

DIVISION 9

FINISHES

BUILDING WORK

DIVISION 9

FINISHES

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SECTION 09205
METAL FURRING AND LATHING**PART 1 GENERAL****1.01 Work Included**

- A. Metal furring, and lathing as required for plaster walls and ceilings.

1.02 Related Work

- A. Section 09220: Portland Cement Plaster.

1.03 Reference Standards

- A. ANSI A42.4 Interior Lathing and Furring.

PART 2 PRODUCTS**2.01 Acceptable Manufacturers**

- A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.
- B. Substitutions: Items of same function and performance are acceptable in conformance with Section 01630.

2.02 Furring Materials

- A. Furring Channels: Minimum 0.5 mm thick.
- B. Resilient Channels: Minimum 0.5 mm thick galvanized sheet steel; size and lengths as required.
- C. Fastening and Anchorage Devices: Approved devices of type and size to suit application and to rigidly secure furring members in place.

2.03 Ceiling Furring Materials

- A. Furring Channels: Minimum 0.55 mm thick galvanized sheet steel; 19 mm deep x 31.8 mm wide; lengths as required.
- B. Hangers: Galvanized steel, of size and type to suit application and to rigidly secure ceiling system in place, with maximum deflection of 1/360.

2.03 Ceiling Furring Materials (Contd.)

- C. Resilient Channels: Minimum 0.5 mm thick galvanized sheet steel; size and lengths as required.
- D. Anchorage and Fastening Device: Approved devices of type and size to suit application and to rigidly secure ceiling furring members in place.

2.04 Lathing Materials And Accessories

- A. Metal Lath: Flat diamond mesh 10 mm rib Stamped sheet type; with galvanized or rust inhibitive coating; of weight to suit application.
- B. Anchorages: Tie wire, nails, screws and other approved metal supports, of type and size to suit application and to rigidly secure lathing materials in place; galvanized or rust inhibitive coated.

PART 3 EXECUTION**3.01 General Installation Requirements**

- A. Erect metal furring and lath as required for sand and cement plaster in accordance with ANSI A42.4, unless indicated otherwise herein.
- B. Install members true to lines and levels and to provide surface flatness with maximum variation of 4 mm in 3 meters in any direction.

3.02 Wall Furring

- A. Erect wall furring directly attached to concrete block and concrete walls.
- B. Erect furring channels vertically. Secure in place on alternate channel flanges at maximum on center.
- C. Space furring channels maximum 400 mm on center, not more than 100 mm from floor and ceiling lines.

3.03 Ceiling Furring

- A. Install ceiling furring indicated on drawings. Erect after above ceiling work is complete. Coordinate the location of hangers with other work.
- B. Securely fix carrying channels to hangers to prevent turning or twisting and to develop full strength of hangers.
- C. Place furring channels perpendicular to carrying channels at 600 mm on center, not more than 50 mm from perimeter walls. Rigidly secure to carrying channels. Lap splices minimum 200 mm and secure together 25 mm from each end of splice.

3.03 Ceiling Furring (Contd.)

- D. Reinforce openings in ceiling suspension system, which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 600 mm past each end of openings.
- E. Laterally brace suspension system where required.

3.04 Lathing Materials

- A. Apply metal lath taut, with long dimension perpendicular to supports. Place projections of lath against supports.
- B. Lap ends minimum 25 mm. Adequately secure end laps with tie wire where they occur between supports.
- C. Lap sides of diamond mesh lath minimum 38 mm. Nest outside ribs of rib lath together.
- D. Securely attach metal lath to metal supports using tie wire at maximum 150 mm on center.
- E. Continuously reinforce all internal angles with concrete, except where the metal lath forms the angle reinforcement. Fasten concrete at extreme edges only.

END OF SECTION

SECTION 09220
PORTLAND CEMENT PLASTER**PART 1 GENERAL****1.01 Work Included**

- A. Three coat cement plaster with wood float trowelled finish coat.
- B. Two coat cement plaster with rough finish coat to receive wall tiles.

1.02 Related Work

- A. Section 03300: Cast-in-place concrete.
- B. Section 04220: Concrete Masonry Unit .

1.03 Reference Standards

- A. ASTM C150 - "Portland Cement".
- B. ASTM C144 - "Sand for Cement Plaster Work".
- C. ASTM C6 - "Normal Finishing Hydrated Lime".
- D. ASTM C206 - "Special Finishing Hydrated Lime".
- E. ASTM C35 - "Inorganic Aggregates for Use In Gypsum Plaster".
- F. UL - "Underwriters' Laboratories Incorporated".
- G. ASTM C631 - "Bonding Compounds for Interior Plastering".

1.04 Sample Panel

- A. Construct 1000 mm wide x 1000 mm high sample panel with finished surface, using materials and methods specified herein, for review by the Engineer.
- B. Accepted surface finish of sample establishes minimum standard of quality and workmanship of cement plaster work on job.

1.05 Environmental Conditions

- A. Provide sufficient heat and ventilation in areas where work of this Section is being performed, so as to allow cement plaster to properly cure. Take precautionary measures necessary to ensure that excessive temperature changes do not occur.

PART 2 PRODUCTS**2.01 Basecoat Materials**

- A. Cement: Normal - Type I. Portland type, conforming to requirements of ASTM C150; gray color.
- B. Hydrated Lime: Normal finishing type conforming to requirements of ASTM C6, or an approved mortar plasticiser, both types pending the Engineer's approval.
- C. Water: Clean, potable fresh and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.
- D. Sand: Shall conform to ASTM C-144, except that the gradation shall meet further requirements for cement plaster work.
- E. Bonding Agent: Type recommended for satisfactorily bonding cement plaster to concrete and concrete block surfaces. Conforming to ASTM C631. Feb products or approved equal.

2.02 Finishing Plaster Materials

- A. Cement and Sand as specified in 2.01, items "A" and "D".

2.03 Metal Accessories

- A. Angle Beads, Corner Mesh and Plaster stops: Minimum 0.50mm thick steel with rust inhibitive coating of longest possible lengths; sized and profiled to suit application. Angle beads to have bullnosed edges.
- B. Expansion Joints: Back to back plaster stops of longest possible lengths.
- C. Anchorages: Nails, staples, or other metal supports, of type and size to suit application and to rigidly secure metal accessories in place.

2.04 Cement Plaster Mixes

- A. Mix and proportion cement plaster as follows: (by volume).
 - 1. Base coat: 1 part cement, to 2 parts sand, using an approved plasticiser, Feb Products or approved equal.
 - 2. Second coat: 1 part cement to 4 parts sand with an approved plasticiser.
 - 3. Finish coat: 1 part cement, to 3 parts sand with an approved plasticiser.
- B. Mix only as much plaster as can be used in one hour.
- C. Mix materials dry, to uniform colour and consistency, before adding water.

2.04 Cement Plaster Mixes (Contd.)

- D. Add color pigments in accordance with manufacturer's recommendations. Ensure uniformity of mix and coloration.
- E. Protect mixes from frost, dust and evaporation.
- F. Do not retemper mixes after initial set has occurred.
- G. Where hydrated lime is accepted and approved by the Engineer, the volume of lime must not exceed 0.5 that of cement volume for the base course, and 1.0 that of cement volume for the second and third coats.
- H. For two coats plaster use items 1 and 2 of "A" above.

PART 3 EXECUTION**3.01 Preparation**

- A. Prior to application ensure mechanical and electrical services behind surfaces to receive cement plaster have been tested and approved.
- B. Clean concrete and concrete block surfaces of dust, laitance, efflorescence, loose particles, grease or other foreign matter. Thoroughly wet surfaces before using acid solutions, solvents or detergents to perform cleaning. Thoroughly wash surfaces with clean water immediately following their use. Ensure mortar joints are flush.
- C. Roughen smooth concrete surfaces so as to allow adequate adhesion. Use method acceptable to the Engineer.
- D. Apply a bonding agent on concrete and concrete block surfaces which are to receive cement plaster. Apply in accordance with manufacturer's recommendations, ensuring complete coverage.
- E. Ensure metal lath has been properly installed and rigidly secured.
- F. Wet Concrete and Concrete block surfaces to reduce excessive suction.
- G. Place metal accessories true to lines and levels.

3.02 Cement Plaster

- A. Apply cement plaster using two coat system and three coat system respectively.
- B. Apply each basecoat to minimum thickness of 10 mm. Moist cure and allow each coat to slowly dry for minimum period of 24 hours.
- C. Allow each coat to cure for minimum 3 days prior to application of the following coat.

3.02 Cement Plaster (Contd.)

- D. Evenly dampen each coat, to ensure uniform suction, and apply the following coat. Apply to thickness sufficient to secure required texture but in no case less than 3 mm. Apply finish coat subject to requirements.
- E. Maintain surface flatness, with maximum variation of 3.2mm in 3.000 m.
- F. Provide surfaces receiving paint with a steel trowel finish, to match approved sample pane.
- G. Avoid excessive working of surface. Delay trowelling as long as possible to avoid drawing excess fines to surface.
- H. Moist cure finish coat for minimum period of 48 hours.

3.03 Fire Rated Assemblies

- A. Perform cement plaster work for fire rated assemblies in accordance with drawings and as recommended by Underwriter's Laboratories.

END OF SECTION

SECTION 09260
GYPSUM BOARD FALSE CEILING SYSTEMS

PART 1 GENERAL**1.01 Work Included**

- A. Metal Framing required for gypsum board suspended ceilings.
- B. Blocking.
- C. Acoustical and sound insulation.
- D. Thermal Insulation for z-furring channel installation.
- E. Gypsum Board, fire rated, sound and thermal insulating.
- F. Radiation Protection Gypsum Board.
- G. Acoustical Sealant.
- H. Taped and sanded joint treatment.

1.02 Related Work

- A. Section 09900 : Painting

1.03 Quality Assurance

- A. Perform gypsum board systems work in accordance with recommendations of:

Gebr. Knauf
Westdeutsche Gipswerke
Export Department
D 8715 Iphofen, West Germany

Tel. No. 09323 31-1
Fax. No. 09323 31277
Telex 689300 29-9K

Or any approved equal.

1.04 Submittals

- A. Submit samples of gypsum board systems and exposed joint covers in accordance with Section 01300. Include a sample of each material, texture, and colour specified.

1.04 Submittals (Contd.)

- B. Submit manufacturer's recommendations for installation of thermal insulation and gypsum board.

1.05 References

- A. GA 216 - Recommended Specifications for installation of thermal insulation and gypsum board.
- B. Complies with ASTM C-36, 0-630 method C-473.
- C. DIN 18180 - Insulation Blankets, Thermal Mineral Wool. DIN 4102 - Building Material Class B1 - Flame Resistance - Building Material Class A2 - Non Combustible

PART 2 PRODUCTS**2.01 Metal Framing**

- A. Provide metal framing materials in accordance with GA 216.
- B. Studs: 60 X 60 cm both directions.
- C. Runners: Match studs.

2.02 Materials

- A. Gypsum board false ceiling shall be 12.5mm thick concealed system similar to Knauf Gypsum Ceiling System D113.
- B. Gypsum board false ceiling in toilets and kitchenettes' areas shall be moisture resistant type, 12.50 mm thick, and as item "A" above.

