

717 - BRIDGE OVERLAYS

SECTION 717

BRIDGE OVERLAYS

717.1 DESCRIPTION

Construct the portland cement concrete overlay as shown on the Contract Documents.

When Bridge Deck Grooving is a bid item in the contract, perform the grooving as shown in the Contract Documents.

BID ITEMS

- Portland Cement Concrete Overlay (*)
- Material for Portland Cement Concrete Overlay (Set Price)
- Bridge Deck Grooving
- * Thickness

UNITS

- Square Yard
- Cubic Yard
- Square Yard

717.2 MATERIALS

Provide materials that comply with the applicable requirements.

Grade 4.0 (AE) Concrete ⁺	SECTIONS 401 & 402
Aggregate for Concrete Not On Grade.....	DIVISION 1102
Precure/Finishing Aid Material ⁺⁺	DIVISION 1400
Concrete Curing Materials	DIVISION 1400
Concrete Masonry Coating	DIVISION 1700

⁺Use concrete that meets requirements for low permeability concrete (LPC) as specified in **DIVISION 400**.

⁺⁺When silica fume is used as an SCM, the use of Precure/Finish Aid may be used according to the manufacturer's instructions.

For overlays use Supplemental Cementitious Materials at allowable substitution rates as listed in **TABLE 401-2**.

717.3 CONSTRUCTION REQUIREMENTS

a. Equipment. Use a finishing machine consisting of a mechanical strike-off capable of providing a uniform thickness of concrete slightly above finish grade in front of an oscillating screed or screeds. The finishing machine will be inspected and approved by the Engineer before work is started on each project.

Use a minimum of 1 oscillating screed capable of consolidating the concrete by vibration to 100% of the vibrated unit weight with the following features:

- Install identical vibrators so a minimum of 1 vibrator is provided for each 5 feet of screed length;
- Bottom face a minimum of 5 inches wide with a turned up or rounded leading edge;
- Effective weight a minimum of 75 pounds for each square foot bottom face area;
- Positive control of vertical position, the angle of tilt and the shape of the crown;
- Design together with appurtenant equipment to obtain positive machine screeding of the plastic concrete as close as practical to the face of the existing curb line;
- Length sufficient to uniformly strike-off and consolidate the width of the lane to be paved;
- Forward and reverse motion under positive control;
- Supporting rails which are fully adjustable (not shimmed) to obtain the correct profile, unless otherwise approved by the Engineer. Provide supports which are sufficiently rigid and do not deflect under the weight of the machine. Anchor the supporting rails to provide horizontal and vertical stability; and
- Equip to travel on the completed lane when placing concrete in a lane abutting a previously completed lane.

Manufacturer's specifications or certification may be used as verification of the oscillating screed requirements.

A drum roller equipped to perform all functions outlined for the oscillating screed above, may be used for finishing the overlay concrete in lieu of an oscillating screed. Equip the drum roller to vibrate by either a factory or

717 - BRIDGE OVERLAYS

field adaptation. The drum roller must be able to compact the concrete to a minimum of 100% of the consolidated unit weight.

Provide an overall combination of labor and equipment with the capability for proportioning, mixing, placing and finishing new concrete at the following minimum rates shown in **TABLE 717-1**.

TABLE 717-1: PORTLAND CEMENT CONCRETE OVERLAY PRODUCTION REQUIREMENTS	
Total Placed Surface Area per Bridge (Square Yards)	Minimum Cubic Yards per Hour
0-328	1.0
329-492	1.5
493-656	2.0
Over 656	2.5

b. Preparation of Surface. Prior to placement of concrete, sand or shot blast the surface followed by an air blast to the bottom 3 inches of hubguard, and edges against which concrete is to be placed to remove all dirt, oil, pavement marking and other foreign material, as well as any unsound concrete, laitance and curing material from the surface. Wet sand blasting may be used only with approval of the Engineer. It is desired that the surface be roughened by the sand or shot blast to provide satisfactory bond with the surfacing concrete. Protect metal deck drains and areas of the curb or railing above the proposed surface from the sand or shot blast.

Check the finish machine clearance above the prepared surface before concrete is placed to obtain the thickness specified in the Contract Documents.

A minimum of 2 hours before the placing of the concrete overlay, use clean water to thoroughly wet any concrete surfaces to which the concrete is to bond against. Blow or broom away all free water immediately ahead of the placing operation. Bonding surfaces should be maintained in a damp condition with no free water.

c. Placing Concrete. Place and fasten the screed rails in position to obtain finished concrete at the required profile. Place the supporting rails upon which the finishing machine travels outside the area to be concreted. A hold-down device shot into concrete is prohibited, unless the concrete is to be subsequently overlaid. Hold-down devices of other types leaving holes in exposed areas will be approved provided the holes remaining are grouted full. Methods for anchoring and supporting the rails and the concrete placing procedure require approval by the Engineer.

Locate longitudinal joints along lane lines, or as approved by the Engineer. Keep the joints clear of wheel paths as much as practical.

