.
2. Remove temporary protection and labels not required to remain.
3. Remove debris, rubbish, dirt, etc., resulting from the Contractors work from all areas including concealed spaces, chases, and above ceilings.
4. Remove debris, rubbish, etc. resulting from the Contractors work, from roofs and drainage systems.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
B. Use cleaning materials only on surfaces by cleaning material manufacturer.

END OF SECTION

01741.9 CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
A. This Section includes administrative and procedural requirements for the following:
1. Salvaging non-hazardous demolition and construction waste.
2. Recycling non-hazardous demolition and construction waste.
3. Disposing of non-hazardous demolition and construction waste.
4. Related Sections include the following:

B. Division 1 Sections “LEED Requirements” and “LEED Checklist” for construction waste management and other U.S. Green Building Council's (USGBC) LEED prerequisites and credits needed for the Project to obtain LEED certification.

1. Division 1 Section "Temporary Facilities and Controls" for environmental-protection measures during construction.
2. Division 2 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.
3. Division 4 Section "Unit Masonry Assemblies" for disposal requirements for masonry waste.
4. Division 4 Section "Stone Veneer Assemblies" for disposal requirements for excess stone and stone waste.

1.03 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE GOALS

A. Salvage/Recycle Goals: Develop a Construction Waste Management Plan to divert 75% of construction waste from landfills through recycling and salvage; Owner's goal is to salvage and recycle as much non-hazardous demolition and construction waste as possible including the following materials:

1. Demolition Waste:

a. Asphaltic concrete paving.
b. Concrete.
c. Concrete reinforcing steel.
d. Brick.
e. Concrete masonry units.
f. Wood studs.
g. Wood joists.
h. Plywood and oriented strand board.
i. Wood paneling.
j. Wood trim.
k. Structural and miscellaneous steel.
l. Rough hardware.
m. Roofing.
n. Insulation.
o. Doors and frames.
p. Door hardware.
q. Windows.
r. Glazing.
s. Metal studs.
t. Gypsum board.
u. Acoustical tile and panels.

v. Carpet.
w. Carpet pad.
x. Demountable partitions.
y. Equipment.
z. Cabinets.
aa. Plumbing fixtures.
bb. Piping.
cc. Supports and hangers.
dd. Valves.
ee. Sprinklers.
ff. Mechanical equipment.
gg. Refrigerants.
hh. Electrical conduit.
ii. Copper wiring.
jj. Lighting fixtures.
ll. Lamps.
mm. Ballasts.
nn. Electrical devices.
oo. Switchgear and panelboards.
pp. Transformers.

2. Construction Waste:

a. Site-clearing waste.
b. Masonry and CMU.
c. Metals.
d. Gypsum board.
e. Piping.
f. Electrical conduit.
g. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
(1) Paper.
(2) Cardboard.
(3) Boxes.
(4) Plastic sheet and film.
(5) Polystyrene packaging.
(6) Wood crates.
(7) Plastic pails.

1.05 SUBMITTALS

A. Waste Management Plan: **Submit 3 copies of plan within 30 days of date established for the Notice to Proceed**.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in .
4. Quantity of waste salvaged, both estimated and actual in .
5. Quantity of waste recycled, both estimated and actual in .
6. Total quantity of waste recovered (salvaged plus recycled) in .
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

1.06 QUALITY ASSURANCE

A. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal

requirements.
B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.02 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.
C. Salvaged Items for Owner's Use:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area off-site.
5. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

3.03 RECYCLING OF DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.
B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
a. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.04 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Grind asphalt to maximum size.

1. Crush asphaltic concrete paving and screen to comply with requirements in Division 2 Section "Earthwork" for use as general fill.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Crush concrete and screen to comply with requirements in Division 2 Section "Earthwork" for use as satisfactory soil for fill or subbase.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Crush masonry and screen to comply with requirements in Division 2 Section "Earthwork" for use as general fill.

2. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.

2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

I. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

J. Plumbing Fixtures: Separate by type and size.

K. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

L. Lighting Fixtures: Separate lamps by type and protect from breakage.

M. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

N. Conduit: Reduce conduit to straight lengths and store by type and size.

3.05 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

2. Polystyrene Packaging: Separate and bag materials.

3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

C. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.06 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: **Do not burn waste materials.**

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

- END OF SECTION -

016610 STORAGE AND PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies requirements for storage and protection of products upon delivery and after installation.

1.02 GENERAL STORAGE

A. Store products immediately on delivery in accordance with the manufacturer's printed instructions, with seals and labels intact and legible, and protect until installed in the work.
B. Arrange storage in a manner to provide easy access for inspection.

1.03 ENCLOSED STORAGE

A. Store products subject to damage by the elements in substantial weathertight enclosures.
B. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
C. Store unpacked products on shelves, in bins or in neat piles, accessible for inspection.

1.04 EXTERIOR STORAGE

A. Provide substantial platforms, blocking or skids to support fabricated products above the ground to prevent soiling or staining.
B. Cover products which are subject to discoloration or deterioration from exposure to the elements with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
C. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
D. Provide surface drainage to prevent flow or ponding of rainwater.
E. Prevent mixing of refuse or chemically injurious materials or liquids.

1.05 MAINTENANCE OF STORAGE

A. Maintain a periodic system of inspections of stored products on a scheduled basis to assure that:
   1. Condition of storage facilities is adequate to provide required conditions.
   2. Required environmental conditions are maintained on a continuing basis.
   3. Surfaces of products exposed to elements are not adversely affected.
   4. Note: Any weathering of products, coatings and finishes is NOT acceptable under requirements of the Contract Documents.

B. Have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on the exterior of the package, for mechanical and electrical equipment which requires servicing during long term storage.
   1. Comply with the manufacturer's instructions on a scheduled basis.
   2. Connect space heaters which are part of the electrical equipment and operate continuously until equipment is placed in service.

1.06 PROTECTION AFTER INSTALLATION

A. Provide substantial coverings to protect installed products from damage from subsequent operations. Remove when no longer needed, prior to completion of work.
B. Control traffic to prevent damage to equipment and surfaces.
C. Provide coverings to protect finished surfaces from damage.
D. Cover projections, wall corners, jambs, sills and soffits of openings, in areas used for traffic and passage of products in subsequent work.
E. Protect finished floors and stairs from dirt and damage.
F. In other areas subject to foot traffic, secure heavy paper, sheet goods or other materials in place.
G. For movement of heavy products, lay planking or similar materials in place.
H. Cover walls and floor of elevator car, and surfaces of elevator car doors, used by construction personnel.
I. Waterproofed and roofing surfaces:
   1. Prohibit use of surfaces for traffic of any kind, and for storage of any products.

2. When some activity must take place in order to carry out the Contract, obtain recommendations of the installer for protection of surface.
3. Install recommended protection and remove on completion of that activity.
4. Restrict the use of adjacent unprotected areas.

J. Prohibit traffic of any kind across planted lawn and landscaped areas.

END OF SECTION

01710 UNCOVERING AND CORRECTION OF WORK

PART 1 - GENERAL

1.01 UNCOVERING OF WORK

A. If the Contract Documents, laws, ordinances, rules, regulations or orders of any Public Authority having jurisdiction require any portion of the Work to be inspected, the Contractor shall give the Architect timely notice of its readiness so that the Architect may observe such inspections.
B. If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for the Architect's observation and be replaced at the Contractor's expense without change in the Contract Time.

1.03 CORRECTION OF WORK

A. The Contractor shall promptly correct the Work rejected by the Architect and/or the Public Authority, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed.
B. The quality of materials and workmanship used in restoring this work shall be in full compliance with the requirements of the Contract Documents.

END OF SECTION

01732.9 INCIDENTAL CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

A. This section modifies the General Conditions to include incidental requirements and limitations for cutting, fitting and patching required to complete the Work, or make its several parts fit together.

1.02 SUBMITTALS

A. Submit written request in advance of cutting or alteration work which affects the following:
1. Structural integrity of any element of the Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance or safety of any operational element.
4. Visual qualities of site-exposed elements.
5. Work of Owner or separate contractor.

B. Include the following in each written request:
1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alterations.
4. Description of proposed work, and materials and products to be used.
5. Alternatives to cutting and patching.

6. Effect on work of Owner or separate contractor.
7. Written permission of the affected separate contractor.
8. Date and time the work will be executed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Types: Shall be new materials and products of types and quality required by the Contract Documents.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching work.
B. After uncovering, inspect conditions affecting the performance of work.
C. Beginning of cutting and patching work means acceptance of existing conditions.

3.02 PREPARATION

A. Provide supports to assure structural integrity of surroundings and provide devices and methods to protect other portions of the Project from damage.
B. Provide protection from elements for areas which may be exposed by uncovering the Work.
C. Erect and maintain waterproof closures for exterior openings. Maintain excavations free of water.
D. Erect and maintain dustproof partitions as required to prevent spread of dust, fumes and smoke to other parts of the building. On completion, remove partitions and repair damaged surfaces to match adjacent surfaces.

3.03 PERFORMANCE

A. Perform cutting and patching work using methods to avoid damage to other work, and which will prepare surfaces to receive patching and finishing in accordance with the Contract Documents.
B. Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
C. Structural Work: Do not cut building framing members or modify the foundation without written approval.
1. Modifications to structural system are acceptable only with the Structural Engineer's written approval, submitted through the Architect.
2. Submit written request for Structural Engineer's site visit in accordance with submittal requirements of this section.

D. Cut rigid materials using masonry saw or core drill.
1. Pneumatic tools are not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.
F. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
G. At penetrations of fire-rated walls, ceilings, or floor construction, completely seal voids with fire-rated material, full thickness of the construction element.
H. Refinish surfaces to match adjacent finishes.
1. For continuous surfaces, refinish to nearest intersection.
2. For an assembly, refinish the entire unit.

END OF SECTION

01770 CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout.

1.02 SUBSTANTIAL COMPLETION

A. When each individual Phase, Critical Area, and the Work as a whole is considered to be substantially complete, the Contractor shall submit the following:

1. Written notice that the Phase, Critical Area, or Work, or designated portion, is substantially complete.
2. List of items to be completed or corrected.

B. Within a reasonable time, Architect will inspect to determine status of completion, and compile a punch list of items to be completed and corrected. If Architect determines that the Project is not substantially complete, the Contractor will be notified in writing. Architect will generally point out his reasons, but he will not be obligated to give an exhaustive list of discrepancies.

C. Contractor's Duties: Remedy deficiencies and send another written Notice of Substantial Completion.

1.03 OWNER OCCUPANCY

A. Owner's Action: Occupy the Project, or designated portion of the Project, in accordance with provisions of the Certificate of Substantial Completion.

B. Contractor's Duties:

1. Obtain Certificate of Occupancy (if required by local building codes authority).
2. Obtain consent of insurance company or companies to keep insurance in force during partial occupancy by Owner.
3. See that corrections listed on punch list attached to Certificate of Substantial Completion are made by Contractor.
4. Perform final clean-up.

1.04 FINAL COMPLETION

A. When the Work or any of the Phases or Critical Areas are considered to be complete, Contractor shall submit certification indicating the following:

1. Contract Documents have been reviewed and Work has been inspected for compliance with those Documents.
2. Work has been completed in accordance with Contract Documents.
3. All punch list items have been corrected.
4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
5. Work is complete and ready for final inspection.

B. Architect's Actions During Final Inspection:

1. Inspect to verify the status of completion with reasonable promptness.
2. If he considers the Project incomplete or defective, the Contractor will be notified in writing, with deficiencies listed.

C. Contractor's Duties: Take immediate action to correct deficiencies, and send certification to Architect's that work is complete.

D. When Architect determines that the work is acceptable, the Contractor will be requested to make closeout submittals.

1.05 REINSPECTION FEES

A. Should status of completion of work (in whole or in part) require reinspection by Architect due to failure of work to comply with Contractor's claims on initial inspection, Architect will deduct the amount of his compensation for reinspection services from final payment to Contractor.

1.10 POST-CONSTRUCTION INSPECTION

A. Prior to expiration of one year from the Date of Substantial Completion, the Architect will make a visual inspection of the Project to determine whether correction of Work is required, in accordance with the Conditions of the Contract.
B. The Architect will promptly notify the Contractor, in writing, of any observed deficiencies. Contractor shall then correct deficiencies.

END OF SECTION

01782.3 OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
B. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
C. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1.02 QUALITY ASSURANCE

A. Have data prepared by personnel:
1. Trained and experienced in maintenance and operation of the described products.
2. Completely familiar with requirements of this Section.
3. Skilled as a technical writer to the extent required to communicate essential data.
4. Skilled as a draftsman competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

A. Prepare data in the form of an instructional manual for use by Owner's personnel. Submit three (3) copies of manual to Architect for transmittal to the Owner.
B. Format:
1. Size: A4 on paper.
2. Digital PDF copy
3. Text: Manufacturer's printed data, or neatly typewritten.
C. Drawings:
1. Provide reinforced punched binder tab; bind in with text.
2. Fold larger drawings to the size of the text pages.
D. Product Literature:
1. Provide fly-leaf for each separate product, or each piece of operating equipment.
2. Provide typed description of product, and major component parts of equipment.
3. Provide indexed tabs.
E. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS."
F. List:
1. Title of Project.
2. Identity of separate structure as applicable.
3. Identity of general subject matter covered in manual.
G. Binders:
1. Commercial quality three-ring binders with durable and cleanable plastic covers.
2. When multiple binders are used, correlate the data into related consistent groupings.

1.04 CONTENT OF MANUAL

A. Prepare a neatly typewritten table of contents for each volume, arranged in a systematic order, to include:
1. Contractor, name of responsible principal, address, and telephone number.

2. A list of each product required to be included, indexed to the content of the volume.
3. List, with each product, the name, address, and telephone number of:
a) Subcontractor or installer
b) Maintenance contractor, as appropriate.
c) Identify the area of responsibility of each.
d) Local source of supply for parts and replacement.
4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
B. Product Data:
1. Include only those sheets which are pertinent to the specific product.
2. Annotate each sheet to:
a) Clearly identify the specific product or part installed.
b) Clearly identify the data applicable to the installation.
c) Delete references to inapplicable information.
C. Drawings:
1. Supplement product data with drawings as necessary to clearly illustrate:
a) Relations of component parts of equipment and systems.
b) Control and flow diagrams.
2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
3. Do not use Project Record Documents as maintenance drawings.
D. Written text, as required to supplement product data for the particular installation:
1. Organize in a consistent format under separate headings for different procedures.
2. Provide a logical sequence of instructions for each procedure.
E. Copy of each warranty, bond, and service contract issued.
F. Provide information sheet for Owner's personnel giving:
1. Proper procedures in the event of failure.
2. Instances which might affect the validity of warranties or bonds.

1.05 MANUAL FOR MATERIALS AND FINISHES

A. Submit three copies of complete manual in final form.
B. Content for architectural products, applied materials, and finishes:
1. Manufacturer's data, giving full information on products.
2. Catalog number, size, composition.
3. Color and texture designations.
4. Information required for reordering specially manufactured products.
5. Instructions for care and maintenance.
6. Manufacturer's recommendation for types of cleaning agents and methods.
7. Cautions against cleaning agents and methods which are detrimental to the product.
8. Recommended schedule for cleaning and maintenance.
9. Housekeeping Manuals containing manufacturer's recommended cleaning practices for vinyl wallcoverings, painted surfaces and all floor finishes.
C. Content for moisture protection and weather exposed products:
1. Manufacturer's data, giving full information on products.
2. Applicable standards.
3. Chemical composition.
4. Details of installation.
D. Instructions for inspection, maintenance and repair.
E. Additional requirements for maintenance data: The respective sections of Specifications.
F. Provide complete information for products of applicable sections of the Project Manual including, but not limited to, the following types of materials:
1. Metal fabrications.

2. Waterproofing.
3. Dampproofing.
4. Roofing.
5. Flashing and sheet metal.
6. Roof accessories.
7. Joint sealants.
8. Entrances and Aluminum Frames.
9. Hardware.
10. Glazing.
11. All finish materials.
12. Toilet partitions.
13. Toilet accessories.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit three copies of complete manual in final form.

B. Content for each unit of equipment and system, as appropriate:
1. Description of unit and component parts.
2. Function, normal operating characteristics, and limiting conditions.
3. Performance curves, engineering data, and tests.
4. Complete nomenclature and commercial number of all replaceable parts.

C. Operating Procedures:
1. Start-up, break-in, routine and normal operating instructions.
2. Regulation, control, stopping, shutdown, and emergency instructions.
3. Summer and winter operating instructions.

4. Special operating instructions.

D. Maintenance Procedures:
1. Routine operations.
2. Guide to "troubleshooting."
3. Disassembly, repair, and reassembly.
4. Alignment, adjusting, and checking.

E. Servicing and lubrication schedule.
1. List of lubricants required.

F. Manufacturer's printed operating and maintenance instructions.

G. Description of sequence of operation by control manufacturer.

H. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams, required for maintenance.
1. Predicted life of parts subject to wear.
2. Items recommended to be stocked as spare parts.

I. As-installed color diagrams by controls manufacturer.

J. Each contractor's coordination drawings.
1. As-installed color coded piping diagrams.

K. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

L. Other data as required under pertinent sections of Specifications.

M. Content for each electrical and electronic system, as appropriate:
1. Description of system and component parts.
2. Function, normal operating characteristics and limiting conditions.
3. Performance curves, engineering data, and tests.
4. Complete nomenclature and commercial number of replaceable parts.
5. Circuit directories of panelboards.
6. Electrical service.
7. Controls.

8. Communications.
9. As-installed color-coded wiring diagrams.
10. Operating schedules:
a) Routine and normal operating instructions.
b) Sequences required.
c) Special operating instructions.
11. Maintenance procedures:
a) Routine operations.
b) Guide to "troubleshooting."
c) Disassembly, repair, and reassembly.
d) Adjustment and checking.
12. Manufacturer's printed operating and maintenance instructions.
13. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

14. Other data as required under pertinent sections of Specifications.

N. Prepare and include additional data when the need for such data becomes apparent during the instruction of Owner's personnel.

O. Additional requirements for operating and maintenance data: The respective sections of Specifications.

P. Provide complete information for products of applicable sections of the Project Manual including, but not limited to, the following types of materials:

1. Drainage systems.
2. Plumbing systems.
3. Domestic water conditioners.
4. Fire protection.
5. Power or heat generation.
6. Air distribution.
7. Controls and instrumentation.
8. Motors.
9. Power generation and transmission.
10. Service and distribution.
11. Lighting.
12. Special systems.
13. Communications.
14. Chemical Treatment.

1.07 SUBMITTAL SCHEDULE

A. Submit two copies of preliminary draft of proposed formats and outlines of contents prior to start of work.

B. Submit one copy of completed data in final form to final inspection or acceptance.

C. Submit specified number of copies of approved data in final form after final inspection or acceptance.

1.08 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment, and systems.

B. For each item, record the following information:

1. Time and date of instruction.
2. Name(s) of personnel providing instruction.
3. Name(s) of personnel receiving instruction.
4. Items covered during instructions.

C. Use operating and maintenance manual to constitute the basis of instruction.

1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

END OF SECTION

01783.9 PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Procedural requirements for maintaining documents and samples at the site as required in the General Conditions.

B. The General Conditions require the Contractor to maintain a record copy of the following for Architect's review:

1. Drawings.
2. Specifications and Schedules (Project Manual).
3. Addenda.
4. Change Orders and other documents which modify original document.
5. Approved shop drawings, product data and samples.
6. Records of all changes made during construction.

C. In addition to the above, Contractor shall maintain at the Contractor’s office a record copy of the following:

1. Field test records.
2. Manufacturer's certificates.
3. Fixed equipment manuals.
4. Inspection certificates.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store Record Documents and samples in a file in the Field Office, apart from the documents used for construction.

1. Provide files, racks and secure storage for Record Documents and samples.

B. Label and file Record Documents in sequence with section number listings in Table of Contents of this Project Manual.

1. Label each document "PROJECT RECORD" in the lower right hand corner in neat, large printed letters.

C. Maintain Record Documents in clean, dry, legible condition.

1. Do not use Record Documents for construction purposes.

D. Keep Record Documents and samples available for inspection by Architect.

1.03 RECORDING

A. Record information concurrently with construction progress.

1. Do not conceal work until required information has been recorded.

B. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including the following:

1. Depth of footings in relation to finish first floor level.
2. Measured horizontal and vertical locations of underground utilities, valves, etc. referenced to building exterior lines. Show direction of flow of pipe and depth of piping underground.
3. Field changes of dimensions and details.
4. Changes made by Contract Modifications.
5. Details not on original Contract Drawings.

C. Project Manual: Legibly mark to record actual construction, including the following:

1. On appropriate pages, record changes made by Addenda, Change Orders and other modifications.
2. On appropriate pages, enter trade name, manufacturer, catalog number, and name of supplier of each product and item actually installed, if different from that specified.
3. Other items installed but not originally specified.

1.04 RECORD DRAWINGS

A. Record Drawings which are required for Owner's records, shall be recorded on reproducibles by the Contractor. These reproducibles shall be transmitted to the Contractor prior to the start of Construction.

1. Do not use Record Drawings for construction purposes.

B. Contractor shall transfer all changes recorded on construction drawings on the Record Drawings.
1. All information shall be recorded neatly and legibly.
2. Use separate colors for recording information about each major system.
3. Establish a code to denote the color for each trade and indicate by a schedule placed on the front sheet of the Record Drawings.

1.05 SUBMITTALS

A. At Contract Closeout, deliver Record Documents and samples, including Record Drawings, to Architect.
B. Submit Record Documents under cover of a transmittal letter containing:
1. Date.
2. Project title and number.
3. Contractor's and subcontractor's names and addresses.
4. Title and number of each Record Document.
5. Certification that each document submitted is complete and accurate.
6. Signature of Contractor or his authorized representative.

END OF SECTION

02100 PROTECTION

PART 1 - GENERAL

1.01 The general intent of this section is to establish both the extent of protection which the Contractor and his subcontractors are required to provide beyond that considered normal or specified above, and the penalties if such protection is not provided.
1.02 Personally caution subcontractors before they move on the site as to the protection required for their work and the penalties involved.

PART 3 - EXECUTION

3.01 Adequately mark all existing construction, utilities, trees, or plant life that the Drawings indicate are to remain before any work is started.
3.02 Box in all trees that are to remain. Then cut and remove from the site all trees that are to be removed.
3.03 Completely remove all stumps and roots from cut trees.
3.04 Any trees that are to remain which receive damage shall be immediately repaired by a qualified person.
3.05 If any trees not designated for removal are destroyed, replace them with trees of equal species and size. If replacement has not been made or proper credit based on estimated replacement cost not issued at the time for final payment, the Owner's due credit will be subtracted from the Contractor's retainage and final payment.

END OF SECTION

03000 CONCRETE

03100 CONCRETE FORMWORK

1.00 _ GENERAL

1.01 SCOPE

Furnish all materials, labor, equipment , plant , tools, required to complete: all cast in place concrete form work. All work shall be done in accordance with the minimum requirements of the AMERICAN CONCRETE INSTITUTE CODE FOR REINFORCED CONCRETE ACI 381 except as modified herein. Refer to the General Conditions for all pertinent provisions.

1.02 SUBMITTALS

Shop drawings of formwork when required by the Architect shall be submitted for approval before fabrication and erection of such formwork.

1.03 APPROVAL

All form materials are subject to approval before fabrication of formworks.

PROTECTION

Provide adequately braced forms that will produce correctly aligned concrete, able to meet the specific weights and side pressure of newly placed concrete.
Choose form fittings that are adequate to the purpose.
Exercise care in the choice of surface forms and form fittings that will be in contact with concrete.

2.00 PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 PREPARATION

A. Check all forms to conform to the shape, lines and dimensions of members as called for in the plans.
B. Check all formwork for plumbness and correct alignment.
Provide openings in column forms for cleaning and inspection preferably at lowest points of pour lifts.
Provide camber for cantilever and long spans or as indicated in construction notes.
Coat all forms with Nox-crete form oil before reinforcement is placed. Remove all surplus oil on form surfaces.

