

**PART 1 - GENERAL**

**1.1 GENERAL REQUIREMENTS**

- .1 Comply with requirements of Division 1.

**1.2 RELATED WORK**

- .1 Section 06 10 00: Rough Carpentry.
- .2 Section 07 21 00: Building Insulation.
- .3 Section 07 92 00: Joint Sealing.
- .4 Section 09 22 16: Non-Structural Metal Framing.
- .5 Section 09 91 00: Interior Painting.
- .6 Mechanical and Electrical Divisions: Supply of access doors.

**1.3 DEFINITION**

- .1 Drywall = gypsum board.

**1.4 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM C475 / C475M - 12, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  - .2 ASTM C514 / C475M – 04(2009e1), Standard Specification for Nails in the Application of Gypsum Board.
  - .3 ASTM C840 - 13, Standard Specification for Application and Finishing of Gypsum Board.
  - .4 ASTM C954 - 11, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
  - .5 ASTM C1002-07 (2013), Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
  - .6 ASTM C1047-14a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
  - .7 ASTM C1396 / C1396M - 14, Standard Specification for Gypsum Wallboard.
  - .8 ASTM C1629 / C1629M - 14a, Standard Classification for Abuse Resistant Nondecorated Interior Gypsum Panel Products and Fibre Reinforced Cement Panels.
- .2 Association of the Wall and Ceilings Industries International (AWEI).
- .3 Underwriters' Laboratories of Canada (ULC).
  - .1 CAN/ULC-S102-10, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

## 1.5 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product data: Submit manufacturer's instructions, printed product literature and data sheets for gypsum board types specified herein. Include product characteristics, performance criteria, physical size, finish and limitations.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's recommendations.
- .2 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.
- .3 Storage and Handling Requirements:
  - .1 Store gypsum board assemblies materials level, off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
  - .3 Protect from weather, elements and damage from construction operations.
  - .4 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.
- .4 Damaged and broken panels are not to be incorporated into the work. Replace defective or damaged materials with new.

## 1.7 AMBIENT CONDITIONS

- .1 Apply gypsum board after building has been completely enclosed. Ensure that work to be concealed by gypsum board has been installed, tested reviewed and approved before starting work.
- .2 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.
- .3 Apply board and joint treatment to dry, frost free surfaces.
- .4 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

## 1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .4 Divert unused gypsum from landfill to recycling facility for disposal approved by Departmental Representative.
- .5 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Gypsum Board - Standard (Type 1): to ASTM C1396 / C1396M, regular, 16 mm thick where indicated, 1220 mm wide x maximum practical length, ends square cut, edges tapered.
- .2 Gypsum Board - Fire Rated (Type 2): to ASTM C1396 / C1396M, Type "X", 16 mm thick, 1220 mm x maximum practical length, ends square cut, edges tapered.
- .3 Gypsum Board - High Impact Resistant (Type 3): to ASTM C1629 / C1629M, abuse and high impact resistant board, fibre-reinforced gypsum with fiberglass mesh reinforcement layer on backside of wallboard panels, 16mm thick, 1220 mm wide x maximum practical length, ends square cut, edges tapered.
- .4 Gypsum Board – Moisture Resistant Board (Type 4): to ASTM C1396 / C1396M, regular, 16mm thick, and Type X, 16 mm thick, 1220 mm x maximum practical length, ends square cut, edges tapered.
- .5 Plywood: as specified in Section 06 10 00 – Rough Carpentry.
- .6 Acoustic Insulation: as specified in Section 07 21 00 – Building Insulation.
- .7 Acoustic Sealant: as specified in Section 07 92 00 – Joint Sealing.
- .8 Metal furring runners, hangers, tie wires, inserts, anchors: to CSA A82.30, hot dipped galvanized (wipe coat) to ASTM A525.
- .9 Furring channels: 0.5 mm. core thickness galvanized steel channels for screw attachment of gypsum board.
- .10 Resilient furring: 0.5 mm base steel thickness galvanized steel channels for screw attachment of gypsum board.
- .11 Corner beads: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, beaded angle with perforated flanges, # D-100-90° drywall corner bead by Bailey Metal Products or approved equal.

- .12 Casing beads / channel trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, channel shaped; beaded corners, # 4411 channel trim by Bailey Metal Products or approved equal.
- .13 Metal Trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, # D-200 drywall metal trim by Bailey Metal Products or approved equal.
- .14 Cornice cap: 12.7 mm deep x partition width, of 1.6 mm base thickness galvanized sheet steel, prime painted. Include splice plates for joints.
- .15 Hangers: minimum 3 mm. galvanized steel wire.
- .16 Screws: to ASTM C1002, self-drilling, self-tapping, case hardened.
- .17 Joint compound: to ASTM C475, asbestos-free, as recommended by board manufacturer.
- .18 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm. wide, with self sticking permanent adhesive on one face, lengths as required.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- .1 Verify conditions of substrates previously installed under other Sections are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
- .2 Visually inspect substrate in presence of Departmental Representative. Inform Departmental Representative in writing of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and receipt of written approval to proceed from Departmental Representative.

### **3.2 ERECTION**

- .1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.
- .2 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840, except where specified otherwise.
- .3 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .4 Install work level to tolerance of 1:1200.

- .5 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers and grilles.
- .6 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .7 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .8 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .9 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.
- .10 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Check clearances with equipment suppliers.
- .11 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

### 3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work is approved by Departmental Representative.
- .2 Apply single or double layer gypsum board to metal furring or framing using screw fasteners for first layer, laminating adhesive or screw fasteners for second layer. Maximum spacing of screws 300 mm on centre.
  - .1 Single-Layer Application:
    - .1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.
    - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .3 Ceilings: install gypsum board perpendicular to supports, stagger end joints at least 250 mm. over supports.
- .4 Water-resistant gypsum board: apply water-resistant sealant to edges, ends, and cut-outs which expose the gypsum core and to fastener heads.
- .5 Acoustic partitions: apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partition to seal gypsum board / structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, and other penetrations in partitions where perimeter sealed with acoustic sealant.
- .6 Install gypsum board on walls vertically to avoid end-butt joints.
- .7 Install gypsum board with face side out.
- .8 Do not install damaged or damp boards.

- .9 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

### **3.4 INSTALLATION**

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre using contact adhesive or screw fasteners for full length.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Cut and fit gypsum board as required to accommodate other work.
- .4 Unless otherwise shown or specified, extend gypsum board on both sides of partitions to underside of structure above.
  - .1 Fasten gypsum board to studs, not to top channel.
  - .2 Allow for 25 mm deflection.
  - .3 Fasten gypsum board to supports with screws spaced at maximum 305 mm o.c.
- .5 Fasten gypsum board to supports with screws spaced at maximum 305 mm. o.c.
- .6 Provide casing beads at top of all exposed partitions, around openings, where gypsum board abuts dissimilar material and construction, where gypsum board butts against surfaces having no trim concealing junction and where indicated. Provide corner beads at external corners. Seal joints with sealant.
- .7 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .8 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.
- .9 Locate control joints where indicated and at changes in substrate construction.
- .10 Install control joints straight and true.
- .11 Install cornice cap where gypsum board partitions do not extend to ceiling.
- .12 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
- .13 Splice corners and intersections together and secure to each member with 3 screws.

- .14 Install access doors supplied by mechanical and electrical divisions to electrical and mechanical fixtures specified in respective sections. Rigidly secure frames to furring or framing systems, build doors into gypsum board elements flush and parallel to walls.
- .15 Tape and fill exposed joints, fastener heads, edges, corners, to produce an acceptable surface ready for finishing.
- .16 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces minimum 200 mm.
- .17 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .18 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
- .19 Sand lightly to remove burred edges and other imperfections. Sand each coat of topping compound with fine sandpaper as required to produce smooth surface. Do not sand paper face of gypsum board.
- .20 Finish concealed joints at fire rated and at acoustically insulated gypsum board elements to underside of metal deck. Provide tape and one coat of cement.
- .21 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .22 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.
- .23 Mix joint compound slightly thinner than for joint taping.
- .24 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .25 Allow skim coat to dry completely.
- .26 Remove ridges by light sanding or wiping with damp cloth.
- .27 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.
- .28 Provide control joints where shown on Drawings and where gypsum board assemblies abutt dissimilar construction. Stop gypsum board 6 mm from abutting construction at dissimilar building elements.

### 3.5 SOUND CONTROL

- .1 Partitions:
  - .1 Provide acoustical insulation in gypsum board partitions as indicated on Drawings. Unless otherwise noted, fill stud space with acoustic insulation.
  - .2 Provide 2 bead caulking system around horizontal and vertical perimeters of partitions. Apply continuous sealant beads at each side of horizontal runner tracks and vertical end studs, between gypsum board and adjacent construction.
  - .3 Caulk around objects such as electrical outlets, light switches, electrical and mechanical panels and boxes, grilles and other objecting penetrating the partition. Caulk behind metal control joint sections.
  - .4 Provide compressible closed cell neoprene closures to fill metal deck flutes where sound rated non-fire rated partitions abut metal deck.

### 3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .2 Leave work clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

### 3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

### 3.8 GYPSUM BOARD SCHEDULE

- .1 Use 16 mm thick Type 'X' gypsum board (Type 2) at fire rated assemblies and elements.
- .2 Acoustic partitions: where indicated on drawings.
- .3 Partitions: Refer to Interior Partition Types Schedule on Architectural Drawing A2.0 for gypsum board types.

- .4 Ceilings:
  - .1 Use 13 mm thick Standard gypsum board (Type 1) at suspended ceiling assemblies in office environments, storage rooms and where indicated on drawings.
  - .2 Use 13 mm thick Water-Resistant gypsum board (Type 4) at suspended ceiling assemblies and bulkheads in Residential Area laundry rooms, washrooms and shower room ceilings.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 GENERAL REQUIREMENTS**

- .1 Comply with requirements of Division 1.

**1.2 RELATED SECTIONS**

- .1 Section 07 21 00: Building Insulation.
- .2 Section 07 92 00: Joint Sealing.
- .3 Section 09 21 16: Gypsum Board Assemblies.

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM C645-13, Specification for Nonstructural Steel Framing Members.
  - .2 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .2 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-1.40, Primer, Structural Steel, Oil Alkyd Type.

**1.4 QUALITY ASSURANCE**

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Fire rated assemblies: where indicated, provide materials and construction which are identical to those indicated in the fire-rated test design designation.

