

- 1 General
- 1.1 SECTION INCLUDES
 - 1.1.1 Floor tile.
 - 1.1.2 Wall tile.
 - 1.1.3 Ceiling tile.
 - 1.1.4 Tile base, treads and trim.
- 1.2 RELATED SECTIONS

SPEC NOTE: Edit to suit.

- 1.2.1 Section 03 31 00 – Structural Concrete
- 1.2.2 Section 03 35 00 – Concrete Finishing
- 1.2.3 Section 05 51 00 – Metal Stairs
- 1.2.4 Section 06 10 00 – Rough Carpentry
- 1.2.5 Section 07 92 00 – Joint Sealers.
- 1.2.6 Section 09 21 16 – Gypsum Board Assemblies

SPEC NOTE: Edit to suit project requirements. Delete standards that do not apply to the project.

- 1.3 REFERENCES
 - 1.3.1 ASTM A82/A82M-05a – Standard Specification for Steel Wire, Plain for Concrete Reinforcing
ASTM A641/A641M-03 – Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire
ASTM A185/A185M-06e1 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
 - 1.3.2 ANSI A108-1999: American National Standard Specifications for the Installation of Ceramic Tile
 - 1.3.3 ANSI A118.1-1999: Dry-Set Portland Cement.
 - 1.3.4 ANSI A118.2-1999: Conductive Dry-Set Portland Cement Mortar.
 - 1.3.5 ANSI A118.3-1999: Water Cleanable Tile Setting and Grouting Epoxy.
 - 1.3.6 ANSI A118.4-1999: Latex-Portland Cement Mortar.
 - 1.3.7 ANSI A118.5-1999: Furan Mortars and Grouts.
 - 1.3.8 ANSI A118.6-1999: Ceramic Tile Grouts.
 - 1.3.9 ANSI A118.7-1999: Polymer Modified Cement Grouts
 - 1.3.10 ANSI A118.8-1999: Modified Epoxy Emulsion Mortar/Grout.
 - 1.3.11 ANSI A118.9-1999: Cementitious Backer Units (CBU).
 - 1.3.12 ANSI A118.10-1999: Load Bearing, Bonded, Waterproof Membrane for Thin-set Ceramic Tile and Dimensional Stone Installations.
 - 1.3.13 ANSI A118.11-1999: Exterior Grade Plywood (EGP) Latex-Portland Cement Mortar.
 - 1.3.14 ANSI A136.1-1999: Organic Adhesive.

- 1.3.15 ASTM C144-04: Standard Specification for Masonry Aggregates.
- 1.3.16 ASTM C207-06 (1992): Standard Specification for Hydrated Lime.
- 1.3.17 ASTM C373-88 (2006) Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity and Apparent Specific Gravity of Fired Whiteware Products.
- 1.3.18 ASTM C503-05: Standard Specification for Marble Dimension Stone.
- 1.3.19 ASTM C568-03: Standard Specification for Limestone Dimension Stone.
- 1.3.20 ASTM C615-03: Standard Specification for Granite Dimension Stone.
- 1.3.21 ASTM C627-93 (1999) e1: Standard Method for Evaluating Ceramic Floor Tile Installation Systems.
- 1.3.22 ASTM C648-04: Standard Test Method for Breaking Strength of Ceramic Tile.
- 1.3.23 ASTM C241-90 (2005): Abrasion Resistance.
- 1.3.24 ASTM C1597M-04: Standard Specification for Gypsum Wallboard (Hard Metric Sizes)
- 1.3.25 ASTM C616-03: Standard Specification for Quartz-Based Dimension Stone.
- 1.3.26 ASTM C629-03: Standard Specification for Slate Dimension Stone.
- 1.3.27 ASTM C847-04: Standard Specification for Reinforcing Metal Lath.
- 1.3.28 ASTM C1028-06: Standard Test Method for Evaluating the Static Coefficient of Friction of Ceramic Tile.
- 1.3.29 ASTM C1178/C1178M-04e1: Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
- 1.3.30 ASTM C171-03: Cleavage Membrane
- 1.3.31 CSA A3000-03: Cementitious Materials Compendium
- 1.3.32 CSA A123.3-98: Asphalt Saturated Organic Roofing Felt.
- 1.3.33 CSA O121-M1978: Exterior Grade Douglas Fir Plywood.
- 1.3.34 CSA 0151: Canadian Softwood Plywood
- 1.3.35 CSA 0153: Poplar Plywood
- 1.3.36 CAN/CSA-0325.0: Construction Sheathing
- 1.3.37 CSA 0437.0: Oriented Strandboard
- 1.3.38 CAN/CGSB-25.20-95: Surface Sealer for Floors.
- 1.3.39 CAN/CGSB-51.34-M86: Vapour Barrier, Polyethylene Film for Use in Building Construction.
- 1.3.40 CAN/CGSB-75.1-M88: Tile, Ceramic.
- 1.3.41 CAN/ULC 5701 Type 4: Rigid Polystyrene Insulation
- 1.3.42 Terrazzo Tile & Marble Association of Canada (TTMAC): Tile Specification Guide 09 30 00-2006/2007.
- 1.3.43 Terrazzo, Tile and Marble Association of Canada latest Maintenance Guide.

