

**2521 WALKS**

**2521.1 DESCRIPTION**

This work consists of constructing concrete or bituminous walks. Concrete walks include concrete median walk and concrete truck aprons.

**2521.2 MATERIALS**

<b>A</b>	<b>Concrete</b> .....	<b>2461</b>
<b>A.1</b>	<b>Concrete Walk</b> .....	<b>Mix No. 3F52</b>
<b>A.2</b>	<b>Concrete Walk, Exposed Aggregate Finish</b> .....	<b>Mix No. 3F52EX or 3F53EX</b>
<b>A.3</b>	<b>Concrete Walk, Colored</b> .....	<b>Mix No. 3F52CO</b>
<b>B</b>	<b>Preformed Joint Filler</b> .....	<b>3702</b>
<b>C</b>	<b>Bituminous</b> .....	<b>2360</b>
<b>C.1</b>	<b>Bituminous Walk</b> .....	<b>Mix No. SPWEB230B</b>
<b>D</b>	<b>Curing Materials</b>	
<b>D.1</b>	<b>Burlap Curing Blankets</b> .....	<b>3751</b>
<b>D.2</b>	<b>Poly-Alpha Methylstyrene (AMS) Membrane Curing Compound</b> .....	<b>3754</b>
<b>D.3</b>	<b>Linseed Oil Membrane Curing Compound</b> .....	<b>3755</b>
<b>D.4</b>	<b>Plastic Curing Blankets</b> .....	<b>3756</b>
<b>E</b>	<b>Granular Materials</b> .....	<b>3149</b>

**2521.3 CONSTRUCTION REQUIREMENTS**

**A Foundation Preparations**

Excavate, shape, and compact the foundation to a firm, uniform bearing surface to the dimensions and grade as shown on the plans and in accordance with 2105, "Excavation and Embankment," 2112, "Subgrade Preparation," and 2211, "Aggregate Base."

**B Sawing Concrete Walk**

Saw existing concrete walk to produce a neat line for the new work.

**C Forms**

Provide forms made of non-reactive metal or wood, or other material in accordance with 1805, "Method and Equipment," capable of maintaining the concrete until the concrete can retain the molded shape. Provide forms with a height at least equal to the walk thickness of the formed concrete shown on the plans. Support the forms on the foundation to maintain the line and grade shown on the plans.

Before placing the concrete, coat the contact surfaces of the forms with an approved form treating material in accordance with 3902, "Form Coating Material."

Leave forms in place for at least 12 h after placing the concrete unless otherwise approved by the Engineer.

**D Placing and Finishing Concrete**

The Concrete Contractor, or Subcontractor, shall have at least two people with a current ACI concrete flatwork technician or flatwork finisher certification, and at least one of them must be onsite for all concrete pours.

Wet the foundation and forms before placing the concrete.

Prevent segregation of the concrete during placement. Consolidate the concrete to fill voids using internal vibration. Strike-off the concrete to the grade shown on the plans, and float the surface smooth. After the water sheen disappears, edge the joints and lightly brush the surface to a uniform texture.

**D.1.a Exposed Aggregate Finish**

Provide concrete Mix No. 3F52EX or 3F53EX with multi-colored rounded stone, modified for exposed aggregate construction.

Use surface retardation, meeting the Type B requirements in 3113, "Admixtures for Concrete," to produce a medium to deep exposure on the aggregate finish making the aggregate the dominant surface feature. Do not embed or top seed the aggregate.

Apply retardant coating immediately after completion of the concrete surface screeding, edging, and jointing. Apply retardant as recommended by the manufacturer to produce a  $\frac{1}{4}$  in  $\pm$   $\frac{1}{8}$  in etch of mortar removal after final concrete set.

Use pressurized water to remove surface mortar. Do not loosen individual aggregate particles with the pressurized water.

After the Engineer approves the exposed aggregate finish, apply a 10 percent muriatic acid solution to the exposed aggregate surfaces. Allow the acid solution to interact with the exposed aggregate surface for 5 min to 10 min before flushing the surface with water.

Cover the concrete with white polyethylene sheeting to continue curing. Before applying sealer, remove staining or streaking from the exposed aggregate surface resulting from the moist curing.

Seal the exposed aggregate finish with two coats of a clear acrylic based compound with at least 18 percent solids meeting the requirements of ASTM C 309.

#### **D.1.b Colored Concrete**

Provide concrete Mix No. 3F52CO with approved color additive for colored concrete walk construction.

For color verification, provide sample chip(s) of specified color(s) indicating color additive number(s) and required dosage rate(s). Samples indicate general color and may slightly vary from concrete finished in the field.

One week prior to first placement of the colored concrete on the project, hold a preconstruction meeting with the Agency, Prime Contractor, Concrete Contractor, Ready-Mix Concrete Representative, Testing Agency and Colored Admixture Manufacturer Representative to discuss the proposed colored concrete placement and application materials.