**1.5 DELIVERY HANDLING AND STORAGE**

- 1. Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- 2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- 3. Storage and Handling Requirements:
  - .1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect metal framing from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## 1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Non-load bearing channel stud framing: to ASTM C645, stud size as indicated on drawings, roll formed from 0.53 mm (25 Ga.) and 0.91 mm (20 Ga.) thickness as indicated on drawings, hot dipped galvanized steel sheet, for screw attachment of gypsum board.
  - .1 Knock-out service holes at 460 mm centres.
- .2 Top track: two piece nesting tracks to ASTM C645, 0.91 mm (20 Ga) thick, in widths to suit stud sizes. Top track: 65 mm flange height. Nesting track: 75 mm flange height.
- .3 Floor tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.
- .4 Metal rough furring members: 38 x 19 x 1.4 mm size and 19 x 12 x 1.4 mm thick cold rolled steel, galvanized steel wire.
- .5 Metal channel stiffener: J-profile, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating, sized to suit channel stud size.
- .6 Resilient furring channels: semi-hat shape with only one flange for anchorage, depth as indicated.
- .7 Rigid furring channels: hat shape to ASTM C645.
- .8 Hangers: minimum 3 mm galvanized steel wire.
- .9 Screws: to CAN/CSA-A82.31, self-drilling, self tapping, case hardened.
- .10 Acoustical sealant: as specified in Section 07 92 00 – Joint Sealing.
- .11 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

- .12 Dampproof course: closed cell, polyethylene foam, 6.3 mm thick, 89 mm wide.

## **PART 3 - EXECUTION**

### **3.1 FRAMING – GENERAL**

- .1 Framing and furring indicated on drawings are schematic and shall not be considered exact or complete. Location and spacing of members, bracing, supports and securement shall be in accord with referenced standards as required to provide complete and finished work.
- .2 Execute work neatly and accurately to provide plumb, true and square lines to fit the perimeter edges of adjacent work.
- .3 Coordinate work with installation of door frames, metal screens / windows, special supports or anchorage and wood blocking for Work installed under other sections. Reinforce wall studs at jambs as required. Ensure wood blocking and plywood sheathing is installed before applying gypsum board.
- .4 Make provisions for supporting recessed and surface mounted fixtures and equipment. Provide additional framing, supports and stiffeners as required. Neatly frame around recessed fixtures and openings.
- .5 Examine Mechanical and Electrical drawings and co-ordinate Work of this section with Mechanical Divisions 21, 22, 23 and 25 and Electrical Divisions 26, 27 and 28 to determine openings required.

### **3.2 ERECTION - PARTITIONS**

- .1 Install wall furring for gypsum board wall finishes in accordance with CAN/CSA-A82.31, except where specified otherwise.
- .2 Provide maximum deflection of  $L/240$ , L being the space between supports.
- .3 Align partition tracks at floor and ceiling and secure at 600 mm o.c. maximum.
- .4 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .5 Place metal studs vertically at 400 mm on centre maximum, unless indicated otherwise.
- .6 Extend studs to underside of structural deck above, unless indicated otherwise.
- .7 At partition corners, extend one runner channel to end of corner and butt other runner channel; allow clearance for gypsum board thickness – do not mitre channel runner.
- .8 Place studs vertically at centres noted and not more than 50 mm from abutting walls. Position studs in tracks at floor and ceiling.

- .9 Securely attach studs to bottom runner track by screwing on both sides of stud.
- .10 Erect metal studding to tolerance of 1:1000.
- .11 Do not fasten studs to top track. Position stud screw fasteners at nesting track to allow up to 25 mm movement. Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
- .12 Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .13 Stiffen partitions over 2400 mm in height at mid-point with at least one 19 mm horizontal bracing channel extending full height of partition.
- .14 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, using column clips or other approved means of fastening placed alongside frame anchor clips.
- .15 Install additional studs as required at partition intersections, openings and terminations.
- .16 Erect track at head of door / window openings and sills of sidelight / window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .17 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .18 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .19 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .20 Provide 40 mm stud, metal backing plate or special metal shapes secured between studs as required for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, grab bars and towel rails, toilet partitions, wall-hung casework, handrail brackets, and other items attached to metal stud partitions.
- .21 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .22 Furr duct shafts, beams, columns, pipes and exposed services and other conditions where indicated on drawings.
- .23 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use double track slip joint.

- .24 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.
- .25 At sound control partitions, install resilient furring channels transverse to framing members where indicated. Start rows of channels 50 mm up from floor and space rows at maximum 610 mm o.c. Locate splices over framing and secure channel ends to framing.

### **3.3 ERECTION – CEILINGS, BULKHEADS AND COVES**

- .1 Erect suspension and furring system level with a maximum tolerance of (+/-) 3 mm over a 3000 mm length.
- .2 Suspension system shall support ceiling assemblies, with maximum deflection of L/240, L being the span between supports.
- .3 Hangers for suspended ceilings shall support grillage independent of walls, columns, pipes and ducts. Space hangers at maximum 1200 mm o.c. along rough furring members and not more than 150 mm from ends.
- .4 Space furring channels transverse to runner channels at maximum 400 mm o.c. and secure to each support with clip or saddle tie with 2 loops of wire. Install furring channels so as not to contact perimeter walls.
- .5 Frame bulkheads and cover to profiles shown, rigid, square, true to line and securely fastened to supporting building elements.
- .6 Space furring members to receive gypsum board at maximum 400 mm o.c.
- .7 Provide rough framing and bracing members as required to ensure stability and accuracy of work.
- .8 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.

### **3.4 CLEANING AND PROTECTION**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by work of this Section.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 GENERAL REQUIREMENTS**

- .1 Comply with requirements of Division 1.

### **1.2 RELATED SECTIONS**

- .1 Section 07 92 00: Joint Sealing.
- .2 Section 09 21 16: Gypsum Board Assemblies.
- .3 Section 09 65 16: Resilient Sheet Flooring.
- .4 Section 09 65 19: Resilient Tile Flooring.

### **1.2 REFERENCES**

- .1 American National Standards Institute (ANSI) / Ceramic Tile Institute (CTI)
  - .1 ANSI A108.1 - 99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).
  - .2 CTI A 118.3-92, Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).
  - .3 CTI A118.4-92, Specification for Latex Cement Mortar (included in ANSI 108.1).
  - .4 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI 108.1).
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C144-04, Specification for Aggregate for Masonry Mortar.
  - .2 ASTM C207-06, Specification for Hydrated Lime for Masonry Purposes.
  - .3 ASTM C847-06, Specification for Metal Lath.
  - .4 ASTM C979-05, Specification for Pigments for Integrally Coloured Concrete.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 71-GP-22M-78, Adhesive, Organic, for Installation of Ceramic Wall Tile.
  - .2 CAN/CGSB-75.1-{M88}, Tile, Ceramic.
  - .3 CAN/CGSB-25.20-95, Surface Sealer for Floors.
- .4 Canadian Standards Association (CSA International)
  - .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
  - .2 CAN/CSA-A3000-03(R2006), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .5 Terrazzo Tile and Marble Association of Canada (TTMAC)
  - .1 Tile Specification Guide 09 30 00 (2009-2010), Tile Installation Manual.
  - .2 Tile Maintenance Guide.

### 1.3 ACTION AND INFORMATION SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for ceramic tile and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples – submit for review the following:
  - .1 Floor tile: duplicate samples of each colour, texture, size, and pattern of tile.
  - .2 Wall tile: duplicate samples of each colour, texture, size, and pattern of tile.
  - .3 Trim shapes: bullnose cap, cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, submit duplicate samples of each type, colour, and size.
  - .4 Adhere tile samples to 12 mm thick plywood and grout joints to represent project installation.
  - .5 If requested by Departmental Representative, submit samples of transition trim and prefinished edge protection trim.

### 1.4 QUALITY ASSURANCE

- .1 Do tile work in accordance with Installation Manual 200, "Ceramic Tile", produced by Terrazzo Tile and Marble Association of Canada (TTMAC), except where specified otherwise.
- .2 Quality Assurance Submittals:
  - .1 Manufacturer's Instructions: manufacturer's installation instructions.
  - .2 Manufacturer's Field Reports: manufacturer's field reports specified.

### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading: deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and disposal: separate and disposal of waste materials in accordance with Section 01 74 21 – Construction Waste Management and Disposal.

### 1.6 AMBIENT CONDITIONS

- .1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12°C for 48 hours before, during, and 48 hours after, installation.
- .2 Do not install tiles at temperatures less than 12°C or above 38°C.
- .3 Do not apply epoxy mortar and grouts at temperatures below 15°C or above 25 °C.

## 1.7 MAINTENANCE MATERIALS

- .1 Extra Materials:
  - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Provide minimum 2% of each type and colour of tile and not less than 1 full box of each type and colour of tile required for project for maintenance use upon completion of Work of this Section. Identify each carton of tile.
  - .3 Maintenance material same production run as installed material.
  - .4 Deliver to jobsite and store where directed by Departmental Representative upon completion of the work of this section.
  - .5 Extra materials are not to be used to correct deficiencies.

## PART 2 - PRODUCTS

### 2.1 FLOOR TILE

- .1 CT1.1 - Porcelain floor tile to CAN/CGSB-75.1, ANSI A118.4; 300 mm x 300 mm x 9 mm, square edges, anti-slip pebble-textured surface finish. Colours to be selected by Departmental Representative from manufacturer's full range.
  - .1 Acceptable material:
    - .1 Regal Series – Matte by Olympia Tile + Stone International Inc.
    - .2 Granitogres - Unicolore Series– by Casalgrande Padana
    - .3 Global Collection 2<sup>nd</sup> edition – by Royal Mosa.
  - .2 CT1.2 - Porcelain floor tile to CAN/CGSB-75.1, ANSI A118.4; 300 mm x 300 mm x 9 mm, square edges, anti-slip pebble-textured surface finish. Colours to be selected by Departmental Representative from manufacturer's full range.
    - .1 Acceptable material:
      - .1 Regal Series – Matte by Olympia Tile + Stone International Inc.
      - .2 Granitogres - Unicolore Series– by Casalgrande Padana
      - .3 Global Collection 2<sup>nd</sup> edition – by Royal Mosa.