3.02 FORM AND SHORING

A. Removal

Remove forms only upon approval of the Engineer in such manner that will prevent damage to the concrete and at such time as to insure the complete safety of the structure. In no case shall the supporting forms and shorings be removed until the members have attained sufficient strength to support their weight and load thereon.
Exercise due care while stripping forms and protect corners subsequently against chipping or other damage by approved means.
Any repairs of surface imperfections shall be formed at once and curing shall be started as soon as the surface is sufficiently hard to permit it without further damage.
The results of suitable control tests shall be used as evidence that the concrete has attained sufficient strength to permit removal of shorings and supporting forms. Cylinders required for control tests shall be made in addition to those required by this Specification.

The minimum time period for removal of forms shall govern where it exceeds the minimum specified curing period. Where the formwork for one element supports the framework for another element, the greater time period shall apply to both elements. Forms shall not be removed before the expiration of the minimum time specified below:

Element	Time Period (Days Min.)	
Walls, columns, sides of beams and girders, and slabs on grade	1	
Pan joist forms (side only):		
30 inches wide more or less	3	
Over 30 inches wide	4	
Where design live load is:	less than dead load	greater than dead load
For Arch center :	14	7
Joist, beam, or girder soffits:		
Under 10 feet	7	4
10 feet to 20 feet	14	7
Over 20 feet	21	14
For one way floor slabs when clear span between structural supports		
Under 10 feet	4	3
10 feet to 20 feet	7	4
Over 20 feet	10	7

3.03 SUPPORT

Sufficient shoring members to support dead loads plus construction loads on beams and slabs shall be provided for a period of eight (8) days in addition to the seven (7) days specified thereto. The time for removal of forms for structures not included thereto shall be as directed by the Engineer. Concrete work shall be protected from damage during construction.

3.04 TOLERANCE LIMITS

A. Set and maintain concrete forms so as to insure completed work within the following tolerance limits.

1. Variation from the plumb

a. In the lines and surfaced of columns, piers, walls and rises:

In 3.00 m (10')……..6 mm (1/4")

In any storey or 6.00 m (20') max……10 mm (3/8")

b. For exposed corner columns, control joints, grooves and other conspicuous lines:

In any way 6.00 m (20') max……..6 mm (1/4")

In 12.00 m (40') or more……10 mm (3/8")

2. Variation from the level or from the grades indicated on the drawings:

a. In floors (below removal of forms), ceiling beams, soffits and rises.

In 3.00 m (10')……..6 mm (1/4")
In any way or 6.00 m (20') max……10 mm (3/8")
In 12.00 m (40') or more……10 mm (3/8")

b. For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

In any way of 6.00 m (20') max……..6 mm (1/4")
In 12.00 m (40') or more……10 mm (3/8")

3. Variation of the linear building lines from the established position in plan and related position columns, walls and partitions:

In any way or 6.00 m (20') max……6 mm (1/4")
In 12.00 m (40') or more……25 mm (1")

4. Variation in the sizes and location of sleeves, floor openings and in thickness of slabs and wall.
   Openings……6 mm (1/4")
5. Variation in cross-sectional dimensions of columns and beams and in thickness of slabs and walls:
   Minus……6 mm (1/4")
   Plus……12 mm (1/2")
6. Footings
   a. Variation of dimensions in Plan
      Minus……..12 mm (1/2")
      Plus……50 mm (2")
      (applies to concrete only and not to reinforcing bars and dowels).
   b. Misplacements of eccentricity, 5% of specified thickness.
7. Variation in steps:
   a. In a flight of steps:
      Rise……3 mm (1/8")
      Tread……6 mm (1/4")
   b. In consecutive steps:
      Rise……2 mm (1/16")
      Tread……3 mm (1/8")

END OF SECTION 03100

03200 CONCRETE REINFORCEMENT

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete:
   1. steel reinforcing bars
   2. welded wire fabric
   3. bar supports and dowels
   4. reinforcement accessories, including all wire ties, chairs, spacers, supports, and other necessary devices.

B. All pertinent provisions of the General Conditions form part of this section.

1.02 SUBMITTALS

Shop drawings of each reinforcing steel detail and placement drawings shall be submitted for approval in accordance with the requirements of the GENERAL CONDITIONS. Any material fabricated before final approval of the shop drawings will be done at Contractor's risk, but no material shall be placed until shop drawings have final approval. Shop drawings shall be in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI 315).

1.03 PROTECTION AND STORAGE

Protect steel reinforcement adequately from rusting. Store reinforcing steel on supports, above ground / floor level. Store undercover. Keep covered with tarpaulins, if required, due to a delay in use.

1.04 TESTING

Tests shall conform to ASTM Designations of specified materials. Samples for testing shall be provided by the Contractor without additional costs to the Owner. Expenses for testing shall be borne by the Contractor. Copies of the results shall be furnished to the Owner and the Architect promptly.

1.05 MEASUREMENT AND PAYMENT

For deduction or addition in the contract sum due to deletion or extra work involved, the steel reinforcement shall be measured by weight either in kilograms or in tons. The Contractor shall be paid based on the steel weight as per unit prices submitted on the proposal form. Steel bars that are not installed shall not be paid by the Owner.

2.00 PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 PREPARATION

Before placing reinforcement and before pouring of concrete, remove all loose rust, mill scale, oil, or other adhering materials which tend to reduce or destroy bond between concrete and reinforcement.

Cutting and Bending:

Reinforcing steel shall be accurately cut and bent in accordance with the approved detailed reinforcement drawings.

Reinforcing steel shall not be straightened or re-bent 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 on the bends shall not be used.

All bars shall be bent cold. Bends for stirrups and ties shall be made around pins with a diameter of at least twice the thickness of the bars; for bars 25 mm (1") and smaller, six (6) times the thickness; for larger bars, eight (8) times the thickness.

If Contractor elects to have reinforcing steel cut and bent off the Site, he shall provide, maintain and operate a small cutting and bending shop on the Site and maintain a representative stock of steel.
This provision is to take care of minor revisions and additions in an expeditious manner.

3.02 PLACING REINFORCEMENT

Metal Reinforcement

Reinforcing steel shall be accurately placed in accordance with approved detailed reinforcement drawings and shall be adequately secured against displacement by using specified tie wires or approved clips at all intersections. Refer to the Engineer in case of doubt in placing of steel.
Reinforcing bars shall be accurately placed and adequately secured with concrete metal wires, metal chair spacer ties or other accessories.
Wire mesh reinforcement where shown in slabs shall be secured in position by spacer bars and chairs. Spacer bars shall be lapped not less than 125 mm (5”). In slabs on ground, pre-cast concrete blocks may be substituted for chairs.
Reinforcing steel shall be supported by concrete or metal supports, spacers, or metal hangers, except at surfaces exposed to the ground or to the ground or to the weather, where supports shall be concrete.
Wooden support and wooden spreaders shall not be used. At surfaces where an attractive appearance is paramount, the support shall be of a type which shall not cause subsequent staining or marring of the exposed surface.
After it has been installed, reinforcing steel shall be inspected by the Engineer for compliance with requirements as to size, shape, length, splicing, position and number.

Bar Spacing

Spacing of bars shall be done in accordance with the ACI-Building Code or as follows:
Clear distance between parallel bars shall be one and one-half (1-1/2) times the diameter of the bars.
Clear distance shall not be less than 1-1/3 times the maximum size of aggregates, nor less than 25 mm (1”).
Where bars are used in two or more layers, the bars in the upper layers shall be placed directly above those in the lower layers at a clear distance of not less than 25 mm (1”).

3.03 OFFSET AND SPLICE IN REINFORCEMENT

A. Splices

Generally, avoid splices in slabs, beams and girders at points of maximum stress.
Splices may be allowed only upon written approval of splice details by the Architect / Engineer or as shown or noted in the Plans.
Splice in adjacent bars shall be staggered a minimum distance of forty (40) bar diameters.

B. Offsets

Where changes in cross section of columns occur, longitudinal bars shall be offset in a region where lateral support is afforded. Where offset, the slope of the included portion shall not be more than one on six (1:6) and in case of tied columns, the ties shall be spaced 75 mm (3”) on center for a distance of 300 mm (1’) below and above the point of offset.

END OF SECTION 03200

03300 CAST-IN-PLACE CONCRETE

1.00 GENERAL

SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete:

1. proportioning
2. mixing
3. placement
4. curing and
5. finishing of concrete

All pertinent provisions of the General Conditions form part of this Section.

REFERENCE STANDARDS

The latest edition of following standards shall form part of this specification:

ACI	American Concrete Institute
211.01- 85	Standard Practice for Selecting Proportions for Normal and Heavyweight Concrete
301 - 84(R88)	Concrete, Structural for Building
309R-87	Standard Practice for Consolidation of Concrete
318 – 86	Building Code Requirements for Reinforced Concrete
AASHTO	American Association of State Highway and Transport Officials
M173-84	Concrete Joint Sealer, Hot-Poured Elastic Type Performed Expansion Joint Filler for Concrete
ASTM	American Society for Testing and Materials
C33-86	Concrete Aggregates
C31-88	Standard Practice for Making, Curing Concrete Test Specimen in the Field
C39-86	Compressive Strength of Cylindrical Concrete Specimen
C42-87	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C94-86	Standard Specification for Ready-Mixed Concrete
C143-78	Standard Test Method for Slump of Portland Cement Concrete
C150-86	Portland Cement, Specification for
C309-81	Liquid-Membrane Forming Compounds for Curing Concrete
C494-86	Chemical Admixtures

REQUIREMENTS

Full coordination shall be given other trades to install embedded items. Provisions shall be made for setting items not placed in the forms. Before concrete is placed embedded items shall have been inspected, and test for concrete aggregates and other materials shall have been done.

PROTECTION & STORAGE

Cement :

Store cement in bags in suitable dry, water tight, properly ventilated weatherproof structure;
Elevate floors above the ground to sufficiently prevent the absorption of moisture.
Stock bags close together to reduce circulation of air but shall not be stocked against walls.
Storage shall permit easy access for inspection and identification of each shipment.
Cement that has been in storage for so long that there may be doubt of each quality shall be tested by standard mortar test to determine its suitability for use, and shall not be used without approval of the Engineer.
Aggregates :
Store in am manner as to prevent the inclusion of foreign matter.
Aggregates of different sizes shall be stored in separate piles

Maintain storage piles in a manner that will afford good drainage.

Stock piles of coarse aggregate shall be built in horizontal layers not exceeding 1200 mm in depth to avoid segregation. Should the coarse aggregate become segregated, it shall be remixed to conform to the grading requirements given hereinbefore.

Admixtures – store to prevent deterioration or intrusion of foreign matters.

1.02 SUBMITTALS

Concrete Mix Design

Samples

Submit samples of cement and aggregates proposed for exposed architectural concrete work for approval, giving names, sources and descriptions of the material.

Reports

Submit 5 copies of mix design and test results.

D. Notification

Submit schedule of pours and location at least 7 days prior to date of pouring for approval.

1.04 MEASUREMENT AND PAYMENT

For deduction or addition on the contract sum due to deletion or extra work involved, measure cast-in-place concrete in cubic meter and base payment on the actual poured volume using the unit prices on the proposal form.

1.05 DESIGN STRENGTH OF CONCRETE

All strengths of concrete shall be as indicated on the Structural Design Criteria / Construction Notes.

2.00 _ PRODUCTS

2.01 MATERIALS

Refer to Section 01020 Summary of Materials and Finishes.

2.02 CONCRETE PROPORTIONS AND CONSISTENCY

A. Cement and Aggregate

Make proportions so as to produce a concrete mixture which will work readily into corners and angles of the forms and around reinforcement with the method of placing materials to avoid segregation of accumulation of excess free water on the surface.

B. Measurement

Measure concrete materials such that the proportions can be accurately controlled and easily checked at any time during work.

Conform to measurement of materials for ready mixed concrete to STANDARD SPECIFICATIONS FOR READY MIXED CONCRETE. ASTM Designation C-94, where applicable.

Never exceed the water content by 6 U.S. gallons per bag of cement for all portions in the structure. Allow job mix adjustment of water content only on permission of the Architect / Engineer provided that cement is also added to keep the original water-cement ratio of the design mix. Limit slumps to the following.

SLUMP TEST VALUES

PORTION OF STRUCTURE -	SLUMP (inches)
Column, Beams, Girders, Slabs	3-6”
Foundation Elements, Bedded Slabs and Cantilevered Beams and Slabs	2-5”
Pavement	2-3”

C. Proportions

The proportions of all materials in concrete shall be subject to the approval of the Engineer. The Contractor shall employ on his own expense an approved testing laboratory which shall design the mixed proportions in accordance with ACI 211.01-85. Strength requirements shall be 21 Mpa (3000 psi) for footings, retaining walls, footing tie beams, cistern and suspended slabs; 27 Mpa (4000 psi) for columns, girders, beams; 17.2 Mpa (2500 psi) for slabs on grade, partitions, walks, & other non-structural members; and 10.5 MPa (1500 psi) for lean concrete, or as required by the Engineer. The adequacy of this mix shall be verified by a test on a minimum of 6 cylinders; 3 tested at 7 days, 3 at 28 days, in accordance with ASTM C39. These mixes shall be proved by preliminary tests 30 days before concreting and shall show a 28-day strength of 15 percent higher than the ultimate required. No substitution shall be made in the materials or mix with additional tests to show that the quality of concrete is satisfactory. If, at any time during the construction, the concrete resulting from the approved mix design proves to be unsatisfactory for any reason such as too much water, lack of sufficient plasticity to prevent segregation , honeycomb, etc., or insufficient strength, the contractor shall notify the Testing Laboratory and the Engineer. The laboratory shall modify the design, subject to the approval of the Engineer until a satisfactory concrete is obtained.

2.03 MIXING CONCRETE

Site Mixed Concrete

All concrete shall be machine mixed for at least 1 1/2 minutes after all materials including water are in the mixing drum. The time elapse between the introduction of the mixing water to the cement and aggregates and placing of the concrete in final position shall not exceed 45 minutes.

Placing of material in mixer shall be done in such a way that the first batch of concrete materials in the mixer shall contain sufficient excess of cement, sand and water to coat the inside of the drum without reducing the cement content of the mixed to discharged. The tampering of concrete, that is, placing additional cement, aggregate or water during mixing period shall not be permitted.

Let the mixer be of an approved size and type which will ensure a uniform distribution of material throughout the mass. Equip it with a DEVICE FOR ACCURATELY MEASURING, TIMING AND CONTROLLING THE AMOUNT OF MIXING WATER IN EACH BATCH and operate in accordance with the manufacturer's recommendations.

No hand mixing shall be allowed except in case of emergency such as mixer breakdown during pouring operations and shall stop at the first allowed construction joint.

Retempering of concrete shall not be permitted. The Contractor shall mix only such quantities that are required for immediate use and mixture which has developed setting shall not be used. Concrete which has been partially hardened shall not be retempered.

Ready-Mixed Concrete

1. Ready-mixed concrete, when used shall be batched, mixed, and delivered from a plant approved by the Engineer and shall be in strict accordance with the requirements set forth in ASTM C-94.
2. The rate of delivery of the mixed concrete shall be such that the interval between placing of successive batches shall not exceed thirty (30) minutes. The elapsed time between the introduction of water to the cement and aggregate and completion of discharge shall not exceed one (1) hour or not more than 1 1/2 hours if a retarder is used. It should be kept constantly agitated during the transit period. Delivery tickets shall not exceed one (1) hour and contains the weight of sand, gravel and amount of cement and water added. The Contractor shall keep legible copies available for examination of the Engineer

3.00 EXECUTION

3.01 PREPARATIONS

Inspect and clean all forms and check all installations before placing concrete.

Wet surfaces thoroughly and grout before placing concrete.

Clean all laitance from previous pouring and possibly expose aggregates before renewing pouring.

3.02 CONCRETE PLACING

A. Concrete shall be placed only after all formworks, installations of materials to be embedded and preparation of surface involved in the placing have been inspected and approved by the Engineer. The Contractor shall provide equipment and shall employ methods which will minimize separation of aggregates from concrete mix.

B. Water shall be removed from excavation before concrete is deposited. Any flow of water shall be diverted through proper side drains to a pump or be removed by other approved methods to avoid washing over freshly deposited concrete. Hardened concrete, debris and foreign materials shall be removed from interior of forms and from inner surfaces of mixing and conveying equipment. Reinforcements shall be secured in position, inspected and approved before pouring concrete. Runaways shall be provided for wheeled concrete handling equipments, such equipment shall not be wheeled over reinforcements nor shall runaways be supported on reinforcements.

C. Concrete shall be handled from the place of final deposit as rapidly as practicable by methods which shall prevent the segregation or loss of the ingredients. It shall be deposited in the forms in approximately uniform horizontal layers and as nearly as practicable in its final position to avoid rehandling.

D. Conveying or handling of concrete by the use of long; inclined chutes or pipes or more than three (3) meters shall not be permitted. Dumping of concrete into buggies buckets or wheelbarrows with a free fall or more than one (1) meter shall not be permitted. When placing operations would involve dropping the concrete more than 1 1/2 meters, it shall deposited through sheet metal or other approved conveyor. As for practicability, the conveyor shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly-placed concrete. After the initial set of concrete, the forms shall not be jarred and no strain shall be placed on the ends of the reinforcing bar which are being projected.

E. Concrete in columns shall be placed in one continuous operation. Concrete in girders, beam and slabs in superstructures shall be poured in a monolithic and continues manner. No construction joint shall be allowed on any part of the structure without the approval of the Engineer.

F. Consolidation: Consolidate all concrete in accordance with provisions of ACI 309R-87. Consolidate all layers of concrete greater than four inches in depth with high frequency, internal, mechanical vibrating equipment, supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading and settling with a heavy leveling straight edge. Operator vibrators with vibratory element submerged in the concrete with a minimum frequency of not less than 6000 impulses per minute when submerged. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously lift with the vibrator when more than one lift is required. Place concrete in 18-inch maximum vertical lifts. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation of aggregates. Provide adequate number of units and power source at all times. Maintain spare units to ensure adequacy. If in the opinion of the Engineer, the equipment being used is not adequate to accomplish proper consolidation, the Engineer may order delay in proper placement of concrete until such equipment is available for use at the location of placement of concrete.

FLOOR FINISHES

Floor finishes shall be noted carefully by the Contractor. Prepare slabs suitable in surface and elevation to receive finishes. Consult Division 9 Finishes and its application.

CONCRETE JOINTS

Construction Joint

Construction joints shall be provided where indicated in the Drawings or as directed by the Engineer. Joints not indicated on drawings shall be so made and locate as not to impair the strength of the structures. When a construction joint is to be made, the surface of the hardened concrete shall be thoroughly cleaned and all laitance removed. In addition, the joint shall be thoroughly wetted and sloshed with a coat of neat cement grout immediately prior to placing of new concrete.

Expansion and Contraction Joints

Expansion and contraction joints shall be provided where indicated and shall be in accordance with details.

Preformed Strips

Preformed strips shall be placed before the adjoining concrete of a joint is poured. The joint sealer shall be applied after concrete on both sides of the joint have been poured and after the joint lines have been trued.

PROTECTION AND CURING CONCRETE

General.

Concrete surfaces exposed to conditions causing premature drying shall be protected as soon as possible with canvas, straw, burlap, sand or other satisfactory materials and kept moist; or if the surfaces are not covered they shall be kept moist by flushing or sprinkling, as directed by the Engineer. All concrete shall be moist cured for a period of not less than seven consecutive days after placing by an approved method or combination of methods applicable to local conditions.

Moist Curing

The surface of the concrete shall be kept continuously wet with water for a period of seven (7) days, by spraying or covering with burlap or other approved material thoroughly saturated with water or keeping the covering wet by spraying or intermittent hosing. Water for curing shall be generally clean and free from any element which might cause objectionable staining or discoloration of the concrete.

3.06 REPAIR OF CONCRETE

A. Correct all imperfections on concrete surfaces to produce concrete and concrete surfaces that conform to the requirements of this Section.
B. Unless otherwise approved by the Engineer, repair of imperfections in formed concrete shall be completed after 24 hours of removal of forms.
C. Large bulges and abrupt irregularities shall be removed by bushing, hammering and grinding.
D. Honeycombed or otherwise defective area shall be cut out to solid concrete but to depth of not less than 25 mm. The edges of the cut shall be perpendicular to the surface of the concrete.
E. All imperfections on formed surfaces shall be repaired by patching with cement mortar:
F. Use white cement in the concrete to provide a finish color matching the surrounding concrete, except that for exposed surfaces.
G. Saturate the area to be patched and at least 150 mm adjacent thereto with water before placing the mortar.
H. Mix the mortar approximately one hour before placing and remix occasionally during this period with a trowel without adding water.
I. Then brush a grout of cement and water, mixed to the consistency of paint, onto the surface to which the mortar is to be bonded. Compact the mortar into place and screed slightly higher than the surface.
J. Finish patches on exposed surfaces to match the adjoining surfaces, after they have set for an hour or more. Cure patches as specified for the concrete.
K. Use mortar filling placed under impact of mortar gun as drypack filling for holes too shallow for concrete filling and these holes should be no deeper than the far side of the reinforcement nearest the surface.
L. Concrete filling shall be used for holes extending entirely through the concrete for holes which are greater in area then 1,000 square centimeters and deeper than 10 centimeters and for holes in reinforced concrete which are greater in area than 500 square centimeters and which extend beyond reinforcement..
M. Filling shall be bonded tightly to the surfaces of the holes and shall be sound and free from shrinkage, cracks and drumy areas, after the fillings have been cured and dried.
N. Exposed surfaces shall utilize plywood forms, and after the removal of forms, shall not be plastered, unless otherwise directed by the Engineer.
O. All joint marks of the formwork shall be reworked to a smooth surface to match adjacent areas and to present a neat appearance.

P. All materials, procedures and operations used in the repair of concrete shall be as directed by the Architect / Engineer.

Q. The cost of all materials, labor and equipment used in the repair of all materials shall be borne by the Contractor.

3.07 TEST OF CONCRETE

A. Concrete Samples and Testing

The Contractor shall be required to make test on concrete samples taken from actual pouring of concrete on site under the Supervision of the Engineer. Throughout the period the concrete is being poured into the forms and while spading operation are being done, sets of test samples in cylinder shall be taken from fresh concrete from the forms.

The Contractor shall employ, at his own expense, an approved testing laboratory which shall make the following test and immediately submit five copies of test reports to the Engineer. The following test shall be made each 10 cu.m. of concrete or fraction thereof, but not less than one (1) set of tests, shall be made from any one batch of concrete and all three (3) tests shall be made from the same batch.

1. Compression Tests:

The Contractor shall furnish six (6) standard 150 x 300 mm cylindrical mould and place on the fresh concrete inside the cylinder in three separate equal layers rodded separately with 16mm diameter rod 25 strokes, with the tamping end rounded to a hemispherical tip of the same diameter. Level the surface with trowel and label the samples identifying the proportion of concrete, date taken and place taken. These samples are to be cured in the same manner as to the concrete in the construction cured.

Test one cylinder at the age of seven (7) days, and one cylinder at the age of twenty eight (28) days, in accordance with ASTM C31 and C39. Keep one cylinder in reserve for a fifty six day test, if the twenty eight day test does not meet the requirements.

The Contractor shall make additional cylindrical sample as required or as directed by the Engineer, to check strength of concrete in the construction.

2. Slump Tests:

To determine the consistency of workable fluidity of freshly-mixed concrete in the field, the Contractor shall keep all times a slump cone at the site. At least two slump test shall be made and the sample of concrete from which test specimens are made shall be representative of the entire batch and shall conform with the procedures as specified in ASTM C143-78.

Place freshly-mixed concrete in the slump cone 100 x 200 mm x 300 mm in equal layers. Rod each layer with 25 strokes of the tamping rod 16 mm diameter with the tamping end rounded to a hemispherical tip of the same diameter. Level the mould and lift at once. Measure the slump action immediately by getting the difference in height between the height of the mould and the top of the slumped concrete.

The slump for vibrated concrete shall be 50 mm minimum and 100 mm maximum provided that the required strength of concrete is obtained.

3. Test Reports:

a. The testing laboratory shall submit four copies of its test cylinder reports which are to include as far as applicable, the following items: Location of pour in the structure, concrete design, mix number, concrete design strength, type and manufacturer of cement, amount of any admixture used, slump tests, date of sampling, cylinder application number, days cured in the field, days cured in the laboratory, age at time of testing, crushing stress, type of failure, who made the samples, who shipped the samples to the laboratory and whether concrete strength meets the specifications.

