

**TECHNICAL SPECIFICATION 265  
PORTLAND CEMENT CONCRETE SIDEWALKS AND RAMPS**

265.1 SCOPE OF WORK

This technical specification includes the furnishing of labor, materials, testing, submittals, tools, and equipment necessary to replace or construct Portland Cement Concrete sidewalks, drill for and install steel dowels, and construct driveway ramps and sidewalk ramps with detectable warning strips. Prior to the installation of the concrete, all work within the sidewalk limits shall be complete and shall include, but not be limited to, the adjustments of all public and private frames, grates, covers, and utility boxes.

265.2 MATERIALS

A. Base Material:

Base material shall be medium gradation processed aggregate base conforming to Technical Specifications 210 – “Processed Aggregate Base”.

B. Portland Cement Concrete:

All Portland Cement Concrete shall conform to the following specifications:

All concrete used shall be proportioned by weight for one cubic yard as follows:

Cement (7 sacks)	658 lbs.
Sand	1,244 lbs.
3/8" crushed stone	700 lbs.
3/4" crushed stone	1,080 lbs.
Water	34 gals.
Darex II (A.E.A.)	3.29 oz.
Air Entrainment	5-7 percent
Slump	3 inches (max.)
Strength (28 day)	4,000 PSI (min.)

The proportions listed are based on the weight of cement and surface dry aggregates with a bulk specific gravity of 2.65 for sand with a fineness modulus of 2.70 and trap rock with a specific gravity of 2.90.

Portland Cement shall be Type II or IIA and shall comply with AASHTO M-85. Type III or IIIA may not be used except as directed by the Engineer for special conditions. All cements must meet requirements of ASTM C-150. Should air entraining cement be used, it must be capable of producing entrained air within the specified limits without air entraining admixtures.

The air entraining agent used shall be of the vinsol resin type and shall conform to Form 817, Sections M.03.01-5. The air entraining agent shall be added to the mixing water prior to its addition to the mix, for non air entrained cement mixes only. Air entraining agent may not be used with air entrained cement.

All Portland Cement Concrete used shall be "ready-mixed concrete", (Portland Cement Concrete manufactured for delivery to a purchaser in a plastic state and delivered to the job site suitably mixed for placing in the work). Ready-mixed concrete shall be either (1) mixed completely at a central mix plant and transported to the job in a truck mixer operating at agitator speed or (2) mixed completely in a truck mixer while in transit or at the point of delivery. Ready-mixed concrete shall be obtained from suppliers approved by the Inspector. Batching equipment, stationary mixes and truck mixers shall conform to the requirements of Form 817, Section 4.01.03 and Section 6.01.03, as applicable, and be in good condition and operated as designated by the manufacturer. The concrete shall be discharged at the site of the work in a thoroughly mixed and uniform mass of the consistency and workability required without the use of additional mixing water. The slump of the concrete at and during discharge at the work shall be three (3) inches or less.

As determined in accordance with AASHTO T-119, discharge of the batch shall be complete within one (1) hour of the addition of water to the mix. Concrete delivered in outdoor temperatures lower than 40° F shall be discharged at the work site having a temperature not less than 60° F nor greater than 90° F. Every load of concrete delivered to the job site shall have a ticket clearly marked indicating the proportionment of the batch and stamped by a time clock indicating the time the batch was placed in the truck mixer. This ticket shall be presented to the Inspector on the job prior to beginning discharge. Additional water for tempering will be added to the mix only on direction of the Inspector. The concrete supplier shall guarantee proper frequency of delivery to allow conformance with placing requirements of these specifications. Failure to conform with all the requirements of this technical specification will result in the rejection of the nonconforming load(s). Rejected loads that have been "doctored up" will not be accepted. Repeated failure of a supplier to conform to these specifications will result in loss of approval by the Engineer as an approved source of material for construction within the Town.

C. Premolded Joint Material:

Premolded joint material shall be Kork Pak, Proflex Reflex or equivalent approved by the Engineer.

D. Curing Materials:

Waterproof paper shall be double sheet, bituminous cemented Kraft Paper, reinforced in both directions and conforming to the requirements of AASHTO M-139.