### 2.2 WALL TILE

- .1 CT2.1 – Accent porcelain wall tile to CAN/CGSB-75.1, ANSI A118.4; 600 mm x 300 mm x 9 mm, square edges. Colours to be selected by Departmental Representative from manufacturer's full range.
  - .1 Acceptable material:
    - .1 Duramen (30 x 60) – by Cifre Group
    - .2 Classic Design Series (Polished Porcelain), by Olympia Tile + Stone International Inc.
    - .3 or approved equivalent

- .2 CT2.2 - Accent porcelain wall tile to CAN/CGSB-75.1, ANSI A118.4; 600 mm x 300 mm x 9 mm, square edges. Colours to be selected by Departmental Representative from manufacturer's full range.
  - .1 Acceptable material:
    - .1 Silk Series by Savoia Ceramics
    - .2 or approved equivalent
- .3 CT2.3 - Accent porcelain wall tile to CAN/CGSB-75.1, ANSI A118.4; 600 mm x 300 mm x 9 mm, square edges. Colours to be selected by Departmental Representative from manufacturer's full range.
  - .1 Acceptable material:
    - .1 Silk Series by Savoia Ceramics
    - .2 or approved equivalent
- .4 CT2.4 - Porcelain wall tile to CAN/CGSB-75.1, ANSI A118.4; square edges. Colours to be selected by Departmental Representative from manufacturer's full range.
  - .1 Acceptable material:
    - .1 Vision – 100 x 300 (4"x12"), by Centura
    - .2 10Thirty – 100 x 300 (4"x12"), by Royal Mosa
    - .3 Bloc – 100 x 400 (4" x 16"), by Cera Gres.
- .5 CT2.5 – Porcelain wall tile to CAN/CGSB-75.1, ANSI A118.4; square edges. Colours to be selected by Departmental Representative from manufacturer's full range.
  - .1 Acceptable material:
    - .1 Vision – 100 x 300 (4"x12"), by Centura
    - .2 10Thirty – 100 x 300 (4"x12"), by Royal Mosa
    - .3 Bloc – 100 x 400 (4" x 16"), by Cera Gres.

### 2.3 TRIM SHAPES

- .1 Conform to applicable requirements of adjoining floor and wall tile.
- .2 Use trim shapes sizes conforming to size of adjoining field wall tile, unless specified otherwise.
- .3 Provide cove and bullnose shapes where required to complete tile work.

### 2.4 MORTAR AND ADHESIVE MATERIALS

- .1 Portland cement: to CSA-A5, type 10.
- .2 Sand: to ASTM C144, passing 16 mesh.
- .3 Latex additive: formulated for use in Portland cement mortar and thin set bond coat and as recommended by mortar and grout manufacturer.
- .4 Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.

- .5 Adhesive: polymer modified, low odour, low VOC adhesive. Maximum VOC limit 65 g/L to SCAQMD Rule 1168.
  - .1 Acceptable material:
    - .1 Duo-Flex 90 by Flextile Ltd.
    - .2 Mapei or Laticrete as approved by Departmental Representative.
  
- .6 Thin set mortar:
  - .1 Thin set mortar (floor tile and shower wall tile): pre-sanded, polymer modified dry set mortar mix for bonding tile to concrete, low odour, low VOC type.
    - .1 Acceptable material:
      - .1 # 52 Versatile Premium Grade Polymer Modified Mortar by Flextile Ltd.
      - .2 Mapei or Laticrete as approved by Departmental Representative.
  
    - .2 Thin set mortar (floor tile in showers): un-modified, portland cement based, dry set mortar mix for bonding tile to concrete, low odour, low VOC type.
      - .1 Acceptable material:
        - .1 # 51 Premium Floor and Wall Thin-Set Mortar by Flextile Ltd.
        - .2 Mapei or Laticrete as recommended by shower waterproofing membrane manufacturer and as approved by Departmental Representative.

## 2.5 GROUT

- .1 Epoxy thin set system grout (grouting of floor tile in washrooms): to ANSI A 108.1, ultra-premium sanded grout waterproof, self-curing, non-dusting, dry-set cement type, non-absorbent, capable of being coloured, suitable for use with "thin-set" method of tile installation.
  - .1 Acceptable material:
    - .1 Flex-Epoxy 100, Epoxy Grout by Flextile.
    - .2 equivalent product by MAPEI or Laticrete.
    - .3 Floor grout colours to be selected by Departmental Representative from manufacturer's full range (for epoxy grout).
  
  - .2 Thin set system grout (wall tile): to ANSI A 108.1, premium, Portland cement-based, unsanded grout, polymer modified, suitable for use with "thin-set" method of tile installation.
    - .1 Acceptable material:
      - .1 500, Polymer Modified Unsanded Wall Grout by Flextile.
      - .2 equivalent product by MAPEI or Laticrete.
      - .3 Wall grout colours to be selected by Departmental Representative from manufacturer's full range.

## 2.6 ACCESSORIES

- .1 Floor transition strip: aluminum edging strips for transition between ceramic tiles and adjacent flooring material of differing heights, purpose made clear anodized aluminum extrusions, satin finish.
  - .1 Acceptable material - ceramic floor tile to resilient sheet flooring:
    - .1 RENO-U-AE by Schluter Systems (Canada) Inc.
    - .2 Size edging strip to suit thickness of porcelain tile and resilient (linoleum) flooring.
- .2 Wall edge strip: type 304 stainless steel wall edge protection strips at external corners at along top of ceramic tile wall finish.
  - .1 Acceptable materials:
    - .1 QUADDEC (E), by Schluter Systems (Canada) Inc.
    - .2 Size edge protection strip to suit thickness of ceramic wall tile.
- .3 Floor and base edging: type 304 stainless steel edging at termination of ceramic floor tile and along exposed top of ceramic floor tile base.
  - .1 Acceptable materials:
    - .1 SCHIENE (E), by Schluter Systems (Canada) Inc.
    - .2 Size floor edging and base edging to suit thickness of ceramic floor tile and base finish.
- .4 Reducer Strips: purpose made metal extrusion; clear anodized aluminum type; maximum slope of 1:2.
- .5 Ceramic accessories: soap holder, surface mounted, 150mm x 150mm face dimension, colour to match surrounding wall tile.
- .6 Sealant: as specified in Section 07 92 00 – Joint Sealing.
- .7 Cleaners, floor sealer and protective coating: to CAN/CGSB-25.20, Type 1, to tile and grout manufacturer's recommendations.

## 2.7 SUBFLOOR PATCHING AND LEVELLING COMPOUND

- .1 Cement base, acrylic polymer compound, manufactured specifically for resurfacing and levelling concrete floors. Products containing gypsum are not acceptable.
- .2 Having not less than the following physical characteristics:
  - .1 Compressive strength – 25 MPa.
  - .2 Tensile strength – 7 MPa.
  - .3 Flexural strength – 7 MPa, Density – 1.9.
- .3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.
- .4 Ready for use in 48 hours after application.

- .5 Acceptable products:
  - .1 88 Floor Smooth by Flextile,
  - .2 equivalent product by MAPEI or Laticrete,

## **2.8 CLEANING COMPOUNDS**

- .1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- .2 Materials containing acid or caustic material are not acceptable.

## **PART 3 - EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 PREPARATION**

- .1 Prepare substrate surfaces as required to ensure satisfactory installation conditions. Remove, strip, wash, etch, grind or otherwise treat substrate as required to completely remove substances which would adversely affect installation of ceramic tile flooring. Do not use wire brush.
- .2 Substrates shall be clean and free of foreign matter and minimum 12° C.
- .3 Clean substrates as required to produce acceptable surface.

### **3.3 WORKMANSHIP**

- .1 Do tile work in accordance with current edition of TTMAC Tile Installation Manual, "Ceramic Tile", except where specified otherwise.
- .2 Apply tile to clean and sound surfaces. Bond tiles to substrate with thin set mortar in accordance with mortar manufacturer's directions.
- .3 Install floor and wall tiles to patterns and colours symmetrically within each area and to patterns indicated. Flooring patterns to utilize full tiles of colour with minimal cutting to achieve pattern.
- .4 Align vertical joints of wall tiles with horizontal joints of floor tiles.
- .5 Maximum allowable finished surface variation shall be 1:1000 when measured, in any direction, with a 3.0 m straightedge.
- .6 Make joints between tile uniform and approximately 1.5 mm wide, plumb, straight, true, even and flush with adjacent tile. Align patterns.

- .7 Lay out tiles so perimeter tiles are minimum one-half tile size.
- .8 Sound tiles after setting and replace hollow-sounding units to obtain full bond. Make internal and external corners square.
- .9 Install purpose-made clear anodized aluminum trim pieces at external corners, and along top and bottom termination edge of wall tile.
- .10 Fit tile accurately against and around interruptions, penetrations, around corners, fitments, fixtures, drains, other built-in objects and where abutting dissimilar surfaces. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.
- .11 Finished work shall be level, plumb, true, square and free of defective, chipped, broken, discoloured or blemished tiles.
- .12 Use bullnose edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.
- .13 Install prefinished aluminium edging strips at junction of tile flooring and dissimilar materials. Feather levelling compound as required to ensure flooring materials fit tightly.
- .14 Allow minimum 24 hours after installation of tiles, before grouting.
- .15 Clean installed tile surfaces after installation and grouting cured.

### **3.4 CONTROL JOINTS**

- .1 Place prefabricated divider strips (control joints) in tile floors. Coordinate locations of divider strips with Departmental Representative.
- .2 Make joint widths same as tile joints.
- .3 Fill control joints with sealant in accordance with Section 07 92 00 – Joint Sealing.

### **3.5 GROUTING**

- .1 Commence grouting not earlier than 24 hours after setting tiles, unless otherwise indicated by grout manufacturer's written directions.
- .2 Force grout into joint so as to fill them flush, leaving no voids.
- .3 Remove excess grout from adjacent tile surfaces promptly as work progresses; before grout establishes tight adhesion.
- .4 Provide stain resistant grout at washroom floors; provide latex grout at other areas.
- .5 Cure grout in accordance with manufacturer's directions.

### **3.6 FLOOR SEALER AND PROTECTIVE COATING**

- .1 Apply 2 coats of color sealer in accordance with ceramic tile sealer manufacturer's printed instruction.
- .2 Do not apply floor sealer to anti-slip floor tile, unless manufacturer's written installation instructions so direct.

### **3.7 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

### **3.8 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon curing of grout, thoroughly clean tile surfaces in accordance with manufacturer's recommendations.
- .3 Polish after cleaning with clean, dry cloths.

### **3.9 PROTECTION OF FINISHED WORK**

- .1 Protect new floors from time of final set of adhesive until final inspection. Prohibit traffic on floor for 48 hours after installation.
- .2 Exclude construction traffic from areas to receive tile during installation and curing period.
- .3 Protect tile flooring subject to construction traffic with non-staining protective covers.

**END OF SECTION**

## PART 1 - GENERAL

### 1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

### 1.2 RELATED SECTIONS

- .1 Section 09 21 16: Gypsum Board Assemblies.
- .2 Section 09 22 16: Non-Structural Metal Framing.
- .3 Section 09 53 00 - Acoustical Suspension Assemblies.

