

CW 3326 – DETECTABLE WARNING SURFACE TILES

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CW 3326 – DETECTABLE WARNING SURFACE TILES

1. DESCRIPTION

1.1 General

- .1 This specification covers the supply and installation of detectable warning surface tiles in sidewalk ramps, and multi-use path ramps.
- .2 Execution Requirements
 - .1 This specification applies to sidewalk ramps on P1 and P2 streets.
 - .2 *A list of Regional Streets (P1) and Non-regional streets (P2) roadways can be found at the following web address:*
<http://winnipeg.ca/publicworks/Streets/SnowRoutes.asp>
 - .3 Install detectable warning surface tiles at all four corners of intersections within the project limits for new construction, reconstruction, rehabilitation, and mill and fill projects.
 - .4 Where project limits are in one direction only, place tiles on all four corners, medians and islands of signalized intersections. All remaining intersections within the project limits shall receive tiles in only the longitudinal direction of the project.
 - .5 When a pedestrian corridors falls within project limits, install tiles on both sides of the road.
 - .6 Further to clause .1 of these Execution Requirements, this specification applies to all ramps on multi-use paths on P1, P2, or P3 streets. Install detectable warning tiles on both sides of the street in the direction of the multi-use path.
 - .7 Do not install tiles at private approaches or alleys.
 - .8 Install detectable warning surface tiles on curb ramps at all legs of a roundabout, including the splitter islands, regardless of street priority.

1.2 Definitions

- .1 Clear Path of Travel means a path that is unobstructed by vertical and /or overhanging elements.
- .2 Curb Ramp means the combined curb taper and depressed curb.
- .3 Sidewalk Ramp means the ramped portion of sidewalk behind the depressed curb.

1.3 Referenced Standard Construction Specifications

- .1 CW 3235 - Renewal of Existing Miscellaneous Concrete Slabs
- .2 CW 3240 - Renewal of Existing Curbs
- .3 CW 3310 - Portland Cement Concrete Pavement Works
- .4 CW 3325 - Portland Cement Concrete Sidewalk

1.4 Referenced Standard Details

- .1 SD-229A - Curb Ramp for 1500 Sidewalk at Intersections

- .2 SD-229AA - Detectable Warning Surface Tile for Intersections, **Layout Priority 1**
- .3 SD-229AB - Detectable Warning Surface Tile for Intersections, **Layout Priority 2**
- .4 SD-229AE – Curb Ramp for Pedestrian Corridor with a Traffic Control Device
- .5 SD-229AF – Detectable Warning Surface Tile Orientation for Offset Intersections
- .6 SD-229BA - Curb Ramp for Full Width Sidewalk at Intersections
- .7 SD-229BB – Detectable Warning Surface Tile in Curb Ramps for Medians
- .8 SD-229C - Curb Ramp for Concrete Pavement
- .9 SD-229D - Curb Ramp for Asphalt Overlay
- .10 SD-229E - Curb Ramp and Depressed Curb with Detectable Warning Surface Tile

2. MATERIALS

2.1 Approved Products

- .1 Use only those materials listed as Approved Products for Surface Works. The Approved Products are available in Adobe Acrobat (.pdf) format at the City of Winnipeg, Corporate Finance, and Material Management Internet site at: <http://www.winnipeg.ca/matmgt/info.stm>

2.2 General

- .1 Detectable warning surface tiles shall be Federal Yellow (USA); or Safety Yellow (Canada). Colour shall be homogeneous throughout the tile.
- .2 Detectable warning surface tiles shall be cast in place type with ribs. (Anchored type is not allowed)
- .3 Truncated domes on detectable warning surface tiles shall be in accordance with ADA Accessibility Guidelines (ADAAG).
- .4 Detectable domes shall be on a square grid (in line pattern).
- .5 Detectable warning surface tiles shall be as follows:
 (a) 610 x 1220mm (2'x 4') Cast in Place

2.2 Detectable Warning Surface Tile (SMC)

- .1 Detectable Warning Surface Tile (SMC) shall be made of glass and carbon reinforced polyester based Sheet Moulding Compound.