PART 3 EXECUTION**3.01 Metal Framing Erection - General**

- A. Erect metal framing in accordance with ASTM C764.
- B. Install members true to lines and levels to provide surface flatness with maximum variation of 1/8 inch in 10 feet in any direction.

3.02 Ceiling Framing Installation

- A. Coordinate location of hangers with other work.
- B. Install ceiling framing independent of walls, columns, and above ceiling work.
- C. Space main carrying channels at maximum 600 mm on center, not more than 150 mm from perimeter walls. Lap splices minimum 300 mm and secure together 50 mm from each end of splice.
- D. Place furring channels perpendicular to carrying channels at 600 mm on center not more than 150 mm from perimeter walls. Lap splices minimum 200 mm and secure together 25 mm from each end of splice.
- E. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 600 mm past each end of openings.
- F. Laterally brace entire suspension system where required.

3.03 Gypsum Board Installation

- A. Install gypsum board in accordance with recommendations of GA 216, the manufacturer's recommendations, or both.
- B. Erect single layer standard gypsum board in direction most practical and economical, with ends and edges occurring over firm bearing.
- C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Erect exterior gypsum sheathing board horizontally, with edges butted tight and ends occurring over firm bearing.
- E. Use screws when fastening gypsum board to metal furring or framing. Use nails or screws when fastening gypsum board to wood furring or framing. Staples may only be used when securing the first layer of double layer applications.
- F. Erect patterned gypsum board horizontally/vertically, complete with exposed batten fastening system. Erect in accordance with manufacturer's recommendations.
- G. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- H. Place control joints to be consistent with lines of building spaces and in consistent pattern and as directed by Engineer.
- I. Place corner beads at external corners. Use longest practical lengths. Place edge trim where gypsum board abuts dissimilar materials.

3.03 Gypsum Board Installation (cont'd)

- J. Tape, fill, and sand exposed joints, edges, corners, openings and fixings, to produce surface ready to receive surface finishes.
- K. Remove and re-do defective work.

3.04 Warranty/Guarantee

All warranties/guarantees to be issued by the Supplier, Manufacturers and Sub-Contractors shall be counter- signed by Main Contractor and both of them will be liable for repair/replace the items/works, etc., during the Defect Liability period.

END OF SECTION

**SECTION 09309
GLASS MOSAIC TILES****PART 1 GENERAL****1.01 Work Included**

- A. Wall and Gutter mosaic tile, installed by the approval adhesive material.
- B. Approved mosaic tile grout, from first quality products.
- C. Labor and protection of tiles before and after laying.

1.02 Related Work

- A. Section 04100 Mortar..

1.03 Reference Standards

- A. Palistine General Specifications.
- B. Instructions of the Manufacturers.

1.04 Samples

- A. Submit a 1000mm x 1000mm sample of glass mosaic tile installation, clearly indicating pattern, coloration and grouted joints. Submit in accordance with the Engineer's instructions.

1.05 Environmental Conditions

- A. Provide sufficient heat and ventilation in areas where work of this section is being performed, so as to allow mosaic tile to properly set. Take all precautionary measures necessary to ensure that excessive temperature changes do not occur.

PART 2 PRODUCTS**2.01 Acceptable Manufacturers**

- A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this section. Approval of the manufacturer or product must be obtained before proceeding with associated work.
- B. Type: Type and sizes of tiles shall be as shown on the drawings and indicated in the Bill of Quantities and Book of Details.

2.02 Materials And Components For Floors

- A. Glass Mosaic Tiles: Square edges, size 20 x 20 x 4 mm thick; smooth surface; glazed..
- B. Setting Bed: Approved adhesive, as approved by the Engineer.
- C. Grout: Waterproof cementitious type; with latex additive, color selected by the Engineer; uniform in color and resistant to shrinking.
- D. Water: Clean, fresh and free of deleterious substances.

2.04 Grout

Plastic - modified, cement - based grout for joints (cerinol FF and CERINOL FB) as manufactured by DEITERMANN or approved equal.

PART 3 EXECUTION**3.01 Installation**

- A. Prior to installing mosaic tiles, ensure surfaces are level, with maximum surface variation of 6mm in 3.00 meters, and are steel trowelled. Ensure surfaces slope to drains.
- B. Ensure surfaces are clean and well cured.
- C. Do not commence until surface conditions are within tolerances required for proper installation.
- D. Neatly cut tile around fixtures and drains. Accurately form corners, base, intersections and returns.
- E. Ensure tile joints are uniform in width, subject to normal variance in tolerance allowed in tile size. Ensure joints are watertight, without voids, cracks, excess mortar or grout.
- F. Keep expansion/contraction control joints free of mortar or grout.
- G. Allow tile to set for a minimum of 48 hours prior to grouting.
- H. Completed installation to be free of broken, damaged or faulty tile.

END OF SECTION

SECTION 09310
CERAMIC TILES**PART 1 GENERAL****1.01 Work Included**

- A. Ceramic tile flooring and skirting, installed using approved adhesive material with epoxy grouted joints.
- B. Ceramic tiled walls, installed using adhesive, with epoxy grouted joints.
- C. Approved Adhesive Material.
- D. Fixing of ceramic washroom accessories as supplied under Sanitary Ware.

1.02 Related Work

- A. Section 03251 - Expansion and Contraction Joints.

1.03 Reference Standards

- A. ANSI A108.5 - Ceramic Tile installed in the Dry-Set Portland Cement Mortar on Latex-Portland Cement Mortar.
- B. ANSI A118.4 - Latex-Portland Cement Mortar.
- C. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.
- D. ANSI A42.4 - Interior Lathing & Furring.
- E. Tile Council - Handbook for Ceramic Tile Installation. of America
- F. TCA137.1 - Recommended Standard Specifications for Ceramic Tile.

1.04 Samples

- A. Submit a 1000mm X 1000mm sample of ceramic wall and floor tile installation, clearly indicating pattern, coloration and grouted joints. Submit in accordance with Section 01340.

1.05 Environmental Conditions

- A. Provide sufficient heat and ventilation in areas where work of this section is being performed, so as to allow ceramic tile to properly set. Take all precautionary measures necessary to ensure that excessive temperature changes do not occur.

PART 2 PRODUCTS**2.01 Acceptable Manufacturers**

- A. The Contractor shall submit to the Engineer the name of three manufacturers and their Products which will be acceptable under this Section. Approval of the Manufacturer or the Product must be obtained before proceeding the associated work.
- B. Type:
 - 1) Type and sizes of tiles shall be as indicated in the BOQs and drawings.

2.02 Materials And Components For Floors

- A. Ceramic Floor Tile: Square edges, of approved thickness; smooth surface; unglazed.
- B. Setting Bed: Adhesive as approved by the Engineer and instructed by the manufacturer.
- C. Grout: epoxy type; color selected by the Engineer; uniform in color and resistant to shrinking (preparation, mixing and placing should be as instructed by the manufacturer).
- D. Water: Clean, fresh and free of deleterious substances.

2.03 Materials And Components For Walls

- A. Ceramic Wall Tile: cushioned edges; glazed surfaces.
- B. Scratch Coat and Mortar Bed: Adhesive material as instructed by the manufacturer.
- B. Grout: Epoxy type; color selected by the Engineer; uniform in color and resistant to shrinking.

PART 3 EXECUTION**3.01 Installation**

- A. Prior to installing floor tile, ensure surfaces are level, with maximum surface variation of 6mm in 3.00 meters, and are steel trowelled. Ensure surfaces slope to drains.
- B. Prior to installing wall tile, ensure surfaces are level, with maximum surface variation of 3 mm in 3.00 meters.
- C. Ensure surfaces are clean and well cured.
- D. Do not commence until surface conditions are within tolerances required for proper installation.

3.01 Installation (cont'd)

- E. Neatly cut tile around fixtures and drains. Accurately form corners, base, intersections and returns.
- F. Ensure tile joints are uniform in width, subject to normal variance in tolerance allowed in tile size. Ensure joints are watertight, without voids, cracks, excess mortar or grout.
- G. Form internal wall angles square and external angles rounded.
- H. Sound tile after setting. Remove and replace hollow sounding units.
- I. Keep expansion/contraction control joints free of mortar or grout.
- J. Allow tile to set for a minimum of 48 hours prior to grouting.
- K. Completed installation to be free of broken, damaged or faulty tile.

END OF SECTION

**SECTION 09410
PORTLAND CEMENT TERRAZZO****PART 1 GENERAL****1.01 Work Included**

- A. Preparation of concrete substrate.
- B. Terrazzo floor, colour as selected by the Engineer.
- C. Skirting 100mm X 20mm thick.
- D. Curing, grinding and sealing.

1.02 Related Work

- A. Section 01340: Shop drawings, Product Data and Samples.

1.03 Reference Standards

- A. BS 882 - Aggregate from natural sources for concrete.
- B. BS 12 - Ordinary Portland Cement
- C. BS 5075 - Concrete Admixtures, Air Entraining for concrete
- D. National Terrazzo and Mosaic Association, Inc. (NTMA), Publication:
Terrazzo Design Data Book (1972).

1.04 Product Data & Samples

- A. Product data and samples shall be in accordance with Section 01340.
- B. Prior to delivery of the materials to the site, the following samples shall be submitted for approval to the Engineer:
 - 1. Terrazzo - Two sample panels of each type finish including abrasive, if required, or color combination. Minimum dimension of tile shall be 200mm thick.
- C. Copies of Manufacturer's Specifications and installation instructions for each type of precast terrazzo and material shall be submitted to the Engineer.

1.05 Shop Drawings

- A. Shop drawings shall be in accordance with Section 01340.
- B. Shop drawings showing location, extent, size, shape, and jointing of each type of precast terrazzo item required. Details of anchorage and other special features required shall be included.

1.06 Delivery, Storage & Handling

- A. Manufacturer's packaged materials shall be delivered and stored in their original containers with seals unbroken and labels intact until time of use. Materials shall be protected against the inclusion of foreign matter and/or water and other damage.

1.07 Environmental Conditions

- A. The substrate and the conditions under which the terrazzo is to be installed shall be carefully examined. The Contractor shall submit notification to the Engineer of any unsatisfactory conditions which will affect the terrazzo installations. Work shall not proceed until such unsatisfactory conditions have been corrected and the surfaces are acceptable.
- B. The ambient surroundings and temperature of cementitious mixtures shall be not less than 10 degrees C. from the time the setting beds are placed until completely cured.

PART 2 PRODUCTS**2.01 Materials**

Shall conform to the respective specifications and other requirements specified below:

- A. Portland cement: BS 12 Cement shall be obtained from a single source for all work of one color.
 - 1. Non-staining white or gray shall be provided as required for terrazzo matrix.
- B. Sand: BS 882, for fine aggregate.
- C. Water shall be clean, free of oil, soluble salts, or other deleterious substances.
- D. Aggregate shall be natural, sound, crushed marble chips without excessive flats or flakes. Colors and gradation of sizes shall be as required to match approved samples.
- E. Matrix pigments shall be pure mineral or synthetic pigments, resistant to alkalis and nonfading. Pigments shall be mixed with cement, by weight, to provide colors as required to match approved samples.