4. Additional Tests:

a. If, in the opinion of the Engineer, based on cylinder strengths below specifications requirements or visual defects, concrete of poor quality has been placed, additional test shall be made as directed by the Engineer and at the expense of the Contractor. Test may be compression test on cored cylinder, ASTM C42, and /or load tests as outlined in ACI 318, Sec. 202, or as directed.

3.08 FAILURE OF TEST SAMPLES

In any case of failure to meet specified strength, the Contractor may, at his expense, obtain concrete core samples from the poured concrete and have their compressive strength determined by a competent testing authority which shall be taken as a conclusive evidence of its strength and integrity, provided the curing will not impair the safety of the structure and can be satisfactorily replaced.

To determine adequacy of the structure, the Owner shall have the option to order load tests on parts of the structure where concrete strength tests are below 80% of those specified. These tests are to be done in accordance to ACI 318-89 recommendations and the cost are to be borne by the Contractor.

Demolition and concrete replacement, if recommended by the Engineer shall be borne by the Contractor.

3.09 LIQUIDATED DAMAGES FOR FAILURE TO MEET CONCRETE REQUIREMENTS

For strength to concrete obtained on molded or drilled test specimen less than those required on Article 3.06, the Contractor shall pay to the Owner as liquidated damages, and not as a penalty or forfeiture. The following are the percentages of the proposed unit prices per cubic meter for the quantity of concrete directly and indirectly affected by the failure to meet strength requirements regardless of whether or not analyses of test results show that the concrete in place can still safely carry the design loads:

For concrete less than one hundred percent (100%) but greater than ninety-two percent (92%) of specified strength, payment of thirty percent (30%) of the cost per cubic meter of concrete.

For concrete equal to or less than ninety-two (92%) but greater than eighty-five percent (85%) of the specified strengths, payment of sixty-five percent (65%) of the cost per cubic meter of concrete.

For concrete equal or less than eighty-five percent (85%) of the specified strengths, removal of the concrete deposited and its replacement at the expense of the Contractor.

3.10 INSPECTION

Concrete shall be proportioned, mixed and placed only in the presence of the Architect / Engineer. The Architect / Engineer shall be notified in advance to provide ample time for inspection of reinforcing steel bars before any mixing and placing of concrete is commenced.

END OF SECTION

04100 MORTAR

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete plaster masonry work and patching mortar as shown in the drawings and specified in the Summary of Materials and Finishes herewith.

B. Unless otherwise indicated on drawings or specified herein, all materials or work under the division shall be subject to the provisions under Division 3 CONCRETE

2.00 PRODUCTS

2.10 MATERIALS

Refer to Section 01020 Summary of Materials and Finishes.

2.02 MIXES

Cement Mortar:

1 part Portland Cement

2 parts sand, but not more than 1 part Portland Cement, 3 parts sand.

For plaster works thicker than 25 mm (1”), use plaster mix with FIBRIN – 23 or equivalent as per manufacturer’s specifications.

3.00 EXECUTION

3.01 INSTALLATION

A. Application of Cement Plaster

1. Scratch Coat: Apply with sufficient force and material to form full keys or bond. Cross scratch as soon as scratch coat has attained initial set and apply brown coat as soon as practicable.

2. Brown Coat: Scratch or broom for bond of finish coat and allow to set hard. Keep brown coat moist until finish coat is applied.

3. Finish Coat: Bring to true, even surfaces with rods and trowel smooth, leaving finished surface free from tool marks and blemishes. Keep cement plaster moist for at least 3 days and protect against rapid drying until cured.

B. Application of masonry mortar

Lay all concrete hollow blocks with 10 mm (3/8") horizontal and vertical mortar joints.

C. Application of patching mortar

1. Provide the same mixture of gray and white cement for patching mortar and used to fill holes and imperfections, but should be richer mixture and the cement and sand proportions should be the same as those used in the concrete.

2. Never steel trowel patches, but finish with wood or cork floats.

3. Allowing the mixed patching mortar to stand for an hour or two before using it, reduces the amount of shrinkage, but never add water in remixing it.

No cement dusting is allowed to hasten any phase of surface for floors and wall finishing.

END OF SECTION 04100

04200 UNIT MASONRY

1.00 GENERAL

1.01 SCOPE

Furnish all materials, labor, equipment, plant, tools, required to complete: concrete unit masonry

1.02 HANDLING AND STORAGE

A. Handle in a manner to prevent undue chipping and breakage
B. Protect storage piles, stacks and bins from heavy traffic.
C. Provide platforms to protect bottom piles from contact with soil.

1.03 VISUAL INSPECTION

A. All units shall be sound and free from cracks or other defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction.
B. Units that are intended to serve as a base for plaster shall have sufficiently rough surface to afford good bond.

2.00 PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 CONCRETE UNIT MASONRY

A. Lay all masonry unit, plumb, true to line, level and with accurately spaced course.
B. Let the Architect approve sample of special stone arrangement where required.
C. Keep bond plumb throughout. Keep corners and reveals plumb and true.
D. Build in anchors, wall plugs and accessories to masonry as erection progresses.
E. Bed solidly each course in Portland Cement mortar. Keep all units damp when laid.
F. Wedge units terminating against beam or slab soffits tightly with mortar and reinforcement properly secured to dowels.
G. Consult drawings as to the schedule of reinforcements.
H. Masonry joints
    1. Unless otherwise specified or detailed on plans, make horizontal and vertical mortar joints 10 mm (3/8") with full mortar coverage on the face shells and on the webs. Fill surrounding cells.
    2. Fill all joints solidly.
    3. Do not permit furrowing of the mortar.
I. Tooled joints
    1. Use concave joints where tooled mortar joints are called for in the drawings.
    2. Joints must be neat and clean, plumb and true to line.

3.02 UNFINISHED WORK

A. Step back unfinished work for joining with new work.

B. Before new work is started, remove all loose mortar and wet the exposed joint thoroughly not less than one hour before laying new work.

3.03 CLEANING

Wash finished surface in a manner most appropriate and satisfactory to the Architect. No cement dusting is permitted for any cement finish.

END OF SECTION 04200

05000 METALS

05100 STRUCTURAL STEEL FRAMING

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete fabrication and erection of all structural steel and miscellaneous steel items complete, as shown and/or as specified including:

a. Furnishing of anchor bolts for structural steel columns and responsibility for their correct locations; provide templates;
b. Brackets and miscellaneous iron connections, shop-connected to structural members;
c. Beam Penetrations as indicated in the drawings;
d. Installing and removing temporary guys, shores, scaffolding and bracing required for steel erection.

B. Where so indicated on the plans, structural members shall be joined by welding. The welds shall be of size and type indicated and shall be made by competent operators.

1.02 RESPONSIBILITY

A. Contractor shall be responsible for the accurate location of all steel work including all items used to attach materials to other parts of the work.

B. Contractor shall see to it that any and all items of work which are to be built into the works of other trades are installed at the proper time.

C. Contractor shall notify the Architect / Engineer if the steel work shall be fabricated in a shop other than the site, so that arrangements can be made together with the Project Representative in the inspection of the delivered materials and in the fabrication of the steel work.

D. Where specified steel sizes and thicknesses are found unavailable in market, all affected items shall be upgraded to next higher level of size and thickness.

1.03 REFERENCES, CODES AND STANDARDS

A. Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings of the American Institute of Steel Construction (AISC), latest edition.

B. Code of Standard Practice for Steel Buildings and Bridges, of AISC, latest edition.

C. Code for Welding in Building Construction, D1.1 of the American Welding Society (AWS).

D. Specifications for Structural Joints using ASTM A 325 or A490 Bolts by the Research Council of Riveted and Bolted Structural Joints.

1.04 QUALIFICATIONS

A. Welding procedures, welders, welding operations and tackers shall be qualified in accord with the AWS Code.

1.05 SUBMITTALS

A. Shop Drawings

1. In accordance with the requirements of the General Conditions, furnish complete detailed fabrication and erection shop drawings including details of all connections for review and approval of the Engineer.
2. The Engineer will review and approve all shop drawings. Resubmit if any corrections are required.

B. Proof of Compliance: Submit the following in three (3) copies for review by Testing Laboratory and Architect.

1. Certified reports of tensile properties and bend tests for steel shapes, bar, and plates.
2. Certificates of conformance for structural steel tubing.
3. Affidavit (in duplicate) that structural steel having a yield strength greater than 36 ksi conforms to the requirements of Drawings and Specifications.

1.06 DELIVERY, STORAGE AND HANDLING

A. Shipping statements shall be delivered in the jobsite. The Project Representative and the Engineer shall inspect the materials per delivery and may request additional tests on the materials delivered, if in their opinion, there is reasonable doubt as to the materials specification. The fabrication and delivery of the fabricated structural steel should conform with the approved schedule of erection and items such as anchor bolts, anchorage and others that have to be placed in concrete which shall be in jobsite before such concrete structural member will be poured. Erection marks shall be painted on structural steel members and fabricated sections. Small structural members such as rivets, bolts, nuts, washers, etc, should be shipped and kept in properly marked suitable container.

B. Structural steel members which are stored at the site or a staging area shall be above ground on platforms, skids, or other supports. Store fasteners and welding electrodes in a weathertight and dry place until ready for use. Store packaged materials in their original containers.

2.00 PRODUCTS

A. MATERIALS: Refer to Section 01020 Summary and Finishes.

B. FABRICATION:

1. Fabricate structural steel within tolerances specified under Codes and Standards referenced in paragraph 1.03.
2. Fabricate and assemble structural steel in the shop to the greatest extent possible. Do shearing carefully and accurately using machine equipment where possible.
3. Connections shall be welded or bolted as indicated. Shop connections not otherwise shown shall be welded. Eccentric connections are not permitted unless shown in detail on shop drawings.
4. Surfaces required to be milled or planned are indicated on the drawings.
5. Provide bearing plates for members bearing on footings, piers and walls.
6. Drift pins may be used for assembling parts provided metal is not distorted or holes enlarged. Holes requiring enlargement to admit bolts shall be reamed. Misaligned holes will subject members to rejection.
7. Shop Cleaning:

    a) Cleaning: Thoroughly clean loose mill scale, rust, dirt, grease and other foreign matter from structural steel shapes.

8. Shop Painting: Shop paint structural steel work which will be exposed in the finish work and other fabrications exposed to weather. Coordinate the use of primer paint on the steel with architectural drawings and fire ratings.

    a) Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) SP-2, SP-3, or SP-7. Remove oil and grease deposits by solvent.

    b) Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide uniform dry film thickness on 1.5 mils. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

3.00 EXECUTION

3.01 CONDITION OF SURFACES

A. Before starting work, verify locations and elevations of bearings and anchor bolts. Immediately report inaccuracies. Work under this Section shall include responsibility for accurate bearing of steel and correct location of anchorage.

3.02 ERECTION

A. General - The Contractor shall use special care in unloading, handling and erecting the steel to avoid bending, twisting or otherwise distorting the steel members. The erector shall handle the materials in such a way as to minimize the damage to the shop coat of paint. The Contractor shall plan and execute the erection in such a way so that the close fit and neat appearance of the joints and the structure, as a whole will not be impaired. If temporary braces or erection slips are employed, care shall be taken to avoid any unsightliness upon removal. Tack welds shall be ground smooth and holes shall be filled with weld metal or body solder and smoothed by grinding or filing. The Contractor shall submit to the Architect or Engineer the sequence of erection for approval.

B. Erect items of structural steel in accord with applicable provisions of Reference Standard 1.03.

C. Erection Tolerances:

1. Structural Steel work erection tolerances shall be in accord with “AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings” and “AISC Code of Standard Practice for Steel Buildings and Bridges”.
2. Let all structural members of single rolled shape and builtup members fabricated by riveting or welding, unless otherwise specified, be straight within the tolerances allowed by ASTM Specification.
3. Never let compression members deviate from straightness by more than 1/100 of the axial length between points which are to be laterally supported.
4. Let completed members be free from twists, bends and open joints. Sharp kinks or bends shall be the cause of rejection of materials.

D. Field connections shall be welded or bolted as indicated.

E. Temporary Bracing: Introduce wherever necessary to provide for loads to which structure is subjected including erection equipment and its operation. Leave in place until no longer required for safety. Make proper provisions for construction loads, piles of materials, equipment, etc., carried by structural frame during erection.

F. Alignment: No riveting, permanent bolting or permanent welding shall be done until the structure has stiffened with the resulting stresses and properly aligned.

3.03 WELDING TECHNIQUE

A. Perform welding in accord with appropriate Section of Reference Standards.

B. Conform the technique of welding employed, the appearance and quality of welds made, the methods used in correcting defective work to the requirements of the Standard Code for Welding in Building Construction of the American Welding Society.

C. Make surfaces to be welded free from loose scale, slag, rust grease, paint and any other foregoing material except that mill scale which withstands vigorous wire brushing remain. Any shop paint on surface adjacent to joints to be field welded shall be wire brushed, to reduce the paint film to a minimum.

D. Prepare edges by gascutting, whenever practicable, cut by a mechanically guided torch.

E. Let gas cut edges which will be subjected to substantial stress or which are to have weld

metal deposited on them be free from gouges. Remove by grinding any gouges that remain from cutting.

F. Shape all reentrant corners notch free to a radius of at least 12 mm (1/2").

G. Bring the fit of joints at contact surfaces which are not completely sealed by welds, close enough to exclude water after painting.

H. Align all abutting parts to be welded carefully. Correct misalignments greater than 3 mm (1/8") and in making the correction, never draw parts into a slope sharper than two (2) degrees (7/16 inch in 12 inches).

I. Position the work for flat welding whenever practicable.

J. In assembling and joining parts of structure or of builtup members, avoid needless distortion and minimize shrinkage stresses. Where it is impossible to avoid high residual stresses in the closing welds of a rigid assembly, make closing welds in compression elements.

K. In the fabrication of cover plated beams and builtup members, make all shop splices in each component part before such component part is welded to other parts of the member.

L. Backing strips may be removed by gouging or gas cutting after welding is completed, provided no injury is done to the base metal and weld metal. Weld metal surface is left flush or slightly convex with full throat thickness.

M. Terminate butt welds at the ends of a joint in a manner that will ensure soundness. Where possible, do by the use of extension bars or runoff plates. Remove extension bars or runoff plates upon completion of the weld. Make the ends of the weld smooth and flushed with abutting parts.

N. Undercut and overcut should be avoided.

3.04 BOLTING

A. As erection progresses, bolt up work to take care of dead loads, construction live loads, lateral forces and erection stresses. Tighten all bolts to a bolt tension not less than the proof load given in the applicable ASTM Specification for the type of the bolt used.

B. Unless other wise noted, erection bolts used in welded construction may be either tightened securely and left in place or removed and the holes filled with plug welds.

C. Make high strength bolted connections in accord with Reference Standard for “high-type” connections with threads excluded from shear plane for bearing-type connections.

D. Contact surface with “slip critical (friction) type” connections shall be free of oil, paint, lacquer, or other coatings.

E. Tighten nuts using Direct Tension Indicators. Minimum bolt tension as per Reference Standard for each bolt type and size used. Use beveled washers to compensate for parallelism when outer face of bolted parts has a slope greater than 1:20 with respect to a plane normal to the bolt axis.

F. Let completed member be free from twist, bends and open joints. Sharp or bends shall be the cause of rejection of materials.

G. When bolts have been completely tightened, mark with identifying symbol.

3.05 FIELD PAINTING

A. For convenience, all steel works shall receive final painting on the ground before erection on a higher level. Connections made on the field by bolting or welding shall receive another coat of epoxy paint.

All steel work connections shall be free from loose mill scale, rust, weld slag and other foreign matter.

After erection, all unpainted areas including any marred or damaged surfaces shall receive one coat of same rust inhibitive paint as used in the shop painting.

3.06 QUALITY CONTROL, TESTS AND INSPECTIONS

A. Testing Laboratory: A qualified testing laboratory, meeting requirements of ASTM E 329 shall be approved by the Design Structural Engineer. Testing and Inspection shall be as required by Drawings as well as these Specifications. Inspection of welding shall be in accordance with the provisions of Section 6 of the Standard Code for Welding in Building Construction of the American Welding Society. All tests are charged to the contractor.

B. Tests for structural steel shall be made and reports furnished by Testing Laboratory in accord with the following requirements:

1. Mill Tests and Inspection of Structural Steel:

a) Test of Mill Order A36: Where steel, ordered from mill, cut to lengths, is identified by heat or melt numbers and is accompanied by mill analysis test reports, material shall be used without further local tests, provided an affidavit is given that materials conform with requirements. In case of controversy, tension and bend tests of materials, either locally or at the mill, as required for local stock is mandatory.

b) Test of Unidentified Steel: In the event that structural steel cannot be identified by heat or melt numbers and is accompanied by mill analysis and test reports, such stock may be used, provided one (1) tension and one (1) bend test is made for each 50 tons or fractional part, of stock as may be used in the work. Complete four-sided surface inspection may be required for materials. Each piece of high-strength local stock steel shall be tested and stamped.

c) Test Specimens shall be taken under direction of Testing Laboratory and shall be machined by the Contractor, at his expense, to dimensions as required by related applicable Standard ASTM Specification.

C. Tests of Welding and Bolting: Testing Laboratory shall inspect shop and field welding and inspect high tensile bolting. Testing Laboratory shall certify in writing, upon completion of work, that welding and high tensile bolting has been performed in accord with Drawings and Specifications and applicable Reference standards in 1.03.

D. Inspection of High Tensile Bolts: Testing Laboratory shall check bolt tightness on 100% of bolts.

E. Continuous Inspection of Welds: Testing Laboratory shall inspect welded connections of column to column, column to girder, or girder to girder by ultrasonic or other approved non-destructive tests.

a) Ultrasonic testing shall be performed by a specially trained, qualified technician, who shall operate equipment, examine welds and maintain a record of welds examined, defects found and disposition of each defect. Defective welds shall be repaired and costs of retesting defective welds shall be borne by the Contractor.

b) Welds requiring ultrasonic testing shall be tested at the rate of 100%.

c) When ultrasonic indication arising from the weld root can be interpreted as either a weld defect or backing strip, backing strip shall be removed at expense of Contractor, and if no root defect is visible, weld shall be retested. If no defect is indicated on this retest and no significant amount of base and weld metal have been removed, joint needs no further repair or welding. If a defect is indicated, it shall be repaired at no expense to Owner.

d) Questionable root indications that prove not to be defective shall not count against welder to increase test rates.

e) Ultrasonic instrumentation shall be calibrated by a qualified technician to evaluate quality of welds in accord with AWS D1.1, Appendix C.

f) Other methods of inspection, for example, x-ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if deemed necessary by Testing Laboratory with cooperation of Contractor.

F. Ultrasonic Material Inspection:

a) All column materials within 1 foot (6 inches either side) of a direct buttweld for girder flange connections is to be ultrasonically tested for laminations in accord with ASTM designation A578-Level II.

b) Material in designated location shall be tested for laminations by ultrasonic means prior to fabrication, with written reports submitted to Architect.

c) Detection of Laminations: Rejectable defect discovered by ultrasonic means are defined as follows: Using suitable calibrated ultrasonic equipment, any recordable discontinuity causing complete loss of back-reflection and which cannot be encompassed within a 3-inch diameter circle is unacceptable (Level II Standard of Acceptance). Should such flaws be detected, they may be repaired by welding, subject to Engineer’s review.

d) All full penetration groove welds, all partial penetration groove welds and all electroslag welds shall be subjected to ultrasonic testing.

3.07 IDENTIFICATION

A. Mark to identify the ASTM Specifications of steel for main components.

B. Identify such steel in completed members or assemblies by painting the designation of the piece over any shop coat of paint, prior to shipment from fabricators plant.

ESTIMATING

Includes weld plates, welding rods, welding electrodes, powder actuated anchor, bolts nails, screws, expansion anchors, saddles and connectors, and painting.

END OF SECTION 05100

05200 MISCELLANEOUS METALS

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete all stainless steel works for roof flashing, window grilles, stone anchors, stair and ramp railing and others, as required.

1.02 MEASUREMENTS AND COORDINATION

Obtain measurements for all work required to be accurately fitted at the job and not from the drawings. The Contractor will be responsible for the accuracy of all such measurements and the precise fitting and assembly of the finish products. Coordinate the work with that of all other trades to prevent interference. Verify conditions at the job before fabrication.

2.00 PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 WORKMANSHIP

A. Make all works well formed to shape and size shown and assemble as detailed. .Methods of fabrication and assembly however, unless otherwise specifically stated, shall be of first quality craftsmanship and at the discretion of the Contractors whose responsibility shall be to guarantee satisfactory performance as herein specified.

B. Cut, shear and punch to produce clean, true lines and surfaces with burrs removed.

C. Weld or bolt connections as indicated. Use countersunk screws recessed work where possible. Make all details of assembly strong with sufficient stiffness. Form joint exposed to weather in a manner to exclude water.

D. Provide all work with proper clearances. Fabricate and install in a manner to provide for expansion and contraction but will insure rigidity and provide close fitting of sections.

E. Fabricate and install as directed by the Manufacturer.

F. Provide a protective clear coating which is resistant to alkaline, mortar and plaster to be applied to aluminum sections after fabrication.

3.02 PROTECTION

Protect all finished work until turnover to the Owner.

END OF SECTION 5200

05510 METAL STAIRS

PART 1 - GENERAL

1.01 SCOPE:

A. Provide all of the labor, materials, equipment, and services required to furnish and install the steel stairs.

1.02 QUALITY ASSURANCE:

A. Manufacturer: Shall have not less than 10 continuous years of successful production/installation of this product.

B. All components shall meet or exceed ADA, OSHA and appropriate building code requirements.

C. Comply with the following:
1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A366 - Standard Specification for Commercial Steel (CS) Sheet, Carbon (0.15 maximum Percent) Cold-Rolled.
4. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
5. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
6. ASTM A570 - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled.
7. ASTM A569 - Standard Specification for Commercial Steel (CS), Sheet and Strip, Carbon (0.16 Maximum to 0.25 Maximum to 0.25 Maximum Percent), Hot-Rolled.
8. AWS D1.1 - Structural Welding Code - Steel.
9. AWS D1.3 - Structural Welding Code - Sheet Steel.

1.03 STRUCTURAL REQUIREMENTS:

A. Steel stairs: Engineer, fabricate, and install steel stairs to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of steel stairs.

1. Treads: Capable of withstanding a uniform load of 100 lbf per square foot or a concentrated load of 300 lbf on an area of 4 square inches located in the center of the tread, whichever produces the greater stress.

2. Platforms: Capable of withstanding a uniform load of 100 lbf per square foot.

3. Framing: Capable of withstanding stresses resulting from loads specified above as well as stresses resulting from railing system loads.

4. Limit deflection of treads, platforms and framing members to L/240 or 1/4", whichever is less.

C. Handrails and railings systems: See Section 05 52 13.

1.04 SUBMITTALS:

A. Prior to fabrication, submit to the Architect for review the following:

1. Manufacturer's product data indicating materials.
2. Shop drawings indicating profiles, sizes, connection attachments, reinforcing, anchorage, openings, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
3. Certification by an engineer, registered in the state where project is located, stating that stairs meet specified structural loading requirements.
4. Certification that primer finishes/coats are compatible with specified finished painting.

B. Submit all project required LEED documentation including, but not limited to, 500 mile radius data for local manufacturing/harvesting and recycled material content information.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Store components in a dry, clean location and cover to protect.

B. Rusted, bent, warped or otherwise damaged units will not be accepted.

PART 2 - PRODUCTS

2.01 TREADS, RISERS AND LANDINGS:

A. Type:

1. Closed risers with pans for poured-in-place concrete treads and landings.

B. Materials:

1. Steel: ASTM A-36.

2. Bolts, nuts and washers: ASTM A-325 bolts of sizes recommended by the stair manufacturer for the application.

3. Welding materials: AWS D1.1, type required for materials being welded.

C. Assembly:

1. Stringers: Minimum thickness or gauge as determined by structural design calculations, structural grade steel plate and/or channel.
2. Risers: Closed riser, minimum 14 gauge hot-rolled mild steel sheet, sloped maximum 1-1/2"
3. Treads: Manufactures standard concrete pan system (field poured) tread pans to be a minimum of 14 gauge, or as determined by design calculations. Pan depth 1-1/2". Exposed welds from the bottom side of flight assemblies will not be allowed. All welds to be from topside of tread pans as recommended by manufacturer.
4. Mid landings: Minimum of 11 gauge hot-rolled mild steel sheets, formed for a minimum 3" concrete fill, with 12 gauge channel supports and bracing welded to perimeter frame at 12" o.c.
5. Fasteners and supports: Sized by the manufacturer to meet the structural design criteria.