Polyethylene (i.e. Plastic) Sheeting shall not be allowed except to cover the waterproof paper in case of inclement weather.

E. Curing Compound:

Liquid membrane-forming compound shall be white pigmented and conform to Form 817, Section M.03.04.

F. Suitable Subbase Material:

Suitable subbase material shall be medium gradation processed aggregate base as specified in Technical Specification 210 – “Processed Aggregate Base”, or bank run gravel meeting the applicable provisions of Form 817, Section M.02.02 and approved by the Engineer.

G. Dowels:

Dowels shall be 5/8-inch diameter x 24-inch long intermediate grade steel conforming to AASHTO M-38 and shall be smooth. Speed Dowel plastic sleeve or approved equal to cover one end of the dowel shall be 12-inches long by 5/8-inch diameter.

H. Wire Mesh Reinforcing:

Wire mesh reinforcing shall be cold-drawn steel wire conforming to the requirements of AASHTO M-32 and M-35, and shall be welded steel, no. 8 wire, spaced 6 inches by 6 inches, both ways. All 8 inch concrete walks, drives, and ramps shall be reinforced.

I. Detectable Warning Strips

Detectable warning strips shall be prefabricated cast-in-place truncated dome detectable warning surface tile as manufactured by ADA Fabricators, Inc. P.O. Box 179, North Billerica, MA 01862. The color shall be brick red and approved by the Engineer.

265.3 SUBMITTALS

The following submittals shall be submitted to the Engineer for review and approval prior to installation:

- Gradation test results for processed aggregate

- Concrete specifications from supplier
- Manufacturer's cut sheet for premolded joint material
- Manufacturer's cut sheet for waterproof paper
- Label or manufacturer's cut sheet for curing compound
- Gradation test results for processed aggregate
- Gradation test results for bank run gravel
- Manufacturer's cut sheet for dowels
- Manufacturer's cut sheet for wire mesh reinforcing
- Material certification for detectable warning strips

#### 265.4 CONSTRUCTION METHODS

##### A. Excavation:

All proposed 5 inch thick walks shall be excavated 13 inches below and parallel to the finished grade of the walk. All proposed 8 inch walks and ramps shall be excavated 16 inches. Excavation shall extend 3 inches minimum and 6 inches maximum outside the edges of the proposed walk. Ledge rock encountered within 13 inches of the finished walk grade shall be removed. After completion of excavation, and prior to placing of base material, the subbase shall be compacted by at least 2 passes of a motor driven vibratory compactor; should the subbase appear soft and yielding, this material shall be removed to firm ground with a maximum depth of 25 inches below finished grade as ordered by the Engineer, for 5 inch thick walks, and 28 inches below finished grade for 8 inch walks and ramps. The sub-grade shall then be recompacted as herein before specified.

##### B. Subbase:

Subbase, if required, shall be placed in maximum 12 inch lifts and compacted with a minimum of 2 passes with a motor drive vibratory compactor.

##### C. Base:

The processed aggregate base material shall be placed in two 4 inch lifts, the full width of the excavation, and shall be compacted to the satisfaction of the Inspector with at least 2 passes of a motor driven vibratory compactor. Base should extend 3 to 6 inches beyond the outside edges of the walk. Additional fine material shall be added to fill any voids that may have developed during compaction and to bring the completed foundation to true line and cross section 5 inches (or 8 inches) below and parallel to the finished grade of the walk.

##### D. Forms:

Forms shall be of metal or wood, straight, free from warp and of sufficient strength to resist springing from the pressure of the concrete. Wood, forms for 5 inch thick walks shall be 2 inch by

6 inch smooth surfaced plank, except that at sharp curves, thinner material may be used. Forms for 8 inch thick walks and ramps shall be 8 inches deep. Metal forms shall be of section approved by the Inspector, and shall have a flat surface on the top. Forms shall be of a depth equal to the depth of the walk. Forms shall be securely staked, braced and held firmly to the required line and grade; special care shall be taken to maintain the proper shape of all curves. Forms shall remain in place for at least 24 hours after finishing of concrete. No stakes or bracing shall project above the top of the form. Forms shall be sufficiently tight to prevent leakage of concrete. All forms shall be cleaned and oiled before concrete is placed against them. Sheet metal templates, 1/4 inch thick of the full depth and width of the walk, shall be placed at every expansion joint or as ordered by the Inspector. If concrete is placed in alternate sections, these templates shall remain in place until concrete has been placed on both sides of the templates. As soon as the concrete has obtained its initial set, the template shall be removed.