2.01 Materials (cont'd)

- F. Cleaner shall be liquid, neutral chemical cleaner, formulated for Portland cement terrazzo, as recommended by the Manufacturer of the sealer.
- G. Interior floor sealer shall be colorless, non-slip, stain-resistant penetrating sealer which will not disturb the color or physical properties of the terrazzo surface.
- H. Exterior sealer shall be a colorless, non-yellowing, penetrating, synthetic resin sealer for terrazzo.
- I. Air-entraining admixture: BS 5075.

2.02 Precasting

- A. NTMA specifications and recommendations for fabrication of precast terrazzo shall be complied with.
- B. Units shall be cast accurately to size and profile indicated on approved shop drawings.
- C. Type of Portland cement, amount of pigment, if any, and percentages of aggregate shall be in accordance with approved NTMA color plates.
- D. Exposed edges of precast items shall have 3.2 mm radius unless otherwise indicated.
- E. Precast members shall be not less than the following minimum thickness:
 - 1. Floor tile -
 - 250mm x 250mm x 25mm thick
 - 400mm x 400mm x 40mm thick
- F. Abrasive aggregate, approximately 15 percent by volume, shall be provided in both the topping mix aggregate and the aggregate seeded during installation in the non-slip areas shown on the drawings.
- G. All precast members shall be moist-cured in compliance with NTMA specifications.
- H. Cured terrazzo topping shall be grouted and ground in accordance with NTMA specifications. Finishing shall be by fine grinding with abrasive grit of the size specified by NTMA, or as otherwise required to match approved samples.
- I. Terrazzo surfaces to receive rustic finish shall be washed to remove approximately 1.5mm of uncured matrix, without disturbing the aggregate. Curing shall be as specified by NTMA. The terrazzo surface shall be saturated with water and cleaned with a 20 percent solution of muriatic acid (9 parts water to 1 part commercial acid) then rinsed thoroughly with clean water to remove and neutralize the acid wash. The terrazzo surface shall match the approved samples for depth of etch into matrix.

PART 3 EXECUTION**3.01 Installation**

- A. Preparation of substrate, proportioning setting bed, and placing, grouting, and finishing shall be in accordance with NTMA specifications and recommendations unless otherwise shown or specified.
- B. Setting bed mortar shall be one part Portland cement and three to four parts clean sharp sand. Only enough water to produce a workable mix shall be added.
- C. Terrazzo installation shall be completed before the application of other items which might be damaged by this work.
- D. Marble Bases shall be installed after placing floor tile or other terrazzo floor toppings. Base shall be set accurately to wall and floor finish lines.
- E. Floor tile shall be laid out to avoid pieces less than one half tile size.
- F. Field cutting of precast terrazzo, where required, shall be with high speed diamond or other abrasive saws.
- G. Joints shall be aligned in floor tile at right angles to each other and straight with walls.
- H. All tiles shall be applied with straight joints each way unless otherwise indicated.
- I. Precast terrazzo shall be installed as shown and in accordance with NTMA specifications. Units shall be tamped into setting bed to achieve a full bond without voids, and leveled at joints. Units shall be finish ground at joints if required to remove any minor discrepancies in level of units. Warped, stained, damaged, and non-matching units shall be replaced as directed. Joints shall be grouted, except those shown to receive sealant, with a mixture of Portland cement, pigment, and water matching the matrix of the units.

3.02 Cleaning And Sealing

- A. Terrazzo shall be cleaned after all installation and finishing operations are completed in accordance with the instructions of the terrazzo sealer Manufacturer.
- B. Sealer shall be applied to cleaned terrazzo surfaces in accordance with Manufacturer's Instructions. The maximum number of coats of sealer recommended by the Manufacturer shall be applied.

3.03 Final Cleaning And Protection

- A. Terrazzo shall be cleaned as recommended by the Manufacturer of the sealer, and machine buff if required when buildings are ready for occupancy.
- B. Protection shall be provided for finished terrazzo work until buildings are ready for occupancy.

END OF SECTION

SECTION 09510
ACOUSTICAL CEILINGS**PART 1 - GENERAL****1.01 Work Included**

- A. Fire rated suspended metal grid system complete with wall and bulkhead trim.
- B. Lay-in ceiling tiles.
- C. Hangers and Inserts.
- D. Cut-out for ceiling appurtenance and/or access panels.

1.02 Related Work

- A. Section Lighting fixtures within ceiling system.
- B. Section Air Diffusers within ceiling system.

1.03 Shop Drawings

- A. Submit shop drawings of acoustical ceilings in accordance with the Engineer's instructions.
- B. Clearly indicate grid layout and all related dimensioning, junctions with other work or ceiling finishes, inter- relation of mechanical and electrical items related to system.

1.04 Environmental Conditions

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead mechanical work is completed, tested and approved.
- B. Permit wet work to dry prior to commencement of installation.
- C. Maintain uniform temperatures of minimum 16 degrees C. and humidity of 20% to 40% prior to, during and after installation.

PART 2 - PRODUCTS**2.01 Acceptable Manufacturers**

- A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.
- B. Substitutions: Items of same function and performance are acceptable in conformance with the Engineer's instructions.

2.02 Suspension System

- A. Type and Manufacture: Heavy duty system as instructed by the manufacturer and approved by the Engineer.

2.03 Lay-In Panels

- A. Acoustic Tiles: 24 inch x 24 inch size x 5/8 inch thick Tegular Lay-in for 5/16 inch Prelude Exposed Tee Grid System; mineral fiber composition; Fissured surface finish.

PART 3 - EXECUTION**3.01 Installation**

- A. Install acoustical ceiling systems in accordance with manufacturer's recommendations to produce finished ceiling true to lines and levels and free from warped, soiled or damaged grid or lay-in panels.
- B. Install fire rated ceiling systems in accordance with UL requirements.
- C. Install ceiling systems in a manner capable of supporting all superimposed loads, with maximum permissible deflection of 1/360 of span and maximum surface deviation of 1/960.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work. Ensure the layout of hangers and carrying channels are located to accommodate fittings and units of equipment which are to be placed after the installation of ceiling grid systems.
- E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying channels as required to span the required distance.
- F. Supply hangers or inserts for installation to the respective section in ample time and with clear instructions for their correct placement. Provide additional hangers and inserts as required.

3.01 Installation (Cont'd)

- G. Hang independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of the longitudinal axis or face plane of adjacent members.
- H. Center ceiling systems on room axis leaving equal border pieces.
- I. Do not support fixtures from or on main runners or cross runners if weight of the fixture causes the total dead load to exceed the deflection capability. In such cases, support fixture loads by supplementary hangers located within 150 mm of each corner, or support the fixtures independently.
- J. Do not install fixtures so that main runners and cross runners will be eccentrically loaded. Where fixture installation would produce rotation of runners, provide stabilizer bars.
- K. Install edge moldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level. Miter corners. Provide edge moldings at junctions with other ceiling finishes. Where bullnose concrete block corners occur, provide preformed closers to match edge molding.
- L. Install lay-in panels level, in uniform plane and free from twist, warp and dents.
- M. Install hold-down clips on all lay-in panels to hold such panels tight to grid system where within 6.0 m of exterior doors.

3.02 Adjustments

- A. Adjust any sags or twists which develop in the ceiling systems and replace any part which is damaged or defective.

END OF SECTION

SECTION 09513
METAL TILES FALSE CEILING SYSTEM

PART 1 GENERAL**1.01 Work Included**

- A. Suspended Metal Grid Ceiling Support System
- B. Formed Metal Laid in Ceiling Tiles
- C. Cut-out for Ceiling Appurtenance
- D. Hangers and Inserts

1.02 Related Work

- A. Section 01340: Shop Drawings, Product Data and Samples
- B. Section 01630: Substitution and Product Options

1.03 Performance

- A. Design and construct suspension system to accommodate wind and suction loads and wind uplift.

1.04 References

- A. ASTM B209 - Aluminum Allowy Sheet and Plate.
- B. ASTM A446 - Steel Sheet, Zinc - coated (galvanized) by the hot dip process structural (physical) quality.

1.05 Shop Drawings And Product Data

- A. Submit shop drawing and product data in accordance with Section 01340.
- C. Indicate extent of suspension system, method of support for system, integration with mechanical and electrical components, component materials and profiles, perimeter trim members, and installation and coordination details.

1.06 Samples

- A. Submit samples in accordance with Section 01340.
- B. Provide sample of metal sections, supporting main and secondary suspension members, and attachment clips; and in color and finish required.

PART 2 PRODUCTS**2.01 Acceptable Manufactures**

- A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.
- B. Type: Type and Size of tiles shall be as indicated in the Bill of Quantities and instructed by the Manufacturer.
- C. Substitutions: Items of same function and performance are acceptable in accordance with Section 01630.

2.02 Components

- A. System: Preformed aluminum lay in tiles with plain surface offering sound absorption in the low frequency range similar to Messers. DAMPA A/S Denmark or approved equal type AL-0. Complete with galvanized steel suspension system with anchors to structure as recommended by the manufacturer.

2.03 Materials

- A. Suspension Members: Formed steel tees, with adjustment clips, galvanized finish.
- B. Suspension Wire: 8 mm steel wire, annealed, galvanized.
- C. Aluminum Extrusions: ASTM B209.
- D. Splices: of same material, profile, and color as exposed members.
- E. Internal and External Corners: of same material, thickness, and finish as exposed members; of profile to suit system; shop formed to required angles. Back brace internal corners.
- F. Recessed Closures: Formed aluminum tiles, lay in between exposed members.
- G. Accessories: as required to complement system members, same color and finish.
- H. Expansion Joints: of same material, thickness, and finish as exposed members.
- I. End Caps: formed metal of same color and finish as exposed members.

2.04 Fabrication

- A. Shop fabricate exposed components.

PART 3 EXECUTION**3.01 Installation**

- A. Install ceiling system in accordance with manufacturer's instructions.
- B. Install ceiling system to support superimposed loads.
- C. Install ceiling after major above-ceiling work is complete. Coordinate the location of hangers and carrying tees with other work.
- D. Install hangers or inserts.
- E. Where ducts or other requirement prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying tees to span the required distance.
- F. Hang independently of walls, columns, ducts, pipe and conduit.
- G. Design and layout runners and cross runners so that fixtures will not produce eccentric loads.
- H. Install exposed members using maximum lengths.
- I. Install recessed closures between exposed members at interior and exterior locations.
- J. Exercise care when cutting members on site to insure surface finish is not defaced.
- K. Install edge mouldings at intersection of ceiling and vertical surfaces using maximum lengths. Field miter corners. Provide edge moldings at junction with other ceiling finishes.
- L. Provide expansion joints to accommodate plus or minus movement and maintain visual closure.
- M. Provide end caps for members exposed to view.

END OF SECTION

SECTION 09515
ALUMINUM LINEAR CEILING SYSTEM

PART 1 GENERAL**1.01 Work Included**

- A. Suspended Metal Grid Ceiling Support System
- B. Formed Metal Laid in Ceiling Tiles
- C. Cut-out for Ceiling Appurtenance
- D. Hangers and Inserts

1.02 Related Work

- A. Section 01340: Shop Drawings, Product Data and Samples
- B. Section 01630: Substitution and Product Options

1.03 Performance

- A. Design and construct suspension system to accommodate wind and suction loads and wind uplift.