D. Fabrication:

1. Verify dimensions on site prior to shop fabrication.
2. Provide support beams appropriate for the application as recommended by the stair manufacturer.
3. Grind exposed welds flush and smooth with adjacent finished surfaces. Ease exposed edges to small uniform radius.
4. Priming: Clean surfaces of rust, scale, grease, and foreign matter prior to finishing. Do not prime surfaces in direct contact bond with concrete or where field welding is required. Apply one coat of primer.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Inspect areas where stairs are to be installed for defects which would affect the proper installation of stairs. If any defects are found, do not commence stair erection until the defects are corrected.

B. Erect stair units plumb, square and in proper alignment, and securely anchor as indicated on the Drawings.

C. Do not field cut or alter members.

D. Field bolt and weld to match standard of shop bolting and welding. Hide bolts and screws where possible. Where not hidden, use flush counter-sunk fastenings.

E. Mechanically fasten joints butted tight, flush, and hairline.

F. Welding:

1. Welds shall be ground smooth.

2. Field welding and joining shall conform to AWS D1.1 and AWS D1.3 requirements.

3.02 TOUCH-UPS:

A. Clean and smooth all welds. Check welds for integrity before permitting any use of the stairs.

B. Check the complete installation for sharp edges and grind smooth any sharp edges found.

C. Clean surfaces of foreign matter, oil, and grease.

D. Touch-up any areas where shop coat has been disturbed to as closely as possible match the existing shop coat.

- END OF SECTION -

06000 WOOD AND PLASTICS

06200 FINISH CARPENTRY

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete Wood framing, trims and mouldings Wood panel boards and related finish carpentry work as indicated on the drawings and/or specified herein.

B. Coordinate work with all other related trades.

1.02 HANDLING, STORAGE AND PROTECTION

A. Millwork

1. Protect millwork against dampness during and after delivery.
2. Do not bring interior finish, including doors, inside building until plaster is thoroughly dry.
3. Protect all finished woodwork from injury after it has been set in place until the completion and final acceptance of the work.

B. Medium Density Fiberboard, Gypsum Board and Fiber Cement Board.

Stack boards flat on a smooth level surface. Timber blocks may be used as support if it ensures optimum performance. Store sheets under cover and keep dry prior to fixing. If sheets should become wet, allow to dry thoroughly before fixing is commenced.

2.00 PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 WORKMANSHIP

A. Make all wood finish and millwork true to details, clean and sharply defined.

B. Set panels to allow for free movement in case of swelling or shrinkage.

C. Conceal means of fastening various parts together.

3.02 FINISH

A. Mill, fabricate and erect interior finish as indicated on the drawings. Machine sand at the mill and manual smooth at the job.

B. Separate with 6 mm (1/4”) stone-cut joints all interior trim set against with fine finishing nails, screws or glue where required.

C. Make mill mouldings perfectly smooth on exposed surfaces and true to profile.

D. Make joints tight and in a manner to conceal shrinkage. Secure trims with fine finishing nails, screws or glue where required.

E. Set nails for putty stopping.

F. Make window and door trim simple length.

G. Miter mouldings at corner, cope and angles.

3.03 WOOD SHELVING

A. Each shelf shall be supported on a continuous wood cleat at walls.

B. Secure cleats to masonry walls by expansion bolt or approved fastening device.

3.04 CABINETS AND LOCKERS

A. Fabricate cabinets and closets in accordance with details.

B. Use sound kiln-dried lumber or medium density fiberboard.

C. Erect cabinets straight, level and plumb and securely anchor in place.

3.05 ASSEMBLY MATERIALS

A. WELDWOOD or approved water-resistant wood glue

B. SELLEY LIQUID NAILS or approved equal.

C. Nails, screws and bolts of appropriate type, shape and size for all types of joints.

3.06 FASTENERS FOR ECOBOARD

A. Fasteners: Use galvanized wire nails 32 mm (1 1/4”) long for fixing to timber frames. Deutsher “Teks” screws may also be used with self-embedded head, No. 8 * 32 mm (1 1/4”).

3.07 HARDWARE

A. Accurately fit and install all required finish hardware items.

B. If surface-applied hardware is fitted and applied before painting, remove all such items, except butts and reinstall after painting is completed.

Finish Hardware: See Summary of Materials and Finishes.

END OF SECTION 06200

07000 THERMAL AND MOISTURE PROTECTION

07100 WATERPROOFING and DAMPPROOFING

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete:

a. Protection of all exterior finishes
b. Watersealing of exterior wall surfaces
c. Waterproofing of roof decks, underground walls and slab, concrete gutters, suspended toilets, cisterns and others
d. Watersealing of expansion joints
e. Dampproofing of slabs on fill.

B. See drawings and details for location and extent of requirements.

1.02 SUBMITTALS

Samples - Submit to Architect samples of materials to be used clearly labeled as to brand name and manufacturer's name to secure approval.

Manufacturer's Instructions - Submit to the Architect the manufacturer's complete printed instructions for the application of the material.

Warranties - Upon completion, submit to the Architect written warranty that the waterproofing is effective for a period of five years.

1.03 ALTERNATES

No substitution of materials shall be made unless authorized in writing by the Architect prior to starting the work of waterproofing.

2.00 _ PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 _ EXECUTION

3.01 GENERAL

A. Waterproofing:

Deliver waterproofing materials to the site in original sealed containers or packages bearing the manufacturer's name and brand designation, specification number, type and class.

2. Store and protect waterproofing materials from damage, weather, moisture and extreme temperature with extraordinary care.

3. Clean, free from holes and imperfections, smooth and dry all surfaces to receive waterproofing materials. The Contractor shall perform the necessary surface preparation according to the manufacturer's specifications. Immediately before application of waterproofing, clean surfaces and secure approval. No application of waterproofing is permitted in wet weather.

All work under this section shall be performed only by a qualified Contractor trained and approved by the manufacturer. Apply all waterproofing strictly in accordance with manufacturer's specifications.

Dampproofing of slabs on fill and basement slabs:

Prior to placing the concrete, the hard core should be compacted to smooth, even surface, eliminating all sharp projections or irregularities which may puncture the moisture barrier.

Cover the entire area with a layer of dampproofing film, extending past the perimeter of the slab and turning up against walls for the depth of the concrete.

Overlapping of sides and ends: 150 mm (6”) minimum.

3.02 TESTING

Flood test all applicable waterproofed areas prior to acceptance of job. Plug all drains, build temporary dams at openings so that water will be 250 mm (1") deep at the high point of the waterproofed area. Maintain the water for at least 24 hours. Remedy at once any evidence of leaking.

3.03 GUARANTEE

The Contractor shall guarantee all waterproofing work to be free from defects in materials and in workmanship and free of leaks for a period of five (5) years from the date of final acceptance. Any defect shall be repaired at the Contractor's expense.

3.04 CURING

Where curing of waterproofing is required, cure strictly in accordance to the Manufacturer's specifications. Allow foot traffic only after complete curing.

3.05 TOPPING

Where topping over waterproofing is required, the Contractor shall provide the topping to the thickness indicated in the drawings.

END OF SECTION 07100

07210 BUILDING AND ROOFING INSULATION

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete works as indicates in Plans.

See drawings for location and extent of work required.

1.02 SUBMITTALS

Samples - Submit to the Architect samples of materials to be used and secure approval prior to installation.

Manufacturer's Instructions - Submit to the Architect the manufacturer's complete printed instructions for the installation of the material.

1.03 PRODUCT HANDLING AND PROTECTION

a. Supply and deliver insulation material in its finished form.
b. Store at a place properly protected from rain and sunlight. Extended outdoor exposure is not recommended.
c. The insulation material shall not be in contact with wet concrete.
d. All works shall be performed only by qualified contractor.

2.00 PRODUCTS

2.01 MATERIALS

Refer to the Summary of Materials and Finishes

3.00 EXECUTION

Install insulation in dry state.

Where cutting of material is necessary, use sharp knife and straight edge.

Fit tight around all roof protrusions. Fill the gaps with offcuts to avoid heat leakages.

Side and end laps shall be 50 mm (2") to 100 mm (4") and adhered by rugby contact adhesive.

Install insulation before roofing is fixed.

Any accidental punctures and damages shall be repaired and sealed with aluminum tapes.

END OF SECTION 07210

07400 SHEET METAL ROOFING

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete:

fitting and installation of ribbed metal roofing, flashing components, strap and rivet units

application of supplementary materials to make the roof unit watertight and leakproof.

B. See drawings and details for sizes and location of work required.

1.02 SUBMITTALS

Submit to the Architect shop drawings and samples of materials to be used and secure approval prior to installation.

1.03 BRANDING

Each sheet shall be branded with the name or trademark of the manufacturer.

2.00 PRODUCTS

See Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 GENERAL

Lay down the ribbed roofing sheet starting from the end opposite the prevailing wind.

Lay and install the first sheet with the turned down edge towards the outside of the area covered.

Overlay the next sheet in such a manner that the exposed edge is turned down and the covered edge is turned up.

Fix the strap according to indications shown in the manufacturer's catalogue.

Fasten the roofing sheets to the steel purlins by means of straps riveted to roofing sheets and strapped around purlins.

Side lap fasteners shall be done by rivets and washers spaced from 300 mm (12") to 457 mm (18") on centers.

3.02 RIDGE ROLLS

Minimum lap of ridge roll shall be 300 mm (12") over roofing sheets. Rivet ridge to roofing sheets at top of every fourth corrugation in addition to rivets engaging top line of straps.

3.03 FLASHING & COUNTER FLASHING

A. Provide flashing and counterflashings at all critical points where water may seep through.
Where corrugations run parallel to the walls, corrugate one wing of the flashing sheet to match corrugation of roof sheet while other wing shall go up against the walls and counter flash.

3.04 FASCIA

See drawings as to the details of the fascia.

END OF SECTION 07400

07900 JOINT SEALANTS

1.00 GENERAL

1.01 SCOPE

Furnish all materials, labor, equipment, plant, tools, required to complete: application of caulks and sealants for panel joints, expansion joints construction joints, glazing of doors and windows, acoustic control and others.

1.02 SUBMITTALS

A. Samples

Submit to the Architect sample of materials to be used and secure approval.

B. Manufacturer's Instructions

Submit to the Architect the manufacturer's complete printed instructions for the application of the material.

1.04 PRODUCT HANDLING

A. Materials shall be delivered to the site in the original sealed containers or packages bearing manufacturer's name and brand specification.

B. Materials stored on jobsite shall be protected from weather moisture and extreme temperature with extra ordinary care.

1.05 PROJECT CONDITION

Temperature and relative humidity conditions for a period before, during and after application shall be as recommended by the manufacturer. If rain occurs, allow surfaces to dry before proceeding with the applications.

2.00 PRODUCTS

2.01 MATERIALS

Refer to the Summary of Materials and Finishes.

3.00 EXECUTION

3.01 SURFACE PREPARATION

A. Surface to be bonded should be free of oil, grease and dust. Scrub off soap residue with water, then clean with solvent. Surface must be completely clean and dry. Any trace of old sealant should be removed.

B. Concrete should be fully cured.

C. Wood surfaces should be lightly sanded and free from dust.

D. Metal must be free of corrosion, mill scale, oil tar or peeling paint.

E. Iron and steel surfaces should be painted to protect against rusting.

3.02 APPLICATION

A. Apply sealant evenly in a continuous, steady flow pushing sealant ahead of nozzle to achieve a filled, void-free joint.

B. Do not apply too thick. A thin bead of sealant will accommodate more joint movement than a thick bead. Ideally, sealant depth should be no more than 12 mm and no less then 6 mm. Use backing material to reduce depth.

C. If necessary, widen joints by cutting sides or removing rigid filler. Wider joints accommodate more movement than narrow joints.

D. Use masking tape for neat appearance. Remove soon after smoothing before sealant cures.

E. Smooth with spatula for heat appearance, and to force sealant into joints and ensure proper contact onto sides of joint.

F. Clean up spills before sealant cures with suitable solvent-soaked cloth.

G. Remove cured sealant by scraping or wire brushing.

Read product instructions carefully and follow them to the letter.

END OF SECTION 07900

08000 DOORS AND WINDOWS

08100 METAL DOORS AND WINDOWS

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete:

Metal Doors and Windows

Metal Jambs and Frames

Operable Wall Partition

B. See drawings and schedules for size, details and location of required work.

1.02 SHOP DRAWINGS AND SAMPLES

A. Submit shop drawings and secure Architect's approval prior to placement of order.

B. Submit sample corner sections, hinges, tracks, handles and all other accessories.

C. Submit sample of one full size unit, complete assembly, with all accessories, prior to fabrication of steel windows.

2.00 _ PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 _ EXECUTION

3.01 METAL DOORS

A. Fabrication

a. Factory prefabricate all frames in accordance to the designs and dimensions indicated in the drawings.
b. Flush type doors shall be 45 mm (1-3/4") thick. Reinforced doors form steel sections extending full height of doors and spaced not over 200 mm (8") o.c. vertically.
c. Tops and bottoms of doors shall have continuous stiffener channels welded to side plates.
d. Insulate hollow flush doors with fiberboard or cork to deaden metallic sound. Edges at top sides shall be reinforced and finished flush.

B. Installation

1. Set and anchor frames as shown in details and in approved shop drawings.
2. Set frames plumb and square and brace where necessary to prevent distortion.
3. Provide continuous vinyl weatherstrip, vertically at meeting stiles on pairs and concealed top and bottom rails for all exterior doors. Entrances shall be constructed so that gaps will not occur between pivot stiles and door jambs when doors are locked or operational to prevent heat and air transmission and entrance of water and insects.

4. Protective Coating: Clean all surfaces and apply a protective coating of clear, waterwhite methacrylatetype lacquer, resistant to alkaline mortar and plaster immediately after fabrication and may not be removed even after completion of installation.

5. Wedge clear of masonry all frames set in prepared openings 3/16 to 1/4 inch to allow for caulking.

Install hardware to fit details as shown in the drawings and as per manufacturer's specifications. Supply all necessary templates and instructions required.

C. Adjustments

1. Adjust all frames and attach all hardware before glazing.

2. Secure all windows and doors to be watertight and all hardware operating free and easy.

3.02 ALUMINUM DOORS and WINDOWS

A. Fabrication

1. **Factory prefabricate all frames** in accordance to the designs and dimensions indicated in the drawings.

2. Extruded aluminum swing doors shall be mortised and reinforced corner construction, assembled with 9.525mm dia. steel tension rods for maximum strength.

Use RPC 12030/12031 Door Stile, 12033 Door Bottom Rail, 12032 Top Rail

B. Installation

1. Set and anchor frames as shown in details and in approved shop drawings.

2. Set frames plumb and square and brace where necessary to prevent distortion.

3. Provide continuous vinyl weatherstrip, vertically at meeting stiles on pairs and concealed top and bottom rails for all exterior doors. Entrances shall be constructed so that gaps will not occur between pivot stiles and door jambs when doors are locked or operational to prevent heat and air transmission and entrance of water and insects.

4. Protective Coating: Clean all surfaces and apply a protective coating of clear, waterwhite methacrylatetype lacquer, resistant to alkaline mortar and plaster immediately after fabrication and may not be removed even after completion of installation.

5. Wedge clear of masonry all frames set in prepared openings 3/16 to 1/4 inch to allow for caulking. Install hardware to fit details as shown in the drawings and as per manufacturer's specifications. Supply all necessary templates and instructions required.

C. Adjustments

1. Adjust all frames and attach all hardware before glazing.

2. Secure all windows and doors to be watertight and all hardware operating free and easy.

3.03 OPERABLE WALL PARTITION

A. Fabrication

Factory prefabricate everything including finish in accordance to the designs and dimensions indicated in the drawings. All material specifications will be provided for by the manufacturer.

B. Installation

Installation will be handled by the manufacturer.

3.04 ADJUSTING AND CLEANING

Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.

Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

Factory Finish Touchup: Immediately after erection, sand to feather-edge minor scratched, chipped, or damaged areas and apply touchup of compatible air-drying paint. Minor finish imperfections may be repaired provided finish matches new work finish and is acceptable to Architect; otherwise remove and replace.

END OF SECTION 08100

08441.3 ALUMINUM CURTAIN WALL

PART 1 - GENERAL

1.01 SCOPE:

A. Provide all of the labor, materials, equipment, and services required to furnish and install the aluminum curtain wall system and doors.

1.02 QUALITY ASSURANCE:

A. Qualifications:

1. Installer shall be experienced to perform work of this section who has specialized in the installation of work similar to that required for this project. If requested by Architect, submit reference list of completed projects.

2. Manufacturer shall be capable of providing field service representation during construction, approving acceptable installer and approving application method.

B. Mock-ups (field constructed):

1. Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Architect's acceptance of finish color, and workmanship standards.

a. Maintenance: maintain mock-up during construction for workmanship comparison; remove and legal dispose of mock-up when no longer required.

b. Mock-up may be incorporated into final construction upon Architect's approval.

C. Single-source responsibility: Provide curtain wall from one source and produced by a single manufacturer.

D. Pre-installation meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

E. Air leakage and U-factor:

1. Provide a permanent name-plate, installed by the manufacturer, listing the U-factor, SHGC and air leakage rate.

2. U-factor and the air leakage rate for all doors installed between conditioned space, semiheated space, unconditioned space, and exterior space shall be identified on a permanent name-plate installed on the product by the manufacturer.

1.03 SUBMITTALS:

A. Prior to fabrication, submit to the Architect for review the following.

1. Shop drawings showing the following:
    a. A description of all materials, sizes, dimensions, and gauges.
    b. Size of openings.
    c. Method of fabrication and assembly.
    d. Method of joining.
    e. Any concealed stiffening and reinforcement.
    f. Type of spacing of fasteners.
    g. Method of providing for expansion and contraction.
    h. Method of attachment to adjacent construction.
    I. Method of glazing.
    j. Location of sealant.

2. Physical Sample: An aluminum corner section of system in the color and finish proposed to be provided. Sample shall show complete range of light and dark of color anodized finish.

B. Submit all project required LEED documentation including, but not limited to, 500 mile radius data for local manufacturing/harvesting and recycled material content information.

1.04 PROJECT CONDITIONS:

A. Field measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.05 WARRANTY:

A. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.

1. Beneficiary: Issue warranty in the name of the project Owner.

2. Warranty period:

a. Windows: 2 years commencing from the Date of Substantial Completion.

b. Installation: Warranted against defects for 1 year from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 CURTAIN WALL SYSTEM:

Description:
1. Thermally improved.
2. Horizontal and vertical framing member face dimension: 2-1/2". Depth as indicated on Drawings.
3. Flush glazing on all sides. No protruding stops.
4. Extrusion: ASTM B-221, 6063-T5 Aluminum.
5. Finish: AAMA 611-98, Class 1 - 7 mils minimum coating thickness, Powder Coated
C. Glazing: See Section 08800.

2.02 DOORS:

A. See Section 08411.3.

PART 3 - EXECUTION

3.01 GENERAL:

A. Installation shall be in accordance with the Contract Documents, the approved submittals, and the manufacturer's instructions.

3.02 FABRICATION:
A. Shop prefabricate all doors and frames into complete units, verifying all measurements at the job site prior to fabrication.
B. Fabricate in strict accordance with the approved submittals and the manufacturer's published recommendations.
C. Accurately miter and fit all members to hairline joints.
D. Weld or mechanically fasten along entire line of contact on the unexposed side.
E. No discoloration on the face after anodizing will be acceptable.

3.03 ERECTION:

A. Install all members with adequate provision for setting, expanding, and contracting to occur without breaking glass.

B. Firmly anchor all members, using all anchoring devices required to ensure positive attachment of the members for long life under hard use.

C. All items shall be set in their correct locations and shall be level, square, plumb, and at proper elevations and in alignment with other work.

D. All joints between interior metal and masonry and between interior glass framing and mullion members shall be tightly caulked in order to secure a watertight job.

E. All metal shall be screwed in place, using backing, masonry plugs, or anchor straps as required.

F. Where moldings are joined, they shall be accurately cut and fitted to result in a tightly closed joint.

G. Protection:

1. Wherever aluminum is in contact with steel, concrete, or other material potentially creative of electrolytic action, provide all required permanent isolation of the aluminum by backpainting with first quality bituminous paint or by such other isolation as is approved in advance by the Architect.

2. Protect all finished surfaces as necessary to prevent damage during progress of the Work.

3.04 CLEANING UP:

A. Immediately prior to acceptance of the work, remove all protective materials from the storefront system and clean all exposed members.

B. Do not use abrasives or harmful cleaning agents.

- END OF SECTION -

08520 ALUMINUM WINDOWS

1.00 _ GENERAL

1.01 SCOPE

A. Furnish and install all materials and equipment and perform labor required to install completely and ready for use all types of Aluminum Windows, hardware and all accessories.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. This Section includes Architectural Grade aluminum windows of the performance class indicated. Window types required include the following:

1. Awning windows
2. Fixed windows

B. Related Section: Division 8 Section "Glazed Aluminum Curtain Walls" contains requirements that relate to this Section.

1.04 DEFINITIONS

A. Combination Windows: Where 2 different types of operating sash or ventilators are included in the same window unit and share a common frame, the unit is considered a "combination window."

B. Dual windows are double-hung, horizontal-sliding, and fixed-type units with both a prime and a secondary window combined in a single composite unit. The prime window element protects the building from climatic elements. The secondary window is used for energy conservation and acoustical control.

C. Hinged emergency-access/egress windows are side-hinged units that swing out to provide emergency exit.

D. Performance class number, included as part of the window designation system, is the actual design pressure in pounds force per square foot (pascals) used to determine structural test pressure and water test pressure.

1. Structural test pressure, wind load test, is equivalent to 150 percent of the design pressure.
2. Water-leakage-resistance test pressure is equivalent to 20 percent of the design pressure with 8 lbf/sq. ft. (383 Pa) as a minimum for Architectural Grade windows.

1.05 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.

B. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:

1. Design wind velocity at Project site is 155 mi./h (250 km/h).

2. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 331 for water penetration, and ASTM E 330 for uniform load deflection and structural performance.

C. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of AAMA 101, Section 3, "Optional Performance Classes," for higher than minimum performance class.

1. Air-Infiltration Rate for Operating Units: Not more than 0.37 cfm/ft. (2.06 cu. m/h per m) of operable sash joint for an inward test pressure of 6.24 lbf/sq. ft. (299 Pa).
2. Air-Infiltration Rate for Fixed Windows: Not more than 0.15 cfm/ft. (2.74 cu. m/h per m) of area for an inward test pressure of 6.24 lbf/sq. ft. (299 Pa).
3. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 20 percent of the design pressure.
4. Uniform Load Deflection: No deflection in excess of 1/175 of any member's span during the imposed load, for a positive (inward) and negative (outward) test pressure of 60 lbf/sq. ft. (2873 Pa).
5. Thermal Movements: Provide window units that allow thermal movement resulting from the following maximum change (range) in ambient temperature when engineering, fabricating, and installing aluminum windows to prevent buckling, opening of joints, and overstressing of components, connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime sky heat loss.
    a. Temperature Change (Range): 20 deg C, ambient; 80 deg C, material surfaces.

D. Window Wall Tests: Provide window units included as part of the aluminum curtain wall system that comply with performance requirements of Division 8 Section "Glazed Aluminum Curtain Walls."

1.06 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of window required, including the following:

1. Construction details and fabrication methods.
2. Profiles and dimensions of individual components.
3. Data on hardware, accessories, and finishes.
4. Recommendations for maintaining and cleaning exterior surfaces.

C. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:

1. Layout and installation details, including anchors.
2. Elevations at 1/4 inch = 1 foot (1:50) scale and typical window unit elevations at 3/4 inch = 1 foot (1:20) scale.
3. Full-size section details of typical composite members, including reinforcement and stiffeners.
4. Location of weep holes.
5. Panning details.
6. Hardware, including operators.
7. Window cleaning provisions.
8. Glazing details.
9. Accessories.

D. Samples for initial color selection on 12-inch- (300-mm-) long sections of window members. Where finishes involve normal color variations, include Sample sets showing the full range of variations expected.