E. Placing of Concrete:

The Contractor shall give the Inspector assigned to the work a 24 hour notice before placing concrete. All expansion joints and other embedded material items shall be in place, and all necessary placing and finishing tools, and all curing and protection materials shall be on the job prior to commencement of placing concrete. Before the concrete is placed, the sub-grade shall be thoroughly dampened so that it is moist throughout, but without puddles of water. Concrete shall be placed as near to its final position as practicable, and precautions shall be taken not to overwork the concrete while it is still plastic. The concrete shall be uniformly placed along the forms or screens. The concrete shall be placed in one course and struck off as hereinafter specified to the required graded cross section. The top shall be struck off by use of a suitable screed resting on the forms or screed support to the required grade and cross section.

F. Finishing of Concrete:

No finishing operation shall be performed while free water is present; finishing operations shall be delayed until all bleed water and water sheen have left the surface and the concrete has started to set. Dusting the surface with cement to promote drying will not be permitted. After water sheen has disappeared, all exposed walk edges, and edges on each side of expansion joints shall be finished with a 1/4 inch radius edging tool. Transverse dummy joints shall be formed by cutting a slot in the concrete, 1 inch deep. The slot may be cut by a 1 inch deep T-bar forced into the fresh concrete or by a 1 inch bit jointer held against a straight edge. After the concrete has partially hardened, the joint shall be edged with a jointer having a 1 inch bit and 1/4 inch fillets held against a straight edge to make a clean straight joint. All other dummy joints in the walk shall be treated as above specified for transverse dummy joints. All completed dummy joints shall be 1 inch deep. After edging and jointing operations, the surface shall be floated with a wood float. In very warm weather, care shall be taken to prevent final set by shading until all finishing operations have been performed. If necessary, all tooled joints and edges shall be rerun after floating to maintain uniformity. After floating, the surface shall be brushed by drawing a soft bristled push broom, across the entire sidewalk width, perpendicular to the direction of pedestrian traffic, with a long

handle over the surface of the concrete, to produce a non-slip surface. "Picture frame" finishes should NOT be provided. A rain spattered finish will not be acceptable. Forms shall not be stripped for at least 24 hours after completion of finishing; care shall be taken to not damage the green concrete during stripping of forms.

G. Joints:

Transverse dummy joints shall be constructed at a longitudinal spacing equal to the width of the walk but not over 5 feet apart; or to match adjoining walk. Doweled transverse expansion joints shall be constructed to replace every third dummy joint and at change of walk thickness. Dowels are also to be installed between new and existing concrete slabs. Where new or repaired walks abut existing concrete sidewalks the Contractor shall drill holes measuring  $\frac{3}{4}$  inch in diameter and 12 inches deep into the existing concrete slab. Transverse expansion joints shall be  $\frac{1}{2}$  inch thick by the depth of concrete (5 inches or 8 inches), premolded joint material and shall have  $\frac{5}{8}$  inch diameter by 24 inches long dowels spaced as shown in the details or as ordered by the Inspector. One end of each dowel shall be set in a 12 inch long  $\frac{5}{8}$  inch ID Speed Dowel plastic sleeve. The Contractor is to ensure that the expansion joint is kept straight and perpendicular to the forms by use of a steel or wood spacer drilled to accommodate the dowels. Dowels are to be centered vertically in the slab. In areas where dowels are not specified, premolded joint material shall be  $\frac{1}{4}$  inch thick.

Isolation joints,  $\frac{1}{4}$  inch by the depth of the concrete (5 or 8) inches, premolded joint material shall be used between the walk being constructed and existing concrete walks, entrance walks, building foundations, retaining walls, light pole bases, vaults, manholes and all similar structures. Where dowels are specified, the premolded joint material shall be  $\frac{1}{2}$  inch thick. Utility poles, hydrants, fire alarm boxes, gate boxes and similar installations located in the walk area shall be separated from the main walk by isolation joints of suitable pattern as ordered by the Inspector. No transverse dummy joint, or expansion joint, shall be located within 12 inches of any structure in the walk.