1.04 References

- A. ASTM B209 - Aluminum Allowy Sheet and Plate.
- B. ASTM A446 - Steel Sheet, Zinc - coated (galvanized) by the hot dip process structural (physical) quality.

1.05 Shop Drawings And Product Data

- A. Submit shop drawing and product data in accordance with Section 01340.
- B. Indicate extent of suspension system, method of support for system, integration with mechanical and electrical components, component materials and profiles, perimeter trim members, and installation and coordination details.

1.06 Samples

- A. Submit samples in accordance with Section 01340.
- B. Provide sample of metal sections, supporting main and secondary suspension members, and attachment clips; and in color and finish required.

PART 2 PRODUCTS**2.01 Acceptable Manufactures**

- A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.
- B. Substitutions: Items of same function and performance are acceptable in accordance with Section 01630.

2.02 Components

- A. System: Preformed aluminum lay in tiles with plain surface offering sound absorption in the low frequency range similar to Messers. DAMPA A/S Denmark or approved equal type AL-0. Complete with galvanized steel suspension system with anchors to structure as recommended by the manufacturer.

2.03 Materials

- A. Suspension Members: Formed steel tees, with adjustment clips, galvanized finish.
- B. Suspension Wire: 8 mm steel wire, annealed, galvanized.
- C. Aluminum Extrusions: ASTM B209.
- D. Splices: of same material, profile, and color as exposed members.
- E. Internal and External Corners: of same material, thickness, and finish as exposed members; of profile to suit system; shop formed to required angles. Back brace internal corners.
- F. Recessed Closures: Formed aluminum tiles, lay in between exposed members.
- G. Accessories: as required to complement system members, same color and finish.
- H. Expansion Joints: of same material, thickness, and finish as exposed members.
- I. End Caps: formed metal of same color and finish as exposed members.

2.04 Fabrication

- A. Shop fabricate exposed components.

PART 3 EXECUTION**3.01 Installation**

- A. Install ceiling system in accordance with manufacturer's instructions.
- B. Install ceiling system to support superimposed loads.
- C. Install ceiling after major above-ceiling work is complete. Coordinate the location of hangers and carrying tees with other work.
- D. Install hangers or inserts.
- E. Where ducts or other requirement prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying tees to span the required distance.
- F. Hang independently of walls, columns, ducts, pipe and conduit.
- G. Design and layout runners and cross runners so that fixtures will not produce eccentric loads.
- H. Install exposed members using maximum lengths.
- I. Install recessed closures between exposed members at interior and exterior locations.
- J. Exercise care when cutting members on site to insure surface finish is not defaced.
- K. Install edge mouldings at intersection of ceiling and vertical surfaces using maximum lengths. Field miter corners. Provide edge moldings at junction with other ceiling finishes.
- L. Provide expansion joints to accommodate plus or minus movement and maintain visual closure.
- M. Provide end caps for members exposed to view.

END OF SECTION

**SECTION 09557
HARD WOOD FLOORING****PART 1: GENERAL****1.01 Work Included**

- A. Hard wood flooring, steps and adhesive applied.
- B. Surface finishing.

1.02 Reference Standard

- A. ASTM E84 - Surface Burning Characteristics of Building Materials.
- B. NOFMA - National Oak Flooring Manufacturers Association
- C. WSFI (Wood and Synthetic Flooring Institute) - Mosaic Wood Parquet Flooring Set in Adhesive over concrete Slab or Wood Subfloors.
- D. WSFI (Wood and Synthetic Flooring Institute) - Recommendations for the correct preparation, finishing, and testing of concrete subfloor surfaces to receive wood flooring.

1.03 Shop Drawings

- A. Submit shop drawings in accordance with the Engineer instructions.
- B. Shop drawings shall show installation data and details of flooring system installation and details of conditions where flooring abuts other construction or built-in equipment. Accessories shall be approved by the flooring manufacturer and the Engineer.

1.04 Samples

- A. Submit under provision of section 01300.
- B. Submit samples of the following:
 - 1) Hard solid wood, parquet flooring : Two of each species and shape, actual installation length.
 - 2) Shop drawings : Indicate floor joint pattern and termination details.
 - 3) Product date : Provide data for flooring and floor finish materials.

1.05 Delivery And Storage:

Deliver materials to the building site in original unopened packages, bundles, or containers. Protect materials against dampness during shipment and after delivery. Store material under cover in a well ventilated building. Prevent exposure to extreme change of temperature and humidity. Do not store materials in any building under construction until all wet-applied building materials are dry. Store flooring under adequate and controlled ventilators and under approved temperature and humidity conditions at location where it is to be laid for at least 7 days before installation.

1.06 Environmental Conditions:

- A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized.
- B. Provide heat, light, and ventilation prior to installation.
- C. Maintain room temperature and relative humidity in accordance with adhesive manufacturer's instructions for a period of two days prior to delivery of materials, during, and after installation.

PART 2: PRODUCTS**2.01 Acceptable Manufacturers**

The contractor shall submit to the Engineer the names of three manufactures and their products which will be acceptable under this section, Approval of the manufacturer or product must be obtained before proceeding with the associated work.

2.02 Hard wood Floor System

- A. Hard wood Flooring on Regubol Rubber Cushions on self leveling cement screed trowelled smooth laid on Concrete Slab. Provide flooring system consisting of hard wood Flooring seated on Regubol rubber cushions resting on the concrete floor slab the top face of the parquet shall be trowelled with permadur material as instructed by the manufacturer.

2.03 Materials

Materials shall conform to the respective specifications and to the requirements specified herein and as instructed by the manufacturer.

- A. Hard wood Flooring: better grade hard natural, graded in accordance with current standard specifications for manufacture, Installation and Official grading rules. Flooring shall be kiln dried, continuous tongue and groove, and end matched. Each bundle of flooring shall be clearly grade stamped.

2.03 Materials (cont'd)

- B. *Rubber Cushions*: Rubber cushions shall have a durometer hardness of A50 plus or minus 5, when tested in accordance with National Standards and shall have a minimum tensile strength of 1500 psi, when tested in accordance with the Standard Specifications. When subjected to an aging period of 70 hours and exposed to a temperature of 158 degrees F and allowed to cool to room temperature over a period of 4 hours and re-tested, tested specimen shall have a change in hardness of 10 points maximum, a change in tensile strength of minus 25 percent maximum in accordance with the applicable test methods referenced above. Test rubber cushions, under a load of 40 psi. Size of tested specimen shall be 57 mm by 76 mm by 9.5 mm. Time of test shall be 22 hours; temperature of test shall be 158 degrees F. Test specimen shall recover, without set or displacement.
- C. *Coating for hard wood Flooring*: Coating shall conform to the manufacturer instructions for Heavy Duty Finishes for Larch wood Floors.
- D. *Adhesive Materials*: As recommended by wood flooring finish manufacturer and approved by the Engineer.

PART 3: EXECUTION**3.01 Preparation**

- A. *Condition of Subfloors*: Do not install flooring on surfaces that are not suitable for proper installation. Before any work under this section is begun, correct all defects such as rough or scaling concrete, low spots, high spots, uneven surfaces, and repair all damaged portions of concrete slabs. Concrete slabs shall be given a leveling course of latex fill and the surface shall not vary more than 3 mm with a 3 meter straight edge placed in any direction.
- B. *Preparation of Concrete Slab*: Sweep concrete floor. Assume that slab is dry and clean. Remove paint spots, plaster, masonry droppings, grease, dirt, and all other foreign matter. Concrete shall be fully cured and dry.
- C. *Work of Other Trades*: Do not start the work specified under this section until the work of trades, which could create moisture has been completed.
- D. *Moisture Content*: Check with an approved meter verifying conformance with the requirements specified herein before.

3.02 Installation

- A. Hard wood - Flooring on Regubol Rubber Cushions on cement screed shall be installed as instructed by the manufacturer and as approved by the Engineer.
 - 1. Vapor proofing for Slabs on Grade: Cover entire slab with polyethylene membrane. Lap joints by at least 152 mm. Seal joints with a full coverage of the adhesive recommended by the membrane manufacturer.
- B. *Hard wood Base*: Install moulded and perforated continuous Larch wood base of the type indicated, along perimeter walls as instructed by the manufacturer and approved by the Engineer.

3.03 Finishing of the Floors

- A. *Finishing*: Floors shall be trowelled with the material as indicated before as instructed by the manufacturer and approved by the Engineer. Allow 5 days for proper curing of finish. Do not walk on floors thereafter until finish has been applied and is dry.

3.04 Protection

- A. After completion of laying and finishing of the flooring, cover it immediately. Upon its drying, use non-staining, porous building paper of the type and grade recommended by manufacturer, taped along edges. Remove draft paper covering after all work in this area is completed.

END OF SECTION

SECTION 09570
WOOD PANEL SUSPENDED CEILING**PART 1: GENERAL****1.01 Work Included**

- A. Ceiling grids.
- B. Cornice.
- C. Surface finishing.

1.02 Reference Standard

- A. ASTM E84 - Surface Burning Characteristics of Building Materials.
- B. NOFMA - National Oak Ceiling Manufacturers Association

1.03 Shop Drawings

- A. Submit shop drawings in accordance with the Engineer instructions.
- B. Shop drawings shall show installation data and details of ceiling system installation and details of conditions where ceiling abuts other construction or built-in equipment. Accessories shall be approved by the ceiling manufacturer and the Engineer.

1.04 Samples

- A. Submit under provision of section 01300.
- B. Submit samples of the following:
 - 1) Ceiling panels : Two of each species and shape, actual installation length.
 - 2) Shop drawings : Indicate floor joint pattern and termination details.
 - 3) Product data : Provide data for ceiling and ceiling finish materials.

1.05 Delivery And Storage

Deliver materials to the building site in original unopened packages, bundles, or containers. Protect materials against dampness during shipment and after delivery. Store material under cover in a well ventilated building. Prevent exposure to extreme change of temperature and humidity. Do not store materials in any building under construction until all wet-applied building materials are dry. Store ceiling under adequate and controlled ventilators and under approved temperature and humidity conditions at location where it is to be laid for at least 7 days before installation.

1.06 Environmental Conditions

- A. Do not install wood ceiling until wet construction work is complete and ambient air at installation space has moisture content stabilized.
- B. Provide heat, light, and ventilation prior to installation.
- C. Maintain room temperature and relative humidity in accordance with adhesive manufacturer's instructions for a period of two days prior to delivery of materials, during, and after installation.

PART 2 PRODUCTS**2.01 Acceptable Manufacturers**

The contractor shall submit to the Engineer the names of three manufactures and their products which will be acceptable under this section, Approval of the manufacturer or product must be obtained before proceeding with the associated work.

2.03 Materials

Materials shall conform to the respective specifications and to the requirements specified herein and as instructed by the manufacturer.

- A. Hard wood (ceiling): better grade hardwood, graded in accordance with current standard specifications for manufacture, Installation and Official grading rules. Ceiling shall be kiln dried, continuous tongue and groove, and end matched. Each bundle of ceiling shall be clearly grade stamped.