Table CW 3326.1 – SMC Detectable Warning Surface Tile requirements:

Physical Property	Standard	Test Method
Compressive Strength	25,000psi (172MPa) minimum	ASTM D695
Slip Resistance	0.80 - minimum	ASTM C1028
Tensile Strength	10,000psi (69MPa) minimum	ASTM D638
Flexural Strength	25,000psi (172MPa) minimum	ASTM D790
Abrasion Resistance	300 minimum	ASTM C501
Accelerated Weathering	ΔE<5.0 at 2,000 hrs. No fading	ASTM G155
Salt Spray	200hrs exposure – no deterioration or defects	ASTM B117

2.3 Detectable Warning Surface Tile (VPC)

.2 Detectable Warning Surface Tile (VPC) shall be made of vitrified polymer composite.

Table CW 3326.2 – VPC Detectable Warning Surface Tile requirements:

Physical Property	Standard	Test Method
Compressive Strength	28,000psi (193MPa) minimum	ASTM D695
Slip Resistance	0.80 - minimum	ASTM C1028
Tensile Strength	19,000psi (131MPa) minimum	ASTM D638
Flexural Strength	25,000psi (172MPa) minimum	ASTM D790
Abrasion Resistance	500 minimum	ASTM C501
Accelerated Weathering	$\Delta E < 4.5$ @3000hrs – No fading	ASTM G155
Salt Spray	100hrs – No deterioration or defects	ASTM B117
Freeze/Thaw	200hrs – No deterioration or defects	ASTM D1037

3. CONSTRUCTION METHODS**3.1 Selection of Layout Options**

- .1 Select the appropriate design layout for detectable warning surface tiles according to the following prioritized order:
- .2 Layout Priority 1:
Install detectable warning surface tiles in accordance with SD-229AA and this Specification. If two tiles would physically overlap each other, or would be within 50mm of each other, or if one tile would lie within the path of travel towards the other tile, then install the detectable warning surface tiles according to with Layout Priority 2.
- .3 Layout Priority 2:
Install detectable warning surface tiles in accordance with SD-229AB and this Specification. Separate the tiles by moving either one or both tiles along the curb line in opposite directions, in accordance with this Specification, and keeping the ramp and pedestrian road crossing as perpendicular to the road as possible, as directed by the Contract Administrator. Deviations in the path of travel are allowed but are to be kept to a minimum. No one tile can lie in front of another tile within a path of travel. The minimum distance between two tiles is 50mm. If the requirements of this Section 3.1 are not able to be met due to lack of sidewalk area, fill in additional sidewalk area behind the back of sidewalk to create a minimum 1500mm clear path of travel opening between any tile and the nearest back of sidewalk.
- .4 For all layout priorities, on the street side of the detectable warning surface tiles, crossing paths of travel are not allowed in accordance with SD-229AC.

3.2 Layout**3.2.1 General**

- .1 Construct curb ramps, sidewalk ramps and multi-use paths in accordance with the referenced Standard Construction Specifications and Standard Details.

- .2 Install the detectable warning surface tiles as shown on the Drawings or as directed by the Contract Administrator.
- .3 Detectable warning surface tile shall not be placed at private approaches or alleys.
- .4 All curb ramps opposite each other shall have the same width.
- .5 Orient the detectable warning surface tiles perpendicular to the crossing direction.
- .6 Construct the lip of the depressed curb in accordance with SD-229E.
- .7 Construct ramp slopes in accordance with SD-229C and SD-229D. Use a ramp slope with preference for a slope as close to 5% maximum as possible.
- .8 Rest Area
 - a) Construct a rest area at the top of the sidewalk ramp 1500mm x 1500mm.
 - b) If the rest area is lower in elevation than the existing sidewalk, construct the sidewalk grades leading down to the rest area 2% – 5%
- .9 Construct flare and curb taper slopes for full width sidewalks as follows:
 - a) If a full width sidewalk has a clear path of travel at the top of the ramp that is ≥ 1500 mm in width, construct the curb taper 900mm in length and a flare to match the curb taper.
 - b) If a full width sidewalk has a clear path of travel at the top of the ramp that is < 1500 mm in width, construct the flare and curb taper at 10% in accordance with SD-229AE.
- .9 Locate gratings, access covers and other appurtenances outside of the sidewalk ramps, depressed curbs, rest areas, and gutters in front of the depressed curbs, as directed by the Contact Administrator.