SPEC NOTE: Specify quantity and size of samples required and whether they are to be mounted on panels, with specified grout.

1.4 PERFORMANCE STANDARDS

1.4.1. Static Coefficient of Friction: Tile installed on walkway surfaces shall have the following values as determined by testing identical products per ASTM C1028.

1.4.1.1 Level Surfaces: Minimum 0.5 dry.

1.4.1.2 Step Treads: Minimum 0.6 dry.

1.4.1.3 Ramp Surfaces: Minimum 0.6 dry.

SPEC NOTE: Tile as well as total assembly must be able to meet or surpass the testing requirements under conditions similar to actual specified usage or environments.

1.4.2 Traffic Level Performance: floor tiles to meet [extra heavy] [heavy] [moderate] [light] [residential] traffic level performance passing ASTM C627, cycles 1 through [14] [12] [10], as described in TTMAC Tile Specification Guide 09 30 00.

1.4.2.1 Extra Heavy: Passes cycles 1 through 14.

1.4.2.2 Heavy: Passes cycles 1 through 12.

1.4.2.3 Moderate: Passes cycles 1 through 10.

1.4.2.4 Light: Passes cycles 1 through 6.

1.4.2.5 Residential: passes cycles 1 through 3.

1.4.3 Exterior tiles provided for Work in this Section to be frost resistant in accordance with CAN/CGSB 75.1 and shall have a moisture absorption rating of 3.0% or less.

1.5 SAMPLES

1.5.1 Submit samples to requirements of Section 01 33 00 – Submittals.

1.5.2 Samples: [305 x 305] [___ x ___] mm size panel [c/w approved grout colour]; mounted to a [19] [___] mm thick plywood backer.

SPEC NOTE: Shop drawings are generally only required for unusual conditions such as tile for pools, special mosaics and other installations requiring details.

1.6 SHOP DRAWINGS

1.6.1 Submit shop drawings to requirements of Section 01 33 00 – Submittals.

1.6.2 Shop Drawings: indicate swim lines, terminal, targets, pool markings, and special patterns. Include locations and details for all proposed control joints.

1.7 SUBMITTALS

1.7.1 Submit four copies of the latest TTMAC Maintenance Guide for inclusion in the operations and maintenance manual prepared and submitted in Section 01 78 00 – Closeout Submittals. Give specific warning of any maintenance practice or materials that may damage or disfigure the finished work.

1.7.2 Submit product data [and WHMIS MSDS] sheets for floor sealer products.

1.7.3 Where more than one manufacturer's products are part of a single tile assembly, arrange for each manufacturer to submit a written statement of compatibility with respect to the other manufacturers' materials.

SPEC NOTE: Include paragraphs which provide the criteria, limitations and standards to establish a minimum level of quality that manufacturers' and applicators can be evaluated for compliance with requirements of the project.

1.8 QUALITY ASSURANCE

- 1.8.1 Installer: Employ skilled mechanics trained and experienced in tile work, company must be registered as members in good standing with the Terrazzo, Tile and Marble Association of Canada, with a minimum of two years [proven] experience. If requested by Consultant, submit a listing of at least three previously completed projects of similar size and scope.
- 1.8.2 Supplier: A member in good standing with the Terrazzo, Tile and Marble Association of Canada, providing materials meeting the minimum standards of TTMAC.
- 1.8.3 Consultant: Specifications and compatibility to be submitted to the TTMAC through the Verispec Program. Cost to be carried by the trade contractor.