2.03 Materials (cont't)

- B. Rubber Cushions: Rubber cushions shall have a durometer hardness of A50 plus or minus 5, when tested in accordance with National Standards and shall have a minimum tensile strength of 1500 psi, when tested in accordance with the Standard Specifications. When subjected to an aging period of 70 hours and exposed to a temperature of 158 degrees F and allowed to cool to room temperature over a period of 4 hours and re-tested, tested specimen shall have a change in hardness of 10 points maximum, a change in tensile strength of minus 25 percent maximum in accordance with the applicable test methods referenced above. Test rubber cushions, under a load of 40 psi. Size of tested specimen shall be 57 mm by 76 mm by 9.5 mm. Time of test shall be 22 hours; temperature of test shall be 158 degrees F. Test specimen shall recover, without set or displacement.
- C. Coating for Hardwood ceiling: Coating shall conform to the manufacturer instructions.
- D. Adhesive Materials: As recommended by wood ceilings finish manufacturer and approved by the Engineer.

PART 3: EXECUTION**3.01 Preparation**

- A. Condition of Ceilings: Do not install ceiling on surfaces that are not suitable for proper installation. Before any work under this section is begun, correct all defects such as rough or scaling concrete, low spots, high spots, uneven surfaces, and repair all damaged portions of slabs.
- B. Work of Other Trades: Do not start the work specified under this section until the work, which could create moisture has been completed.
- C. Moisture Content: Check with an approved meter-verifying conformance with the requirements specified herein before.

3.02 Installation

- A. Hardwood Ceiling installed as instructed by the manufacturer and as approved by the Engineer.

3.03 Protection

- A. After completion of laying and finishing of the ceilings, cover it immediately. Upon its drying, use non-staining, porous building paper of the type and grade recommended by manufacturer, taped along edges. Remove draft paper covering after all work in this area is completed.

END OF SECTION

SECTION 09610
STONE FLOORING**PART 1 GENERAL****1.01 Work Included in the Unit Rate**

- A. Stone floor finish (sizes and type as indicated in the Bill of Quantities).
- B. Mortar bed and joint pointing.

1.02 Related Work

- A. Section 04100 - Mortar
- B. Section 07900 - Sealants.

1.03 References:

- A. The Jordanian General Specifications

1.04 Submittal

- A. General: Shop drawings - Product Data and Samples for submittal provisions and procedures.
- B. Shop Drawings and Product Data:
 - 1. Submit shop drawings and product data in accordance with the Engineer's instructions. Shop drawings shall clearly indicate expansion joints' dimensions and locations.
 - 2. Indicate Pertinent dimensioning, layout, construction details, method of installation and adjacent construction.
 - 3. Indicate all units of stone, their configuration and size.
 - 4. Submit stone supplier's installation instructions, and field erection drawings.
 - 5. Submit manufacturer's instructions for use of pointing colour and admixtures.

1.04 Submittal (Cont'd)**C. Samples**

1. Submit two sets of each type of stone, full size units as selected by the Engineer to the project site, in sufficient number to indicate the full range of color, texture and each type of finish. One of each of the duplicate samples approved by the Engineer will be retained by him at the project site, the other being returned to the Contractor for his guidance. Colors and types of stone - dressings are as mentioned under Part 2 - Products, paragraph B, "STONE SCHEDULE".
2. The following physical data on all proposed stone shall be submitted by the stone supplier:
 - a. Analysis of mineral composition.
 - b. Analysis of chemical composition.
 - c. Thermal coefficient of expansion.
 - d. Absorption.
 - e. Specific Gravity.
 - f. Abrasion Resistance
3. Submit samples of other materials specified herein upon request by the Engineer.

D. Mock Up

1. Furnish and install a typical stone floor application required for the project at area designated by the Engineer. The panel shall be constructed for Engineer's approval showing 1.5m x 1.5m for floor installation.

The Contractor shall also be required to install a typical stone stair application, or any offer which in the opinion of the Engineer is required.

2. All work shall include setting and jointing all stone including final cleaning as specified herein for the actual work and as required for approval. Construct as many mock-ups until approval by the Engineer has been obtained.
3. The approved mock-up shall constitute the quality of work to be expected throughout the entire project, and shall remain in place for visual inspection until no longer needed as directed by the Engineer. The removal and disposition of the mock-ups shall be done by the Contractor at his expense without additional cost to the Owner.

1.05 Guarantee/Warranty

- A. Attention is directed to the provisions of the CONDITIONS OF CONTRACT regarding guarantees/warranties for the Works.
- B. All warranties/guarantees to be issued by the Supplier, Manufacturers and sub-contractors shall be counter-signed by Main Contractor and both of them will be liable for repair/replace the items/works, etc., during the warrantee/guarantee period.

1.06 Standards

- A. Applicable provisions of the following standard publications shall apply throughout the work:
 - 1. The Jordanian General Technical Specifications for buildings, section 5, volume I, STONWORK; "Recommended Practices for the use of Natural Stones in Building Constructions".

1.07 Qualifications

- A. Supplier/Fabricator: A firm having an adequate supply of the specified types of stone and an annual rated production capacity to deliver the stone to the project site on schedule within a time limit established by the Engineer as required to assure no delay in the progress and completion of the Work.
- B. Installer: A Firm with a minimum of five years successful experience in the installation of stone pavers.

1.08 Design Criteria

- A. The method of installation of all stone pavers shown on the Drawings is diagrammatic only and is not to be used for the purpose of bidding or construction. It shall be the responsibility of the Contractor to guarantee the structural support and the permanent watertight sealing of all stone pavers. The installation shall be designed to allow for expansion and contraction of supporting floors of the paved areas.

1.09 Delivery, Storage & Handling

- A. Packing and Loading: Finished stone shall be carefully packed and loaded for shipment using all reasonable and customary precautions against damage in transit. No material which may cause staining or discoloration shall be used for blocking or packing.
- B. Site Storage: Upon receipt at the building site or storage yard, the stone shall be stacked on timber or platforms at least 100 mm above the ground, and extreme care shall be taken to prevent staining during storage. If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between any wood and finished surfaces, and shall be used also as an overall protective covering.

Salt shall not be used for melting of ice formed on pieces, or for any purpose involving its contact with the stone.

- C. Defective Stone: Any piece of stone showing flaws, cracks, or imperfections such as vents, sand and clay holes, shelly bars, shakes, mottle, seams or starts upon receipt at the storage yard, or at the area to be paved, shall be discarded and removed from the work site, and at the Contractor's own expense.

1.10 Environmental Requirements

- A. The following environmental requirements are applicable to stone set in mortar, and when caulking stone joints with sealant.
- B. During freezing or near freezing weather provide equipment and cover to maintain a minimum of 4 degrees C and to protect stone work completed or in progress.
- C. At end of working day, or during rainy weather, cover stone work exposed to weather with waterproof coverings, securely anchored.
- D. Maintain materials and surrounding air to a minimum 10 degrees C prior to, during and 48 hours after completion of work.

PART 2 PRODUCTS**2.01 Stone Materials And Fabrication**

- A. General
 - 1. Stone shall be of good quality, sound, free from cracks and defects, seams or starts which may impair its structural, integrity, durability, appearance or function colour, texture and finish shall be within the range of samples approved by the Engineer.
 - 2. All stone shall be obtained from quarries having adequate capacity and facilities to meet the specified requirements. Cutting and finishing shall be performed by using approved equipment to process the material promptly on order and in strict accordance with specifications. Evidence to this effect shall be provided by the Contractor.
 - 3. Stone rejected for noncompliance with the submitted samples or the requirements of this Specification shall be replaced with material acceptable to the Engineer. Replacement shall be prompt and at the Contractor's own expense. Inspection of stone by the Engineer shall not relieve the Contractor of his responsibility to perform all work in accordance with the Contract Documents.
- B. Stone Schedule: Refer to the Drawings for locations, sizes and thicknesses of the various types of stone specified herein. All stone work shall be carried out in accordance with the classification of Class "Special" refer to clause 1.06, Item A/1:

Stone Type Application/Thickness/Finish**1. First Quality (Local Type) Stone**

Application: First quality stone tiles, white and pink stone exterior stone tiling, set in mortar and sand over reinforced concrete slabs.

Thickness: As noted on the relevant drawings.

Finish: As shown on relevant drawings.

2.01 Stone Materials Fabrication (Cont'd)**B. Stone Schedule: (Cont'd)****2. Stone Application:**

Exterior Stairs treads and risers bedded with mortar and anchored as necessary.

Thickness: as noted on the relevant drawings.

Finish: As shown on drawings.

All stone work to be executed in accordance with approved shop drawings.

C. Stone

1. The finish of exposed to view surfaces of stone shall be as specified above. The concealed from view surfaces of all stone types shall be sawn, hacked and/or roughened to allow key for the mortar bed.
2. End match the texture in the face of stone elements that abut one another to assure continuity in surface appearance.

D. Stone Fabrication - General

1. Fabrication of stone shall be in strict accordance with approved shop drawings for fabrication, and with this specification.
2. To the maximum extent possible, fabrication and assembly of stone shall be executed on site to maintain the approved pattern and to compensate for field conditions.
3. All work shall be of the highest quality, in accordance with the best trade practices, and performed by skilled workmen. All materials and workmanship shall conform to the highest industry standards, including the Jordanian General Specifications. Recommended Practices for the Use of Natural Stone in Building Construction.
4. Use no materials, equipment, or practices that may adversely affect the functioning, appearance, or durability of the stone work or work of other trades.

E. Dimensions: Cut all stone work accurately to shape and dimensions shown on the final approved shop drawings. Exposed plane surfaces shall be true. Bed and joint surfaces shall be dressed straight and at right angles to the faces, unless otherwise shown. Exposed arris lines shall be sharp and true. Patching of stone will not be permitted.**F. Beds & Joints: Stone beds and joints surfaces shall be cut square from the face for the entire thickness of stones. Stone shall be bedded and jointed, including the various expansion joints dimensions as shown on the approved drawings.**

2.01 Stone Materials Fabrication (Cont'd)

- G. Backs of Pieces: Backs of all pieces of stone, shall be sawn to approximately true planes with a maximum of 1.5mm in thickness from that indicated on the approved shop drawings.

2.02 Mortar Materials And Accessories**A. Cement**

1. Cement for Setting Mortar: Non staining Portland Cement conforming to Jordanian General Specifications except containing not more than 0.03% water soluble alkali.
2. Cement for Pointing Mortar: Non staining white Portland Cement conforming to Jordanian General Specifications.

Gray non staining cement may be used for pointing mortar if the colour of pointing mortar, as selected by the Engineer, does not require White Portland Cement.

3. The specified cement shall fulfill further requirement that it shall exhibit no efflorescence when cast into the form of 51mm X 179mm X 13mm slabs comprising the cement under test.

B. Water: Shall be potable, clean and fresh from Public Water System.

C. Sand: Well graded non staining masonry sand conforming to Jordanian General Specifications. Use white Silica sand for pointing mortar. No other sand shall be permitted for mortar or grout unless otherwise tested and approved by the Engineer.

D. Lime: Approved brand of plastic hydrated, conforming to Jordanian General Specifications.

E. Integral Water-proofing: As manufactured by "FEB Master Builders or approved equal..

F. Integral Colour: As "FEB Master Builders" or approved equal.

G. Grout for Stone Pavers: Premixed commercial expanding agent as manufactured by FEB Master Builders or approved equal.

H. Items E, F & G: are manufactured by FEB Ltd., Construction Chemicals, Local Agent:

F.A. Kettaneh & Co. P.O. Box 485 - Amman, Jordan
Fax: 792582 - Tel: 798642

Or approved equal.