### 1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  - .2 ASTM E1264, Standard Classification for Acoustical Ceiling Products.
  - .3 ASTM E1477, Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-92.1, Sound Absorptive Prefabricated Acoustical Units.
- .3 Underwriter's Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

### 1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety Requirements.
- .3 Submit duplicate 300 x 300 mm samples of each type of acoustical panel.

### 1.5 QUALITY ASSURANCE

- .1 Mock-up:
  - .1 Construct mock-ups in accordance with Section 01 45 00 – Testing and Quality Control.
  - .2 Construct ceiling mock-up of one typical office and 10 m<sup>2</sup> minimum of each other type of acoustical tile ceiling including one inside corner and one outside corner.
  - .3 Construct mock-up where directed by Departmental Representative.
  - .4 Allow 48 hours notice for review of mock-up by Departmental Representative - before proceeding with ceiling work.

- .5 When accepted, mock-up will demonstrate minimum standard for this Work. Approved mock-up may remain as part of the finished work.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Store material in dry place. Protect on site stored or installed absorptive material from moisture damage.
- .2 Store extra materials required for maintenance, where directed by Departmental Representative.

#### **1.7 JOB CONDITIONS**

- .1 Install ceiling systems after building has been completely enclosed and not before cementitious building elements are complete and cured and humidity levels are acceptable in the opinion of the Departmental Representative.
- .2 Ensure that work to be concealed by ceiling systems has been installed, tested, inspected and approved before starting work.
- .3 Co-ordinate with mechanical and electrical divisions for work to be built into Work of this Section.

#### **1.8 ENVIRONMENTAL REQUIREMENTS**

- .1 Permit wet work to dry before beginning to install.
- .2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20-40% before and during installation.
- .3 Store materials in work area 48 hours prior to installation.

#### **1.9 EXTRA MATERIALS**

- .1 Provide extra materials of acoustic panels in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Upon completion of the Work of this Section, provide acoustical panels amounting to 2% of gross ceiling area for each pattern and type required for project and in any case not less than one full sealed carton of each type of acoustical panel.
- .3 Ensure extra materials are from same production run as installed materials.
- .4 Clearly identify each type of acoustic panel, including colour and texture.
- .5 Deliver to jobsite and store where directed by Departmental Representative, upon completion of the work of this Section.
- .6 Extra materials are not to be used for correction of deficiencies.

## 1.10 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers and dispose of in accordance with Governmental Authorities.
- .5 Fold up metal and plastic banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Acoustic panel (ACT 1): High NRC fine fissured acoustic panel: to ASTM E84, mineral fibre board; nominal size 610 x 1220 mm x 19mm thick, square edge, lay-in type, non-directional fine fissure pattern, factory applied latex finish, Class A fire performance, 0.70 NRC, sag resistant, anti-mould and mildew. Colour "white". Acceptable products:
  - .1 "School Zone Fine Fissured", # 1714, by Armstrong Ceilings.
  - .2 "Radar ClimaPlus High CAC, High NRS", # 22311 by CGC.
  - .3 "Performa Fine Fissured High NRC", # HHF-497 HNRC by Certainteed.
  - .4 or other equal product approved during tender period.
- .2 Acoustic panel (ACT 2): High NRC fine fissured acoustic panel: to ASTM E84, mineral fibre board; scored tile showing 2 equal squares, nominal size 610 x 1220 mm x 19mm thick, lay-in type, square-edged, non-directional fine fissure pattern, factory applied latex finish, Class A fire performance, 0.70 NRC, sag resistant, anti-mould and mildew. Colour "white". Acceptable products:
  - .1 "Cortega Second Look II", by Armstrong Ceilings.
  - .2 "Radar Illusion 2 Panells", by CGC.
  - .3 equivalent by Certainteed.
  - .4 or other equal product approved during tender period.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- .1 Do not install acoustical panels until work above ceiling has been reviewed by Departmental Representative.

### **3.2 CEILING LAYOUTS**

- .1 Lay out ceilings in accordance with reflected ceiling plans and symmetrical within each area to obtain uniform borders. Where layout is not shown install ceilings as directed by Departmental Representative.
- .2 Finish work shall be plumb, level and square with adjoining work.

### **3.3 INSTALLATION**

- .1 Install acoustical panels and tiles in acoustical ceiling suspension system.
- .2 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.
- .3 Neatly cut and fit panels as required to suit ceiling layout and to accommodate other work.
- .4 Recessed items shall replace or be centred on panel unless otherwise indicated.
- .5 Install acoustic panels with directional pattern running in same direction.
- .6 Scribe acoustic panel units to fit adjacent work. Butt joints tight, terminate edges with moulding.

### **3.4 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 After installation, clean and touch up minor surface defects on acoustical panels.
- .3 Remove damaged and badly marked units which in the opinion of the Departmental Representative cannot be satisfactorily touched up and replace with new unmarked material.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 GENERAL REQUIREMENTS**

- .1 Comply with requirements of Division 1.

**1.2 RELATED SECTIONS**

- .1 Section 09 21 16: Gypsum Board Assemblies.
- .2 Section 09 22 16: Non-Structural Metal Framing.
- .3 Section 09 51 13: Acoustical Panel Ceilings.

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C635, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
  - .2 ASTM C636/C636M, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.4 DESIGN REQUIREMENTS**

- .1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

**1.5 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit one representative model of each type ceiling suspension system.
  - .2 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

## 1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Heavy duty system to ASTM C635.
- .2 Basic materials for suspension system: commercial quality cold rolled steel, zinc coated.
- .3 Suspension system: non fire rated, made up as follows:
  - .1 Two directional exposed tee bar grid with exposed edge trim system where indicated.
- .4 Exposed tee bar grid components: factory applied baked enamel finish, satin sheen "White". Components die cut. Main tee with double web, rectangular bulb and 24 mm flange on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
  - .1 Acceptable products:
    - .1 Prelude XL by Armstrong World Industries Canada Ltd.
    - .2 Donn DX by CGC Interiors.
    - .3 BE System by Bailey Metal Products Ltd.
    - .4 or approved equal.
- .5 Hanger wire: galvanized soft annealed steel wire:
  - .1 3.6 mm diameter for access tile ceilings.
- .6 Hanger inserts: purpose made.
- .7 Carrying channels: as required by manufacturer, galvanized steel.
- .8 Accessories: splices, clips, wire ties, retainers and wall moulding flush, to complement suspension system components, as recommended by system manufacturer.

## **PART 3 - EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 Installation: in accordance with ASTM C636 except where specified otherwise.
- .2 Install suspension system to manufacturer's instructions.
- .3 Do not erect ceiling suspension system until work above ceiling has been reviewed by Departmental Representative.
- .4 Lay out ceiling system as indicated.
- .5 Layout centre line of ceiling both ways, to provide balanced borders at room perimeter as shown on drawings.
- .6 Suspend ceilings directly from structure above or from carrying channels supported by structure.
- .7 Secure hangers to overhead structure using attachment methods acceptable to Departmental Representative.
- .8 Install hangers spaced at maximum 1220 mm centres and within 150 mm from ends of main tees.
- .9 Ensure suspension system is co-ordinated with location of related components.
- .10 Install perimeter wall moulding to provide correct ceiling height where indicated.
- .11 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, and speakers.
- .12 Install main tees in accord with module size. Suspend at maximum 1220 o.c.
- .13 Install cross tees perpendicular to main tees in accord with module size. Interlock with main tees to provide rigid assembly.
- .14 Hangers for suspended ceilings shall support system independently of walls, columns, pipes and ducts.
- .15 At light fixtures and diffusers occurring on and in suspended ceilings, provide additional ceiling suspension hangers at each corner of the fixture.

- .16 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.
- .17 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
- .18 Finished ceiling system to be square with adjoining walls and level within 1:1000.
- .19 Label suspension grid with coloured dots to locate equipment servicing above ceiling system:
  - .1 Green = electrical.
  - .2 Red = fire protection.
  - .3 Blue = mechanical.

### **3.3 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Touch up scratches, abrasions, voids and other defects in painted surfaces.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 GENERAL REQUIREMENTS**

- .1 Comply with requirements of Division 1.

**1.2 RELATED SECTIONS**

- .1 Section 09 30 13: Ceramic Tile.
- .2 Section 09 65 19: Resilient Tile Flooring.
- .3 Section 09 68 13: Tile Carpeting.

**1.3 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM F1303, Standard Specification for Sheet Vinyl Floor Covering with Backing.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.4 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit duplicate tile in size specified, 300 mm long base, nosing, feature strips, treads, edge strips.
- .4 Closeout Submittals:
  - .1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- .3 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

- .4 Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
  - .1 Materials should be stored in areas that are fully enclosed, weathertight with the permanent HVAC system set at a uniform temperature of at least 20°C for 72 hours prior to, during and after installation.

## **1.6 PROJECT CONDITIONS**

- .1 Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, Areas to receive flooring shall be clean, fully enclosed, weathertight with the permanent HVAC set at a uniform temperature of at least 20°C. The flooring material should be conditioned in the same manner. Maximum temperature should not exceed 38°C after installation.
- .2 Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.
  - .1 Temperature conditions to be 20°C for 72 hours prior to, during and after installation.
- .3 Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