1.9 ENVIRONMENTAL CONDITIONS

- 1.9.1 Do not install tiles at temperatures less than [12 degrees C] or above [38 degrees C].
- 1.9.2 Maintain temperatures at or above [12 degrees C] until cementitious materials have fully cured.
- 1.9.3 Do not apply epoxy mortar and grouts at temperatures below [18 degrees C] or above [35 degrees C].

1.10 DELIVERY STORAGE AND HANDLING

- 1.10.1 Store materials in a dry area, protected from freezing, staining and damage.
- 1.10.2 Store cementitious materials on a dry surface.

1.11 EXTRA MATERIALS

- 1.11.1 Provide extra stock to requirements of Section 01 78 00 – Closeout Submittals.
- 1.11.2 Extra Stock: [4 m²] or 2 percent, whichever is the greater, of each type and colour of tile; clearly marked to identify:
 - 1.11.2.1 Manufacturer's name
 - 1.11.2.2 Product's name
 - 1.11.2.3 Product colour and pattern
- 1.11.3 Package tile products neatly in original containers, to prevent damage.

2 Products**2.1 MANUFACTURERS**

- 2.1.1 Manufacturers of [ceramic] [granite] [limestone] [marble] [slate] tile having Product considered acceptable for use:

- 2.1.1.1 [_____].

- 2.1.1.2 [_____].

- 2.2.2 Manufacturers of mortar and grout having Product considered acceptable for use:

- 2.2.2.1 [_____].

- 2.2.2.2 [_____].

- 2.2.2.3 [_____].

2.1.3 Substitutions: refer to Instructions to Bidders and Section 01 62 00 – Product Options.

SPEC NOTE: Preselect and name exact tile, stair treads and/or trim required wherever possible. Otherwise specify standard, type, class, size, colour, and pattern. Refer to TTMAC Tile Specification Guide 09 30 00 – 2006/2007.

2.2 TILE MATERIALS

2.2.1 Ceramic [Floor] [Wall] Tile: [___ x ___] mm size, [___] mm thick; to CAN/CGSB-75.1-M.88, Type [___], Class MR[1] [2] [3] [4] [5] [6] [7]; [___] by [___], [___] colour [as selected by Consultant].

2.2.2 Marble Tile: [___ x ___] mm size, [___] mm thick; to ASTM C503; [___] by [___], [___] colour [as selected by Consultant].

2.2.3 Limestone Tile: [___ x ___] mm size, [___] mm thick; to ASTM C568, Class III - High Density; [___] by [___], [___] colour [as selected by Consultant].

2.2.4 Granite Tile: [___ x ___] mm size, [___] mm thick; to ASTM C615; [___] by [___], [___] colour [as selected by Consultant].

2.2.5 Slate Tile: [___ x ___] mm size, [___] mm thick; to ASTM C629; [___] by [___], [___] colour [as selected by Consultant].

2.2.6 Base: coved; type, size, colour and texture to match adjacent flooring material.

2.2.7 Stair Treads: bull nosed edge, [non-slip surface], matching floor tile, sized to suit stair tread configuration.

SPEC NOTE: It is recommended the following materials are supplied by a single source manufacturer.

2.3 MORTAR, ADHESIVE AND GROUT MATERIALS

2.3.1 Portland Cement: to CSA A3000, Type GU.

2.3.2 Hydrated Lime: to ASTM C207, Type [N] [NA] [S] [SA].

2.3.3 Sand: to ASTM C144, passing 16 mesh.

2.3.4 Dry-Set Portland Cement Mortar: to ANSI A118.1.

2.3.5 Latex-Portland Cement Mortar: to ANSI A118.4.

2.3.6 Commercial Portland Cement Grout: to ANSI A118.6.

2.3.7 Latex-Portland Cement Grout: to ANSI A118.6.

2.3.8 Polymer Modified Grout: to ANSI A118.7

2.3.9 Epoxy Adhesive and Grout: to ANSI A118.3.

2.3.10 Modified Epoxy Emulsion Mortar: to ANSI A118.8

2.3.11 Furan Mortars and Grout: to ANSI A118.5.

2.3.12 Exterior Grade Plywood (EGP) Latex-Portland Cement Mortar: to ANSI A118.11.

2.3.13 Organic Adhesive: to ANSI A136.1

2.4 ACCESSORIES

2.4.1 Underlayment: [as specified under Section 06 10 00.] [[16 mm] thick Douglas Fir plywood, to CSA O121.]

2.4.2 Cleavage Membrane: [[0.10 mm] [4 mil] thick polyethylene film, to CAN/CGSB-51.34-M] [asphalt saturated roofing felt, to CSA A123.3, Type 1].

