

SUPPLEMENTAL SPECIFICATIONS  
INDIANA DEPARTMENT OF TRANSPORTATION  
1999 STANDARD SPECIFICATIONS

REVISION TO 1999 STANDARD SPECIFICATIONS

SECTION 702, BEGIN LINE 64, DELETE AND INSERT AS FOLLOWS:

The relative yield of the concrete shall be determined in accordance with 501.03(a) 505. The concrete when produced shall provide a relative yield of 1.00 " 0.02.

SECTION 702, BEGIN LINE 114, DELETE AND INSERT AS FOLLOWS:

All concrete shall have an air content of 6.5% " 1.5% by volume. Air content shall be determined in accordance with 501.03(b) 505. When fly ash is used, the first concrete

truck on the contract will be tested by the Department for complete compliance with plastic concrete requirements for air content, slump, and yield. If not in complete

SECTION 702, BEGIN LINE 517, DELETE AND INSERT AS FOLLOWS:

**702.12 Consistency.** Slump shall will be measured in accordance with AASHTO T 119

as modified in 501.03(a) 505 and shall be no less than 25 mm (1 in.) nor more than 100 mm (4 in.) except for concrete placed in foundation seals.

SECTION 702, BEGIN LINE 537, INSERT AS FOLLOWS:

In designing forms, fresh concrete shall be considered as a liquid weighing 2430 kg/m<sup>3</sup> (150 lb/cu ft) for vertical loads and 1600 kg/m<sup>3</sup> (100 lb/cu ft) for horizontal pressure. A live load allowance of 2.4 kPa (50 lb/sq ft) shall be used on horizontal projections of surfaces. The scheme of formwork for work on a span over active railroad

SECTION 702, BEGIN LINE 581, DELETE AND INSERT AS FOLLOWS:

**2. Permanent.**

~~a. General.~~ Fabricated permanent metal forms for concrete deck slabs

may be used as an alternate method of forming on a steel beam, steel girder, or prestressed

concrete I-beam, and prestressed concrete spread box beam bridges only, or prestressed concrete bulb-T beam bridge. Permanent metal forms shall not be removed, and shall otherwise be in accordance with the applicable requirements of 702.12(e) 702.13(e).

~~b. Construction Requirements.~~ The metal forms shall be designed on the

SECTION 702, AFTER LINE 682, DELETE AND INSERT AS FOLLOWS:

**(f) Precast Concrete Deck Panels.** *The construction and furnishing of precast prestressed concrete deck panels in accordance with 707.09.1 will be permitted as an alternate method of forming a bridge deck slab for a prestressed concrete I-beam bridge. Precast concrete deck panels will not be permitted on a prestressed concrete I-beam bridge which is built on a sag vertical curve or on a superelevation transition unless otherwise shown on the plans. Precast concrete deck panels will not be permitted for use on a steel beam, steel girder, prestressed concrete bulb-T beam, or prestressed concrete spread box beam bridge.*

*The deck panel system shall replace the bottom mat of slab reinforcing and, depending on panel depth, the bottom 65 or 75 mm (2 1/2 or 3 in.) of the class C concrete slab. Formwork is eliminated in the areas between the beams, but forms shall be used for the copings and diaphragms.*

*Mating surfaces of the deck panels shall have a maximum deviation of 3 mm in 1.8 m (1/8 in. in 6 ft). All other dimensions as shown on the plans shall be fabricated to " 6 mm (" 1/4 in.), except the vertical location of prestressing strands shall be " 2 mm (" 1/16 in.). All panel joints shall be mortar tight immediately prior to placing the cast-in-place portion of the deck slab. Immediately prior to placement of concrete, the precast deck panels shall be wetted until free moisture appears and remains without ponding.*

**(f) (g) Removal and Re-Use of Forms.** The forms for any portion of the structure

SECTION 702, LINE 711, DELETE AND INSERT AS FOLLOWS:

**(g) (h) Test Beams.** When it is to the advantage of the Department or Contractor,

SECTION 702, BEGIN LINE 728, DELETE AND INSERT AS FOLLOWS:

The beams ~~shall~~ *will* be cured under the same conditions as the concrete which they represent. Beams ~~shall~~ *will* be tested *for flexural strength* as simple beams with third point loading in accordance with ~~AASHTO T 97 as modified in 501.03(a)~~ 505.