## **1.7 EXTRA MATERIALS**

- .1 Extra Materials:
  - .1 Provide extra materials of resilient sheet flooring, base and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Provide 10 m<sup>2</sup> or 2% of gross floor area of each colour, pattern and type flooring material and 10 linear meters of resilient base required for this project for maintenance use.
  - .3 Extra materials one piece and from same production run as installed materials.
  - .4 Identify each roll of sheet flooring and each container of adhesive.
  - .5 Deliver to jobsite and store where directed by Departmental Representative upon completion of the work of this section.
  - .6 Extra materials are for use by Owner. Use of extra materials for correction of deficiencies is not allowed.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Linoleum sheet flooring: composed of natural ingredients which are mixed and calendered onto a jute backing:
  - .1 Homogeneous sheet linoleum of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendered onto natural jute backing. Pattern and color shall extend throughout total thickness of material.
  - .2 Width: 2.0 m.
  - .3 Length: 32.0 m
  - .4 Thickness: 2.5 mm
  - .5 Adhesive: As per manufacturers recommendations.
  - .6 Heat Welding Rod: Color-matched or multi-color welding rod. Colour of welding rod to be selected by Departmental Representative from manufacturer's full range.
  - .7 Acceptable products and manufacturers:
    - .1 Marmoleum by Forbo Flooring Systems.
    - .2 LinoArt Series by Armstrong
    - .3 or approved equivalent
  - .8 Linoleum Colours Up to 10 colours may be selected by Departmental Representative from manufacturers full colour range.
- .2 Resilient Sheet Flooring (RFL1): to ASTM F-1913, Sheet vinyl flooring with urethane aluminum oxide topcoat, 2.03 mm overall thickness, random repeat pattern, heat weld seaming with solid colour weld rods. Up to 2 Colours may be selected by Departmental Representative from manufacturer's standard colour range.
  - .1 Acceptable Material:
    - .1 Rejuvenations – TimberLine: by Armstrong
    - .2 Realities: by Mannington Commercial
    - .3 Naturelife – Wood: by Shaw Hard Surface.
- .3 Resilient Sheet Flooring (RFL2): to ASTM F-1913, Slip retardant/ water resistant sheet vinyl flooring, heat weld seaming with solid colour weld rods. Up to 2 colours may be selected by Departmental Representative from manufacturer's full colour range.
  - .1 Acceptable Material:
    - .1 Altro Aquarius – by Altro USA Inc.
    - .2 or approved equivalent
  - .2 Provide appropriate accessories to achieve a 100 mm. high resilient base around room perimeter and coved base in shower.
- .4 Resilient Sheet Flooring (RFL3): to ASTM F-1913, Slip retardant sheet vinyl flooring, heat weld seaming with solid colour weld rods. Up to 2 colours may be selected by Departmental Representative from manufacturer's full colour range.
  - .1 Acceptable Material:
    - .1 Eternal Step SR – by Forbo Flooring Systems
    - .2 or approved equivalent
  - .2 Provide all appropriate accessories to finish corners end edges.

- .5 Resilient base (RB): Rubber base as specified in Section 09 65 19 – Resilient Tile Flooring.
- .6 Resilient Stair Treads and Risers: as specified in Section 09 65 19 – Resilient Tile Flooring.
- .7 Vinyl Transition Strips: for transition between resilient sheet flooring and flooring of differing heights, as specified in Section 09 65 19 – Resilient Tile Flooring.
- .9 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade. Maximum VOC limit 50g/L to SCAQMD Rule 1168.
- .10 Sub-floor filler and leveller: as recommended by flooring manufacturer for use with their product.
- .11 Sealer: to CAN/CGSB-25.20, type 2 water based, as recommended by flooring manufacturer for their product.
  - .2 Sealant: maximum VOC limit 50g/L to SCAQMD Rule 1168.
- .12 Wax: to CAN/CGSB-25.21, type as recommended by flooring manufacturer for their product.

### **PART 3 - EXECUTION**

#### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

#### **3.2 INSPECTION**

- .1 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.
- .2 Concrete substrate shall have cured a minimum of 28 days prior to application.
- .3 Moisture content of substrate shall not exceed 14 %.
- .4 Substrate surface temperatures shall be 16° C for 24 hours prior to and during application and for a minimum of 48 hours after completion.

#### **3.3 PREPARATION**

- .1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

- .3 Prime or seal flooring substrate to flooring manufacturer's printed instructions.

#### 3.4 APPLICATION: FLOORING

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. Vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.
  - .1 To minimize emissions from adhesives, use water-based solvent free adhesives as recommended by manufacturer for use with their product.
- .3 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered with flooring before initial set takes place.
- .4 Lay flooring to patterns and colours shown on drawings and details, with seams parallel to building lines to produce a minimum number of seams. Border widths to be a minimum of 1/3 width of full sheet of material.
- .5 Double cut sheet joints and continuously heat weld seams of resilient sheet flooring in accordance with manufacturer's printed instructions. Joints shall be flush, uniform, in moderate contact and in straight lines.
- .6 Cut flooring and fit neatly around fixed objects (flooring to walls, columns, cabinets, floor outlets and other appurtenances) to produce tight joints.
- .7 Extend flooring in recesses and closets. Terminate flooring at centreline of door openings where adjacent floor finish or colour is dissimilar except where multicoloured patterns are required.
- .8 Install flooring in pan type floor access covers. Maintain floor pattern.
- .9 Continue flooring over areas which will be under built in furniture and casework.
- .10 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .11 Install transition strips at unprotected or exposed edges where flooring terminates, and at locations where flooring of different heights meet.
- .12 As installation progresses, and after installation, roll flooring with 45 kg. minimum roller to ensure full adhesion in accordance with flooring and adhesive manufacturer's recommendations.

### 3.5 APPLICATION: BASE

- .1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners. Accumulated short lengths not permitted.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Adhesive apply cove base to vertical surfaces so that gaps do not occur behind base, so that front lip of base cove bears firmly and uniformly on floor surfaces and so that good and permanent bond is produced between base and surface to which it is applied. Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Butt intermediate joints flush without gaps.
- .7 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
- .8 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles, minimum 300 mm each leg. Wrap around toeless base at external corners.
- .9 Install resilient cove type base after installation of resilient sheet flooring on floors.

### 3.6 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
  - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

### 3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove excess adhesive from floor, base and wall surfaces without damage.
- .3 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

### **3.8 PROTECTION**

- .1 Protect new floors from installation until final inspection. Use heavy paper or plastic coverings to protect against damage.
- .2 Prohibit traffic on floor for minimum 48 hours after installation.
- .3 Do not place static loads on newly installed flooring until minimum 7 days after installation.
- .4 Use only water-based coating for linoleum.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 09 30 13: Ceramic Tile.
- .2 Section 09 65 16: Resilient Sheet Flooring.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM F1066-04, Standard Specification for Vinyl Composition Floor Tile.
  - .2 ASTM F1344-04, Standard Specification for Rubber Floor Tile.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
  - .2 CAN/CGSB-25.21-95, Detergent-Resistant Floor Polish.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

### **1.3 ACTION AND INFORMATION SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit manufacturer's instructions, printed product literature and data sheets for floor tile, stair treads / risers, and wall base and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples: submit duplicate sample pieces of floor tile material, stair treads / risers, base.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

### **1.5 ENVIRONMENTAL REQUIREMENTS**

- .1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hours before, during and for 48 hours after installation.

## 1.6 MAINTENANCE MATERIALS

- .1 Extra Materials: provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide 2% of gross floor area for each colour, pattern and type flooring material required for the project and in any case not less than one full sealed carton of resilient tile flooring of each colour and type used; and 20 linear meters of resilient base required for this project for maintenance use.
- .3 Extra materials from same production run as installed materials.
- .4 Identify each container of floor tile and each container of adhesive. Deliver to jobsite and store where directed by Departmental Representative upon completion of the work of this section.
- .5 Extra materials are for use by building personnel for ongoing building maintenance. Extra materials are not to be used to correct deficiencies.

## 1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21- Construction Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Vinyl composition tile (VCT.1): to ASTM F1066, Composition 1 - non asbestos, Class 2 - through pattern tile, plain, 3 mm, 305 x 305 mm size. Up to three colours selected by Departmental Representative from manufacturer's standard colour range.
  - .1 Acceptable Material:
    - .1 BioBase Tile "Migrations" by Armstrong Flooring.
    - .2 equivalent product by Tarkett, or Mannington Commercial.
- .2 Static dissipative tile (VCT.2): to ASTM F1066 and ASTM F 970, Composition 1 - non asbestos, Class 2 - through pattern tile, plain, 3 mm, 305 x 305 mm size. Up to two colours selected by Departmental Representative from manufacturer's standard colour range.
  - .1 Acceptable Material:
    - .1 Armstrong – Static Dissipative Tile
    - .2 static dissipative tile by Tarkett, or Mannington Commercial.

- .3 Rubber Tile (RF): to ASTM F1344, Class 1 – homogenous rubber tile, through pattern colour, with raised roundels, 3mm thick, 305 x 305 mm size. One colour selected by Departmental Representative from manufacturer's standard colour range.
- .1 Acceptable Material:
    - .1 Johnsonite
    - .2 Forbo
    - .3 Armstrong
    - .4 Flexco.
- .4 Resilient base (RB): rubber, toed cove base, minimum 1200 mm length and 100 mm high x 2.3 mm thick, with premoulded end stops and premanufactured inside and outside corners. Up to 8 colours selected by Departmental Representative from manufacturer's standard colour range.
- .1 Acceptable Material:
    - .1 Johnsonite – Traditional Coved Rubber Wall Base.
    - .2 Armstrong – Colour Integrated Rubber Wall Base.
    - .3 Flexco – Wallflowers Rubber Wall Base.
- .5 Vinyl Transition Strips: for transitions between flooring materials of differing heights, or at transition from flooring material to unfinished substrate. Up to four colours selected by Departmental Representative from manufacturer's standard colour range.
- .1 Manufacturer: Johnsonite.
    - .1 Type 1: Linoleum to resilient flooring, transition strip to suit thickness: # SLT-XX-B.
    - .2 Type 2: Carpet Tile to linoleum flooring: transition from 6mm. carpet tile to linoleum flooring (2.5mm): # CTA-XX-A.
    - .3 Type 3: Resilient floor to substrate (0 mm): # RRS-XX-C.
  - .2 or equivalent product and profiles by Flexco, Mannington Commercial.
- .6 Resilient stair tread and riser combination: rubber, one-piece tread-riser combination; 50 mm deep square nosing, with nosing radius compliant with National Building Code of Canada requirement of minimum 8 mm to maximum 13 mm radius; 330 mm tread depth with 178 mm integral riser; 5 mm thick; raised square pattern on tread and with continuous 50 mm wide photoluminescent insert band at nosing; no pattern solid colour. One colour selected by Departmental Representative from manufacturer's standard colour range
- .1 Acceptable Material:
    - .1 Johnsonite product: Safe-T-First™ Photoluminescent Visually Impaired One-piece Tread/Riser Combination Roundel™ Rubber Stair Treads (VIHTRS–SQ).
    - .2 or combination rubber tread/riser by Tarkett, Mannington Commercial, Flexco.
- .7 Primers and adhesives: waterproof, as recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
- .1 Flooring adhesives:
    - .1 Adhesive: maximum VOC limit 50g/L to SCAQMD Rule 1168.

- .7 (continued)
  - .2 Cove base adhesives:
    - .1 Adhesive: maximum VOC limit 50g/L to SCAQMD Rule 1168.
  - .3 Combination stair tread / riser adhesives:
    - .1 Adhesive: maximum VOC limit 50g/L to SCAQMD Rule 1168.
- .8 Accessories and adhesives for static dissipative tile installation:
  - .1 Copper grounding strips: as supplied by tile manufacturer.
  - .2 Adhesive: use product recommended by SDT tile manufacturer for static dissipative tile installation.
  - .3 Copper grounding strips as supplied by SDT tile manufacturer.
  - .4 Adhesive recommended by manufacturer for SDT installation.
  - .5 Manufacturer's recommended SDT-polish.
- .9 Sub-floor filler and leveller: as recommended by flooring manufacturer for use with their product.