PART 3 EXECUTION**3.01 Conditions At Site**

- A. The Contractor shall, prior to proceeding with the stone installation, examine all surfaces and parts of the areas to receive stone work, and notify the Contractor in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with installation until such conditions have been corrected and are acceptable to the Engineer.
- B. Verify all measurements and dimensions, coordinate the installation of this work, and coordinate and schedule this work with the work of other trades. Give particular attention to the location and size of cutouts required to accommodate mechanical, electrical, and other work or adjoining construction, in accordance with the approved shop drawings for such trade.

3.02 Stone Installation

- A. Preparation For Stone Installation:- Clean stone prior to setting, leaving edges and surfaces free from dirt and foreign material. Do not use wire brushes which mark or damage exposed surfaces, unless otherwise approved by the Engineer.
- B. Mortar and Grout Proportioning
 1. General: Mortar grout proportioning shall be prepared and tested by the Contractor, and in addition the Contractor shall allow for preparing and testing the mortar and grout mixes included within this section, to meet the Engineer's satisfaction and approval.
 2. Setting Mortar for Stone:
 - a. Portland Cement - 1 part
 - b. Hydrated Lime - 0-0.25 part
 - c. Sand - 3 parts
 - d. Plasticiser
 - e. Integral water proofer
 3. Fine Grout: Fine grout shall be mixed in the following proportions by volume all in accordance with Jordanian General Specifications.
 - a. White Portland Cement - 1 part
 - b. Sand - 1.0-1.5 parts (as approved by the Engineer)
 - c. Add color additive to acquire the color of mortar approved by the Engineer.
 4. **NOTE:** Add integral waterproofing admixture to setting and grouting mortar in the quantity and manner recommended by the manufacturer.
 5. Generally, febmix admix mortar plasticiser shall be used in all mortars, unless otherwise instructed by the Engineer.

3.02 Stone Installation (Cont'd)**C. Mortar and Grout Mixing:**

1. Mortar and grout shall be machine mixed. Cement and hydrated lime may be batched by the bag. Sand preferably shall be batched by weight, but subject to the approval of the Engineer may on certain small operations be batched by volume in suitably calibrated containers, provided proper allowance is made for weight per cubic foot, contained moisture, bulking and consolidated. Shovel measurement shall not be used.
2. Workability or consistency of mortar on the board shall be sufficiently wet to be worked under the trowel. Water for tempering shall be available at all times. Mortar and grout which has begun to "set" shall be discarded. Mortar and grout which has stiffened due to evaporation shall be re tempered to restore its workability. Re tempering of mortar and grout at the mixer shall not be permitted.

D. Setting Exterior Stone Pavers: Set stone with mortar setting bed onto concrete substrate in the following manner.

1. Place setting bed mix onto a slightly water dampened concrete substrate surface or onto fluid applied membrane with protection board, as applicable. Setting bed shall be slightly thicker than the required thickness and parallel to the finish stone surface.
2. Lay out stone work in pattern shown on approved shop drawings. Perform field cutting of stone as required to maintain the approved pattern and to compensate for field conditions.
3. Accurately form intersections and returns. Perform cutting and drilling of stone without marring visible surfaces. Carefully grind cut edges of stone abutting trim, finish or built-in items for straight aligned joints. Fit stone closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap stone.
4. Apply a dope coat, consisting of cement and water, to the bottom of each stone unit and place into freshly installed setting bed. Tap stone unit lightly to a true surface. Leveling of stone shall be done as the setting operation proceeds so that it is not necessary to disturb the stone units previously set. Grouting shall not be done until under bed sets and hardens for 24 hours or more.
5. Unless otherwise indicated, stone shall be set with 2mm joints. Refer to the approved shop drawings for stone joint dimensions.
6. Allow stone units to set overnight and then completely fill joints with pointing mortar. Surfaces of stone shall be cleaned to remove mortar spills from face of stone.

3.02 Stone Installation (Cont'd)**D. Setting Exterior Stone Pavers: (Cont'd)**

7. Remove and replace stone units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
8. Protect stone from discoloration or damage during construction and until acceptance of the Work.
9. Allowable Variations in Finished Work: Do not exceed the following deviations from level locations, slopes and alignments shown:
 - a. Floors: Maximum variation from horizontal plane of units to adjacent unit: plus or minus 0.8mm Plus or minus 3mm in 3048mm run, in any direction, at any location.
 - b. Joints: plus or minus 1mm variation in alignment of joints, in 1000mm.

E. Setting Interior Stone Pavers

1. All work shall be carried out in conformity with Clause "D" of Part 3.02 stone installation, and the Contractor shall further allow for the following:-
 - a. Neutralize and seal substrates to receive bedding mortar.
 - b. Maintain installation practices and minimum temperature limits.
 - c. Do not commence grouting for at least 24 hours after placing of stone, unless otherwise instructed by the Engineer.
 - d. Apply the specified grout in accordance with the Engineer directions.
 - e. The finished grout shall be uniform in colour, smooth and without voids, pin holes, gaps, strips or low spots.
 - f. Upon completion of setting and grouting, sponge and wash stone thoroughly diagonally across joints.

3.03 Protection

- A. Stone shall at all times be protected from drippings, welding spatter and damage by other trades during construction. Where necessary or directed, substantial non staining wooden or other approved covering shall be placed to protect the work. Heavy polyethylene film shall be used between stone and wood. Maintain all protection until removed to permit final cleaning of stone work.

3.04 Cleaning

- A. Clean soiled surfaces using non-acidic solution of type which will not harm stone, mortar joint materials, or adjacent surfaces.
- B. Use non-metallic tools in cleaning operations.

3.05 Final Inspection

- A. Finished surfaces shall show no objectionable visual distinction in jointing, bedding, plane, colour, texture, pattern, and finish. All units and stones which in the opinion of the Engineer do not provide the required uniformity shall be relocated, or removed and replaced with new stone units to the satisfaction of the Engineer and at the Contractor's own expense.
- B. All defective stone shall be replaced with new stone units, except that minor damages may be repaired when approved by the Engineer. Repairs, when approved, shall be completed to the satisfaction of the Engineer. When the repairs to stone are unsatisfactory to the Engineer, the stone shall be replaced with new stone. All repairs and all replacements of defective and unsatisfactorily repaired stone shall be performed at the Contractor's own expense.

END OF SECTION

**SECTION 09650
RESILIENT FLOORING****PART 1 GENERAL****1.01 Work Included**

- A. Preparation of substrate surfaces.
- B. Application of vinyl flooring.
- C. Cleaning of all surfaces and areas of work.

1.02 Reference Standards

- A. ASTM F 386-82: Thickness of Resilient Flooring Materials having flat surface, test method for
- B. Resilient Tile Institute: Installation Specifications for Vinyl Composition Floor Tile.

1.03 Samples

- A. Submit samples in accordance with Section 01340.
- B. Include duplicate samples of each color and pattern selected.
- C. Include duplicate 300 mm long samples of base.

1.04 Extra Material

- A. Deliver 100 tiles of each type, color and pattern of floor material required for project, for maintenance use.
- B. Deliver 10 meters of base material for maintenance use.
- C. Clearly identify each box.

PART 2 PRODUCTS**2.01 Acceptable Manufacturers**

- A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

2.01 Acceptable Manufacturers (Contd.)

- B. Substitutions: Items of same function and performance are acceptable in conformance with Section 01630.

2.02 Floor Covering Materials

- A. Vinyl Tiles; Types are as indicated in the Bill of Quantities and as instructed by the manufacturer size and color to be selected by the Engineer.

2.03 Base Materials

- A. Bases: Vinyl 100 mm high.

2.04 Accessories/Adhesives/Sealers

- A. Sub-Floor Filler: White premix latex, mix with water to produce cementitious paste.
- B. Primers and Adhesives: Waterproof; of types recommended by resilient flooring manufacturer for specific material.
- C. Sealer and Wax: Type recommended by resilient flooring material manufacturer for material type and location.

PART 3 EXECUTION**3.01 Site And Substrate Conditions**

- A. Ensure floor surfaces are smooth and flat with maximum variation of 1/960.
- B. Ensure concrete floors are dry maximum 7% moisture content and exhibit negative alkalinity, carbonization or dusting.
- C. Maintain minimum 21 deg C air temperature at flooring installation area for 3 days prior to, during, and for 24 hours after installation.
- D. Store flooring materials in area of application. Allow 3 days for material to reach equal temperature as area.

3.02 Leveling

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- B. Clean floor and apply, trowel and float 10cm thick cement screed and self leveling component screed to leave smooth, flat hard surface. Prohibit traffic until filler is cured.

3.03 Installation - Flooring

- A. Open flooring cartons, enough to cover each area, and mix to ensure shade variations do not occur within any one area.
- B. Clean Substrate: Spread cement evenly in quantity recommended by manufacturer to ensure adhesion over entire area of installation. Spread only enough adhesive to permit installation of flooring before initial set.
- C. Set floor tiles in place, press with roller to ensure full adhesion.
- D. Terminate resilient flooring at centerline of door openings where adjacent floor finish is dissimilar.
- E. Install edge strips at unprotected or exposed edges where flooring terminates.
- F. Scribe flooring to walls, columns, floor outlets and other appurtenances to produce tight joints.

3.04 Installation - Base

- A. Fit joints tight and vertical.
- B. Install base on solid backing. Fix tightly to wall surfaces with adhesive.
- C. Scribe and fit to door frames and other obstructions.
- D. Install straight and level to variation of plus or minus 1/960.

3.05 Protection

- A. Prohibit traffic from floor finish for 48 hours after installation.

3.06 Clean-Up

- A. Remove excess adhesive from floor, base and wall surfaces without damage.
- B. Clean, seal and wax floor and base surfaces in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 09695
CARPETING WITH UNDERLAY**PART 1 GENERAL****1.01 Work Included**

- A. Prepare surfaces to receive carpeting.
- B. Apply carpeting on floor surfaces where indicated, complete with underlay and required accessories.
- C. Install edge strips where carpeting terminates at other flooring finishes.
- D. Install nosings on stair treads.

1.02 Reference Standards

- A. FS DDD-C-1023 - Cushion, Carpet and Rug (Hair Felt and Rubber Coated Jute and or Fiber).

1.03 Samples

- A. Submit samples in accordance with Section 01340.
- B. Submit two samples of each type of carpet to be used, sufficiently sized to clearly indicate construction. In addition, submit one duplicate sample of each color selected.
- C. Also submit one 150 mm long sample of each type of edge stripping to be used.

1.04 Shop Drawings

- A. Submit shop drawings in accordance with Section 01340.
- B. Clearly indicate the location of seams, method of joining seams, direction of carpet, type of adhesive to be used, method of integrating edge strips with carpet and installation procedures.

1.05 Environmental Conditions

- A. Do not commence with carpet installation until painting and finishing work is complete and ceilings and overhead work has been tested, approved and completed.

1.05 Environmental Conditions (Contd.)

- B. Maintain room temperature at minimum 15 degrees C for at least 24 hours prior to installation and relative humidity at approximately that at which the area is to be maintained.
- C. Provide sufficient lighting.