SECTION 702, BEGIN LINE 1143 DELETE AND INSERT AS FOLLOWS:

If field operations are controlled by beam tests, curing time shall be in accordance with 702.13(g)(h).

SECTION 702, BEGIN LINE 1276, DELETE AND INSERT AS FOLLOWS:

Traffic, live loads, and backfill against wingwalls, spandrel walls, and abutments may be allowed when test beams indicate a flexural strength of ~~at least 3310~~ 3300 kPa (480 psi) *or greater*

for third point loading. Concrete pavement may be opened to traffic in accordance with ~~501.22~~ 502.18. Beams ~~shall will~~ be prepared and tested in accordance with 702.12(g). Before

traffic is permitted over a concrete structure built to be under fill, it shall be covered with ~~at least 230~~ 225 mm (9 in.) *or more* of earth or other suitable material, or otherwise protected. All other structures shall be properly protected against impact or other damage.

SECTION 702, AFTER LINE 1393, INSERT AS FOLLOWS:

*The cost of precast prestressed concrete deck panels shall be included in the cost of concrete, C, superstructure. The pay quantity of such concrete in the slab will be computed from the dimensions for the formed and poured bridge floor slab shown on the plans. The pay quantity of reinforcing steel will be the plan quantity shown with no adjustment for eliminating the bottom reinforcing steel layer nor for additional reinforcing steel required due to use of the precast concrete deck panels.*

SECTION 704, BEGIN LINE 80, DELETE AND INSERT AS FOLLOWS:

The finishing machine shall be in accordance with the applicable requirements of ~~501.04(e)~~ 507.04(b) except it shall have ~~at least~~ a *minimum of* one reciprocating non-vibrating screen. The weight of the machine shall not cause undue deflection of the bridge members or falsework. The

SECTION 704, BEGIN LINE 101, DELETE AND INSERT AS FOLLOWS:

When a finishing machine is not required or used, as soon as the concrete is placed and consolidated it shall be struck-off to the specified cross section and grade by means of a steel template or other satisfactory metal clad implement having a minimum width of ~~at least 230~~ 225 mm (9 in.) or greater.

For all methods of striking off the surface, an excess of concrete shall be kept in front of the cutting edge at all times. The strike-off shall go over the entire area only for the number of times necessary to produce the required profile and cross section. In general, the strike-off process shall be in accordance with ~~501.15(a)~~ 504 except a vibrator on the strike-off will not be required.

SECTION 704, BEGIN LINE 129, DELETE AND INSERT AS FOLLOWS:

particles during the final checking and brooming. After final checking, the surface shall be tined in accordance with ~~Method 2 of 501.15(d)~~ 504.03, except the spacing of the tines shall be

22 mm, 19 mm, 19 mm, 25 mm, 19 mm, 19 mm, 29 mm (7/8 in., 3/4 in., 3/4 in., 1 in., 3/4 in., 3/4 in., 1 1/8 in.), and then repeated. If a new bridge deck is to be overlaid with

SECTION 704, BEGIN LINE 140, DELETE AND INSERT AS FOLLOWS:

Smoothness shall be in accordance with ~~501.16~~ 502.20. If, after the above requirements have been met, portions of the floor are not entirely satisfactory, the removal and replacement of such portions may be ordered to secure a satisfactory floor. Such removal and replacement shall be done with no additional payment.

SECTION 705, DELETE LINES 18 THROUGH 22.

SECTION 706, AFTER LINE 16, INSERT AS FOLLOWS:

*Steel Bridge Railing Components..... 910.20*

SECTION 707, BEGIN LINE 4, DELETE AND INSERT AS FOLLOWS:

**707.01 Description.** This work shall consist of the construction and furnishing of reinforced *or prestressed* ~~element~~ concrete structural members *or, if specified, concrete deck panels* cast outside the structure, transported to, and incorporated into the structure in accordance with ~~these specifications and in reasonably close conformance with the lines, grades, and dimensions shown on the plans or as directed~~ 105.03.