E. Samples for Verification: The Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

F. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated based on comprehensive testing of current window units within the last 5 years. Test results based on use of down-sized test units will not be accepted.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of successful in-service performance.

B. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Single-Source Responsibility: Obtain aluminum windows from one source and by a single manufacturer.

D. Mockups: Prior to installing aluminum windows, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect one week in advance of the dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before start of final unit of Work.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
    a. When directed, demolish and remove mockups from Project site.
    b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

E. Product Options: The Drawings indicate sizes, profiles, dimensional requirements, and aesthetic effects of aluminum windows and are based on the specific window types and models indicated. Other aluminum window manufacturers whose products have equal performance characteristics may be considered provided deviations in size, profile, and dimensions are minor and do not alter the aesthetic effect. Refer to Division 1 Section "Substitutions."

1.08 PROJECT CONDITIONS

A. Field Measurements: Check window openings by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

1.09 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty signed by aluminum window manufacturer agreeing to repair or replace window components that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
2. Faulty operation of sash and hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period: 3 years after date of Substantial Completion.

D. Warranty Period for Metal Finishes and Glass: 5 years after date of Substantial Completion.

2.00 _ PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements and as approved by the University.

2.02 MATERIALS

A. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength and not less than 0.062 inch (1.6 mm) thick at any location for main frame and sash members.

B. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.

1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, splined grommet nuts.

2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.

D. Compression-Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

E. Sliding-Type Weatherstripping: Provide woven-pile weatherstripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701.2.

1. Provide stripping with integral centerline barrier fin of semirigid plastic sheet of polypropylene.

F. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating. Comply with Division 7 Section "Joint Sealants" of these Specifications for selection and installation of sealants.

2.03 HARDWARE

General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.

B. Four-Bar Friction Hinges: Comply with AAMA 904.1.

1. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

C. Gear-Type Rotary Operators: Comply with AAMA 901.1 for rotary operators. Comply with ASTM E 405, Method A, when subjected to operating moments and closing torques indicated in AAMA 101.

1. Operator shall operate all ventilators simultaneously, securely closing them at both jambs without using additional manually controlled locking devices.

D. Group or Gang-Type Operators: Provide operation system of the type and in groups as indicated. Coordinate operator design with window fabrication and hardware selection to ensure smooth, durable operation of sashes.

1. Provide torsion-type rack-and-pinion system, complete with shafts, brackets, levers, rods, oil-encased gear boxes, and standard fittings and accessories for operation indicated.

2. Provide tension-type horizontal-movement system, complete with steel rod or cable operating in conduit between sash operator units, mounting brackets, oil-encased gear boxes, and standard fittings and accessories for operation indicated.

E. Electric Motor Operator: Provide electric motor operator on each gear box shaft. Provide fully enclosed motor, NEMA Type 1 enclosure, of sufficient capacity to operate units under any condition. Coordinate current characteristics with building power and wiring system.

1. Provide limit switches and push-button station for "OPEN-CLOSE-STOP" operation from location indicated.

2. Operator shall operate all ventilators simultaneously, securely closing them at both jambs without using additional manually controlled locking devices.

F. Pole Operators: Provide one pole operator and pole hanger for every room in the Project that has operable aluminum windows more than 72 inches (1800 mm) above floor. Fabricate pole of tubular-shaped anodized aluminum with rubber cap at lower end and standard push-pull hook at top to match hardware design. Provide sufficient length for window operation without reaching more than 60 inches (1500 mm) above floor.

2.04 ACCESSORIES

A. General: Provide manufacturer's standard accessories that comply with indicated standards.

B. Exterior Louver Units: Where indicated, provide exterior, fixed, extruded-aluminum, solar-shade louver units, of type recommended by manufacturer for application on roof dormers. Provide main extrusion members of 0.062-inch- (1.6-mm-) minimum wall thickness.

C. Weatherstripping: Provide sliding-type weatherstripping where sash rails slide horizontally or vertically along unit frame. Provide compression-type weatherstripping at perimeter of each operating sash where sliding type is inappropriate.

1. Provide weatherstripping locked into extruded grooves in sash.

2.05 AWNING WINDOWS

A. Window Grade and Class: Comply with requirements of AAMA Grade and Performance Class A-C20.

B. Hardware: Provide the following equipment and operating hardware:

1. Operating Device: Push-bar-type operator located on jamb at sill.
2. Window-Operating System: Wall-mounted, group or gang-type, window-operating system with chain-wheel operator.
3. Hinges: Concealed 4-bar friction hinges (2 per ventilator) located on each jamb near top rail. Ventilator operation shall permit inside cleaning of outside glass face.
4. Limit Device: Manufacturer's standard limit device (2 per ventilator) located on each jamb.
5. Lock: Combination lever handle and cam-action lock with concealed pawl.

2.06 HORIZONTAL-SLIDING WINDOWS

A. Window Grade and Class: Comply with requirements of AAMA Grade and Performance Class HS-AW40. Window units shall successfully pass operating force test performance requirements specified in AAMA 101 and life-cycle test requirements specified in AAMA 910.

1. Provide window units with sash that can be removed from inside for cleaning.

B. Hardware: Provide the following operating hardware:

1. Sash Rollers: Steel, lubricated ball-bearing rollers with nylon tires.
2. Sash Rollers: Nylon rollers.
3. Lock: Cam-action sweep sash lock and keeper at meeting rails.
4. Lock: Spring-loaded snap-type lock at jambs (2 per sash).
5. Lock: Spring-loaded plunger lock on meeting rail (2 per sash).

2.07 PROJECTED WINDOWS (Not Applicable)

A. Window Grade and Class: Comply with requirements of AAMA Grade and Performance Class P-AW40. Window units shall successfully pass life-cycle test requirements specified in AAMA 910.

B. Hardware: Provide the following equipment and operating hardware:

1. Operating Device: Crank-operated, pivot-shoe-type, underscreen ventilator operator.
2. Hinges: Concealed 4-bar friction hinges with adjustable slide shoe (2 per ventilator).
3. Hinges: 5-knuckle butt hinges (2 per ventilator).
a. Provide ventilator operation that permits cleaning of outside glass face from the interior.
4. Lock: Cam-action, sweep lock handle with surface-mounted strike.
5. Lock: Custodial lock with removable handle.
6. Lock: Key-operated security lock and keeper.
7. Lock: Pole-operated, spring-catch lock.
8. Lock: Pole-operated, cam-action, sweep lock handle and keeper.
9. Limit Device: Stay bar with adjustable hold-open device.

2.08 FIXED WINDOWS

A. Window Grade and Class: Comply with requirements of AAMA Grade and Performance Class F-AW40.

2.09 FABRICATION

A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.

1. Provide units that are reglazable without dismantling sash or ventilator framing.
2. Prepare window sash or ventilators for glazing, except where preglazing at the factory is indicated.

B. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance, thermal barrier, located between exterior materials and window members exposed on interior, in a manner that eliminates direct metal-to-metal contact.

1. Provide thermal-break construction that has been in use for not less than 3 years, has been tested to demonstrate resistance to thermal conductance and condensation, and has been tested to show adequate strength and security of glass retention.
2. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash.
3. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
4. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.
5. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units.
6. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated.

7. Glazing Stops: Provide screw-applied or snap-on glazing stops, coordinated with glass selection and glazing system indicated. Finish to match window units.

Preglazed Fabrication: Preglaze window units at the factory where possible and practical for applications indicated. Comply with glass and glazing requirements of Division 8 Section "Glazing" of these Specifications and AAMA 101.

2.10 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

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

C. Finish aluminum windows to match other aluminum components of curtain wall system. Refer to Division 8 Section "Glazed Aluminum Curtain Walls" for finish requirements.

G. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.

1. Color: As selected by Architect from the full range of industry colors and color densities.

3.00 _ EXECUTION

3.01 INSPECTION

A. Inspect openings before installation. Verify that rough or masonry opening is correct and sill plate is level. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.

3.02 INSTALLATION

A. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.

B. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.

C. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.

3.03 FIELD QUALITY CONTROL

A. Conduct on-site tests for air and water infiltration with window manufacturer's representative present. The Architect will select units to be tested. Tests not meeting specified requirements and units having similar deficiencies shall be corrected at no cost to the Owner. Testing shall be performed by a qualified independent testing agency selected by the Architect.

1. Air-Infiltration Tests: Conduct tests according to requirements of ASTM E 783. Allowable infiltration shall not exceed 1.5 times the amount indicated.
2. Water-Resistance Tests: Conduct tests according to requirements of ASTM E 1105. No water leakage is permitted.

3.04 ADJUSTING

A. Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and a weathertight closure.

3.05 CLEANING

A. Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

3.06 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to aluminum window manufacturer, that ensure window units are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

08700 HARDWARE

1.00 GENERAL

1.01 SCOPE

A. Furnish and install all materials and equipment and perform labor required to fully equip in the most satisfactory conditions all:

- Finish hardware for doors, and windows and
- other operating members

B. Include nails, spikes, bolts, long screws, etc.

C. Furnish and fit in place all:

Hardware not herein specifically mentioned but necessary to leave the work complete. All such hardware should there be any, shall conform in every respect to the balance of the hardware herein specified.

1.02 SUBMITTALS

Submit samples of locksets, hinges, door pulls, door stops, door closers, door lock chains, door eyes and other finish hardware and accessories for Architect's approval.

2.00 _ PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 INSTALLATION

A. All hardware shall be installed in strict accordance with the manufacturer's directions.

B. All work shall be installed plumb and true and secured with proper fastenings so as to make all work rigid and firm.

C. After installation, all finishing hardware shall operate and function smoothly and efficiently in strict accord with their respective expected operating performance.

D. All work which is to receive hardware shall be inspected and any defect must first be rectified before installing finishing hardware.

E. Exposed items of hardware: After hardware has been properly fitted, all exposed items such as knobs, plates, pulls, locks, etc. shall be removed until final coat of finish has been applied, and then hardware installed.

F. Door Knobs, Lock and Latch Strikes:

1. All locks, latch strikes and strike boxes be installed in door frames at the same height from the floor.
2. Door knobs shall be located so that the center of the knobs is 965 mm (38") from the finished floor or as directed by the Architect.
3. All lock turn to be non-ferrous metal. All lock mechanisms to be free of dye cast material.
4. All locks are to be interchangeable and reversible without any alterations to the door.
5. The face of each lock to be beveled 3 mm (1/8") in 50 mm (2") to conform to the level of the door.
6. Roses to hold firmly in place without use of wood screws. Knobs to be securely fastened to spindles without the use of set screws.
7. All cylinders must be removable and interchangeable with the aid of the key, but without requiring the lock to be removed from the door.
8. Key locks are to have automatic deadlocking latch to prevent forcing back of the bolt. All locks to have box strikes. Lips of strikes not to project beyond jamb trim.

3.02 PROTECTION

A. Hardware which might be damaged by the construction work shall be protected during the progress of the building work and uncovered upon completion.

B. Protection must be provided at all times including during painting operation.

3.03 CLEANING

A. Upon completion of the work, all hardware shall be cleaned and polished and left in perfect operating condition.

B. Any hardware that may have been damaged either on its finish or more shall be replaced.

END OF SECTION 08700

08800 GLAZING

1.00 GENERAL

1.01 SCOPE

Furnish all materials, labor, equipment, plant, tools required to complete all glass and glazing works free from imperfection, water marks.

B. See drawings for size, location and details.

1.02 SUBMITTALS

A. Submit samples of glass panels with factory labels for Architect's approval.

B. Submit samples of glazing compound.

1.03 LABELS

Label each glass panel and do not remove from glass panel until final cleaning and after inspection and approval.

1.04 DELIVERY AND STORAGE

Deliver only as required and store in a safe location as directed. Unpack only when ready for use.

1.05 PROTECTION

A. Protect all glass from damage, breakage, staining, etching, differential ageing, abrasion, scratches, impact during construction and until final acceptance of the contract work. Replace unless satisfactory corrective measures can be made at the job without removing the damaged glass, as directed by the Architect.

B. Glazed openings shall be identified with a colorful flag, festoon, or tape suspended near, but not in contact with the glass. Tapes or banners may be attached to the sash at head, jambs or site with a non-staining adhesive or by any convenient, mechanical means. Do not mark or coat glass partially or completely with "X", "S" or other symbols with soap, wax cleaning powders or other materials.

C. Lost and damaged materials shall be replaced by the Contractor at his own expense.

2.00 _ PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 EXECUTION

3.01 GLAZING

A. Prevent glass from all contact with metal or any hard or sharp materials by use of resilient shims placed at quarter points.

B. Use resilient sealants.

C. Use stops in sizes permitting a "good grip" on the glass.

D. Install glass only in openings that are rigid, plumb and square.

E. Allow sufficient clearance at edges of glass to compensate for its expansion or for some settlement of the building. Clearance should be 6 mm (1/4") from edge to frame and 3 mm (1/8") for face.

Removal of putty or glazing compound smears from glass shall be performed by the glazing contractor during the materials normal work life. Failure to do so may result in damage to the glass.

END OF SECTION 08800

09000 FINISHES

09110 Non-Load Bearing Wall Framing

09110.A1 51mm Metal Stud Wall Framing

51mm x 0 .6mm Metal Stud Framing 1200mm x 400mm OC. For all 51mm Metal Stud Wall Framing.

09200 PLASTER

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete all plain cement plaster finish.

B. See drawings for details and location of work required.

1.02 RELATED DOCUMENTS

A. See Division 4 Section “Mortar” for description of Materials.

2.00 _ PRODUCT

Refer to Section 01020 Summary of Materials and Finishes.

3.00 _ EXECUTION

3.01 PLAIN CEMENT PLASTER WITH DURAPLAS FINISH

A. Provide all walls indicated with three coats of cement plaster (scratch coat, brown coat and finish coat). Mix each coat in the proportion of one part Portland cement to three parts and by volume.

B. Apply the scratch coat with sufficient material and pressure to ensure a good bond and then scratch to a rough surface. Provide a thickness of 6 mm (3/8") for the scratch coat. Dampen with water before applying brown coat.

C. Apply brown coat one day after applying scratch coat with a thickness of 6 mm (3/8") and level to a flat even surface. When stiff enough, trowel with a wooden float and cross hatch or broom lightly and evenly to secure a good mechanical bond for the finish coat. Wet the surface and keep from drying out for at least three (3) days.

D. Apply finish coat using Duraplas cementitious plaster or equivalent seven (7) days after the application of the brown coat. Provide thickness of 2 mm .

DURA-PLAS Application:

1. MIXING: Mix approximately ratio off 0.4 part of clean water to 1 part of Dura-plas Maxi powder in a suitable container. Stir to achieve a lump free, tacky smooth paste. Add water when needed and then allow standing for 3 to 5 minutes. For best results: Re-stir, prior to application. (Mix only what can be used at that time. Do not attempt to extend the pot life by adding water. Do not mix directly on the floor, use plastic bucket for mixing).

Refrain from adding more water to a mixture which has already begun to set. Adding more water might weaken the properties of the product.

2. APPLICATION: Apply Dura-plas Maxi using finishing cement trowel, decorative rubber roller or mortar gun is recommended. Use cement trowel by force in pressing down to fill the dip or crack. Cover thin layer as topping directly to the rough surface of the prepared plastered wall. Allow to set and fill up to level and let dry. Applied area may be sanded 24 hours after application to attain flat, even surface (avoid continous heavy sanding). Wash down with water make sure dirt and dust are removed and let it stand for a few days for hydration, prior to application of topcoat paint.

END OF SECTION 09200

09290 GYPSUM WALLBOARD / ECOBOARD

PART 1 - GENERAL

1.01 SCOPE:

A. Provide all of the labor, materials, equipment and services to furnish and install the gypsum wallboard and the associated products.

1.02 QUALITY ASSURANCE:

A. Regarding fabrication and installation of metal studs conform to the requirements of :

1. ASTM C645

2. ASTM C754

3. IBC 2006.

C. Fire-test-response characteristics: Where fire-rated assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

D. Single-source responsibility:

1. Obtain steel framing members for gypsum board / ECOBOARD assemblies from a single manufacturer.

2. Obtain each type of gypsum board / ECOBOARD and other panel products from a single manufacturer.

3. Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

1.03 SUBMITTALS:

A. Prior to installation, submit to the Architect for review the following:

1. Manufacturer's literature fully describing each product named which shall include, but not be limited to, the manufacturer's name and catalog number for each item.

2. Accompanying the materials list, submit two (2) copies of the manufacturer's current recommended method of installation for each item.

B. Submit all project required LEED documentation including, but not limited to, 500 mile radius data for local manufacturing/harvesting and recycled material content information.

1.04 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum/ecoboard panels flat to prevent sagging.

C. Handle gypsum/ecoboard board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.05 PROJECT CONDITIONS:

A. Environmental conditions: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations.

B. Ventilation: Ventilate building spaces, as required, for drying joint treatment materials. Avoid drafts during hot dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

with paper facings on front and long edges. Tapered edges.
b. Conform to "Specification for Gypsum Drywall", ASTM C 1396; Fed. Spec. SS-L-30d, Type VII, Grade W.
2. Fire rated:
a. 5/8" non-combustible gypsum core enhanced with water-resistant wax emulsion and glass fibers and with paper facings on front and long edges. Tapered edges.
b. Conform to "Specification for Gypsum Drywall", ASTM C 1396 for type "X" gypsum board; Fed. Spec. SS-L-30d, Type VII, Grade W, X.
C. Cement backer board for tile:
1. ½" sheets formed in a continuous process of aggregated Portland cement slurry with polymer-coated, glass-fiber mesh completely encompassing edges and back and front surfaces. Edges shall be formed smooth. Ends shall be square cut.
2. Conform to ANSI A1 18.9-1992 for Test Methods and Specifications for CBU and ANSI 108.11-1992 for interior installation of CBU.
3. Conform to ASTM E 136 for non-combustibility.
4. Tape: 2" wide, alkali-resistant glass-fiber tape.
D. Abuse resistant:
1. 5/8" Fiberglass-enhanced non-combustible high-density gypsum core with reinforced heavy facing paper which shall guard against surface abrasion, indentation.
2. Conform to ASTM C 1396, Type X; Fed. Spec. SS-L-30d, Type III, Grade X.
3. Mold resistance: Shall achieve a panel score of 10 in accordance with ASTM D 3273.
4. Level of abuse resistance required:
a. Category 3 (heavy duty): Abrasion - 100 cycles; Indentation - 0.10"; Hard-body impact - 80 ft lbs; Soft-body impact - 210 ft lbs.
E. Shaftwall liner panels:
1. 1" thick panels with fire resistant core and multi-layered paper facings treated to resist moisture penetration. Edges shall be beveled.
2. Shall be identified with UL classification label.
3. Conform to ASTM C 442/C 1396, type X.
2.03 GYPSUM SHEATHING:
A. See Section 06 16 43, Exterior Gypsum Sheathing.

2.04 SOUND BLANKETS:

A. Description:

1. Paperless, semi-rigid blankets. Produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

2. Conform to ASTM C 665, Type I.

B. Non-combustible:

1. Flame spread: 15.

2. Smoke developed: 0.

C. Perimeter caulking with acoustical sealant:

TUCKCHINTON ARCHITECTS

TH-10008

College of Pharmacy

Lipscomb University

Nashville, Tennessee

SECTION 09 29 00 - PAGE 4

GYPSUM WALLBOARD

1. Highly elastic water-based sealant. Nonstaining and capable of being painted.

2. Conform to ASTM C 834 Standard Specification for Latex-Based Sealing compounds.

3. Conform to ASTM E 90 for sound testing and ASTM E 84 for surfaced burning characteristics.

2.05 INSULATION FOR SHAFTWALL:

A. Description:

1. Paperless, semi-rigid blankets. Produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

2. Conform to ASTM C 665, Type I.

B. Non-combustible:

1. Flame spread: 15.

2. Smoke developed: 0.

2.06 METAL STUDS:

A. Standard:

1. Non-load bearing, screw-type, channel studs, roll-formed with 25 gauge hot-dipped galvanized (G-40) steel in sizes as indicated on the Drawings.

2. Flanges 1-1/4" wide; return lip 0.219".

3. Webs shall be punched to receive bridging, conduit, piping, etc.

4. Conform to ASTM C645, "Light-Gauge Studs, Runners, and Rigid Furring Channels".

5. Unless otherwise directed, install on 16" centers.

6. Size as indicated on Drawings.

B. Shaftwall: C-H steel stud of size and spacing as indicated on Drawings.

1. Conform to ASTM C 645 and C 754.

C. Structural, perimeter wall studs: See Section 05 41 00, Structural Metal Stud Framing.

2.07 METAL FURRING CHANNELS:

A. Furring channels:

1. Galvanized steel designed similar to USG Metal Furring Channels.

2. Face width 1-3/8", depth 7/8", length 12'-0".

B. Furring channel clips:

1. Galvanized wire for use in attaching furring channels.

2. Install on alternate sides of the carrying channels. Where clips cannot be alternated, wire tying must be employed.

C. Resilient channels:

1. 25 gauge.

2. ½" thick.

3. Hole pattern: 3/8" wide slots, 3" long, 4" o.c.

4. 1/8" diameter holes 4" o.c. for screws to attach the channels to the framing member.

5. Manufacturer:

TUCKCHINTON ARCHITECTS

TH-10008

College of Pharmacy

Lipscomb University

Nashville, Tennessee

SECTION 09 29 00 - PAGE 5

GYPSUM WALLBOARD

a. Dietrich.

b. Or an approved equal.

2.08 COLD-ROLLED CHANNELS:

A. Description:

1. 16 gauge galvanized steel for use in furring, suspended ceilings, and partition construction.

2. Sizes: 3/4", 1-1/2", and 2" as required by the Drawings.

2.09 METAL TRIM:

A. Trim:

1. USG #200 series.

2. All metal that shall be concealed when wall is finished out.

3. Sizes to accommodate drywall thickness.

B. Corner bead:

1. Similar to USG "Dura-A-Bead" all metal heavy gauge hot-dipped galvanized steel reinforcement for protecting external corners.

2. Shall be concealed when wall is finished out.

2.10 HANGER AND TIE WIRE:

A. Soft annealed, low carbon steel wire, zinc-coated.

1. No. 9 gauge for hanger wire.

2. No. 18 gauge for tie wire.

2.11 FASTENERS:

A. Metal studs:

1. Self-drilling, self-tapping steel screws to comply with ASTM C646.

2. Type S and S12, Pan and Bugle head.

3. Length of screw to be equal to panel(s) thickness plus 3/8".

2.12 JOINT TREATMENT:

A. All products to comply with ASTM C-475, "Joint Treatment Materials for Gypsum Wallboard Construction".

1. Joint reinforcing tape: USG Perf-A-Tape Reinforcing Tape.

2. Joint compounds: USG All-purpose Joint Compound.

2.13 OTHER MATERIALS:

A. All other materials, not specifically described but required for a complete and proper installation of gypsum drywall, shall be as selected by the Contractor subject to the approval of the Architect.

TUCKCHINTON ARCHITECTS

TH-10008

College of Pharmacy

Lipscomb University

Nashville, Tennessee

SECTION 09 29 00 - PAGE 6

GYPSUM WALLBOARD

PART 3 - EXECUTION

3.01 GENERAL:

A. All materials shall be installed in accordance with the manufacturer's current printed directions, approved submittals and the Contract Documents. In the case of a conflict between these instructions, the most stringent condition shall preside.

3.02 METAL STUD ERECTION:

A. Install all metal studs and accessory items in strict accordance with ASTM C754 and the approved submittal of manufacturer's recommendations, anchoring all members in position for long life under hard use.

B. Align all partition and wall assemblies to a tolerance of one in 200 horizontally and one in 500 vertically.

C. Attach steel runners at floor and ceiling to structural elements with suitable fasteners located 2" from each end and spaced 24" o.c. To suspended ceilings, use toggle bolts or hollow wall anchors spaced 16" o.c.

D. Position studs vertically, with open side facing in same direction, engaging floor and ceiling runners. When necessary, splice studs with 8" nested lap and two positive attachments per stud flange. Place studs in direct contact with all door frame jambs, abutting partitions, partition corners and existing

construction elements. Where studs are installed directly against exterior walls and a possibility of water penetration through walls exists, install asphalt felt strips between studs and wall surfaces.