PART 2 PRODUCTS**2.01 Acceptable Manufacturers**

- A. The contractor shall submit to the Engineer the names of three manufactures and their products which will be acceptable under this section, approval of the manufacturer or product must be obtained before proceeding with the associated work.

2.02 Materials

- A. Carpet: Conforming to FS DDD-C-0095.
- B. Carpet Gripper: Type recommended by carpet manufacturer to suit application; complete with attachment devices.
- C. Adhesive: Type recommended by carpet manufacturer to suit application and expected service.
- D. Edge Strips: Brass type; size 30 X 5 mm thick; selected by the Engineer.

PART 3 EXECUTION**3.01 Preparation Of Surfaces**

- A. Clean floors of dust, dirt, solvents, oil, grease, paint, plaster and other substances which would be detrimental to the proper performance of adhesive and carpet. Allow floors to thoroughly dry.
- B. Ensure floors are level with maximum surface variation of 1/480, non-cumulative.

3.02 Installation Of Underlay

- A. Install underlay using maximum sized pieces. Securely adhere to sub-floor. Lay out underlay so that carpet seams will not fall directly over seams.
- B. Butt edges firmly together and tight to edge of carpet gripper. Tape all joints.

3.02 Installation Of Underlay (cont'd)

- C. Remove air pockets and ridges and slightly stretch. Anchor securely around projections and contours.

3.03 Installation Of Carpet

- A. Lay out rolls of carpet full for the Engineer's approval.
- B. Check matching of carpet before cutting and ensure there is no visible variation between dye lots.
- C. Cut carpet, where required, in a manner to allow proper seam and pattern match. Ensure cuts are straight and true and unfrayed.
- D. Where possible and practical, locate seams in areas of least amount of traffic.
- E. Join seams in recommended manner and so as not to detract from the appearance of the carpet installation and decrease its life expectancy. Ensure seams are straight, not overlapped or peaked and free of gaps.
- F. Lay carpet on floors with run of the pile in same direction of anticipated traffic.
- G. Do not change run of pile in any one room or from one room to next.
- H. Cut and fit carpet neatly around projections through floor and to walls and other vertical surfaces. Where wall bases are scheduled, cut carpet 6.4 mm from walls to allow for possible re-stretching. Fit carpet snugly to walls or other vertical surface where no base is scheduled, leaving no gaps.
- I. Do not place heavy objects such as furniture on carpeted surfaces for minimum 24 hours or until adhesive has set.
- J. Entire carpet installation is to be laid tight and flat to sub-floor, well fastened at edges and present a uniform pleasing appearance. Ensure monolithic color, pattern and texture match within any one area.
- K. Install edging strips where carpet terminates at other floor coverings. Use full length pieces only. Butt tight to vertical surfaces. Where splicing cannot be avoided, butt ends tight and flush.

END OF SECTION

SECTION 09900
PAINTING**PART 1 GENERAL****1.01 Work Included**

- A. Prepare surfaces which are to receive finish.
- B. Supply and apply paint finish in accordance with the finishing schedule.
- C. Spot priming and painting of materials delivered to the site, factory finished.
- D. Stopping and filling where necessary.
- E. Knotting.
- F. Emulsion paint on rendered/plastered and fair-face concrete surfaces, internally
- G. Oil paint and varnish to woodwork.
- H. Gypsum Boards Paint
- I. Epoxy Paint for concrete surfaces.
- J. Exterior grade finishing to external wall panels and other concrete and masonry surfaces.

1.02 Related Work

- A. Section 05500: Miscellaneous Metals
- B. Section 05520: Hand Rails and railings.
- C. Section 06200: Finish carpentry
- D. Section 08110: Steel Doors & Frames.
- E. Section 08210: Wood Doors and Frames.
- F. Section 09220: Portland Cement Plaster
- G. Section 09260: Gypsum Board System.

1.03 Mock-Up

- A. Before proceeding with paint application, finish one complete surface of each color scheme required, clearly indicating selected colors, finish texture, materials and workmanship.
- B. If approved, sample area will serve as a minimum standard for work throughout building.

1.04 Samples

- A. Prepare 500 mm x 100 mm samples of finishes when requested by Engineer. When possible, apply finishes on identical type materials to which they will be applied on job.
- B. Identify each sample as to finish, formula, color name and number and sheen name and gloss units.
- C. Colors to be selected by Engineer prior to commencement of work.

1.05 Maintenance Materials

- A. Leave on Premises, where directed by Engineer, not less than one (1) five liter can of each color used.
- B. Containers to be tightly sealed and clearly labeled for identification.

1.06 Delivery, Storage And Handling

- A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation and instructions for mixing and/or reducing.
- B. Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 7 degrees C in well ventilated area.
- C. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 Environmental Conditions

- A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below following maximums:
 - 1) Plastered surfaces: 12%
 - 2) Masonry, concrete and concrete block: 12%.
- B. Ensure surface temperatures or the surrounding air temperature is above 5 degrees C before applying finishes. Minimum application temperatures for latex paints for interior work is 7 degrees C and 10 degrees C for exterior work.
- C. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 7 degrees C for 24 hours before, during and 48 hours after application of finishes.

1.08 Protection

- A. Before painting is commenced floors shall be swept and washed over; surfaces to be painted shall be cleaned before applying paint as specified, and all precautions taken to keep down dust whilst work is in progress.
- B. No paint shall be applied to surfaces structurally or superficially damp and all surfaces must be ascertained to be free from condensation efflorescence, etc. before the application of each coat.
- C. No painting shall be carried out externally during humid, rainy, damp foggy or freezing conditions, or conditions where surfaces have attained excessively high temperatures or during dust storms.
- D. No new, primed or undercoat woodwork and metalwork shall be left in an exposed or unsuitable situation for an undue period before completing the process.
- E. No dilution of paint materials shall be allowed unless stated otherwise and except strictly as detailed by the manufacturer's own direction, either on the containers, or their literature, and with the special permission of the Engineer. For external work dilution of paints will not be allowed whatsoever. For internal work, where permitted by the Engineer, undercoats may be thinned by the addition of not more than 5% thinners. Gloss finish shall not be thinned at all.
- F. Metal fittings such as ironmongery, etc., not required to be painted shall first be fitted and then removed before the preparatory process are commenced. When all painting is completed the fittings shall be cleaned as necessary and refixed in position.

1.08 Protection (cont'd)

- G. New concrete shall be allowed to age a minimum of 28 days prior to coating application. The surface must then be chemically treated or sweep blasted to remove the laitance layer. The PH of the concrete surface should be within the 6.8 - 8.0 range for safe coating application. If the surface PH is outside this range, the fresh water rinse should be repeated until PH is within the required range.
- H. Plaster work shall be prepared by removing all loose friable materials by wire brushing/sanding. Surfaces are to be cleaned to remove dust, dirt, oil grease, etc.
- I. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.
- J. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.
- K. Place cotton waste, cloths and material which may constitute a fire hazard in closed metal containers and remove daily from site.
- L. Remove electrical plates, surface hardware, fittings and fastenings, prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvent to clean hardware that may remove permanent lacquer finish.

1.09 Guarantee/Warranty

- A. All warranties/guarantees to be issued by the Supplier, Manufacturers and Sub-Contractors shall be countersigned by Main Contractor and both of them will be liable for repair/replace the items/works, etc., during the warrantee/guarantee period.

PART 2 PRODUCTS**2.01 Acceptable Manufacturers**

- A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.
- B. Substitutions: Items of the same function and performance are acceptable in accordance with Section 01630.

2.02 Materials

- A. Powder coated paint, Varnish, Stain, Enamel, clear Lacquer, Polyurethane, Dico and Fillers: Type and brand or equivalent products, approved by Engineer.
- B. Paint Accessory Materials: (Linseed oil, shellac, turpentine and other materials not specifically indicated herein but required to achieve the finishes specified) of high quality and approved manufacturer.
- C. Paints: Ready-mixed except field catalyzed coatings. Pigments fully ground maintaining a soft paste consistency, capable of readily and uniformly dispersed to a complete homogeneous mixture.
- D. Paints to have good flowing and brushing properties and be capable of dry or curing free of streaks or sags.
- E. Powder coated paint shall be applied as recommended by the manufacturer for metal work.

PART 3 EXECUTION**3.01 Inspection**

- A. Thoroughly examine surfaces scheduled to be painted prior to commencement of work. Report in writing to Engineer, any condition that may potentially affect proper application. Do not commence until such defects have been corrected.
- B. Correct defects and deficiencies in surfaces which may adversely affect work of this section.
- C. No priming coats shall be applied until the surface have been inspected and the preparatory work has been approved by the Engineer. No undercoats or finishing coats shall be applied until the previous coat has been similarly inspected and approved.

3.02 Preparation Of Surfaces

- A. Remove mildew, by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry completely.
- B. Remove surface contamination from aluminum surfaces requiring a paint finish by steam, high pressure water or solvent washing. Apply etching primer or acid etch. Apply paint immediately after acid etching.
- C. Remove dirt, oil, grease and sand if necessary to provide adhesion key, when asphalt, creosote or bituminous surfaces require a paint finish. Apply latex based compatible sealer or primer.

3.02 Preparation Of Surfaces (cont'd)

- D. Remove dirt, grease and oil from canvas and cotton insulated coverings.
- E. Remove contamination, acid etch and rinse new concrete floors with clear water. Ensure required acid-alkali balance is achieved. Allow to thoroughly dry.
- F. Remove contamination from copper surfaces requiring paint finish by steam, high pressure water or solvent washing. Apply vinyl etch primer or acid etch. Apply paint immediately after acid etching.
- G. Remove surface contamination and oils from galvanized surfaces and wash with solvent. Apply coat of etching type primer.
- H. Remove surface contamination and oils from zinc coated surfaces and prepare for priming in accordance with metal manufacturer's recommendations.
- I. Remove dirt, loose mortar, scale, powder and other foreign matter from concrete and concrete block surfaces which are to be painted or to receive a clear seal. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to thoroughly dry.
- J. Remove stains from concrete and concrete block surfaces caused by weathering of corroding metals with a solution of sodium meta silicate after being thoroughly soaked with water. Allow to thoroughly dry.
- K. Fill hairline cracks, small holes and imperfections on plaster surfaces with patching plaster. Smooth off to match adjacent surfaces. Wash and neutralize high alkali surfaces where they occur.
- L. Remove grease, rust, scale, dirt and dust from steel and iron surfaces. Where heavy coatings of scale are evident, removed by wire brushing, sandblasting or any other necessary method. Ensure steel surfaces are satisfactory before paint finishing.
- M. Clean unprimed steel surfaces by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Prime surfaces to indicate defects, if any. Paint after defects have been remedied.
- N. Sand and scrape shop primed steel surfaces to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime steel including shop primed steels.
- O. Wipe off dust and grit from miscellaneous wood items and millwork prior to priming. Spot coat knots, pitch streaks and sappy sections with sealer. Fill nail holes and cracks after primer has dried and sand between coats. Back prime interior and exterior woodwork.