#### **D.1.b(1) Colored Concrete Contractor/Installer Qualifications**

Pre-qualified Colored Concrete Contractors/Installers shall meet the following requirements:

- (1) Minimum of five (5) years of experience with work of similar scope and quality.
- (2) A minimum of five (5) projects including references completed in the last five (5) years by Contractor/Installer.
- (3) Listed on the MnDOT Pre-qualified colored concrete contractor/installers vendor list available from the MnDOT website.

#### **D.1.b(2) Test Panels**

Prior to placing any colored concrete, demonstrate workmanship by constructing test panels of the colored concrete in accordance with the following:

- (1) For each color, a separate test panel is required.
- (2) At a location approved by the Engineer.
- (3) Using the same processes, techniques, personnel, materials, concrete supplier and concrete plant intended for use on permanent work, including stamping and curing/sealing procedures.
- (4) The minimum size of the test panels shall be 6' x 6' x 4" unless otherwise directed by the Engineer.
- (5) Retain and protect Engineer accepted test panels as the visual standard for the work of this section and quality standard for permanent work.

#### **D.1.b(3) Placing, Finishing and Curing Colored Concrete**

Construct colored concrete in accordance with products processes and techniques used on approved test panel(s). Do not add water at any time to the slab surface while finishing. Do not over finish the concrete edges.

After completing final finishing operations, cure and seal all exposed concrete surfaces meeting the following requirements and methods:

- (1) Use a curing/sealing compound conforming to ASTM C1315, "Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete," Type 1, Class A, 100% acrylate polymer.
- (2) Apply the curing/sealing compound within 30 minutes of concrete placement/form removal or once the bleed water has dissipated, unless the Engineer directs otherwise in accordance with 2521.3.E.1.a, "Membrane Curing Method."

- (3) Ensure that the curing/sealing compound is applied homogeneously to provide a uniform coverage on all exposed colored concrete surfaces including the edges.
- (4) Apply an additional application of curing/sealing compound a minimum of 30 days after placement of the colored concrete.

Cover adjacent finished surfaces to protect from splatters and excess materials during colored concrete installation and curing/sealing.

#### **D.2 Joint Construction**

Divide the walk into square panels of uniform size no greater than 36 sq. ft and outlined with contraction or expansion joints as shown on the plans.

Provide vertical and straight joints parallel with or at right angles to the walk centerline. Align the joints with joints in adjoining work unless isolated by a ½ in preformed joint filler.

The Contractor may form or saw the joints in walking surfaces as approved by the Engineer. If forming the joints, round joints within the walking surface with a ¼ in radius grooving tool and round edges of the walk with an edging tool having a radius no greater than ½ in.

Extend contraction joints to a depth of at least 30 percent of the walk thickness. If saw cutting, provide ⅛ in wide contraction joints.

Provide joint filler in accordance with 3702, "Preformed Joint Fillers," that is ½ in wide and equal in depth to the full thickness of the walk.

Modify joint construction if a fixed object or structure extends through the walk, as directed by the Engineer. Place preformed joint filler material ½ in thick adjacent to fixed objects to separate the object from the abutting concrete edges.

#### **D.3 Workmanship and Quality**

The Engineer will use a 10 ft straight edge to measure surface tolerance. The Department considers vertical deviations in the surface greater than 3/16 in. and line deviations greater than ½ in. from the required location as unacceptable work. Remove and replace unacceptable work as directed by the Engineer.

#### **E Concrete Curing and Protection**

After completing final finishing operations, cure all exposed concrete surfaces. Use one of the following curing methods:

- (1) In accordance with 2521.3.E.1.a, "Membrane Curing Method", place the membrane curing compound conforming to 3754, "Poly-Alpha Methylstyrene (AMS) Membrane Curing Compound," or 3755, "Linseed Oil Membrane Curing Compound," within 30 minutes of concrete placement or once the bleed water has dissipated, unless the Engineer directs otherwise. Place the membrane curing compound on the edges within 30 minutes after permanent removal of the forms or curing blankets, unless the contract requires otherwise.
- (2) Place plastic curing blankets or completely saturated burlap curing blankets as soon as practical without marring the surface in accordance with 2521.3.E.1.b, "Curing Blanket Method."
- (3) For exposed aggregate placement, cure in accordance with 2521.3.D.1.a, "Exposed Aggregate Finish."
- (4) For colored concrete placement, cure in accordance with 2521.3.D.1.b, "Colored Concrete."

Failure to comply with these provisions will result in the Engineer applying a monetary deduction in accordance with 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work." If the contract does not contain a separate contract item for *Structural Concrete*, the Department will apply a monetary deduction of \$50.00 per cubic yard or 50 percent of the Contractor-provided invoice amount for the concrete in question, whichever is less.

Whenever weather conditions are such as to cause unusual or adverse placing and finishing conditions, expedite the application of a curing method or temporarily suspend the mixing and placing operations, as the conditions require.

If necessary to remove the coverings to saw joints or perform other required work, and if the Engineer approves, remove the covering for the minimum time required to complete that work.