E. Anchor all studs for shelf-walls and those adjacent to door and window frames, partition intersections, corners and free-standing furring to ceiling and floor runner flanges with metal lock fastener tool or screws. Securely anchor studs to jamb and head anchors of door or borrowed-light frames by bolt or screw attachment. Over metal door and borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flange bend at each end, and secure to strut-studs with two screws in each bent web. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over door frame header. When attaching studs to steel grid system, structural adequacy of grid to support end reaction of wall must be determined.

3.03 RESILIENT CHANNELS:

A. Position resilient channel at right angles to steel studs, space 24" o.c. and attach to stud flanges with pan head framing screws driven through holes in channel mounting flange. Install channels with mounting flange down. Channel may be inverted at floor to accommodate attachment of base. Locate channels 2" from floor and within 6" of ceiling. Extend channels into all corners and attach to corner framing. Cantilever channel ends no more than 6". Splice channel by nesting directly over stud; screw-attach through both flanges. Reinforce with screws located at both ends of splice.

3.04 CEILING INSTALLATION:

A. Grillage erection:

1. Space hanger wires 48" o.c. along carrying channels and within 6" of ends of carrying channel run.

2. Install 1-1/2" carrying channels 48" o.c. and within 6" of walls. Position channels for proper ceiling height, level and secure with hanger wire saddle-ties along channel. Provide 1" clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 12" and secure each end with double-strand 18 ga. tie wire.

3. Erect metal furring channels at right angles to 1-1/2" carrying channels or main supports. Space furring channels 16" o.c. and within 6" of walls. Provide 1" clearance between furring ends and abutting walls and partitions. Secure furring to carrying channels with clips or wiretie to supports with double-strand 18 ga. wire. At splices, nest furring channels at least 8" and securely wire-tie each end with double-strand 18 ga. wire.

4. At light troffers or any openings that interrupt the carrying or furring channels, install additional cross reinforcing to restore lateral stability of grillage.

B. Steel stud framing:

1. Attach runners at ceiling height, through gypsum panels, to each partition stud with two screws. Insert steel studs in runners and attach each end with one pan head framing screw. Install 1-5/8" stud cross-bracing over stud framing, space 48" o.c. and attach to each framing stud with two pan head framing screws. At hangers, install 12" long stud section for box reinforcing or lap studs 12" and secure each end with two pan head forming screws.

2. At light troffers or any openings that interrupt the ceiling, install additional cross reinforcing to maintain structural integrity of framing.

3.05 GYPSUM PANEL INSTALLATION - GENERAL:

A. Install and finish in accordance with ASTM C840 and gypsum wallboard manufacturer’s recommendations.

B. Install sound attenuation blankets where indicated prior to installing gypsum panels unless blankets are readily installed after the panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install wall/partition board panels to minimize the number of abutting end joints or avoid them entirely.Stagger abutting end joints not less than one framing member in alternate courses of board. At stairwells and other high walls, install panels horizontally with end abutting joints over studs and staggered.

E. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16" of open space between panels. Do not force into place. Do not allow gypsum panels to directly contact concrete or masonry surface. Hold the panels away from these surfaces approximately 1/8".

F. Locate both edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position adjoining panels so that tapered edges abut tapered edges, and field-cut edges abut field-cut edges and ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions. Avoid joints at corners of framed openings where possible.

G. Attach gypsum panels to steel studs so that the leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

H. Attach gypsum panels to framing provided at openings and cutouts.

I. Spot grout hollow metal door frames for solid core wood doors, hollow metal doors, and doors over 32" wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

J. Form control joints and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

K. Cover both faces of stud partition framing with gypsum panels in concealed spaces (above ceilings,etc.) except in chase walls that are braced internally.

1. Except where concealed application is indicated or required for sound, fire, air, or smokeratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.

2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect open concrete coffers, concrete joists, and other structural members project below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4" to ½" wide joints to install sealant.

L. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors.

Provide 1/4" to ½" wide spaces at these locations and trim edges with edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer’s recommendations.

N. Coordinate work with that of other Trades. Neatly cut face boards to fit around penetrations through wall. Provide suitable back-up anchorage as required for the attachment of shelves and cabinets.

O. Screw heads shall provide a slight depression below the surface of the board. Do not install screw closer than 3/8" from edges and ends of the board.

P. Treat joints, screw head depressions, or defects incurred during the installation of the gypsum board in prescribed manner with joint treatment.

Q. Properly space all fasteners in careful accordance with the manufacturer's recommendations and code requirements with heads driven slightly below the surface for proper cementing but without breaking the paper cover.

R. Loosely butt all joints to be taped; firmly butt all joints to be left untreated.

S. Stagger all end joints and the joints between panels to achieve a maximum of bridging and a minimum of continued joints.

3.06 GYPSUM BOARD APPLICATION METHODS:

A. Single layer application:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.

2. Apply gypsum panels either vertically or horizontally. Position all edges over studs for vertical application; all ends over studs for horizontal application. Use maximum practical lengths to minimize end joints. Stagger joints on opposite ends of partition.

3. Fasten with screws.

B. Wall tile substrates:

1. Install cementitious backer units to comply with ANSI A108.11.

C. Double-layer application:

1. On ceilings, apply base layer prior to applying base layer on walls/partitions; apply face layers in same sequence. Offset face-layer joints at least 10" from parallel base-layer joints. Apply base layers at right angles to framing members unless otherwise indicated.

2. On partitions/walls, apply base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face layer joints offset at least one stud or furring member with base layer joints. Stagger joints on opposite sides of partitions.

3. Fasten both base and face layers separately to supports with screws.

3.07 INSTALLING TRIM AND ACCESSORIES:

A. The Drawings do not purport to show all trim required; verify with the Architect the precise locations and types of trim to be used.

B. In addition to locations shown on Drawings, install trim at ceiling angles and around cut-onto and openings.

C. Install all trim in strict accordance with the manufacturer's recommendations, paying particular attention to make all trim installation plumb, level, and true to line, with firm attachment to supporting members.

D. For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer’s directions for type, length, and spacing of fasteners.

E. Reinforce all vertical and horizontal exterior corners with corner bead fastened with 9/16" rosin-coated staples 9" o.d. on both flanges along entire length of bead.

F. Metal trim: Where assembly terminates against masonry or other dissimilar material, apply metal trim over panel edge and fasten with screws or 9/16" rosin-coated staples 12" o.c. Install edge trim where edge of gypsum panels would otherwise be exposed or semi-exposed. Provide edge trim type with face flange formed to joint compound.

G. Install control joints at locations indicated, and where not indicated according to ASTM C840, and in locations approved by the Architect for visual effect.

3.08 FINISHING GYPSUM BOARD ASSEMBLIES:

A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound. C. Apply joint tape over gypsum board joints and to rim accessories with concealed face flanges as recommended by trim accessory manufacturer and as required to prevent cracks from developing in joint compound at flange edges.

3.09 APPLICATION OF PERIMETER CAULKING:

A. Apply sound caulking where any wall is designated to receive sound blankets. Apply sealant around all cut-outs and all intersections with adjoining structures.

B. Cut panels for loose fit around perimeter. Leave a groove no more than 1/8" wide. Apply a 1/4" minimum round bead of sealant each side of runners including those used at partition intersections with dissimilar wall construction. Immediately install panels, squeezing sealant into firm contact with adjacent surfaces. Fasten panels in normal manner over sealed joints.

C. Seal partitions intersecting sound-isolating partitions that are extended to reduce sound flanking paths.

3.10 EXPANSION CONTROL:

A. Panel surfaces shall be isolated with control joints or other means where:

1. Partition or furring abuts a structural element (except floor) or dissimilar wall ceiling;
2. Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration;
3. Construction changes within the plane of the partition or ceiling;
4. Partition or furring run exceeds 30'-0"; Ceiling dimensions exceed 50'-0" in either direction;
5. The area within separate ceiling sections exceeds 2,500 sq. ft.;
6. Wings of "L", "U", and "T" shaped ceiling areas are joined;
7. Expansion or control joints occur in the base exterior wall.

B. The location of all control joints shall be verified with the Architect.

3.11 CLEANING UP:

A. Do not allow the accumulation of scraps and debris arising from the work of this Section but maintain the premises in a neat and

09300 CERAMIC TILE

1.00 _ GENERAL

1.01 SCOPE:

A. Provide all of the labor, materials, equipment and services to furnish and install the ceramic tile and accessories as indicated on the Drawings and as specified herein.

1.02 SUBMITTALS:

A. Prior to installation, submit to the Architect for review the following:

1. Physical samples:

a. Tile and tile accessory pieces: Architect shall select from manufacturer’s full range of colors and prices.

b. Grout for selection of color.

2. Master Grade Certificate, signed by an officer of the firm manufacturing the tile used, and issued when the shipment is made, stating the grade, kind of tile, identification marks for tile containers, and the name and location of the Project.

B. Maintenance and operation manual: Submit tile manufacturer's maintenance guides for Owner's use in maintaining all tile herein specified.

C. Certification that all standards and requirements have been met. These shall include, but not be limited to:
1. Delivery.
2. Storage.
3. Conditions under which the materials were installed.

1.03 QUALITY ASSURANCE:

1. ANSI Specifications: American National Standard Specification for Installation of Ceramic Tile - A108.1-1976; A108.4-1976; A108.5-1976; A108.6-1976; A108.7-1967 (R1976); A118.1-1976; A118.2-1967 (R1976); A136.1-1967 (R1972).

1.04 DELIVERY, STORAGE, AND HANDLING:

A. Deliver all materials of this Section to the job site in their original unopened containers with all labels intact and legible at time of use.

B. Prevent damage or contamination to materials by water, freezing, foreign matter and other causes.

1.05 PROJECT CONDITIONS:

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

2.00 _ PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

3.00 _ EXECUTION

3.01 TCA INSTALLATION METHODS:

A. Tile shall be installed in accordance with the following TCA Installation Methods:

1. Thin-set floors: F-113.
2. Tile set with waterproof membrane: F-122.
3. Thin-set over gypsum board walls: W-243.

3.02 LAYOUT:

A. Determine location of all movement joints prior to beginning work.
B. Layout all tile work so as to avoid cuts of less than one-half tile size.
C. Locate cuts in both so as to be the least conspicuous.
D. Align all wall joints to give straight uniform grout lines, plumb and level.
E. Align floor tile joints square with walls, and make them uniform in width.
F. Caulk expansion joints wherever tile butts a perpendicular surface.

3.03 CLEAN-UP:

A. Remove debris daily while work is in progress. At completion of this work, leave entire work area in neat and work like condition satisfactory for receipt of other related items of work which are to be installed as part of other sections.
B. Remove all grout haze, observing tile manufacturer's recommendations as to use of mild solution of muriatic acid and chemical cleaners. Rinse tile work thoroughly with water before and after using chemical cleaners.

ADHESIVE, GROUT AND SEALANT:

Grout and Sealant color coordinated as required. Include Colored Silicon Sealant as expansion joint every 4500 m x 4500m of Tiled Area and all tile to wall edges to thickness of tile.

TILE ADHESIVE

MIXING:

Into a plastic pail containing clean tap water, pour a sufficient quantity of TILE ADHESIVE that may be used within the pot life of 3-4 hrs. 5 kg of TILE ADHESIVE needs approx. 1.5 L of water and 25 kg needs approx. 8 L of water. Stir with a mixing device or by hand. Wait 15 min. and mix again briefly. TILE ADHESIVE is now ready to use. This mix will be usable within 1-2 hrs.

CAUTION: Use only plastic pail or galvanized iron sheet as mixing base. Never use absorbent material such as plywood, wooden box, gypsum board, etc.

APPLICATION:

1) Wet the substrate lightly before applying tile adhesive especially during hot and windy conditions.

2) Spread the adhesive mortar over 1m2 area at a time using a notched trowel.

3) Fix tiles immediately within the adhesive's open time of 15 min. Adjust and align accordingly. Carry out random checks every 5 m2 to determine whether the back of the tiles are fully covered with tile TILE ADHESIVE. Also check if the tile adhesive mortar still adheres to your fingers. If not, remove the adhesive layer and throw away. Do not mix with a newly prepared batch of tile adhesive mortar.

SPECIAL APPLICATION: For tile installations over non-concrete surfaces, such as existing ceramic tiles, moisture resistant gypsum boards, fiber cement boards, granolithic floors, marble, granite or wood, use TILE ADHESIVE in combination with REDIFIX or TILE ADHESIVE HEAVY-DUTY. Consult your representative or dealer for more information.

INSTALLATION:Fix tiles immediately within the open time of 20 minutes. Carry out random checks to determine whether the back of the site is fully covered with adhesive.

OPEN TIME: Open time is the period when the mortar's adhesive strength is most effective. Adjust and align accordingly within the adhesive's open time only.

FINGER CHECK:

To ensure that open time has not lapsed, check if the tile adhesive mortar still adheres to your finger in order to avoid bonding failure. Open time has lapsed, remove the applied adhesive layer and throw away. CAUTION: Do not add newly prepared batch of tile adhesive to a previously mixed batch.

CLEANING:

Remove excess mortar on tile face and on tools using clean water.

COVERAGE:

Dependent on substrate conditions 25 kg of TILE ADHESIVE shall cover approx. 5-7 m2.

END OF SECTION 09300

SECTION 09 50 00 Acoustical Ceilings

Part 1 - General

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes

1. Acoustical ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

B. Related Selections

1. Section 09 51 00 - Acoustical Ceilings
2. Section 09 51 13 - Acoustical Fabric-Faced Panel Ceilings
3. Section 09 53 00 - Acoustical Ceiling Suspension Assemblies
4. Section 09 20 00 - Plaster and Gypsum Board
5. Section 02 42 00 - Removal and Salvage of Construction Materials
6. Divisions 23 - HVAC Air Distribution
7. Division 26 - Electrical

C. Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.

2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

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

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material
    A. Armstrong Fire Guard Products or equivalent
10. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint

11. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
12. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
13. ASTM E 1264 Classification for Acoustical Ceiling Products
B. International Building Code

C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

G. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong Suspension Systems or equivalent

H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report

1. 0244 - Armstrong Single Span Suspension System or equivalent

1.4 SYSTEM DESCRIPTION

Continuous/Wall-to-Wall

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with, or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

2. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

3. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

B. Acoustical Panels: As with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, or their local codes for guidance where automatic fire detection and suppression systems are present.

C. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.8 PROJECT CONDITIONS

A. Space Enclosure:

HumiGuard Max Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Ceilings with HumiGuard Max performance can be installed in conditions up to 120°F (49°C) and maximum humidity exposure including outdoor applications, and other standing water applications, so long as they are installed with either SS Prelude Plus, AL Prelude Plus, or Prelude Plus Fire Guard XL suspension systems. Products with Humiguard Max performance can be installed in exterior applications, where standing water is present, or where moisture will come in direct contact with the ceiling. Only Ceramaguard with AL Prelude Plus suspension system can be installed over swimming pools.

1.9 ALTERNATE CONSTRUCTION WASTE DISPOSAL

A. Ceiling material being reclaimed must be kept dry and free from debris

1.10 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Acoustical Panels: Sagging and warping
2. Grid System: Rusting and manufacturer's defects

B. Warranty Period:

1. Acoustical panels: Ten (10) years from date of substantial completion.
2. Grid: Ten (10) years from date of substantial completion.
3. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is Thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.11 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

Refer to Section 01020 Summary of Materials and Finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Follow manufacturer installation instructions.

B. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

C. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

C. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant with provide assistance to facilitate the recycle of the ceiling.

END OF SECTION

SECTION 09900 PAINTING

1.00 _ GENERAL

1.01 SCOPE

Furnish all materials, labor, equipment, plant, tools required to complete: all painting and varnishing works See drawings for location, quantity and extent of surfaces to receive paint and varnish.

1.02 WORK IN OTHER SECTIONS

The Painting Contractor shall examine the drawings and specifications for the section being painted and for painting work in other sections for possible conflict in work.

The Painting Contractor shall also examine all the surfaces to be finished under the contract and see that the work of other trades has been left or installed in satisfactory condition to receive the paint, stain, or specified finish.

1.03 PROTECTION OF WORK

The Painting Contractor shall protect his work and the work of other contractors against damage or injury caused by paint application.

1.04 WORKMANSHIP

A. The paint shall be applied only by skilled painters to the method specified so as to form a film of uniform thickness, free from sags, runs, crawls, or other defects.

B. For painted work, each succeeding coat shall differ slightly in color or tint from that of the preceding coat.

C. The Painting Contractor shall include in his work all final clean-up of paint spots on the floor, glass and finish hardware.

1.05 MATERIALS STORAGE

A. All materials shall be provided to the job site in clean, sealed, original containers with all labels and other markings intact. Materials will be stored in the area designated and all storage areas will be kept neat, clean and locked.

B. A room or rooms in the premises shall be assigned for the storage of painting tools and materials. Protect the floor with drop cloths or building paper. Place cloth and cotton waste in covered metal containers, or destroy them at the end of each work day.

C. All painting materials shall be received and mixed in an assigned room to avoid pilferage and maintain quality control. All necessary precautions shall be taken to prevent fire by complying with all applicable local Fire Prevention and Safety Ordinances.

1.06 COLORS

A. All colors are to be selected or approved by the Architect or his authorized representative and actual color chips shall be supplied to the Contractor for matching.

B. All undercoats shall be tinted to approximate the finish coat color.

1.07 SUBMITTALS

TEST PANELS: Prepare sample panels of selected color or shade on 300 mm by 300 mm (12” by 12”) plywood panels for approval by the Architect. Colors may not be the manufacturer's standard color. Special color shall be provided as required.

1.08 FIRE PREVENTION

Every precaution will be taken by the Contractor to prevent fires. At the end of each day's work, all oily rags, empty containers and combustible material will be removed from the premises. Seal all paint and varnish containers with remaining content and store outside the construction site.

2.00 _ PRODUCT

2.01 MATERIALS

Refer to the Summary of Materials and Finishes.

Use materials in accordance with the manufacturer's directions printed on the labels unless otherwise, approved by the Architect.

2.02 SURFACE PREPARATION

A. Masonry (new surface)

1) All areas to be painted must be dry and free of dirt, grease, oil, dust, loose grit or mortar and other contaminants.

2) Treat with Concrete Neutralizer at least a week prior to painting. Apply sufficient coats, let dry, then brush off white crystals that form on the surface.

3) Apply one coat Concrete Primer & Sealer.

Fill up all hairline cracks and crevices with Concrete Putty. Allow to dry, sand smooth, dust off, then spot prime before applying finish coats.

B. Masonry (old surface)

Remove scaling, flaking, blistering and peeling off paint either with the use of paint remover, wire brushing, or scraping.

For chalking old paint, use Masonry Surface Conditioner as primer.

In case of mildew infestation, treat with Fungicidal Wash Solution by scrubbing or brushing. To ensure adequate treatment, allow to remain on the surface for twenty four (24) hours. Brush off and rinse with water. Let dry.

C. Wood (new surface)

1) All areas to be painted must be dry and free of dirt, dust, grease, oil and other foreign matter.

2) Sand surface until wood is smooth to touch and no slivers or rough edges remain.

3) Dust off completely, then wipe with clean rag.

4) Apply one coat of Interior Primer & Sealer or Exterior Wood Primer.

5) Fill nail holes, cracks, dents and damaged areas with Plastic Wood Dough or Glazing Putty.

D. Metal (new surface)

1) Remove dust, dirt, grease, oil, wax, loose scales and other contaminants by wiping with rag soaked in lacquer thinner or naphtha.

2) Sand, wire brush or scrape all rusty metal exposed to the weather for some time.

3) Treat surface with Rust Converter. Let stand overnight, then wipe off white residue with clean rag soaked in lacquer thinner of naphtha.

4) Apply one coat Red oxide or Red Lead or Zinc Chromate Primer. Let dry overnight before finishing with one or two coats of recommended topcoat.

3.00 _ EXECUTION

3.01 APPLICATION

A. Employ only experienced, skilled craftsmen and apply as per manufacturer's written specifications.

B. Paint shall be applied by a brush, roller or spray in accordance with the manufacturer's directions. All materials when brushed, shall be evenly flowed on with brush best suited for the type of material being applied. When using roller, the covers shall be carpet, velvet back or high pile sheep wool best suited for materials and texture specified by the Architect. Sprayed paint shall be uniformly applied with suitable equipment.

C. Exposed surfaces shall mean all areas visible when all permanent or built in fixtures, etc., are in place in all areas specified or scheduled to be painted. Painted surfaces in back of movable equipment and furniture. Paint all inside metal and plastered surfaces visible through the above specified equipment covers.

D. Access panels, electrical panels, louvers, exposed conduits, primed outlet covers, primed wall and ceiling plates and other primed items they occur unless otherwise specified in Painting Schedule. Paint the back sides of access panels, removable or hinged covers and the like.

E. Do not apply exterior paint in damp, rainy weather. Do not apply interior paint when in the Architect's opinion, satisfactory results cannot be obtained due to high humidity and excessive temperature. However, failures of the Architect to notify the Contractor shall not relieve the Contractor of responsibility to produce satisfactory results.

3.02 PROTECTION

A. Protect or remove all exposed finished hardwares, lighting fixtures and accessories, plumbing fixtures and accessories, glasses and the like so that these are not stained during painting operations. Reinstall them after completion of works.

B. Tape and cover with craft paper or equal all other surfaces which would be endangered by stains or paint marks.

C. Repair any damage done. Refinish any work made necessary by defective workmanship for material or carelessness of other crafts.

3.03 WORKMANSHIP IN GENERAL

A. Mix paint with proper consistency. Apply paints evenly and brush efficiently to minimize brush marks.

B. Stir paint thoroughly to keep pigment in even suspension when paint is being applied.

C. Except as otherwise directed by the Architect, apply paints in three coats (priming, body and finish). Allow each coat to dry thoroughly before the succeeding coat is applied. In general, unless otherwise instructed by the Architect, provide not less than 48 hours as the time between the application of succeeding coats. Let the Architect or his representative inspect and approve each coat before the succeeding coat is applied.

D. If surfaces are not fully covered or cannot be satisfactorily finished in the number of coats specified, apply subsequent coats to attain the desired evenness of paint without extra cost to the Owner.

E. Touch up knots, pitch steaks, sappy spots, etc. where finish calls for interior paints or enamel. For exteriors, use any approved sealer.

F. Sand smooth woodwork to be finished with enamel or varnish. Use fine sand paper between coats of enamel or vanish applied to wood or metal to produce an even smooth surface.

G. Do not paint exterior while surface is damp or during rainy or damp weather.

H. Do necessary puttying of nail holes, cracks, etc. after the prime had been applied. Bring putty flush with adjoining surface in a neat, workmanlike manner.

I. Tint undercoats of paint or enamel to same or approximate shade of final coat.

J. Protect to remove hardwares, hardware accessories, plates, lighting fixtures and other similar items during the painting operation and reinstall them after completion of work.

3.04 VARNISHING

A. Sand thoroughly all woodwork surfaces to be varnished. Fill carefully all cracks, nail holes and other defects with firstquality colored or white putty tinted to match the desired finish.

B. For opengrain woods like Tanguile etc., reduce the prominence of the course grain by applying first quality pastewood filler with consistency reduced for brush application and tinted to match the desired finish. Allow this filler to set sell and remove excess by wiping across grain. Allow overnight drying or as per required by manufacturer. Remove all remaining surplus by wiping the wood.

C. Allow stains and varnishes to dry for 48 hours between coats and sand lightly between coats with no. 00 sand paper or finer. Clean and dust before applying the next coat.

3.03 CLEANING

Protect the work and adjacent work and materials at all times by a suitable covering or by other methods. Upon completion of the work, remove paint and varnish spots from the floor, glass and finish hardware. Remove all surplus materials, scaffoldings, etc. so as to leave the premises in perfect condition, acceptable to the Owner.

END OF SECTION 09900

10000 SPECIALTIES

Toilet Partitions

ESTIMATING

Includes all toilet partitions, nylon fittings, finishing hardware, such as indicator locks, door pulls, etc. and their accessories.

10160.A1 Toilet Partition Assembly 1000mm x 1500mm

Use Phenolic black-core compact board or equivalent, For Level 2 Cafe/Shop Male, Female Toilet. All Accessories shall be, as possible, Stainless Steel

STAINLESS STEEL ACCESSORIES for Each Toilet Partition Assembly includes:

2 Adjustable Feet, 8 Wall Brackets, 2 Self Closing Hinges, 1 Indicator Lockset, 1 Knob Handle, 1 Coat Hook, Top Rail, L-Bracket

10520 Fire Protection Specialties

10520.B1 Recessed Fire Hose Cabinet with Fire Extinguisher

10670.A1 High Density Storage And Shelving

10615.B1 Demountable Fiber Cement Board Panel Partition

Demountable Fiber Cement Board Panel Partition 9mm (Hanger Supported Gypsum Panel). For Level 1 Permanent Exhibition Space.