### **PART 3 - EXECUTION**

#### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

#### **3.2 INSPECTION**

- .1 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.
- .2 Concrete substrate shall have cured a minimum of 28 days prior to application.
- .3 Moisture content of substrate shall not exceed 14 %.
- .4 Substrate surface temperatures shall be 16° C for 24 hours prior to and during application and for a minimum of 48 hours after completion.

#### **3.3 SUB-FLOOR TREATMENT**

- .1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .3 Prime or seal flooring substrate to flooring manufacturer's printed instructions.

### 3.4 TILE APPLICATION

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for minimum 72 hours after installation. Vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .4 Install flooring to square grid pattern with joints aligned.
- .5 As installation progresses, and after installation, roll flooring in 2 directions including resilient tile with 45kg minimum roller to ensure full adhesion.
- .6 Cut tile and fit neatly around fixed objects.
- .7 Install feature strips and floor markings where indicated. Fit joints tightly.
- .8 Install flooring in pan type floor access covers. Maintain floor pattern.
- .9 Continue flooring through areas to receive fitments such as, but not limited to, millwork and movable type partitions without interrupting floor pattern.
- .10 Extend flooring in recesses and closets.
- .11 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .12 Install vinyl transition strips at locations where flooring of different heights meet, and where resilient tile flooring terminates at substrate with no floor finish.

### 3.5 STATIC DISSIPATIVE TILE (SDT) APPLICATION

- .1 Static dissipative tiles are a system which includes SDT tile, manufacturer's recommended SDT-adhesive, copper grounding strips and manufacturer's recommended SDT-polish.
- .2 Install SDT tiles in accordance with tile manufacturer's written instructions. Only use adhesive recommended by SDT tile manufacturer as appropriate for use with SDT tiles.
- .3 Substrates for static dissipative tile installation must be dry, clean, smooth and free from paint, varnish, oil and other deleterious residues, wax, concrete curing agents, sealers and hardeners.

- .4 Area to receive SDT should be maintained at a minimum of 18°C and a maximum of 38°C for 48 hours before, during and 48 hours after installation.
- .5 During the service life of the floor, do not allow temperature to fall below 13°C as the performance of the flooring material and adhesives can be adversely affected below this minimum temperature.
- .6 Plan the layout before installation. Ensure that tiles at perimeter of room are no smaller than 150mm wide. Line off the entire area with chalk lines showing tiles.
- .7 Apply manufacturer's recommended adhesive for SDT over clean floor substrate. Follow manufacturer's written instructions for specified time interval between applying SDT-adhesive and placing copper grounding strips.
- .8 Install manufacturer's specified number of copper grounding strips to suit the area of installation. Review grounding strips location with Contractor and Departmental Representative prior to installation to coordinate proper grounding of strips.
- .9 Cut copper grounding strips to 610 mm lengths. Place 460 mm of copper grounding strip over the specified SDT-adhesive on the substrate. Extend the remaining 150 mm of copper strip up the wall as per SDT tile manufacturer's instructions.
- .10 Install SDT tiles over grounding strips; ensure tile joints are tightly butted.
- .11 Roll tile in both directions within the adhesive's recommended working time using a 45kg hand roller.
- .12 Clean adhesive residue from the surface of the tile using a clean white cloth and appropriate cleaning solution.
- .13 Grounding of the copper strips by Division 26 - Electrical.
- .14 Test floor after installation in accordance with SDT tile manufacturer's instructions and submit test report. Replace flooring which does not meet performance criteria recommended by manufacturer.

### **3.6 STAIR APPLICATION**

- .1 Ensure stair surfaces are clean of deleterious materials prior to commencing installation.
- .2 Follow manufacturer's printed instructions for installation of combination stair tread / risers. Use manufacturer recommended adhesive for this product.

- .3 Install combination stair tread / riser one piece for full width of stair. Adhere over entire surface and fit accurately.
- .4 Install rubber tile at stair landing.
- .5 Install transition pieces at junction of top of tread and landing, and at top of tread and upper floor level.

### **3.7 BASE APPLICATION**

- .1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners. Accumulated short lengths not permitted.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Adhesive apply cove base to vertical surfaces so that gaps do not occur behind base, so that front lip of base cove bears firmly and uniformly on floor surfaces and so that good and permanent bond is produced between base and surface to which it is applied. Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Butt intermediate joints flush without gaps.
- .7 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
- .8 Use premoulded corner units for right-angle inside and outside corners. Use formed straight base material for external corners of other angles, minimum 300 mm each leg. Wrap around toeless base at external corners.
- .9 Install resilient cove type base after installation of resilient tile or sheet flooring on floor.

### **3.8 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

### **3.9 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove excess adhesive from floor, base and wall surfaces without damage.

- .3 Clean floor and base surface to flooring manufacturer's instructions.
- .4 Do not apply wax to SDT floor. Follow manufacturer's written instructions for cleaning and maintenance procedures for SDT floor.

**3.10 PROTECTION**

- .1 Protect new floors from installation until final inspection.
- .2 Prohibit traffic on floor for minimum 48 hours after installation.
- .3 Do not place static loads on newly installed flooring until minimum seven days after installation.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 GENERAL REQUIREMENTS**

- .1 Comply with requirements of Division 1.

**1.2 RELATED SECTIONS**

- .1 Section 09 30 13: Ceramic Tile.
- .2 Section 09 65 16: Resilient Sheet Flooring.
- .3 Section 09 65 19: Resilient Tile Flooring.

**1.3 REFERENCES**

- .1 American Association of Textile Chemists and Colorists (AATCC)
  - .1 AATCC 16, Color Fastness to Light.
  - .2 AATCC 134, Electrostatic Propensity of Carpet.
  - .3 AATCC 174, Antimicrobial Activity Assessment of Carpets.
- .2 American Society for Testing and Materials (ASTM International)
  - .1 ASTM E84-14, Test Method for Surface Burning Characteristics of Building Materials.
    - .1 ASTM E648-14c, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
    - .2 ASTM E662-14, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
  - .2 ASTM D297-93(2006), Standard Test Methods for Rubber Products-Chemical Analysis.
  - .3 ASTM D1335-05, Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-4.2 No.22 - 2004, Textile Test Methods - Colourfastness to Rubbing (Crocking).
  - .2 CAN/CGSB-4.2 No.27.6 - 2004, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
  - .3 CAN/CGSB-4.2 No.77.1-94 /ISO 4919:2000, Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
  - .4 CAN/CGSB-4.129, Carpets for Commercial Use.
  - .5 CAN/CGSB-25.20, Surface Sealer Floors.
- .4 Carpet and Rug Institute (CRI)
  - .1 CRI Carpet Installation Standard 2011.
  - .2 IAQ Carpet Testing Program.
- .5 National Floor Covering Association (NFCA)
  - .1 Floor Covering Specification Manual 2007.

- .6 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S102.2-10, Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

#### **1.4 SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit verification to demonstrate compliance with CAN/ULCS102 and CAN/ULCS102.2.
- .3 Product Data:
  - .1 Submit carpet tile manufacturer's installation instructions. Indicate special procedures and perimeter conditions requiring special attention.
  - .2 Submit product data sheet for each style of carpet tile, accessories and subfloor patching compound.
  - .3 Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colours, and methods of installation.
  - .4 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health Canada for carpet tile adhesive. Indicate VOC content.
- .4 Samples:
  - .1 Submit samples for review and acceptance by Departmental Representative.
  - .2 Submit duplicate samples of each type of carpet tile specified and duplicate tiles for each colour selected.
  - .3 Samples will be returned.
- .5 Test and Evaluation Report:
  - .1 Certified test reports showing product compliance with specified performance characteristics and physical properties.

#### **1.5 MAINTENANCE MATERIALS**

- .1 Provide extra materials of carpet tile and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide one full carton of each style, pattern and colour of carpet tile specified for the project.
- .3 Extra materials to be from same production run as installed materials.
- .4 Identify each package of carpet and each container of adhesive.
- .5 Deliver to job site and store where directed by Departmental Representative.
- .6 Maintenance materials are for use by Departmental Representative and cannot be used to correct deficiencies.

## 1.6 CLOSEOUT SUBMITTALS

- .1 Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Submit maintenance data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.
- .3 Manufacturer's information on, and procedures for reclamation, recycling and future disposition of used carpet tile.

## 1.7 INDOOR AIR QUALITY MANAGEMENT

- .1 Indoor Air Quality: compliance with CRI/CCI Green Label Indoor Air Quality Program, CRI/CCI-IAQ requirements for maximum total volatile chemicals released into air. Label each carpet product with CRI/CCI-IAQ label.

## 1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver materials to site and store in original factory packaging, labelled with manufacturer's name and address.
  - .1 For carpet tile products indicate nominal dimensions of tile and indicate installation direction.
  - .2 Store on pallet form as supplied by Manufacturer. Do not stack pallets.
- .3 Store materials off ground, indoors in dry location, in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .4 Store carpet and adhesive at minimum temperature of 18°C and relative humidity of maximum 65% for minimum of 48 hours before installation.
- .5 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.
- .6 Store materials in area of installation for minimum period of 48 hours prior to installation.
- .7 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

## 1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Management and Disposal.

- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .4 Sort only clean, dry carpet materials for reclamation / recycling. Clean is defined as carpet free from demolition debris, asbestos contamination, garbage and tack strips.
- .5 Return unused cut carpet tile scraps to manufacturer for reclamation/recycling.

#### **1.10 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Moisture: Ensure substrate is within moisture limits and alkalinity limits prescribed by manufacturer. Prepare moisture testing and provide report to Departmental Representative.
  - .2 Temperature: Maintain ambient temperature of not less than 20°C from 24 hours before installation to at least 7 days after completion of work.
  - .3 Relative humidity: Maintain relative humidity between 10 and 65% RH for 48 hours before, during and at least 7 days after installation.
  - .4 Ventilation:
    - .1 Ventilate enclosed spaces in accordance with Section 01 50 00 - Temporary Facilities.
    - .2 Provide continuous ventilation during and after carpet tile application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of carpet installation.
  - .5 Install carpet tile after space is enclosed and weatherproof, wet-work in space is completed and the area is completed and nominally dry, and work above ceilings is complete.

#### **PART 2 - PRODUCTS**

##### **2.1 MATERIALS**

- .1 Carpet Tile (CPT1): Acceptable products:
  - .1 Shaw Contract Group, Series Openwork – Kasuri Tile: Colour; from manufacturers full range.
  - .2 or approved equivalent.