3.2.2 Medians and Refuge Islands

- .1 Where the distance from back of curb to back of curb is ≥ 1320 mm, install one detectable warning surface tile 50mm from back of the curb on each side.
- .2 Where the distance from back of curb to back of curb is < 1320 mm, place the tiles 50mm from back of curb and cut tiles(s) to fill the remaining area between the curbs.

3.2.3 2000mm Wide Depressed Curb for Multi-Use Paths

- .1 Construct a curb ramp with a 2000mm depressed curb in accordance with SD-229E.
- .2 Construct the concrete ramp 2000mm wide and a minimum of 1500mm deep from back of curb.
- .3 Construct the curb ramp in accordance with SD-229C and SD-229D.

- .4 Install one 610mm x 1220mm tile centered to the 2000mm wide depressed curb. The part of the tile nearest the curb must be 50mm from the back of curb similar to tile placement in SD-229AA.

3.2.4 3500mm Wide Depressed Curb for Multi-use Paths

- .1 Construct a curb ramp with a 3500mm depressed curb in accordance with SDE-229E.
- .2 Construct the concrete ramp 3500mm wide and a minimum of 1500mm deep from back of curb.
- .3 Construct the curb ramp in accordance with SD-229C and SD-229D.
- .4 Install two (2) tiles in each concrete ramp, one (1) on each side for each direction. Place the short edge of each tile 150mm from the edge of the concrete ramp, with both tiles in line with each other transversely across the concrete ramp. The tile(s) nearest the curb must be 50mm from back of curb similar to tile placement in SD-229AA.
- .5 Saw cut the middle of the concrete slab, perpendicular to the curb and to a depth of D/4. Cut additional sawcuts as directed by the Contract Administrator.

3.3 Installation

- .1 Pour and finish the concrete to the finished grades.
- .2 Do not remove concrete to prepare the finished surface to accept the tile.
- .3 Drill additional 6mm vent holes in the ribs as required, to seat the tile in the concrete.
- .4 Where the corner of the tile is 50mm from the back of curb at a radius, trim the corner of the tile at curb radii in accordance with SD-229AA and SD-229AC, as directed by the Contract Administrator.
- .5 Orient the detectable warning surface tiles perpendicular to the crossing direction in accordance with SD-229AF.
- .6 Set the tile in wet concrete. Use suitable weights such as concrete blocks, or sand bags on each tile to prevent a wet mix from floating the tile. Eliminate any air voids under the tile by setting one end first into the wet concrete and then the other end.
- .7 Use a large non-marring rubber mallet and/or vibrating unit as required to set the tile. The vibrating unit should be fixed to a soft base.
- .8 Embed the tile so the top of the truncated domes are flush with the adjacent concrete in accordance with SD-229E. Stepping on the tile may cause uneven settling.
- .9 Finish the concrete using an edging tool to create a finished edge. Then use a trowel around the edge of the tile.
- .10 Remove the plastic wrap with a sharp knife after the concrete has set. Remove any concrete from the surface of the tile with a soft wire brass brush.

4. MEASUREMENT AND PAYMENT

4.1 Detectable Warning Surface Tiles

- .1 Detectable Warning Surface Tiles shall be measured on a unit basis and paid for at the Contract Unit Price per unit for “Detectable Warning Surface Tiles”. The number of units to be paid for shall be the total number of detectable warning surface tiles supplied and installed in accordance with this Specification, accepted and measured by the Contract Administrator.
- .2 The area under the detectable warning surface tile is part of the concrete sidewalk ramp and shall be measured for payment in accordance with CW 3235 or CW 3325.
- .3 The concrete sidewalk ramp and the concrete ramp for multi-use paths will be paid as 100mm or 150mm sidewalk in accordance with CW 3235 or CW 3325.
- .4 Curb ramp will be paid in accordance with CW 3240 or CW 3310.