FIRE EXIT SIGNS: White acrylic letters and green acrylic background; 2 Hours duration; complete with 1 X

8 W Fluorescent lamp and Sealed Maintenance-Free Nickel Cadmium Battery. For all fire exit doors.

10800 Toilet Accessories

ESTIMATING

Includes all toilet accessories as indicated in the specifications.

10800.A17 Stainless Steel Towel Dispenser /Paper Towel Dispenser

For all Toilets.

10800.A2 Stainless Steel Toilet Tissue Dispenser/Tissue Holder

For all Toilets.

TOILET PAPER HOLDER:

Vitreous china, one (1) beside every water closet in private toilets, white color.

10800.A3 Stainless Steel Waste Receptacle / Garbage Bin - Level 1 and Level 2 Toilets

10800.A6 Stainless Steel Soap Dispenser - Level 1 and Level 2 Toilets

SOAP HOLDER

Vitreous china, white color, one (1) set for each lavatory in private toilets.

15000 Mechanical

15150 Plumbing System

GENERAL

DESCRIPTION

A. Applicable provisions of "General Conditions" govern work under this section.

B. All fittings, connections and pipings embedded in concrete shall be subject to inspection by the Architect and/or his representative before covering and/or completion.

C. The Contractor shall provide all items, articles, materials, operation or methods listed, mentioned or scheduled on the drawings and/or herein, including all labor, materials, equipment, plant, tools, and other incidentals necessary and required for their completion.

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

E. All dimensional locations of fixtures, drains, riser and pipe chase shall be verified on the architectural drawings and manufacturer's catalogue.

F. In cases where there are conflicts between the drawings and the specifications, the contractor shall within three (3) days, inform the Engineer of such conflicts.

G. It is not intended that the drawings shall show every pipe, fittings, valves and appliances. All such items whether specifically mentioned or not, or indicated on the drawings shall be furnished and installed, if necessary, to complete the system in accordance with the best practice of the plumbing trade and to the satisfaction of the Engineer and the Owner.

H. The Contractor is required to refer to all architectural, structural, mechanical and electrical plans and specifications, and shall investigate all possible interferences and conditions affecting his work.

I. Electrical systems are not included in this division, but the Contractor will provide all facilities and make provisions for the installation of the work as construction progresses.

SCOPE OF WORK

Work included under this section of the specifications consists of furnishing all labor, tools and equipment, appliances and materials necessary for complete installation, testing and operation of the plumbing system in accordance with the contract.

A. Roof, Lower ground floor to roof deck storm drainage system and connection to the point of discharge as shown in the plans to be verified at the jobsite.

B. Sanitary drainage system of the building and connection to the point of discharge as shown in the plans to be verified at the jobsite.

C. Soil, waste and vent piping system within the building.

D. Cold water distribution system and supply pipes to the equipment, fixtures and hose bibbs inclusive of all valves, fittings, and other accessories to complete the system.

E.. Installation of all plumbing fixtures, trims and accessories.

F. Furnish and installation of pumps, valves and other accessories necessary for complete operation of the system.

G. Payments for all permit incidental to the completion of the project.

H. Disinfection and testing of building water distribution system .

I. All other works described in other sections of this document necessary for the completion of this contract.

OTHER WORKS

The following work or materials in conjunction with the work to be done or installed.

A. Civil Works

1. Pumping, shoring, general excavations and backfill.

2. Painting, except as required by the Plumbing Code and these specifications.
3. Underground and elevated water tanks.
4. Septic vaults.

B. Electrical
1. Electrical supply to equipment inclusive of circuit breakers.
2. Wiring from pump motors to controllers and from controllers to the circuit breakers shall be provided and installed by the Contractor under the supervision of the pump supplier.

C. General
1. Water needed for construction shall be metered or prorated by Contractors.
2. Temporary toilet facilities.

APPLICABLE CODE AND STANDARDS

A. All plumbing works to be done and sizes of pipes to be used shall be in accordance with the National Plumbing Code and the Plumbing Code of the Philippines.

B. The Contractor shall verify the above paragraphs with each section of the specifications and coordinate his work so that the General Contractor will clearly understand the intent of the work to be done.

PRODUCTS

DESCRIPTION OF MATERIALS

All materials to be used shall conform with the standards specified. All classes listed are not necessarily required for this project. Of classes listed, only those specifically called for under sections of this Division or shown shall be provided. Use of materials shall further be governed by other requirements imposed on other sections of this specification. Materials shall be subject to test necessary to ascertain their fitness if the Engineer so requires.

ALTERNATE MATERIALS

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

IDENTIFICATION OF MATERIALS

Each length of pipe, fittings, traps, fixtures and devices used in the plumbing system shall have cast, stamped or indelibly marked on it the manufacturer's trademark or name, the weight, type and classes of products when so required by the standards mentioned.

All materials and equipment mentioned in this specification, including all incidental items not specifically indicated but required to complete the contract shall be new and free from defects. If damaged during the course of construction, it shall be repaired or replaced as directed by the Project Representative at no additional cost to the Owner.

PIPE SLEEVES

A. Pipe sleeves shall be installed and properly secured in place at all points where pipes pass through masonry or concrete, except unframed floors on earth.

B. Pipe sleeves shall be of sufficient diameter to provide approximately onequarter inch clearance around the pipe or insulation.

C. Pipes sleeves in walls and partitions shall be of wrought iron or steel pipe schedule 40. Pipe sleeves in concrete beams or concrete fireproofing shall be steel pipe schedule 40.

D. Pipe sleeves thru floors shall be galvanized steel pipe schedule 40. Sleeve in floor shall extend not less than one inch and not more than two inches above and the space around the pipe shall be packed with fiberglass insulation UL/FM listed materials.

E. Pipe sleeves in footings shall be or steel pipe and shall be not less than four inches larger in diameter than the pipe to be installed.

F. Flashing sleeves shall be installed where pipe pass through waterproofing membrane. The sleeves shall be provided with an integral flashing flange or clamping device to which a flashing shield shall be of sixteen ounce, soft sheet copper, shall extend not less than eight inches from the sleeves and flashing flanges and

should be thoroughly mopped into the membrane.

G. All pipe penetration sleeves shall be galvanized Schedule 40 steel pipe with anchor plate or collar for waterproofed exterior or interior concrete walls shall be caulked with oakum and sealed with epoxy.

SEISMIC BRACES, PIPE HANGERS AND SUPPORTS

A. Horizontal Runs of Pipes:

1. Horizontal runs of pipe shall be hung with adjustable wrought iron or malleable iron pipe hangers spaced not over 10 feet apart.
2. Trapeze hangers may be used in lieu of separate hangers on pipes running parallel to and close to each other.
3. Chains, straps, perforated turnbuckles or other approved means of adjustment, except that turnbuckles may be omitted for hangers on soil or waste pipes from individual toilet rooms to maintain stacks when space does not permit their use.
4. Inserts shall be of cast steel and shall be of type to receive a machine bolt or nut after installation. Inserts shall be permitted adjustment of the bolt in one horizontal direction and shall be installed before the concrete is poured.
5. Vertical runs of pipe shall be supported by wrought by iron clamps or collar at every floor and provided with double sway braces between floors.
6. Chromium plated pipe shall have a clearance of not less than three quarter inch nor more than one inch when run on the face of marble or plaster, and the pipe shall be supported where required by cast brass supports finished to match the pipes.
7. Provide sway braces or clamps at every 10 feet for lines running along beams and at every beam for lines running across beams.
8. Water pipes screwed or flanged shall be supported at every 10' intervals and provided with sway braces at every 40' maximum.
9. Other pipes shall be supported in accordance with their manufacturer's requirement.

B. For Vertical Pipes

For vertical risers and down feed gravity supply pipes: Vertical risers shall be supported with clamps over the sleeve at every floor and provided with double sway braces between floors as shown in the drawings.

To determine the weight of pipes, size of hanger rods and spacing of supports, use the following schedule.

PIPE	WEIGHT	MIN.HANGER	ALLOW.	MAX. HANGER SPACING WATER & WASTE		
(in.)	PER FT.	ROD SIZE	LOADS	Copper	Steel	Cast Iron
	FOOT	(in.)	(Pounds)	Type M (Ft.)	Sch. 40	Std
1/2	1	1/4	240	6	6	-
3/4	1.4	1/4	240	6	8	-
1	2.1	1/4	240	6	8	-
1 1/4	2.9	3/8	610	6	10	-
1 1/2	3.6	3/8	610	6	10	-
2	5.2	3/8	610	10	10	5
2 1/2	7.9	1/2	1130	10	10	5
3	10.8	1/2	1130	10	10	5
4	16.50	1/2	1130	10	10	5
5	23.50	5/8	1810	10	10	5
6	31.60	5/8	1810	10	10	5
8	50.50	5/8	1810	10	10	5
10	77.00	3/4	2710	10	10	5
12	102.38	7/8	3770	10	10	5

Note: Weight on Column 2 are for pipes full of water

SCHEDULE OF CONNECTIONS TO STRUCTURAL CONCRETE SUPPORTING MEMBERS

Rod Size For Pipes (in.)	No. of Anchors to Concrete	Sice of Expansion Anchor to Concrete (in.)	Load Max. in Tension	Insert Concrete Cast-in-Place	Machine Bolts
1/2	1	5/8	400	3/8	3/8
5/8	1	3/4	550	1/2	3/8
3/4	2	1/2	900	1/2	3/8
3/4	2	5/8	1300	1/2	1/2
7/8	2	3/4	1800	5/8	1/2
7/8	4	5/8	2600	2 1/2	5/8
7/8	4	3/4	3700	2 5/8	5/8

FLOOR, WALLS, AND CEILINGS

A. Where uncovered exposed pipes pass through floors, finished walls or ceilings, they shall be fitted with chromium plated cast brass plates or chromium plated pipe or steel plates on ferrous pipes.

B. Plates shall be large enough to completely close the hole around the pipes and shall be octagonal or round with the least dimension not less than one and one half inches larger than the diameter of the pipe. Plates shall be well secured.

EXECUTION

PIPING INSTALLATION :

A. General : Piping shall be installed as shown on the drawings, as recommended by the manufacturer and as directed during installation, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and neatly spaced. Erect pipe risers plumb and true, parallel with walls and other pipes neatly spaced.

1. All piping shall be properly supported or suspended on stands, clamps, hangers, or equivalent of approved design. Supports shall be installed in such a manner to permit pipe free expansion and contraction while minimizing vibration.
2. Do not install pipes in a manner which interferes with other pipes, ducts, conduits, equipment and adjacent structures of the building.
3. The arrangement, positions and connections of pipes, fixtures, drains, valves and the like, indicated on the drawings shall be followed as closely as possible. The right is reserved by the Project Representative to change locations and elevations to accommodate conditions which may arise during the progress of the work, prior to installation, without additional compensation for such changes.
4. The responsibility for accurately laying out the work and coordination of installation with other contracts rests with this contractor. Any field layout interferences that occur shall be reported immediately to the Project Representative.
5. All pipes shall be cut accurately to measurements and shall be worked into place without springing or forcing. Changes in pipe sizes shall be made with reducing fittings.
6. Roughing-in for pipes and fixtures shall be carried along with the building construction. Correctly located openings of proper sizes shall be provided where required in the walls and floors for the passage of pipes. All items to be embedded in concrete shall be thoroughly cleaned and free from all rust, scale and paint and shall be in place before concrete pouring.
7. Pipes shall not pass through columns, footings, beam of ribs, except where noted on the drawings.

B. COLD WATER SYSTEM

1. The piping shall be extended to all fixtures, outlets, and equipment from the gate valves installed in the branch near the riser.
2. All pipings above ground shall be run parallel with the lines of the building unless otherwise shown in the plans.
3. No water pipings shall be buried in floors unless specifically indicated on the drawings or approved by the Engineer.
4. All service pipes, valves and fittings shall be kept at a sufficient distance from other work to permit finished covering not less than one-half inch from such work or from finished covering on the different service.
5. Changes in pipes shall be made with reducing fittings.
6. No valve shall be installed with its stem below the horizontal. All valves shall be gate valves unless otherwise specified or noted on the drawings.
7. Unions shall be concealed in walls, ceilings and partitions, except where they are enclosed in a metal frame box and cover.
8. All cold water lines shall be tested at 150 psi for a period of two (2) hours before covering.

C.. SOIL AND WASTE PIPING SYSTEMS

1. Fittings: All changes in pipe sizes on soil, waste and drain lines shall be made with reducing fittings.
2. All changes in direction shall be made by the appropriate use of forty five degrees wyes or long sweep bends, except that sanitary tees may be used on vertical stacks and short quarter bends or elbows may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical and on the discharge from the water closet.
3. No trap which depends for its seal on the action of movable parts shall be used, full Straps, bell traps and crown vented traps are prohibited.

E. VENT SYSTEM

1. All main vertical soil and waste stacks shall be extended full size to and above the roof line to act as vents, except where otherwise specifically indicated.
2. Vent pipes in roof spaces shall be run as close as possible to underside of roof with horizontal piping pitched down to stacks without forming traps. Vertical vent pipes may be connected into one main vent riser above the highest vented fixtures.
3. Where an end or circuit vent pipe from any fixtures or line of fixtures is connected to a vent line serving other fixtures, the connections shall be at least four feet (4') above the floor on which the fixtures are located to prevent the use of vent line as waste.
4. Horizontal waste receiving the discharge from two or more fixtures shall be provided with end vents unless separate venting of fixtures is noted.
5. All fixtures shall be individually vented.

F. PIPING GRADES AND SLOPES:

1. Keep all horizontal runs of piping, except where concealed in partitions, as high as possible and close to the wall.
2. Piping shall be properly graded or pitched to insure easy circulation, drainage and prevent water hammer and noise. Slopes as follows unless otherwise indicated.
3. Cold water shall pitch, up in the direction of flow at 1 inch in 60 feet horizontal run.
4. Maintain a minimum of 1 percent for all sanitary soil and waste lines, and a minimum of 1/2 percent for storm drainage lines.

PLUMBING SYSTEM TEST

A. The entire system of drain, waste and vent piping inside the building shall be tested. Water test shall be in accordance with the Plumbing Code. Every portion of the system shall be tested to a hydrostatic pressure equivalent to at least 10 foot head water. After filling, water supply shall be shut off and allowed to stand for 1/2 hour under test, during which time there shall be no drop greater than 4".

B. Upon completion of the roughing-in and before setting fixtures, the entire cold water piping system shall be tested at 150 psi for a period of two hours before covering at every floor.

C. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested in a manner similar to that described for the system.

D. The Contractor shall furnish and pay for all devices, materials, etc., labor and power required in connection with all tests. All tests shall be made in the presence and satisfaction of the Sanitary Engineer, Plumbing and other City Inspectors, and other public utilities having jurisdiction.

E. Defects disclosed by the test shall be repaired or if required by the Engineer or his representative, defective work shall be replaced without extra charge to the Owner. Test shall be repeated as directed until all works are proven satisfactory.

F. The Contractor shall also be responsible for the other trades that may be damaged or destroyed by the tests or the repair or replacement of his own work and shall restore the damage to its original condition without extra cost to the Owner.

G. The Contractor shall notify the Engineer, Plumbing Inspector and others having jurisdiction at least a week in advance of making the required tests so arrangements can be made for their presence to witness the test.

H. All repairs to pipings shall be made with new materials at the expense of the Contractor.

GUARANTEE FOR PLUMBING SYSTEM

The Plumbing Contractor shall furnish to the Owner a written guarantee covering the satisfactory operations of the plumbing installation in all its parts for a period of one (1) year after the date of acceptance. During this period, the Plumbing Contractor shall repair or replace any defective work and pay for any repair or replacement cost.

WARRANTY FOR EQUIPMENT

A. Pumps if furnished by the Contractor in any section of the specifications shall be guaranteed against defective design, materials and workmanship for a period of one (1) year from the date of final acceptance.

B. Upon receipt of a written complaint and during the period of the guarantee, all defective parts shall be replaced by the Contractor at his own expense.

UNDERGROUND DRAINAGE SYSTEM

A. EXCAVATING

1. Trenches for all underground pipelines shall be excavated to the required depths and grades.
2. Bell holes shall be provided so that pipe will rest on well tamped solid ground for its entire length. (For concrete pipe, use Bell & Spigot)
3. Where rock is encountered, excavation shall extend to a depth of six inches below the pipe bottom and before pipe is laid, the space between the bottom of pipe or other approved filling materials.

B. PIPE LAYING

Pipes in trenches shall be laid true to line and grade on a stable or suitably prepared foundation, each section of the pipe being bedded and bottom of the trench shaped to fit the lowest quadrant of the pipe circumference.

C. BACKFILLING

1. After pipelines have been tested, inspected and approved by the Engineer, and prior to backfilling, all forms and bracings shall be removed and the excavation shall be cleaned from trash and debris.
2. Materials for backfilling shall consist of approved materials and shall be free of debris or big rocks.
3. Backfill shall be placed in horizontal layers, properly moistened and compacted to an optimum density that will prevent excessive settlement and shrinkage.

15410 Plumbing Fixtures and Equipment

GENERAL

DESCRIPTION OF WORK

A. Work Included: Install complete sanitary plumbing fixtures, trims and supply fittings, traps, valves, and supports in accordance with the contract documents.

B. Furnish and install adaptors, couplings and devices required for complete connections of all sanitary plumbing fixtures and trims other than those supplied by the owner.

C. All fixtures shall be completely new, free from defects, function efficiently and shall be cleaned, with trims polished and ready for use before acceptance.

D. All plumbing fixtures and equipment shall be installed free and open in a manner to provide easy access for cleaning and shall be furnished with all brackets, cleats, plates and anchors required to support the fixtures and equipment rigidly in place.

PRODUCTS

MATERIALS

A. General for all sanitary plumbing fixtures unless otherwise specified.

1. Vitreous Ware: Fired vitreous chinaware of the best quality, nonabsorbent and burned so that the whole mass is thoroughly fused and vitrified, producing a material while in color, which when fractured shall show a homogenous mass, close grained and free from pores. Glazed finish thoroughly fused and united to the body, without discoloration, chips, or flaws, and free from craze. Warped or otherwise imperfect fixtures shall not be accepted.

2. Fixtures: Free from imperfections, true as to line, angles, curves, and color, smooth. watertight and quiet in operation. See Summary of Materials and Finishes.

3. Location, Type, Color and Finishes: See architectural drawings.

4. The Plumbing Contractor shall be responsible for the supply of the fixture fittings (or trims) which are not provided with the fixture, but required for a complete installation. All fixtures shall be carefully checked to determine the items which must be provided to complete the installation.

EXECUTION

FIXTURE INSTALLATION

A. Support all fixtures securely in a neat workmanlike manner on approved carriers or supports. The method of support for each fixture shall be approved type manufacturer's standard, except where fixture designations on the drawings indicate modifications.

B. Floor mounted water closets shall be installed in accordance with the manufacturer requirements with standard lead caulked cast bronze adaptor flange, wax gasket and hold down bolts with nuts, washers and bolt head cover on closet flange. Bolt head exposed cover shall match the color finish of the closet.

C. Slab type lavatories (wall mounted) shall be furnished with extra heavy, cast brass chrome plated threaded escutcheon between the fixture and the wall. The escutcheon shall be screwed on the adjustable sleeve or arm.

E. Wall mounted sinks shall be installed with manufacturer's standard concealed carrier or supports and otherwise supported by countertops as indicated on the drawings.

F. Install all fixtures level and flush with finish floors and partitions.

G. Drawings indicate fixtures layout dimensions. All rough-in dimensions shall be based on final finished dimensions. Deviations from the drawings due to actual site condition shall be approved by the Project Representative.

H. All fixtures shall be provided with individual shutoff valves for cold water supplies so that any fixture may be separately controlled without affecting other fixtures supplied with the same distribution line.

I. Fixture fittings, trims, faucets, traps, water supply pipes and waste pipes that are exposed to view in finished spaces shall be painted with one coat of red lead primer and two finish coats of enamel paint, the color to be designated by the Architect unless otherwise specified.

J.Every plumbing fixture or equipment requiring connections to the sanitary drainage system shall be equipped with a trap.

K. Each trap shall be placed as near the fixture as possible. No fixture shall be double trapped.

TESTING AND CLEANING

A. The Project Representative or his authorized representatives shall conduct field inspection of all completed or partially completed installed plumbing fixtures prior to scheduled testing.
B. All plumbing fixtures shall be properly protected from use and drainage during the construction period. At the end of the work and prior to approval, the fixtures shall be cleaned as per manufacturer's recommendations, to the satisfaction of the Architect.
C. After installation of any or all the plumbing fixtures of the building, the same shall be kept clean and in working order, but shall not be used by anyone until the building has been formally turned over to and accepted by the Owner.
D. Water running test shall be conducted for all fixtures in the presence of the Project Representative of his authorized representatives, in order to insure soundness, leakage free and quiet operation.

15700 AIR CONDITIONING AND VENTILATING EQUIPMENT

Duct type split Air conditioner Inverter

Model	Cooling Capacity	Heating Capacity	Power Supply	Refrigerant	Appearance	
	kW	kW			Outdoor	Indoor
FGR20Pd/DNa-X	20	22	3N/380-415V/50Hz / 60Hz	R410a		
FGR25Pd/DNa-X	25	27.5				
FGR30Pd/DNa-X	30	33				
FGR40Pd/D(2)Na-X	40	43				

Model	Heat pump			FGR20Pd/DNa-X	FGR25Pd/DNa-X
Capacity	Cooling		kW	20	25
	Heating		kW	22	27.5
EER/COP			W/W	2.55/3.25	2.65/3.10
Power supply			Ph/V/Hz	3N/380-415/(50/60)	3N/380-415/(50/60)
Power input	Cooling		kW	7.8	9.4
	Heating		kW	6.8	8.9
Current input	Cooling		A	16.5	18.9
	Heating		A	14.4	17.2
Refrigerant charge volume			kg	6.4	8.0
Indoor unit	Airflow volume		CFM	2237	2472
			m^3/h	3800	4200
	ESP	Rated	Pa	120	120
		Range	Pa	0-250	0-250
	Sound pressure level		dB(A)	52	53
	Dimension (W×D×H)	Outline	mm	1460×790×365	1690×870×440
		Package	mm	1575×880×385	1785×985×450
	Net Weight/Gross weight		kg	82/104	99/134
Outdoor unit	Sound pressure level		dB(A)	62	63
	Dimension (W×D×H)	Outline	mm	940×320×1430	940×460×1615
		Package	mm	1020×420×1460	1020×560×1645
	Net Weight/Gross weight		kg	115/126	146/162
Connection pipe	Outer diameter	Liquid	Inch(mm)	Φ3/8	Φ3/8
		Gas	Inch(mm)	Φ3/4	Φ7/8
	Max. distance	Height	mm	30	30
		Length	mm	50	50
Loading quantity	20'GP/40'GP/40'HQ		set	12/24/24	10/20/22

Model	Heat pump			FGR30Pd/DNa-X	FGR40Pd/D(2)Na-X
Capacity	Cooling		kW	30	40
	Heating		kW	33	43
EER/COP			W/W	2.65/3.20	2.60/3.10
Power supply			Ph/V/Hz	3N/380-415/(50/60)	3N/380-415/(50/60)
Power input	Cooling		kW	11.3	15.4
	Heating		kW	10.3	13.9
Current input	Cooling		A	22.7	27.8
	Heating		A	20.7	26.4
Refrigerant charge volume			kg	9.5	6.4×2
Indoor unit	Airflow volume		CFM	3060	4120
			m^3/h	5200	7000
	ESP	Rated	Pa	120	120
		Range	Pa	0-250	0-250
	Sound pressure level		dB(A)	55	56
	Dimension (W×D×H)	Outline	mm	1690×870×440	1680X900X650
		Package	mm	1785×985×450	1800X1020X670
	Net Weight/Gross weight		kg	105/145	175/210
Outdoor unit	Sound pressure level		dB(A)	65	66
	Dimension (W×D×H)	Outline	mm	940×460×1615	940×320×1430
		Package	mm	1020×560×1645	1020×420×1460
	Net Weight/Gross weight		kg	175/190	(15/126) X2
Connection pipe	Outer diameter	Liquid	Inch(mm)	Φ1/2	Φ3/8
		Gas	Inch(mm)	Φ1	Φ3/4
	Max. distance	Height	mm	30	30
		Length	mm	50	50
Loading quantity	20'GP/40'GP/40'HQ		set	10/20/22	7/18/18

16000 Electrical

16100 BASIC ELECTRICAL MATERIALS AND METHODS

GENERAL

GENERAL DESCRIPTION

All electrical works for this project shall be governed by the provisions of the latest edition of the Philippine Electrical Code, rules and regulations of Local Authorities that have jurisdiction over the project and policies of electric and communication utility companies in the locality.