Placing of the overlay is prohibited when conditions on the bridge deck are such that the evaporation rate is estimated to equal or exceed 0.2 pounds per square foot per hour, or is predicted to exceed that rate during the course of the placement, unless corrective measures listed in **subsection 710.3b**, are taken to reduce the evaporation rate to below 0.2 pounds per square foot per hour.

Fogging may be necessary during placement of the overlay. Accomplish fogging according to **subsection 710.3b**.

The evaporation rate will be rechecked with the measures in place, using the procedures outlined above.

The elapsed time between depositing the concrete on the deck and final screeding may not exceed 15 minutes, unless otherwise authorized by the Engineer.

Manipulate and mechanically consolidate new concrete to a minimum of 98% of the consolidated unit weight and screed to final grade. In irregular areas or along the curb where the finishing screed does not reach, hand tamp with a 6-inch by 6-inch metal plate device to assist in consolidation and bonding of the concrete. When concrete for partial depth patches is placed with the overlay, apply additional vibration or hand tamping in the patch areas to assist in consolidation and bonding of the concrete.

d. Finishing. Strike off overlays with a self-propelled finishing machine. The screed on the finish machine must be self-oscillating, and operate or finish from a position either on the skew or transverse to the bridge roadway centerline.

On overlays skewed greater than 10°, operate the finishing machine on the same skew as the bridge, unless approved otherwise by the State Bridge Office.

Irregular sections may be finished by other methods approved by the Engineer. Float and straightedge the wearing surface so the finished surface is at the cross-section shown in the Contract Documents. Do not add water to the surface of concrete, unless approved by the Engineer, and when approved apply as a fog spray.

717 - BRIDGE OVERLAYS

Secure a smooth riding bridge deck, correcting surface variations exceeding $\frac{1}{8}$ inch in 10 feet by use of an approved profiling device, or other method approved by the Engineer.

For decks without the bid item Bridge Deck Grooving, finish the deck with the rough burlap drag.

For decks with the bid item Bridge Deck Grooving, see **subsection 710.3f.** for grooving requirements.

e. Curing and Protection. Cure and protect according to **subsection 710.3e.**

f. Weather Limitations. See **SECTION 401.** Also, discontinue concreting operations when a descending air temperature in the shade and away from artificial heat falls below 45°F except with written approval from the Engineer. Do not start or resume operations until an ascending air temperature reaches 40°F, or if night time temperatures are expected to fall below 35°F.

g. Limitations of Operations. When a new deck is involved, do not commence work on the wearing surface until the lower course meets the time requirements of **SECTION 710**, unless specified otherwise.

Do not place concrete adjacent to a surface course, less than 36 hours old. This restriction does not apply to a continuation of placement in a lane or strip beyond a transverse joint in the same lane or strip.

In areas where there is no traffic, preparation of the area may be started in a lane or strip adjacent to newly placed surface the day following its placement. If this work is started before the end of the 7-day curing period, restrict the work as follows:

- Sawing or other operations may interfere with the curing process in the immediate work area for the minimum practical time only;
- Resume the curing promptly upon completion of the work;
- Keep the exposed areas damp until such time as curing media is replaced; and
- Do not use power driven tools heavier than a 15-pound chipping hammer.

h. Construction Joints. Make construction joints (either longitudinal or transverse) by placing and finishing the overlay approximately 6 inches beyond the desired location of the construction joint. After the overlay is cured, make a vertical saw cut at the location of the construction joint and chip away the excess overlay.

i. Sealing Vertical Faces of the Overlay. Seal all construction joints and vertical faces (such as the edge at the curb line) of the overlay. Sand or shot blast the construction joints and vertical faces, and apply a concrete masonry coating to the cleaned vertical surfaces according to **SECTION 726.** This work is subsidiary to the overlay.

j. Correction of Unbonded Areas. If during construction of the project, newly overlain areas are discovered to be unbonded by tapping or chaining, outline the concrete from such areas by sawing, remove it with small air tools (15-pound maximum) and replace it at no additional compensation.

717.4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The Engineer will measure portland cement concrete overlay by the square yard.

The Engineer will measure material for portland cement concrete overlay by the cubic yard according to the following:

(1) When approved by District on repair of existing bridges, this pay item will be used to compensate the Contractor for the additional overlay material that will be required to fill the areas greater than the thickness of overlay shown in the Contract Documents. The Contractor is responsible for maintaining adequate quality control of the demolition process to minimize deviations from the plan grades.

(2) The Engineer will keep a running account of the volume of overlay material that is produced and delivered to the deck. When approved, the Contractor will be paid, at the set price per cubic yard, for all overlay material in excess of 110% of the theoretical volume to cover the deck area with the thickness of overlay shown in the Contract Documents.

When shown as a bid item in the contract, the Engineer will measure for payment bridge deck grooving by the square yard.

Payment for "Portland Cement Concrete Overlay" and "Bridge Deck Grooving" at the contract unit price and "Material for Portland Cement Concrete Overlay (Set Price)" at the contract set unit price (when approved by the District Engineer) is full compensation for the specified work.