- .2 Carpet Tile (CPT2): Acceptable products:
  - .1 Shaw Contract Group, Series Openwork – Bias Tile: – Colour; from manufacturers full range.
  - .2 or approved equivalent.
- .3 Carpet Tile (CPT3): Acceptable products:
  - .1 Shaw Contract Group, Series Openwork – Bias Tile: Colour; from manufacturers full range.
  - .2 or approved equivalent.

## **2.2 ACCESSORIES**

- .1 Resilient Base: vinyl coved base, products and colours as specified under Section 09 65 19 – Resilient Tile Flooring.
- .2 Vinyl Transition Strips: for transition between carpet tile and resilient sheet flooring, or carpet tile and resilient tile; products and colours as specified under Section 09 65 19 – Resilient Tile Flooring.
- .3 Adhesive:
  - .1 Pressure sensitive type: recommended by carpet tile manufacturer for direct glue down installation of modular carpet or speciality backed carpets.
- .4 Carpet protection: non-staining heavy duty kraft paper.
- .5 Concrete floor sealer: to CAN/CGSB-25.20, Type 1.
- .6 Subfloor patching compound: Portland cement base filler, mix with latex and water to form a cementitious paste. Patching compound to be compatible with carpet tile adhesive.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- .1 Examine conditions, substrates and work to receive work of this Section.
- .2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for carpet tile installation in accordance with manufacturer's written instructions.
  - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### 3.2 PREPARATION

- .1 Subfloor Preparation:
  - .1 Inspect concrete and determine special care required to make it a suitable for carpet tile installation.
  - .2 Fill and level cracks 3 mm wide or protrusions over 0.8 mm with appropriate and compatible patching compound.
  - .3 Comply with manufacturer's written recommendations for maximum patch thickness.
  - .4 Prime large patch areas with compatible primer.
  - .5 Concrete substrates shall be cured, clean and dry. Ensure concrete floors are dry, by using test methods recommended by manufacturer.
  - .6 Concrete substrate shall have cured a minimum of 28 days prior to application. Moisture content of substrate shall not exceed 14 %.
  - .7 Concrete substrates shall be free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that may interfere with the bonding of the adhesive.
  - .8 Wherever a powdery or porous concrete surface is encountered, a primer compatible with the carpet tile manufacturer's written installation instruction shall be used to provide a suitable surface for installation.
- .2 As far as possible, all trades shall have completed their work in the area before carpet tile is installed.
- .3 Temperature of room, floor surface and material shall be maintained at 20° C for 24 hours before, during and at least 7 days after installation.
- .4 Prepare floor surface as required to ensure satisfactory installation conditions. Completely remove all deleterious materials and substances which would adversely affect installation of new flooring.
- .5 Prepare surfaces to receive carpet tiles and install carpet tile and base in strict accordance with manufacturer's written directions. Perform work neatly and carefully by persons skilled in this trade.
- .6 Where carpet tile abuts other flooring of different thickness, provide transition strips or specialty aluminium edging trims as specified.
- .7 Apply cementitious underlayment to gaps, cracks, minor depressions and low spots to achieve level floor. Allow filler to cure properly before commencing installation of carpet tile.
- .8 Mix, apply and finish underlayment in accordance with manufacturer's recommendations.

### 3.3 INSTALLATION

- .1 Install carpet tile in accordance with manufacturer's printed instructions and CPI Installation Standard.

- .2 Install carpet tile after finishing work is completed but before office systems furniture, demountable office partitions, desks and telephone and electrical pedestal outlets are installed.
- .3 Install carpet tile as per manufacturer's written recommendation for directional installation.
- .4 Snugly join carpet tiles in completed installation.
  - .1 Measure distance covered by 11 carpet tiles (10 joints) and ensure distance is in compliance with manufacturer's specifications.
  - .2 Do not trap yarn between carpet tiles.
- .5 Perform work neatly and carefully by persons skilled in this trade.
- .6 Installed carpet tile shall have smooth wearing surface free from conspicuous buckling, seams, burring and other faults.
- .7 Use material from same dye lot.
  - .1 Ensure colour, pattern and texture match within any one visual area.
  - .2 Maintain tile directional pattern as per manufacturer's written instructions.
- .8 Fit carpet tile tightly and neatly around architectural, mechanical, electrical and other fitments, around perimeter of rooms, into recesses, and around projections.
- .9 Install carpet tile in pan type floor access covers.
- .10 Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- .11 Protect exposed carpet tile edges at transition to other flooring materials with suitable transition strips.

### **3.4 BASE INSTALLATION**

- .1 Install resilient base in accordance with Section 09 65 16 – Resilient Sheet Flooring.

### **3.5 CLEANING**

- .1 Clean in accordance with Section 01 74 11 – Cleaning.
- .2 Promptly as work progresses, remove any excess adhesive in accordance with carpet manufacturer's recommendations.
- .3 Immediately following carpet tile installation, vacuum carpet clean. Remove all adhesive residue and other stains in accordance with carpet manufacturer's recommendations. Remove all dirt, dust, loose lint and excess materials.

- .4 Remove and replace stained, torn, cut, burned or worn tiles to satisfaction of Departmental Representative.
- .5 Advise Departmental Representative before removing large waste scraps of carpet tile. Departmental Representative shall be permitted to inspect all remaining carpet pieces and scraps to retain for maintenance purposes in addition to extra materials.

**3.6 PROTECTION**

- .1 Protect new carpet tile from damage during construction.
- .2 Prohibit traffic on carpet tiled areas for a minimum period of 48 hours after installation.
- .3 Install carpet protection over entire carpeted area to satisfaction of Departmental Representative.
- .4 Repair damage to adjacent materials caused by carpet tile installation.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 GENERAL REQUIREMENTS**

- .1 Comply with requirements of Division 1.

### **1.2 RELATED SECTIONS**

- .1 Section 05 50 00: Metal Fabrications.
- .2 Section 06 40 00: Architectural Woodwork.
- .3 Section 08 11 00: Hollow Metal Doors and Frames.
- .4 Section 08 14 00: Wood Doors.
- .5 Section 08 34 74: Sound Control Door Assemblies.
- .6 Mechanical and Electrical Divisions: Prime painting of mechanical and electrical equipment including grilles, panels and cabinets.
- .7 Section 32 17 23: Painted Traffic Lines and Markings.

### **1.3 REFERENCES**

- .1 Architectural Painting Specifications Manual, current edition, Master Painters Institute (MPI).
- .2 Systems and Specifications Manual, SSPC Painting Manual, Volume Two, Society for Protective Coatings (SSPC).
- .3 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings) - Environmental Protection Agency (EPA).
- .4 National Fire Code of Canada
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).

### **1.4 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit product data and manufacturer's installation/application instructions for each paint and coating product to be used and include product characteristics, performance criteria, finish and limitations.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements.
- .4 Submit duplicate 200 x 300 mm sample panels of each specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards.

- .5 Upon completion, submit records of products used. List products in relation to finish system and include the following:
  - .1 Product name, type and use.
  - .2 Manufacturer's product number.
  - .3 Colour numbers.
  - .4 MPI Environmentally Friendly classification system rating.
  - .5 Manufacturer's Material Safety Data Sheets (MSDS).
- .6 Source Quality Control Submittals:
  - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.
- .7 Closeout Submittals:
  - .1 Provide maintenance data for paints and coatings for incorporation into manual specified in Section 01 78 00 - Closeout Submittals supplemented as follows:
  - .2 Upon completion, submit records of products used. List products in relation to finish system and include the following:
    - .1 Product name, type and use.
    - .2 Manufacturer's product number.
    - .3 Colour numbers.
    - .4 MPI Environmentally Friendly classification system rating.

## 1.5 PERFORMANCE REQUIREMENTS

- .1 Environmental Performance Requirements:
  - .1 Provide paint products meeting MPI "Environmentally Friendly" E2 rating based on VOC (EPA Method 24) content levels.
  - .2 Green Performance in accordance with MPI Standard GPS-1.

## 1.6 QUALITY ASSURANCE

- .1 Qualifications:
  - .1 Conform to latest MPI requirements for exterior painting work including preparation and priming.
  - .2 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
  - .3 Paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and be compatible with other coating materials as required.
  - .4 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

- .1 (continued)
  - .5 Standard of Acceptance:
    - .1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.
    - .2 Soffits: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.
    - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
  - .2 Mock-ups:
    - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
      - .1 Provide mock-up for evaluation of surface finishes and work.
      - .2 Prepare mock-up designated exterior surface or item to specified requirements, with specified paint or coating, showing selected colours, number of coats, gloss/sheen, textures and quality of work to MPI Architectural Painting Specification Manual standards.
      - .3 Co-ordinate type and location of mock-ups with project requirements. Accepted mock-up will be used as standard for acceptance of painting work. Repaint areas which are not accepted.
      - .4 Do not proceed with remaining work until work, colour, and finish are reviewed and accepted by Departmental Representative
      - .5 Refinish mock-up area as required to produce acceptable work.
      - .6 When accepted, mock-up with painted surface and/or item will demonstrate minimum standard of finish quality and quality of work required for similar on-site painting work.

## 1.7 MAINTENANCE MATERIALS

- .1 Deliver to site extra materials, for maintenance use, from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
- .2 Quantity: Provide one - four litre can of each type and colour of primer, stain, and finish paint. Identify colour and paint type in relation to project colour schedule and finish system.
- .3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.
- .4 Store where directed by Departmental Representative.
- .5 Extra materials are note to be used to correct deficiencies.

## 1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

- .2 Deliver and store materials in original containers, sealed, with labels intact.
- .3 Labels shall clearly indicate:
  - .1 Manufacturer's name and address.
  - .2 Type of paint or coating.
  - .3 Compliance with applicable standard.
  - .4 Colour number in accordance with established colour schedule.
- .4 Remove damaged, opened and rejected materials from site.
- .5 Provide and maintain dry, temperature controlled, secure storage.
- .6 Observe manufacturer's recommendations for storage and handling.
- .7 Store materials and supplies away from heat generating devices.
- .8 Store materials and equipment in a well ventilated area with temperature range 7° C minimum to 30° C maximum.
- .9 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .10 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.
- .11 Remove paint materials from storage only in quantities required for same day use.
- .12 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- . 13 Fire Safety Requirements
  - .1 Provide one 9 kg, Type ABC dry chemical fire extinguisher adjacent to storage area.
  - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
  - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

## 1.9 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces in accordance Section 01 35 29 – Health and Safety Requirements.
  - .2 Perform painting work when adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10° C for 24 hours before, during and after paint application until paint has cured sufficiently.
  - .3 Where required, provide continuous ventilation for seven days after completion of application of paint.
  - .4 Coordinate use of ventilation system with Contractor and ensure its operation during and after application of paint as required.