~~The members shall be prestressed if so specified. This work shall also consist of the construction and furnishing of a precast prestressed deck panel superstructure, which will be permitted as an alternate to the formed and poured bridge floor slab for a prestressed concrete I beam bridge.~~

SECTION 707, AFTER LINE 18, INSERT AS FOLLOWS:

*Concrete Sealers ..... 909.09, 909.10*

SECTION 707, DELETE LINES 31 THROUGH 35.

SECTION 707, LINE 43, DELETE AS FOLLOWS:

~~approved. Design computations for deck panels shall be submitted for approval for total~~

SECTION 707, DELETE LINES 44 THROUGH 50.

SECTION 707, DELETE LINES 161 THROUGH 174.

SECTION 707, LINE 211, INSERT AS FOLLOWS:

*placed. The tops of all beams and the outside faces of the fascia beams shall be sealed with an approved concrete sealer in accordance with 709.*

SECTION 707, DELETE LINES 212 THROUGH 219.

**707.09.1 Precast Prestressed Concrete Deck Panels.** Precast prestressed concrete deck panels shall be designed as a noncomposite section to support the dead load of the panel, reinforcement, plastic concrete, and a construction load of 2.4 kPa (50 lb/ft<sup>2</sup>). The panel shall be designed as a composite section with the class C concrete to support the live load. The Contractor shall revise the area of top longitudinal reinforcing steel over interior supports for negative moment to be equal to the total area of top and bottom longitudinal reinforcing steel.

The concrete for deck panels shall be placed in accordance with 702.20. The concrete shall be vibrated to prevent honeycombs and voids, especially at the corners and edges of the panels. The tops of the deck panels shall be broom or wire brush finished in the direction of the prestressing strands. The corrugations formed shall be uniform in appearance and shall not be more than 6 mm (1/4 in.) in depth. The coarse aggregate shall not be displaced when preparing the roughened surface.

**707.10 Method of Measurement.** Precast or prestressed concrete structural members will be measured by the ~~number of members installed~~ *meter (linear foot) along the top of each member* or by the square meter (square foot) of ~~roadway top surface as specified of each member.~~ *No measurement will be made if payment is on a lump sum basis.* Railing will be measured in accordance with 706.06 if specified as a pay item.

SECTION 707, BEGIN LINE 367, DELETE AND INSERT AS FOLLOWS:

Structural Member, Concrete, \_\_\_\_\_, \_\_\_\_\_.....EACH m (LFT)  
   type                  size  m2 (SFT)

~~Structural Members, Concrete,.....LS~~

-705-

SECTION 709, BEGIN LINE 114, DELETE AND INSERT AS FOLLOWS:

**(e) Alternate To Concrete Sealers.** In lieu of concrete surface sealing for concrete barrier wall and concrete bridge railing, and alternate concrete mix design may be used. The concrete mix design shall be as specified, except either 3% ~~microsilica~~ *silica fume* by mass (weight) of cementitious material shall be added to the mix design or 30% ground granulated blast furnace slag substitution based on the required cement content shall be incorporated into the mix.

SECTION 711, BEGIN LINE 376, DELETE AS FOLLOWS:

**711.33 Stud Shear Connectors.** Stud shear connectors shall be in accordance with 711.32 *and as shown on the plans*. ~~Welded channels or 22 mm (7/8 in.) diameter welded studs will be permitted as alternate shear connectors. If used, they shall have equivalent shear value. The proposed size and spacing shall be submitted for approval.~~

SECTION 711, AFTER LINE 911, INSERT AS FOLLOWS:

*Stud shear connectors placed on new structural steel will not be measured. Stud shear connectors placed on existing structural steel will be measured by the number installed.*

SECTION 711, AFTER LINE 932, INSERT AS FOLLOWS:

*Stud shear connectors placed on existing structural steel will be paid for at the contract unit price per each, complete in place and accepted.*

SECTION 711, AFTER LINE 1005, INSERT AS FOLLOWS:

*Stud Shear Connectors ..... EACH*

SECTION 711, AFTER LINE 1010, INSERT AS FOLLOWS:

*The cost of stud shear connectors placed on new structural steel will be included in the costs of structural steel.*

SECTION 713, BEGIN LINE 48, DELETE AND INSERT AS FOLLOWS:

Temporary pavement markings in accordance with ~~801.13~~ *801.10* shall be placed as shown on the plans. Delineators in accordance with 804 shall be placed as shown on the plans.