3.03 Paint Application

- A. Each coat of paint shall be so applied as to produce a film of uniform thickness. All paint shall be applied in accordance with the manufacturer's instructions. Special attention shall be given to ensure that all surfaces including edges, corners, crevices, welds and rivets receive a film thickness equivalent to that of adjacent painted. Surfaces paint to plaster is to brush applied.
- B. Each coat of paint is to be slightly darker than preceding coat unless otherwise approved by Engineer.
- C. Sand lightly between coats to achieve required finish.
- D. Do not apply finishes on surfaces that are not sufficiently dry.
- E. Heated Surfaces :
 - 1. Heated surfaces such as radiators and pipes shall remain cold until each coat applied is completely dry.
- F. Drying :
 - 1. All coats shall be thoroughly dried before succeeding coats are applied. Allow a minimum of 24 hours between application on any one surface, unless otherwise specified by the manufacturer.
- G. Plastered Surfaces :
 - 1. Plastered surfaces shall be rubbed down smooth and any cracks cut out and filled. The Contractor shall also apply one coat of Tropoline Putty Filler to the plastered surface prior to the application of paint to provide an absolutely smooth surface.
- H. Unprimed Woodwork :
 - 1. Unprimed woodwork scheduled to be painted shall be rubbed down with abrasive paper and dusted off. Care shall be taken to prevent 'burnishing' of the surface. All knots and resinous areas shall be coated with two coats of knotting. Pitch on large, open unseasoned knots and all other beads or streaks of pitch shall be scraped off, or if still soft, shall be removed with white spirit, before applying the knotting. Apply one coat priming to all surfaces, two coats grained ends, to all, to be subsequently painted. Backs of all wood frames in contact with concrete, brickwork, blockwork and metal work or similar materials shall be primed before fixing. After priming all joints, holes cracks shall be stopped and filled, rubbed down and dusted off.

3.03 Paint Application (cont'd)

2. The primer for non-resinous wood shall be low lead oil based primer to B.S 5358 or aluminum wood primer to B.S. 4576.
 3. The primer for resinous wood shall be aluminum wood primer to B.S. 4576.
- I. Primed Woodwork:
1. Woodwork delivered primed shall be lightly rubbed down with abrasive paper, and dusted off. Touch up bare areas with a similar priming including open grained ends. After touch priming all joints, holes, cracks and open grained ends the woodwork shall be stopped and filled, rubbed down and dusted off.
- J. Plywood And Blockboard :
1. Edges of exterior plywood and blockboard shall be sealed with two coats of aluminum primer and the backs treated with a lead primer.
- K. Clear Finished Woodwork :
1. All woodwork scheduled to receive a clear finish shall be well sanded with the grain removing all dirt, etc., to give as smooth a surface as possible. resinous timber shall be swabbed down with White Spirit and dried thoroughly. Split or end grain shall be filled with suitable filler recommended by the clear lacquer manufacturer, in accordance with their instructions, and of the appropriate shade.
- L. Colors :
1. The colour will be selected by the Employer and/or the Engineer from the paint manufacturer's standard colour range.
- M. Protection:
1. Proper care must be taken to protect surfaces while still wet by the use of screens, and 'wet paint' signs where necessary.
- N. Damage:
1. Care must be taken when preparing surfaces, or painting, etc. not to stain or damage other work. Dust sheets and covers to the satisfaction of the Engineer shall be used to protect adjacent work. Any such stains or damage shall be removed and made good at the Contractor's expense.

3.03 Paint Application (cont'd)**O. Cleanliness:**

1. All brushes, tools, pails, kettles and equipment shall be clean and free from foreign matter. They shall be thoroughly cleaned after use and before being used for different color's types or classes or material. Painting shall not be carried out in the vicinity of other operations that may cause dust. Waste liquids, oil soaked rag, etc., shall be removed from the building each day. Waste liquids shall not be thrown down any sanitary fittings or drains.

P. Performance:

1. If, while the work is in progress, the paint appears to be faulty, such as consistency of colour, drying time or quality of finish, the work shall be stopped at once and the manufacturer consulted.
2. The manufacturer of the materials shall be given every facility for inspecting the work during progress in order to ascertain that the materials are being used in accordance to their directions, and to take samples of their products from the site if they so desire for tests.
3. The finishing coats of the various paints or surface finishing shall be free from sags, brush marks, runs, wrinkling, dust, bare or 'starved' patches, variations in colour and texture, and other blemishes.
4. When the work has been completed, the finished surfaces shall not be inferior in quality, colour and finish to the samples approved by the Engineer, and imperfections in manufacture shall not be apparent through these finished surfaces. In the event the Engineer is not satisfied with the quality of finish (does not comply with the required standards and/or the sample panel) the Contractor will be required to repaint at his own expense, such work to the satisfaction of the Engineer. In the opinion of the Engineer it is necessary to remove completely the unsatisfactory paint work this shall also be done under the direction of the Engineer at the expense of the Contractor.

Q. Emulsion Paints And Undercoats (Based On the approved manufacturer's written instructions and recommendations):

1. The internal paint finish to rendered walls and for fair face concrete ceilings and/or gypsum board ceilings shall be as follows and of colour as selected by the Engineer:
 - a) Apply two coats of primer coat (vinyl primer sealer) at the rate of 40m² per gallon.
 - b) Spot putty and spot prime
 - c) apply two coats of putty filler
 - c) Apply 1st coat of emulsion paint at the rate of 35m² per gallon.
 - d) Apply 2nd coat of emulsion paint at the rate of 30-35 m² per gallon.
 - e) Sand down between coats.

3.03 Paint Application (cont'd)

R. The internal partitions finish to gypsum partitions, shall be of "Special" coat paint and shall be as follows and of color as selected by the Engineer.

1. Remove dirt and grease on the surface and the surface should be kept dry.
2. apply two coats of primer coat (Special Paint) at the rate of 11.3 m²/l/coat
3. apply two coats of intermediate coats at the rate of 13.2m³/l/coat
4. apply one coat of top coat (Special) at the rate of 3.3m²/l/coat.

S. Epoxy Paint Application

1. For Walls & Ceiling

- a. Surface must be free of particles, moisture and other contaminates prior to any coating.
- b. Walls and ceilings to receive epoxy coating shall be cured by a non degrading membrane -forming liquid resin base which can be used, also as a primary coat.
- c. Apply two coats of a two component water base epoxy finish with outstanding abrasion resistance with the following specifications:

| | | |
|-----------------------------|---|-----------------------|
| Dry Film Thickness (micron) | : | 150-200mic./two coats |
| volume Solids's | : | 50% |
| Re-Coat time | : | 10-48 hrs. at 25°C |
| Specific Gravity | : | 1.10 |
| Service Temperature | : | 60°C |

T. Wood Surface :

1. The gloss finish /eggshell finish oil paint shall be as follows:
 - a. Primer cost pink wood primer or linseed oil.
 - b. Enamel undercoat.
 - c. One full coat of oil based putty.
 - d. Enamel under coat.
 - e. 1st coat eggshell or gloss finish.
 - f. 2nd coat eggshell or gloss finish.

3.03 Paint Application (cont'd)

U. Metal Surfaces Other Than Aluminum:

1. Primer coat: zinc chromate primer
2. Enamel under coat.
3. 1st coat eggshell or gloss finish.
4. 2nd coat eggshell or gloss finish.

V. Lead Based Paints :

1. The use of lead based paints will not be permitted.

W. Exterior Concrete Surfaces

1. System "A" Smooth Surfaces.
 - a. Primer coat acrylic Filler at the rate of 45 M2 per gallon.
 - b. 1st coat Acrylic Emulsion at the rate of 35 M2 per gallon.
 - c. 2nd coat Acrylic Emulsion at the rate of 35 M2 per gallon.
2. System "B" Textured Surfaces
 - a. Primer coat Acrylic Block Filler at the rate of 35 M2 per gallon.
 - b. Acrylic Textured coating at the rate of 1 to 1.2 Lt. per square meter, type of paint shall be approved by the Engineer before proceeding with associated work..
 - c. The surface to be coated shall be deemed to be in accordance with the manufacturers recommendations and shall be free from agents which may affect the adhesion of the surface coating.
 - d. All fragile or loose matter on surface of concrete is to be removed prior to coating to provide a hard and stable base. All cement burrs, efflorescence, cement powder and the like shall be removed by scraper, sand paper or wire brush.
 - e. The coating shall be applied in accordance with the manufacturers printed instructions.
 - f. Application of paint shall not be carried out when winds or rain.
 - g. Thinners shall only be permitted to be used in accordance with the manufacturers written instructions, and shall be of a type recommended by the manufacturer.
 - h. Sealers, bases and hardeners shall be thoroughly mixed in the exact proportions as specified by the manufacturer, and shall be mixed in clean containers specifically for the sole use of the coating.

3.03 Paint Application (cont'd)**X. Varnish :**

1. The varnish shall be obtained from approved manufacturer.
2. The first coat shall be applied by brush to obtain saturation. Final coats may be applied by brush or by spray.

Y. Knotting :

1. Knotting shall comply with B.S 1336.

Z. White Spirit :

1. The white spirit shall comply with Bs 245.

AA. Timber Stain :

1. Timber stain shall be oil based pigment stain.

AB. Stopping :

The stopping shall be as follows:

1. Fair faced concrete and plaster work shall be external Grade Koppers Acrylic filler at the rate of 45M2 per gallon.
2. Rough faced concrete and blockwork shall be similar material to the background and finished in a similar texture.
3. Internal woodwork, plywood and blockboard shall be putty complying with B.S. 544.
4. External woodwork shall be white lead paste complying with B.S. 2521.
5. Internal clear wood finishes: the stopping shall be that recommended by the varnish manufacturer.

AC. Fillers :

1. The fillers for internal joinery shall be the type recommended by the paint manufacturer for use with his type of paint or lacquer.
2. Stoppers and fillers shall be tinted to match the undercoat, and shall be compatible with both undercoats and primers.
3. All materials shall be used strictly in accordance with the manufacturer's instructions.

3.03 Paint Application (cont'd)**AD Brushwork:**

1. Unless otherwise specified by the manufacturer all primers and undercoats shall be stopped flush and rubbed down to a smooth surface with an abrasive paper and all dust removed before each succeeding coat is applied. Care shall be taken to prevent burnishing of the surface.
2. The stopping/filling shall be applied by spatula or putty knife.

3.04 Mechanical And Electrical Equipment

- A. Refer to mechanical and electrical sections with respect to painting and finishing requirements, color coding identification banding of equipment, ducting, piping and conduit.
- B. Remove grilles, covers and access panels for mechanical and electrical systems from location and paint separately.
- C. Finish paint primed equipment to color selected.
- D. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with a pre-finished coating.
- E. Replace identification markings on mechanical or electrical equipment when painted over or spattered.
- F. Paint interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed immediately behind louvers, grilles, convector and baseboard cabinets to match face panels.
- F. Paint exposed conduit and electrical equipment occurring in finished areas. Color and texture to match adjacent surfaces.
- H. Paint both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.
- I. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated. Color banding and identification (flow arrows, naming, numbering, etc.)

3.05 Cleaning

- A. As work proceeds and upon completion, promptly remove paint where spilled, splashed or spattered.
- B. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Upon completion of work leave premises neat and clean, to the satisfaction of Engineer.

END OF SECTION