#### **E.1 Curing Methods**

##### **E.1.a Membrane Curing Method**

Before application, agitate the curing compound as received in the shipping container to obtain a homogenous mixture. Protect membrane curing compounds from freezing before application. Handle and apply the membrane curing compound in accordance with the manufacturer's recommendations.

Apply the curing compound with an approved airless spraying machine in accordance with the following:

- (1) At a minimum rate of 1 gal per 150 sq. ft of surface curing area.

- (2) Apply homogeneously to provide a uniform solid white opaque coverage on all exposed concrete surfaces (equal to a white sheet of typing paper) at the time of application. Some MnDOT approved curing compounds may have a base color (i.e. yellow) that cannot comply with the above requirement. In this case, provide a uniform solid opaque consistency meeting the intent of the above requirement.
- (3) If the curing compound is damaged during the curing period, immediately repair the damaged area by re-spraying.

The Engineer will approve the airless spraying machine for use if it is equipped with the following:

- (1) A re-circulating bypass system that provides for continuous agitation of the reservoir material,
- (2) Separate filters for the hose and nozzle, and
- (3) Multiple or adjustable nozzle system that provides for variable spray patterns.

If the Engineer determines that the initial or corrective spraying may result in unsatisfactory curing, the Engineer may require the Contractor to use the blanket curing method, at no additional cost to the Department.

#### **E.1.b Curing Blanket Method**

After completion of the finishing operations and without marring the concrete, cover the concrete with curing blankets. Install in a manner that envelops the exposed concrete and prevents loss of water vapor. After the concrete has cured, apply membrane curing compound to the concrete surfaces that will remain exposed in the completed work.

#### **E.2 Protection Against Rain**

Protect the concrete from damage due to rain. Have available at the site of the work, materials for protection of the edges and surface of concrete. Should any damage result, the Engineer will suspend operations until the Contractor takes corrective action, and may subject the rain-damaged concrete to 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work."

#### **E.3 Protection Against Cold Weather**

If the national weather service forecast for the construction area predicts air temperatures of 36 °F or less within the next 24 h and the Contractor wishes to place concrete, submit a cold weather protection plans.

Protect the concrete from damage, including freezing due to cold weather. Should any damage result, the Engineer will suspend operations until the Contractor takes corrective action, and may subject the damaged concrete to 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work."

#### **E.3.a Cold Weather Protection Plan**

Submit a proposed time schedule and plans for cold weather protection of concrete in writing to the Engineer for acceptance that provides provisions for adequately protecting the concrete during placement and curing. Do not place concrete until the Engineer accepts the cold weather protection plans.

#### **F Bituminous**

Place the bituminous mixture in accordance with 2360.

#### **G Backfill Construction**

Protect newly placed concrete from damage by adjacent vibratory or backfilling operations for a minimum of 24 hours. Perform vibratory operations and backfilling 72 h after placing the concrete or after the concrete reaches a compressive strength of at least 3,000 psi. The Engineer will cast, cure, and test the concrete field control specimens in accordance with 2461.3.G.5.b, "Field Control Strength Cylinders." If damage results from any of these operations, the Engineer will suspend all operations until the Contractor takes corrective action and obtains the Engineer's approval of a new method. The Engineer may require removal and replacement of the damaged concrete in accordance with 1503, "Conformity with Contract Documents," and 1512, "Unacceptable and Unauthorized Work."

The Contractor may use hand-operated concrete consolidation equipment and walk behind vibratory plate compactors 24 h after placing the concrete, and other equipment as approved by the Engineer, in conjunction with the Concrete Engineer.

After the curing is complete and without subjecting the concrete work to damaging stresses, perform the backfill or embankment construction to the elevations shown on the plans. Use suitable grading materials from the excavation for backfill material in accordance with 2105, "Excavation and Embankment," unless otherwise required by the contract. Place and compact the backfill material in accordance with 2105, "Excavation and Embankment."

Dispose of surplus excavated materials in accordance with 2105, "Excavation and Embankment."

#### **2521.4 METHOD OF MEASUREMENT**

The Engineer will measure each uniform thickness item separately by top surface area.

**2521.5 BASIS OF PAYMENT**

Payment for concrete walk (colored) at the contract price per unit of measure is full compensation for all cost to providing concrete walk and concrete truck aprons to the specified lines, grade and minimum thickness specified in the Plans, including but not limited to: Forming, joint filler material, colored concrete test panels, furnishing and placing concrete, concrete compaction by vibration, concrete curing and protecting the completed work from damage.

The Engineer will measure and pay for concrete truck aprons (colored) as \_\_\_ in Concrete Walk.

The Contract Unit Price for concrete or bituminous construction includes furnishing the materials and placement of the Work to the lines and grade of the Plan as specified.

The Department will pay for walk construction on the basis of the following schedule:

<b>Item No.:</b>	<b>Item:</b>	<b>Unit:</b>
2521.518	___ in Concrete Walk	square foot
2521.518	___ in Colored Concrete Walk	square foot
2521.518	___ in Bituminous Walk	square foot

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