SECTION 713, BEGIN LINE 78, DELETE AND INSERT AS FOLLOWS:

per each of the type specified. Temporary pavement markings will be measured in accordance with ~~801.17~~ *801.15* . Seeding and sodding will be measured in accordance with

SECTION 713, BEGIN LINE 89, DELETE AND INSERT AS FOLLOWS:

for the type specified. Temporary pavement markings will be paid for in accordance with ~~801.18~~ *801.16*.

## **SECTION 718 -- UNDERDRAINS**

**718.01 Description.** This work shall consist of constructing underdrains using pipe, granular aggregates, outlet protectors, or geotextiles in accordance with 105.03.

### **MATERIALS**

**718.02 Materials.** Materials shall be in accordance with the following:

10	B Borrow for Structure Backfill .....	211
	Coarse Aggregate, Size No. 8 or 9, Class E or Higher .....	904.02
	Concrete, Class A .....	702
	<del>Delineator Posts .....</del>	<del>910.15</del>
	Geotextile for Underdrains .....	913.19
	<del>Precast Concrete Outlet Protectors .....</del>	<del>913.06</del>
	Reinforcing Steel .....	910.01
	Sod, including Nursery Sod .....	621
	Underdrain Pipes .....	715.02(d)
20	Underdrain Outlet Pipes .....	907.24

Rodent screens shall be woven stainless steel wire mesh or galvanized hardware cloth. ~~Mortar shall be class A concrete with coarse aggregate size No. 12, class B or higher. Coarse aggregate No. 8 or 9 shall be used for 150 mm (6 in.) underdrain installations. Coarse aggregate No. 9 shall be used for 100 mm (4 in.) underdrain installations.~~

*HMA for underdrains shall be in accordance with 402 for HMA Intermediate C19.0 mm.*

### **CONSTRUCTION REQUIREMENTS**

**718.03 Pipe Installation.** Trenches shall be excavated to the dimensions and grade shown on the plans. Pipes shall be secured to ensure that the required grade *and horizontal alignment* of the pipe ~~is are~~ maintained. Perforated pipe shall be placed with the perforations down. The pipe sections shall be joined securely with the appropriate couplings, fittings, or bands. ~~Placement of aggregate shall proceed following placement of the geotextile, if required, Aggregate for underdrains shall be placed~~ in a manner which minimizes aggregate contamination.

If plain end concrete pipe is being laid, ~~no~~ the joint width shall *not* exceed 6 mm (1/4 in.).

**718.04 Geotextile.** Storage and handling of geotextiles shall be in accordance with the manufacturer's recommendations. Each geotextile roll shall be labeled or tagged. Damaged or defective geotextile shall be ~~repaired or replaced as directed.~~ The geotextile

40 shall be placed loosely, but with no wrinkles or folds. The ends of subsequent rolls of geotextile shall be overlapped a minimum of 0.3 m (1.0 ft). The upstream end ~~geotextile shall be~~ overlapped over the downstream geotextile end. *Placement of aggregate shall proceed following placement of the geotextile.*

**718.05 Underdrain Outlets.** After the outlet pipe installation, the trench shall be backfilled with ~~B borrow for structure backfill to 0.3 m (1.0 ft) outside the edge of shoulder with the remaining volume as shown on the plans. B borrow for structure backfill shall not extend into the limits of the underdrain trench. The trench outside the limits of B borrow for structure backfill shall be~~ filled with materials suitable for growing vegetation.