- 2.4.3 Metal Lath: galvanized type, 1.4 kg/m³ to ASTM C847.
- 2.4.4 Reinforcing Mesh: [51 x 51 mm] mesh size, fabricated from 1.6 mm thick galvanized steel wire; welded fabric design.
- 2.4.5 Latex Additive: formulated for use in Portland cement mortars and grouts.
- 2.4.6 Organic Adhesive: to ANSI A136.1, Type [1] [2].
- 2.4.7 Water: potable, clean and free of chemicals and contaminants detrimental to mortar or grout mixes.
- 2.4.8 Thresholds: [] marble, [] mm thick, [rounded edges] [bevelled [one side] [two sides]], honed finish on exposed surfaces, size to suit door opening and frame width.
- 2.4.9 Transition Strips: purpose made metal extrusion; [stainless steel] [brass] [zinc] [anodized aluminium] type.
- 2.4.10 Reducer Strips: purpose made metal extrusion; [stainless steel] [brass] [zinc] [anodized aluminium] type; maximum slope of 1:2.
- 2.4.11 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301MJ-2006/2007.
- 2.4.12 Joint Sealant: as specified under Section 07 92 00.
- 2.4.13 Sealer: to CAN/CGSB-25.20, Type [1] [2]; as recommended by tile manufacturer.

2.5 MIXES

- 2.5.1 Scratch Coat (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.
- 2.5.2 Slurry Bond Coat: mix Portland cement and water to a creamy paste consistency. Include latex additive where required by TTMAC Detail.
- 2.5.3 Mortar Bed for Walls (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.
- 2.5.4 Leveling Coat (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions.
- 2.5.5 Mortar Bed for Floors: 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.

When mixed with water the mortar bed shall be of such a consistency and workability that will allow maximum compaction during tamping of the mortar bed, and achieve a minimum compressive strength of 15 MPa after 28 days. A stronger mix can be achieved by adding latex to the water.

3 Execution

3.1 EXAMINATION

- 3.1.1 Verify existing conditions are ready to receive work.
- 3.1.2 Ensure substrate surfaces are clean, dimensionally stable, cured and free of contaminants such as oil, sealers and curing compounds.
- 3.1.3 Ensure that concrete has been allowed to cure for a minimum of 28 days (preferably 90 days or longer).

- 3.1.4 Ensure concrete floors have not been treated with curing compounds.
- 3.1.5 Ensure concrete floors scheduled to receive thin-set applied tile or cleavage membranes are steel troweled to a fine broom finish. Ensure concrete slabs have been finished with a maximum permissible variation of 6 mm in 3049 mm from the required plane and not more than 2 mm in 305 mm when measured from high points in the surface.
- 3.1.6 Ensure concrete floors scheduled to receive tile applied over a bonded mortar bed have been screed finished. Verify substrate surface variation does not exceed 6 mm in 3049 mm.
- 3.1.7 Notify Consultant in writing of unacceptable substrate conditions. Beginning of installation implies acceptance of existing conditions.
- 3.2 PREPARATION
 - 3.2.1 Protect surrounding work from damage or disfiguration.
 - 3.2.2 Thoroughly clean existing surfaces that are to receive tile finish to ensure the removal of all grease, oil or dust film.

SPEC NOTE: delete the following paragraph if no wood subfloor.

- 3.2.3 Securely screw underlayment to subfloor, smooth face up. Space sheets 6 mm apart.
- 3.2.4 Apply a latex cementitious levelling coat wherever a slight substrate irregularity exists. Limit levelling coat thickness to less than 8 mm where thin-set tile methods are to be used. A levelling coat in excess of 8 mm shall be set with a mortar bed method.
- 3.2.5 Install cleavage membrane over structural concrete slab. If a cleavage membrane is being applied over a rough surface, apply a 6 mm thick sand-bed under the cleavage membrane.

SPEC NOTE: Where finished tile floors are to be flush with adjacent floors, ensure that concrete slabs have been designed to be depressed the thickness of the mortar bed, bond coat and tile.