The plans and specifications are complementary, and what is called for in one shall be taken as called for in both.

The General Conditions and Provisions of the Civil Works Contract not in conflict with the plans and specifications form part of this section of the specifications.

SITE VISIT

The Contractor is advised to visit the site to ascertain for himself the prevailing local conditions there at and to check the existing line facilities of local power and communication companies. Also, to investigate other pertinent things that may affect his work. It shall be presumed that he had done this before preparing his proposal and no subsequent claim on the ground of inadequate or inaccurate information will be entertained.

SCOPE OF WORK OF THE CONTRACTOR

The work of the Contractor includes supervision, labor, equipment and materials, and to perform all electrical operations in connection with the electrical system shown on the plans, and their tests and inspection complete and in accordance with these specifications and plans and subject to the terms and conditions of the contract. Any equipment, materials, or works not shown on the plans but mentioned in the specifications, or vice-versa, shall be furnished and installed by the Contractor.

The following are the scope of work of the Contractor:

A. Install Owner-supplied transformers at locations indicated in the plans. Provide concrete base mounting pads.
B. Furnish and install Generator Sets. Provide resilient mounting pads on concrete base.
C. Furnish and install power service entrance including related concreting and civil works, such as excavation / backfilling and concrete encasement.
D. Furnish and install a complete roughing-in and wiring systems for lighting and power including feeders, branch circuits and taps.
E. Furnish and install all lighting fixtures, wiring devices and necessary wiring gutters and boxes.
F. Furnish and install motor wiring inclusive from overcurrent device to motor terminals except those specified to be done by other trades.
G. Furnish and install wiring and conduits for pump and electronic control motors of mini-irrigation system inclusive from overcurrent device to motor terminals except those specified to be done by other trades.
H. Furnish and install service entrance PVC conduit for incoming telephone service including related concreting and civil works.
I. Furnish and install complete telephone and public address/paging systems, wiring, outlets, telephone terminal cabinets, terminal blocks, wiring accessories, devices and all terminations.
J. Furnish and install a complete fire alarm system including wiring, control panel, alarm stations, bell stations, smoke detectors and heat detectors.
K. Furnish and install panelboards and enclosed circuit breakers as required.
L. Complete testing of all electrical and auxiliary systems.
M. Painting of all panelboards and enclosures.
N. Application of electric power service and telephone service connections including preparation of all necessary plans, forms and related documents, payment of government fees and charges and coordination with power and telephone companies and other authorities or persons involved in the

procedures.

O. Preparation of as-built plans and drawings.

P. Furnish and install a complete grounding system.

Q. If anything has been omitted of any item of work or materials, usually furnished, which are necessary for the completion of the electrical works as outlined herein before, then such items shall be and are hereby included in this division of the work.

WORK NOT INCLUDED

A. Furnishing and installation of the kilo-watt hour meter which is to be supplied by others.

B. Furnishing of transformer which are to be supplied by Owner.

EXCAVATION AND BACKFILL

The Contractor shall be responsible for excavation to layout his electrical conduit. Excavation shall be such as to provide a uniform bearing for the conduit and shall be filled with gravel to grade.

CUTTING AND PATCHING

The Contractor shall furnish sketches to the General Contractor showing the location and sizes of all openings, chases, sleeves and inserts. He shall be responsible for the cost of cutting and patching where any electrical items were not installed, incorrectly sized or located. No structural members shall be cut without the consent and proper direction from the Architect. All patching shall be performed in a neat and workmanlike manner acceptable to the Architect.

SUBCONTRACTING

Whole or any part of the work without the written consent of the Owner. The Contractor shall be responsible for any work carried out by any subcontractor as if he himself were undertaking the job.

WORKMANSHIP

The Contractor shall execute all works in a neat and workmanlike manner and shall do all necessary works whether or not it is clearly specified in the plans and specifications. All work shall be done in accordance with the best practices employed in modern electrical installations.

The Contractor shall employ only competent and efficient workmen and shall, upon written request of the Architect, discharge or otherwise remove from work any employee who, in the opinion of the Architect, is careless, incompetent, an obstruction to the progress of the work, acts contrary to instructions or conducts himself improperly.

STANDARD OF MATERIALS

All materials shall be new and must conform with the technical specifications. They shall be standard products of reputable manufacturers and shall bear its name.

All materials shall be subject to the approval of the Architect. This approval shall not relieve the Contractor of the responsibility of inspecting such materials for defects and non-conformance with the specifications.

Where the technical specifications or the drawings give the name of the manufacturer and/or catalog number of a material, it is given as a guide as to the size, strength, quality or class of the material desired and shall be interpreted to mean that the item or another fully equal is suitable for the service intended. Substitution shall be subject to prior written approval of the Architect.

The apparent silence of the specifications and drawings as to any detail or apparent omission from them of a detailed description concerning any material shall be regarded to mean that only materials of first class quality shall be used.

REMOVAL OF DEFECTIVE OR UNAUTHORIZED WORK

Any defective work due to poor workmanship, defective materials, damaged through carelessness or any other cause, found to exist prior to acceptance of or final payment for the work shall be removed immediately and replaced by work and material which shall conform to these specifications or, otherwise, remedied in an acceptable manner. This clause shall have effect regardless of the fact that the work may have been done within the full knowledge of the Architect.

All materials not conforming to the requirements of the technical specifications shall be considered as defective.

No defective materials, the defect of which has been subsequently corrected, shall be used unless approval has

been given by the Architect.

CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS
These specifications and drawings indicate the general layout of the system and the Contractor shall be responsible for the proper installation of the system without substantial alterations or modifications. Whenever departures from the specifications and the drawings become inevitable due to field condition of exigencies of construction, details of proposed departures shall be submitted without delay to the Architect for approval.

COORDINATION WITH OTHER CONTRACTORS
The Contractor shall familiarize himself with the specifications and drawings of the Civil Works and those works of the specialty trades to avoid conflict with their work. Whenever conflict with the works of other trades are identified or pinpointed, this should be brought to the attention of the Architect immediately for proper disposition and coordination to arrive at the best solution.

INJURY TO PERSONS OR DAMAGE TO PROPERTY
The Contractor shall be responsible for all injuries to persons and damage to property caused by his work or by his workmen and shall be liable for any claim against the Owner on account of such injury and/or damage. Likewise, he shall be liable to damages and loss of Owner's property caused by inclement weather or theft due to his defective work, negligence or carelessness of his men. Should the Contractor cause damage to the works of any other contractor, he should settle the matter between them and free the Owner from any claim on account of such damage.

SUSPENSION OR DELAYS
The Contractor shall not suspend or fail to make progress in his work without justifiable cause. In the event of continuous delay or suspension of the work still persists despite a written complaint, at the Owner shall have the right to take over the work and all materials in the site and take the necessary steps to have the work completed by others.

INSPECTION AND TEST
The Architect, or his representative, shall be allowed access to all parts of the work at all times and shall be furnished information and assistance by the Contractor to conduct a detailed inspection test. The cost of such inspection and test shall be borne by the Contractor.

The Contractor shall conduct the following tests, where applicable, on all electrical conductors and equipment installed in the presence of the Owner or his duly authorized representative.

A. ground resistance test
B. insulation resistance test
C. continuity test
D. voltage level test
E. phase relationship

The Contractor shall also check circuit connection at panelboards, and see to it that all single phase circuits are connected at panelboards, and see to it that all single phase circuits are connected to phase as shown in the load schedule.

All reports must be formal, typewritten and signed with the signatory properly identified.

All defects found during the tests shall be repaired immediately by the Contractor.

All tools, equipment and instruments needed to conduct the tests shall be on the account of the Contractor.

CLEANING UP
During the progress of the entire work, the Contractor shall keep clean the premises at all times by removing all dirt, debris, rubbish and waste materials caused by him in the performance of his work. He shall remove all tools, scaffolding and surplus materials after completion and acceptance of the work.

LEAVING THE SITE
The Contractor shall not withdraw from the site until the whole electrical system is complete and in operating condition and ready for use by the Owner.

GUARANTEE
The Contractor shall leave the entire electrical work in proper working condition. He shall replace any defective work or materials furnished and installed by him without charge for labor and materials except those caused by ordinary wear and tear within one year from the date of acceptance of the project by the Owner or Architect.

PERMITS AND DUES

The Contractor shall secure all necessary permits at his own expense and pay all corresponding government fees and taxes.

The Contractor shall include in his work, without extra cost to the Owner or Architect, drawings (in addition to contract drawings and documents) and associated paperwork as required by the electric and telephone companies and government authorities.

SHOP DRAWINGS

The Contractor shall submit five (5) copies of shop drawings to the Architect for approval within thirty (30) days after the award of the contract.

Shop drawings or brochures for all major electrical equipment, including service entrance equipment, lighting fixtures, panelboards, switches, wiring devices and plates and equipment of auxiliary systems shall be submitted for approval. All equipment shall be a standard product of an established manufacturer whether the manufacturer's name is specified or not.

The Contractor shall be able to submit sample fixtures when requested by the Owner or Architect. All materials and equipment installed without prior approval of the Architect shall be at the risk of subsequent rejection.

AS-BUILT DRAWINGS

The Contractor shall record all deviations made from approved construction plans during the progress of electrical construction and shall reflect the actual layout in the as-built plans. Upon completion of the project, the Contractor shall submit to the Architect two (2) complete sets of as-built plans signed and sealed by the Contractor's Professional Electrical Engineer. One (1) set of original tracing reproducible copy shall be submitted to the Owner.

INSPECTION AND CERTIFICATES

Upon completion of the entire installation, the approval of the Architect and Owner shall be secured. The Contractor shall obtain, at his own expense, a Certificate of Electrical Inspection from the government authorities having jurisdiction over the project and submit same to the Architect prior to final payment.

EQUIVALENTS

When materials or equipment are mentioned by name, they shall form the basis of the contract. If the name is not mentioned, the Contractor may, through written request, recommend an equivalent subject to the approval of the Architect. Substitution of specified materials, if allowed or approved by the Architect, will credit the Owner of any savings so obtained from the difference in cost.

DETAILED BREAKDOWN OF ESTIMATE

The Contractor shall submit a detailed estimate on each listed electrical system along with the bid proposal.

PRODUCTS

GENERAL

Where specifications of any type of material or equipment are in question, such materials shall conform to the standard specifications set by the following:

A. U.S. UNDERWRITERS LABORATORIES
B. U.S. NATIONAL BOARD OF FIRE UNDERWRITERS
C. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
D. INSULATED POWER CABLE
E. AMERICAN STANDARDS ASSOCIATION
F. BUREAU OF STANDARDS, DEPARTMENT OF TRADE
G. PHILIPPINE NATIONAL STANDARDS

CONDUITS

A. Rigid steel conduits (RSC): shall be hot dipped galvanized, standard weight pipes made of mild steel smooth circular bore. It shall be in standard length of 3.05 meters including coupling, reamed and threaded on each end.

B. Intermediate Metallic Conduit (IMC).

C. Non-metallic conduit (PVC): CS40 smooth wall non-metallic conduit conforming to Philippine National Standards No. 14 for PVC Pipes. Conduit shall be in standard length of 3.05 meters including coupling.

SWITCHES, PANELBOARDS AND CIRCUIT BREAKERS

A. Circuit Breakers

Molded case circuit breakers shall be Japan-made. No bracing on handles of single pole breakers shall be allowed in lieu of two- or three-pole types.

B. Metal Enclosures and Cabinets

Panelboard enclosures, telephone cabinets, bus bar gutters, pull boxes, and wire gutters for feeders shall be locally fabricated by reputable manufacturers.

C. Safety Switches:

1. All safety switches shall be rated as shown in the plans and shall be fusible type unless noted otherwise.
2. All safety switches rated at 60A and above shall be spring assisted.

WIRES AND CABLES

Wires and cables shall be insulated for 600 volts. Feeders, sub-feeders and branch circuit wires and cables shall be soft drawn copper, annealed and of 98% conductivity, type THWN.

All joints or splices for No. 8 or larger shall be made with a double indent mechanical compression connector. Branch circuit splices shall be soldered. A soldered joint shall be carefully soldered without use of acid. After the conductors have been made mechanically and electrically secure, the entire joint shall be covered with rubber and plastic tapes to make the insulation of the joint or splice equal to the original insulation of the conductor.

LIGHTING FIXTURES

For lighting fixtures, lamps and accessories, refer to Electrical (E) Plans.

WIRING DEVICES

The following wiring devices are for small appliances, receptacles and switches to control lights only. For other specific loads they shall be described accordingly.

A. Duplex convenience outlet, grounding type, 10A, 250V.
B. Single-pole switch with mounting strap and device plate cover, 15A, 300V.
C. Two single-pole switch with mounting strap and device plate cover, 15A, 300V.
D. Three single-pole switch with mounting strap and device plate cover, 15A, 300V.
E. Three-way switch with mounting strap and device plate cover, 15A, 300V.
F. Special purpose outlet shall be as specified in the plans

AUXILIARY SYSTEMS

All systems shall be as per plans.

A. Fire systems shall be as per plans.

OTHERS

All other materials not mentioned herewith shall be one approved for the location and intended use and the best of its kind.

OPERATION AND MAINTENANCE

1. The Contractor shall furnish operation and maintenance manuals for each electrical and auxiliary systems and for each piece of equipment. Four (4) copies of the complete manual bound in hardback binders or an approved equivalent shall be provided to the Owner. One copy shall be provided to the Architect's office for future reference. The following identification shall be inscribed on the cover: the words "OPERATING AND MAINTENANCE MANUAL", the name and location of the project and the name of the Contractor. The manual shall include the name, address and the telephone numbers of each subcontractor supplying the equipment and systems, and of their local representatives. The manual shall have a table of contents with the tab sheets placed before instructions covering the subject. The instruction sheets shall be legible with large sheets of drawings folded in.
2. The manual shall include, but not limited to the following; a system layout showing circuits, devices and controls; wiring and control diagrams with data to explain detailed description of the function of each principal component of the system, the procedure for operating; shutdown instructions; installation instructions; maintenance instructions; test procedures; performance data; and parts list.

3. The parts list for equipment shall indicate the sources of supply, recommended spare parts, and life service organization which is reasonably convenient to the building site. The manual shall be complete in all respects for all equipment, controls and accessories provided.

EXECUTION

SERVICES

Power and telephone service entrances shall be in PVC pipes installed underground, in concrete encasement, from their designated tapping points to the building being served. Specifications for this type of installation as indicated in the site development plans shall be applied.

A. Secondary service voltage from transformer shall be : 220 volts, 3-phase, 3-wire, 60 Hz.

WIRING METHODS

A. Conduit runs for lighting, power and auxiliary branch layouts shall be in PVC pipes.

B. Exposed conduit runs which are subject to physical injury shall be in RSC pipes.

C. Underground conduit runs shall be in PVC pipes encased in concrete.

GROUNDING

The following shall be grounded in accordance with the drawings and the requirements of the Philippine Electrical Code.

A. Metal enclosures of panelboards and circuit breakers, wire gutters, pull boxes, junction boxes and utility boxes.

B. Non-current carrying metal parts of lighting fixtures, devices and motors.

C. Provide a continuous and effective equipment grounding system.

DISTRIBUTION FEEDERS

Feeder conductors and raceways shall be installed as shown on the plans and no changes in size shall be made without written consent from the Architect and Engineer. Feeder conductors shall be continuous without splices to its destination panelboards, circuit breakers and wire gutters.

BRANCH CIRCUITS

The plans indicate the general installation of all circuit wiring and outlets. Branch circuit raceways shall follow the line of shortest distance between connection points as practicable and in so far as the building condition would allow. However, exposed feeders and circuit raceways shall be installed following the building line. No wires of different circuits shall be inserted in one conduit. Where homerun for light and branch circuits exceeds thirty (30) meters, the next larger conductor size shall be used.

PANELBOARDS

Panelboards shall be fabricated from gauge no. 16 black iron (B.I.) sheet with epoxy primer and baked enamel paint finish. Doors shall be hinged with allen screw lock from the top to bottom. Front covers shall have a stainless push-to-open lock. Dead front covers shall only be removed after the front cover has been detached.

WIRE GUTTERS AND PULLBOXES

Common pullboxes and wire gutters shall be fabricated from gauge no. 16 B.I. sheet with epoxy primer and baked enamel paint finish. Cover shall have twist lock on corners and centers of edge.

OUTLET, SWITCH AND SPLICE BOXES

Power, lighting and auxiliary outlet boxes shall be fabricated from gauge no. 16 standard pressed steel or cast metal coated with red lead primer before installation.

RACEWAY SYSTEM

1. Conduit raceways and tubing shall not have more than four quarter bends in any continuous run. Where more than four (4) 90-degree bends become necessary, a pull box shall be installed to reduce the four (4) quarter bends into halves. Exposed conduits shall be run parallel with or perpendicular to the building line. Exposed conduits shall be secured in place by means of approved supports, hangers or fastenings. Conduit supports shall be fastened to walls by means of bolts with expansion sleeves. The use of wood or lead

plugs is not permitted. All conduit ends shall be firmly attached to cabinets or boxes by means of locknuts and bushings. Field bends shall not be allowed for rigid steel conduits larger than 20mm diameter. Threadless couplings and connectors used with the tubing shall be of concrete-tight type. No tubing smaller than 15mm diameter shall be used.

Exposed conduits shall be treated with red lead primer and finished with gray color paint. All field cut threads shall be painted with white lead.

16420 ELECTRICAL DISTRIBUTION SYSTEM

GENERAL REQUIREMENTS

SCOPE OF WORK

Furnish materials and equipment and perform labor required to complete the following:

- Power distribution system
- Lighting system
- Lightning Protection System

Refer to drawings for extent and magnitude of work.

PRODUCTS

refer to Electrical (E) Plans

EXECUTION

POWER SYSTEM

A. Unless otherwise indicated on drawings, do all wiring for power, connections of motors and line switches, motor starters, speed regulators, circuit breakers, compensators or any other appliance or electrical component that may need motors and specific power requirement. Present a representative when the motors are first started by the supplier for testing.

B. Wire control may be 3.5 mm^2, 5.5 mm^2 and 8.0 mm^2 Type "THWN" and color-coded for easy identification. Use PHELPS DODGE, or approved equal.

LIGHTING SYSTEM

A. Install all wiring in rigid conduit and, in general, conceal them in the structure, except connections to luminous recessed fluorescent troughs, which shall be in flexible steel conduit or ACT cable.

B. Balance lighting conduits at the panels on the 1-phase, 3-wire systems.

COMMUNICATION SYSTEM

Telephone and Intercom Systems:

A. Furnish and install conduits, cables, telephone & intercom cabinets, terminal blocks, pull boxes, telephone & intercom outlets, and telephone/intercom lines as per plans, and other outlets and/or lines the Architect may consider necessary. Provide telephone backing.

B. Furnish and install conduits, cables for public address and sound system.

C. Install all wiring in rigid conduit.

WIFI SYSTEM

Wifi System:

A. Furnish and install conduits, cables, hubs and routers for each floor to service all levels. Connect to UP when possible.

B. Install all wiring in rigid conduit.

FIRE ALARM AND SIGNALLING BELL SYSTEM

A. Install all wiring in rigid conduit and, in general, conceal them in the structure.

B. Install components at terminals as the general location indicated in the plans, and in conformity with the respective specifications for the systems. Confirm the exact placement of components with the Architect prior to implementation and installation.

LIGHTNING ARRESTER

A. Use bare copper wire, 22mm^2 for line inside, and grounding rod 20 mm diameter x 3.00 meters solid copper embedded in the ground. Install where indicated by Electrical Engineer.

B. Fix the cable securely to the base of the finial and to the solid rod at its base. Drop the cable at the

center of the spire avoiding contact with any of the steel reinforcement.

SECTION 16721 FIRE PROTECTION

GENERAL

SCOPE

The work includes the furnishing, installation, commissioning and putting into operation and ready for use a non-coded Class A automatically activated pre-signal, general alarm, pre-signal, 2-wire supervised detection system. The fire alarm system shall consist of the main control panel, manual stations with key switch, manual stations with key switch and vibrating bells. The main control panel shall include alarm silencing switches, system test switches, battery check switch, visual indicator for power, fault and alarm condition; and a trouble sound alarm for system fault indication. The fire alarm system shall be provided with nickel-cadmium batteries for reliable backup operation.

SYSTEM OPERATION

The fire detection main control panel shall have a capacity of at least 8 zones (expandable) in which alarm horns shall be used as the sounding device.

The activation of a manual station shall initially activate a buzzer presignal alarm at the main control of the panel. The corresponding that zone shall be lighted forewarning key personnel to investigate and evaluate the danger at the indicated area. If conditions warrant, the alarm mode can be initiated manually either by inserting a key at any manual station or at the main control panel. The system shall automatically trigger a general alarm should the presignal not be canceled at the preset time. System restart shall be effected at the main control panel.

SHOP DRAWINGS AND TECHNICAL CATALOGUES

The Contractor shall provide together with his proposal technical catalogues (3 sets) and shop drawings indicating the number of wires and sizes or conduits required for his equipment to properly function as required for approval by the Engineer prior to installation.

TESTING AND GUARANTEE

After completion of the system installation and at such time the Engineer may direct, the Contractor shall conduct system and equipment operational tests and make all adjustments required to fully and completely demonstrate that the system has been installed and will operate in accordance with the specifications, drawings, codes and free from any ground, shorts or defects. Copies of test results shall be provided to the Engineer and the Owner's representatives.

The Contractor shall guarantee his work, equipment for a period of not less than one (1) year from the date of final acceptance. Any part of the work or equipment that becomes defective or that will show evidence of defect or neglect during the said period shall be replaced or remedied at the expense of the Contractor without any contest.

PRODUCTS

A. Fire Alarm Devices and Detectors:

B. Fire Alarm Control Panel: Shall be expandable, with supervice bell circuits and supervice detector circuits, with capacity to support 12-volts, 2.6 AH rechargeable sealed battery, plug-in terminal block zone wiring, bell-ring and external trouble input, individual LED indicator for individual zone alarm and fault, AC-AC fault.

EXECUTION

INSTALLATION

Install fire alarm system as per manufacturer's instructions.

16200 Electrical Power

WIRES AND CABLES:

No conductor shall be less than 3.5 mm^2 in size unless otherwise specified.

CONDUITS:

As indicated in the Electrical (E) Plans.

Non-Metallic Conduit (PVC): smooth wall non-metallic conduit conforming to Philippine National Standards No. 14 for PVC Pipes. Conduit shall be in standard length of 3.05 meters including coupling

OUTLET BOXES AND FITTINGS:

Convenience Outlets: White color, Wide-Series, Universal outlet, 220V, with amperage as required. For general building interior use.

Weatherproof Outlets: Double device plate with cover receptacle, heavy duty. For outlets inside pump room and other exterior-located outlets, as indicated in the plans.

Boxes: Metal utility boxes Ga. 16, sizes and shapes as required.

SWITCHES, PANEL BOARDS AND CIRCUIT BREAKERS:

ESTIMATING

Includes circuit breakers, panel boards, starters, grounding, and accessories.

Switches: With amperage as required. Suited to location and intended purpose. Approved type by architect.

Circuit Breakers: GA 16 bolt-on type, pre-painted, surface mounted, with latch lock.

Magnetic Starter: With casing, surface mounted with latch lock.

Metal Enclosures and Cabinets: FUJI-HAYA, ALLIED, MACROPOWER or approved equal.

includes pull-boxes, junction boxes, convenience and weatherproof outlets, switches, cover plates, other wiring devices and accessories.

16500 Lighting

ESTIMATING

All lighting includes luminaires - color temperature to be determined upon approval of products

END OF DOCUMENT