- .1 (continued)
  - .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
  - .6 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless specifically pre-approved by the specifying body, Paint Inspection Agency and the applied product manufacturer, perform no painting work when:
    - .1 Ambient air and substrate temperatures are below 10 ° C for both interior and exterior work.
    - .2 Substrate temperature is over 32 ° C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
    - .4 The relative humidity is above 85% or when the dew point is less than 3 °C variance between the air/surface temperature.
    - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
  - .2 Perform no painting work when the maximum moisture content of the substrate exceeds:
    - .1 12% for concrete block masonry.
    - .2 15% for wood.
    - .3 12% for gypsum board.
  - .3 Conduct moisture tests using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test".
  - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions
  - .1 Apply paint finish only in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint only to adequately prepared surfaces and to surfaces within moisture limits noted herein.
  - .3 Apply paint only when previous coat of paint is dry or adequately cured.
- .4 Additional Interior Application Requirements:
  - .1 Apply paint finishes only when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
  - .2 Apply paint in occupied facilities during silent hours only. Schedule operations such that painted surfaces will have dried and cured sufficiently before occupants are affected.

- .5 Additional Exterior Application Requirements:
  - .1 Apply paint finishes only when conditions forecast for entire period of application fall within manufacturer's recommendations.
  - .2 Do not apply paint when:
    - .1 Temperature is expected to drop below 10° C before paint has thoroughly cured.
    - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
    - .3 Surface to be painted is wet, damp or frosted.
  - .3 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
  - .4 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
  - .5 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

#### **1.10 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan (WMP).
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with Governmental Authorities.
- .6 Ensure emptied containers are sealed and stored safely.
- .7 Unused paint materials must be disposed of at official hazardous material collections site as approved by Departmental Representative.
- .8 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Governmental Authorities.
- .9 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- .10 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

- .11 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
  - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
  - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
  - .3 Return solvent and oil soaked rags used during painting operations for contaminated recovery, proper disposal, or appropriate cleaning and laundering.
  - .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
  - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .12 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Only paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Paint materials for paint systems shall be products of a single manufacturer.
- .3 Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this project.
- .4 Conform to latest MPI requirements for interior and exterior painting work including preparation and priming.
- .5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
- .6 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.
- .7 Provide paint products meeting MPI "Environmentally Friendly" E2 rating based on VOC (EPA Method 24) content levels.
- .8 Paints, coatings, solvents, cleaners, and other fluids, to be as follows:
  - .1 Ensure calculation of VOC's does not include water or tinting colourant added at point of sale.
  - .2 Be water based, water soluble with water clean-up.
  - .3 Be non-flammable, biodegradable.
  - .4 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
  - .5 Primer: maximum VOC limit 250 g/L to Standard GS-11.
  - .6 Enamel Finish: maximum VOC limit 150 g/L to Standard GS-11.
  - .7 Paints: maximum VOC limit 150 g/L to Standard GS-11.

- .9 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .10 Water-borne surface coatings and recycled water-borne surface coatings must have a flash point of 61.0 ° C or greater.
- .11 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
  - .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
  - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .12 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.
- .13 Recycled water-borne surface coatings to contain 50% post-consumer material by volume.
- .14 Recycled water-borne surface coatings must not contain:
  - .1 Lead in excess of 600.0 ppm weight/weight total solids.
  - .2 Mercury in excess of 50.0 ppm weight/weight total product.
  - .3 Cadmium in excess of 1.0 ppm weight/weight total product.
  - .4 Hexavalent chromium in excess of 3.0 ppm weight/weight total product.
  - .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

## 2.2 COLOURS

- .1 Departmental Representative will provide colour schedule after tenders are awarded.
- .2 Colour schedule will be based on no more than 10 base colours and 5 accent colours.
- .3 Where specific products are available in a restricted range of colours, selection will be based on the limited range.
- .4 Second coat in a three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

## 2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.

- .2 Mix paste, powder or catalyzed paint mixes in strict accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.
- .4 Thin paint for spraying according in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

#### 2.4 GLOSS / SHEEN RATINGS

- .1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following values:

Gloss Level	Gloss @ 60°	Sheen @ 85°
G1 – matte finish (flat)	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss	35 to 70	
G6 - gloss	0 to 85	
G7 - high gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces shall be as specified herein.

#### 2.5 INTERIOR PAINTING SYSTEMS

- .1 Concrete Vertical Surfaces
  - .1 INT 3.1M Institutional low odour/low VOC, semi-gloss finish.
- .2 Concrete Horizontal Surfaces: floors
  - .1 INT 3.2G Waterborne concrete floor sealer.
- .3 Concrete Masonry Units: smooth face concrete block
  - .1 INT 4.2E Institutional low odour/low VOC, G4 satin finish.
- .4 Structural Steel and Metal Fabrications: columns, beams, joists, etc.
  - .1 INT 5.1S Institutional low odour/low VOC, G5 semi-gloss finish.
- .5 Steel - High Heat: (boilers, furnaces, heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted)
  - .1 INT 5.2D High heat resistant coating, maximum 593 ° C.
- .6 Galvanized Metal: doors, frames, misc. steel, pipes, overhead decking, ducts, etc.
  - .1 INT 5.3N Institutional low odour/low VOC, G5 semi-gloss finish.

- .7 Copper:
  - .1 INT 5.5G Institutional low odour/low VOC, G4 satin finish.
- .8 Dressed Lumber: including doors, casings, mouldings, etc.
  - .1 INT 6.3R Fire retardant, pigmented (plywood equipment back boards).
  - .2 INT 6.3W Waterborne clear acrylic, G4 satin finish (over stain).
- .9 Wood paneling and casework: panels, shelving, millwork:
  - .1 INT 6.4M - Waterborne clear acrylic, G4 satin finish (millwork).
  - .2 INT - 6.4T Institutional low odour/low VOC , G4 satin finish (panels).
- .10 Plaster and Gypsum Board: gypsum wallboard, drywall, "sheet rock type material", etc., and textured finishes
  - .1 INT 9.2M Institutional low odour/low VOC, G4 satin finish.
- .11 Canvas and Cotton Coverings:
  - .1 INT 10.1D - Institutional low odour/low VOC, G4 finish.
- .12 Bituminous Coated Surfaces: cast iron pipe, concrete, etc.
  - .1 INT 10.2B Alkyd, G5 (semi-gloss) finish.

## **2.6 EXTERIOR PAINTING SYSTEMS**

- .1 Asphalt Surfaces: zone/traffic marking for drive and parking areas, etc.
  - .1 EXT 2.1B - Alkyd traffic marking finish.
- .2 Structural Steel and Metal Fabrications:
  - .1 EXT 5.1D – Alkyd G5 (semi-gloss) finish.
- .3 Steel - High Heat: heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted
  - .1 EXT 5.2C - Inorganic zinc rich coating, maximum 400 ° C
- .4 Galvanized Metal: not chromate passivated
  - .1 EXT 5.3D – Pigmented polyurethane finish for use in high contact/high traffic areas.

## **PART 3 - EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 GENERAL**

- .1 Perform preparation and operations for exterior painting in accordance with MPI Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

### 3.3 EXAMINATION

- .1 Investigate substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
  - .1 Stucco, Plaster and Gypsum Board: 12%.
  - .2 Concrete: 12%.
  - .3 Clay and Concrete Block/Brick: 12%.
  - .4 Wood: 15%.

### 3.4 PROTECTION

- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .5 Removal of electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings shall be done prior to undertaking any painting operations. Items shall be securely stored and re-installed after painting is completed.
- .6 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .7 As painting operations progress, place "WET PAINT" signs in occupied areas to approval of Departmental Representative.

### 3.5 CLEANING AND PREPARATION

- .1 Perform preparation and operations for interior and exterior painting in accordance with MPI Architectural Painting Specification Manual Repainting requirements except where otherwise specified.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

- .3 Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths.
  - .2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
  - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  - .4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
  - .5 Use water-based cleaners in place of organic solvents where surfaces will be painted using water based paints.
  - .6 Use trigger operated spray nozzles for water hoses.
  - .7 Many water-based paints cannot be removed with water once dried. Minimize the use of kerosene or any such organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Touch-up, spot prime and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
- .5 Where possible, prime surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
  - .2 Apply wood filler to nail holes and cracks.
  - .3 Tint filler to match stains for stained woodwork.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove such contaminants and traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air, or vacuum cleaning as required.
- .8 Touch up of shop primers with primer as specified in applicable section. Major touch-up including cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas, shall be by supplier of fabricated material.
- .9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

**APPLICATION**

- .1 Method of application to be as approved by Departmental Representative. Apply paint by brush, roller, air sprayer or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
  - .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
  - .2 Work paint into cracks, crevices and corners.
  - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
  - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.
  - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
  - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
  - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
  - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern.
  - .4 Brush out immediately runs and sags.
  - .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access and only when specifically authorized by Departmental Representative.
- .5 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces.
- .9 Finish closets and alcoves as specified for adjoining rooms.
- .10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

### **3.6 MECHANICAL / ELECTRICAL EQUIPMENT**

- .1 Remove all adhesive labels/ stickers and adhesive residue from pipe fittings, conduits, electrical boxes etc., prior to commencing painting.
- .2 Unless otherwise specified, paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.
- .3 In mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .4 In other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .5 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .6 Do not paint over nameplates.
- .7 Keep sprinkler heads free of paint.
- .8 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .9 Paint fire protection piping red.
- .10 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .11 Paint both sides and edges of backboards for telephone and electrical equipment before installation with fire retardant paint. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .12 Do not paint transformers and substation equipment.
- .13 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise. Remove all adhesive labels/ stickers and adhesive residue from all conduits, pipes, elbows, electrical boxes etc., prior to commencing painting.

### **3.7 SITE TOLERANCES**

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
- .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

### **3.8 CLEANING**

- .1 Clean in accordance with Section 01 74 11 – Cleaning.
- .2 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
- .3 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as other cleaning and protective materials (i.e. rags, drop cloths, and masking papers), paints, thinners, paint removers/strippers in accordance with safety requirements of Governmental Authorities.
- .4 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Sediment remaining from cleaning operations to be recycled or disposed of in manner acceptable to Governmental Authorities.

### **3.9 RESTORATION**

- .1 Clean and re-install all hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

**END OF SECTION**