3.3 APPLICATION

- 3.3.1 Install materials to requirements of TTMAC Tile Specification Guide, as scheduled below. Refer to Notes for the Professional.
- 3.3.2 Fit tile units around corners, fitments, fixtures, drains and other built-in objects to maintain uniform joint appearance.
- 3.3.3 Make cut edges smooth, even and free from chipping. Do not split tile.
- 3.3.4 Lay out tiles according to drawings and patterns so that perimeter and all cut tiles are no less than half size.
- 3.3.5 Prior to installation ensure that the back of each tile is free of contaminants.
- 3.3.6 For tile with raised or textured backs, bonding material must be evenly dispersed and pressed into the back of the tile to ensure a minimum of 95% coverage. Set tile in place while bond coat is wet and tacky, prior to skinning over. Notch bond coat in horizontal straight lines and set on the freshly set bonding material while moving (sliding) tile back and forth at 90° to the notches. Ensure corner and edges are fully supported by bonding material. Avoid lippage.
- 3.3.7 Clean excess bonding material from surface prior to final set.
- 3.3.8 Sound tiles after setting materials have cured and replace hollow sounding tile before grouting.
- 3.3.9 Use sufficient bond coat to ensure minimum 80% contact. Bonding material must be evenly dispersed and pressed into the back of the tile.
- 3.3.10 Bond coverage of 95% evenly dispersed is required for tile larger than 305 mm x 305 mm, tile used in

wet areas or exterior, and for tile used in areas rated Heavy or Extra Heavy Duty. To help ensure coverage [backbuttering] or [notch the bond coat in straight lines and move the tile back and forth perpendicular to notches when setting] are two techniques that can be used.

- 3.3.11 Keep two-thirds of the depth of grout joints free of setting material.
- 3.3.12 Protect exposed edges of floor tile with appropriately sized transition strips. Provide reducer strips where uneven transitions between 6 mm and 12.5 mm occur.

3.4 CONTROL JOINTS

SPEC NOTE: Verify that the location of expansion, control, cold or seismic joints are indicated on the drawings. Use the following table to determine placement of control and expansion joints on the drawings. If not included on drawings, consider including table as part of specification.

<u>Environment</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Joint Width</u>
Interior	4878 mm	6098 mm	6 mm minimum
Interior/Sunlight	2439 mm	3659 mm	6 mm minimum
Exterior – Normal	2439 mm	3659 mm	10 mm minimum
Exterior – Excessive	2439 mm	3049 mm	13 mm minimum

- 3.4.1 Install control joints and expansion joints in tile work in accordance with TTMAC Detail 301MJ-2006/2007.
- 3.4.2 Keep all control and expansion joints free of setting materials.

3.5 GROUTING

SPEC NOTE: Epoxy grout must be installed in a dust free environment and protected for 7 days.

- 3.5.1 Allow proper setting time prior to grouting.
- 3.5.2 Pre-seal tiles requiring protection from grout staining.
- 3.5.3 Force grout into joints to ensure dense finish.
- 3.5.4 Remove excess and polish with clean cloths.

SPEC NOTE: Inspection may be part of the Verispec Program provided by the TTMAC.

3.6 FIELD QUALITY CONTROL

- 3.6.1 Inspect completed work and replace broken, cracked, hollow sounding or damaged tile.

3.7 TOLERANCES

- 3.7.1 Set and level tile flush with adjacent tile (lippage 1 mm tolerance over a 3 mm joint).

3.8 CLEANING

- 3.8.1 Apply floor sealer in accordance with manufacturer's instructions.

3.9 PROTECTION

- 3.9.1 General contractor to provide appropriate protection to completed tile work. Protect work of other trades. Prohibit traffic during installation and for 48 hours after completion. Protect floor from impact and vibration for a minimum of 48 hours after installation. Protect base from impact, vibration, heavy hammering on adjacent and opposite walls. On completion of tile floor it is the responsibility of the owner/agent or general contractor to protect the floor from damage.
- 3.9.2 Protect grouted areas from traffic for 24 hours after grouting.
- 3.9.3 Provide protective covering in traffic areas until substantial completion of the work.

3.9.4 Protect wall tiles and bases from impact, vibration, heavy hammering on adjacent and opposite walls for at least 14 days after installation.

3.10 SCHEDULE

SPEC NOTE: Specify TTMAC detail suitable for project. If more than one method applies, list conditions applicable to each detail.

3.10.1 Wall Tile: TTMAC Detail [_____].

3.10.2 Floor Tile: TTMAC Detail [_____].

3.10.3 Ceiling Tile: TTMAC Detail [_____].

END OF SECTION