For repair work, all joints shall be similar in pattern to the joints in the adjacent existing walk.

All concrete areas, wider than the normal sidewalk width, will have isolation joints limiting the size of the continuous slab to a maximum of one 144 square feet.

H. Detectable Warning Strips:

The detectable warning strips for new construction shall be set directly in poured concrete according to the plans and the manufacturer's specifications, or as directed by the Engineer. The Contractor shall place 2-25 pound concrete blocks or sandbags on each tile to prevent the tiles from floating after installation in wet concrete.

The Contractor is responsible for removing any material splatters or debris and repairing any damage to the existing sidewalks arising from the installation of the tile.

## I. Curing

In case of inclement weather, a forecast of inclement weather, or when ordered by the Engineer, immediately following the final finishing and as soon as possible without marring the surface, the concrete shall be covered with waterproof paper conforming to Section 265.2 (d) of these specifications. The waterproof paper shall extend at least 12 inches beyond the edge of the walk and, if required, shall be lapped a minimum of 6 inches. It shall be held down on all edges and laps by continuous wood planks or piles of sand. Use of rocks or broken concrete will not be permitted. Paper shall not be removed for at least 72 hours.

Curing methods shall conform to Form 817, Section 4.01.03 (f-7).

## J. Wire Mesh Reinforcing:

The mesh shall be placed 4 inches below the required finished grade and all adjacent sections of the mesh shall be lapped 8 inches and tied together with wire, spaced not over 24 inches on centers, to prevent displacement. Wire mesh shall be continuous transversely between sides of the sidewalk. No more than two pieces of wire mesh may be used per 10 longitudinal feet of sidewalk. Scrap pieces of wire mesh shall not be placed in the sidewalk but shall be disposed of by the Contractor. Wire mesh shall not be placed within 2 inches of sidewalk edges or isolation joints. The concrete shall be placed 4 inches deep and struck off to a reasonably true grade prior to placing the wire mesh and the final 4 inches of concrete. Wire mesh, if supplied in rolls, shall be cut to the proper size and flattened out prior to placement in the concrete.

## K. Cold Weather Concrete:

No Portland Cement Concrete shall be placed when the air temperature is 40° F or below. When, in the opinion of the Engineer, the condition of the weather is such that any concrete which has not been completely cured is liable to become frozen, such concrete shall be protected using suitable blanketing materials approved by the Engineer to prevent freezing of the concrete. During the period of time of such protection, the Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete damaged by frost action shall be removed and replaced at the Contractor's expense.

## L. Conditions for 8 inch Walks and Ramps

Construction of 8 inch concrete pedestrian ramps shall conform to all provisions of this specification, except as follows:

1. Regardless of the type of pavement of adjacent sidewalks, all pedestrian ramps shall be constructed of Portland Cement Concrete.

2. The final texture of the concrete surface shall be a coarse broom finish, transverse to the slope of the ramp.
3. Ramps shall conform to detail drawings as shown in the plans and shall comply with all applicable laws and regulations governing handicap access to public sidewalks.
4. Ramps shall be a minimum of 5 feet in length.
5. Expansion joint material and dowels shall be placed between 8 inch walks and 5 inch walks.

265.5 MEASUREMENT

Measurement for this item will be based on the number of square feet of concrete sidewalks, ramps, and detectable warning strips completed and accepted in place. All items incidental to the sidewalk construction, including excavation, base material, and others described in 265.2 and 265.4 will not be measured for payment but shall be included in the square feet measurement for this item.

265.6 PAYMENT

Payment for this item will be based on the contract unit price per Square Foot for 5 inch or 8 inch sidewalks, 8 inch ramps, and detectable warning strips including all labor, materials, testing, submittals, tools, and equipment necessary to complete the work as specified.

<b>PAY ITEM</b>	<b>PAY UNIT</b>
5" Sidewalk	S.F.
8" Sidewalk	S.F.
8" Driveway Ramp	S.F.
8" Pedestrian Ramp	S.F.
Detectable Warning Strips	S.F.