Aggregate and stabilized materials removed from an existing shoulder shall *not be used as backfill and shall be disposed of* in accordance with 206.07. At the time of installation, a rodent screen shall be placed on the outlet pipe *or the ends of the underdrain pipe when located in inlets or catch basins.* ~~Delineator posts shall be installed as shown on the plans.~~

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**718.06 Underdrain Outlet Protectors.** Underdrain outlet protectors shall be installed *constructed* as shown on the plans. ~~Type A outlet protectors may be either fabric formed or cast-in-place.~~

~~The fabric forming material shall be multiple panels of woven geotextile joined together to form a double layered mat with drop cord stitches. The geotextile used to form the mat and the drop cord stitches shall be strong enough to withstand forces exerted during construction. Fabric material shall be unrolled in the direction of the flow of water with the upper and lower edges placed in the anchor trenches. Adjacent fabric panels and~~

60 the upper and lower layers shall be joined together with seams prior to the injection of mortar. All seams shall be machine sewn with the fabric manufacturer's recommended thread. The seam shall be either a J or butterfly seam. The sewn fabric edges shall be clean, even, and completely penetrated by stitching. Manufactured or shop assembled fabric mats will be permitted.

Mortar shall be injected into the fabric formed mat through holes cut into the top layer of the fabric panels. The portion of the mat located in the trenches shall be filled first to anchor the mat in place. The holes shall be plugged after injection with a piece of the same fabric tucked into the opening to lie flat and tight against the fabric mat.

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For a type B outlet protector, the pipe coupling shall be cast into the outlet protector as shown on the plans.

**718.07 Video Inspection.** Underdrains and outlets shall be inspected using high resolution, high sensitivity, waterproof color video camera/recording equipment.

The camera/recording equipment shall be specifically designed for continuous viewing/recording of detailed images of the interior wall of pipes and transitions of the specified sizes. The equipment shall have the capability of viewing a minimum of 140 m (450 ft) into the pipes and shall be designed to include sufficient lighting to view the entire periphery of the pipe. The equipment shall have appropriate attachments to maintain a position in the center of the pipe and an electronic counter to continuously record the location of the equipment in the pipe. The recording equipment shall be a minimum four head industrial grade VHS recorder or a digital archiving and reviewing system. A color video printer shall be included in the equipment for printing observations during inspection.

The Engineer will determine the runs of the underdrain installations to be inspected. Video inspection shall be conducted after guardrail, lighting, sign installation, and final seeding or sodding operations are completed.

Damage discovered by the video inspection shall be repaired. Damage shall include but is not limited to; crushed or partially crushed pipes that impedes the progress of the camera, blockages, vertical pipe sags filled with water to a depth of d/2 or greater, 90 degree connections, connector separations, cracks or splits in the pipes. All repaired sections shall be video reinspected prior to acceptance. A copy of the video inspection shall be submitted to the Engineer.

**718.07 718.08 Method of Measurement.** Underdrains pipe and underdrain outlet pipe will be measured in accordance with 715.11. Outlet protectors will be measured by the number and type of units installed.

B borrow for structure backfill will be measured in accordance with 211.09. HMA for underdrains will be measured by the megagram (ton).

Aggregate for underdrains will be measured by the cubic meter (cubic yard), complete in place to excavated lines. The pay limits will not extend beyond the neat lines shown on the plans.

~~Elbow connections will be measured along the centerline of such connection. An additional allowance of 0.6 m (2 ft) of pipe of the same diameter as that of the elbow will be made for making such connection.~~

Geotextiles will be measured by the square meter (square yard) based on the neat line limits shown on the plans.

~~Increaser and decreaser connections will be measured by the meter (linear foot) as the larger diameter pipe over the length of the connection.~~

*Video inspections for underdrains will be measured by the meter (linear foot) as determined by the electronic equipment.*

~~Concrete collars, temporary screened end caps, rodent~~ *Rodent screens, delineator posts, elbows, increaser or decreaser connections, B borrow for structure backfill, mortar, and other incidentals will not be measured for payment.*

*Concrete, reinforcing steel, or sod for underdrain outlet protectors will not be measured for payment.*

**~~718.08~~ 718.09 Basis of Payment.** The accepted quantities of underdrains pipe and underdrain outlet pipe will be paid for in accordance with 715.12. Aggregate for underdrains will be paid for at the contract unit price per cubic meter (cubic yard) ~~for the type and size specified.~~ Geotextile for underdrains will be paid for at the contract unit price per square meter (square yard). Outlet protectors will be paid for at the contract unit

100 price per each of the type of unit specified installed, ~~completed~~ complete in place. *The accepted quantities of HMA for underdrains will be paid for at the contract unit price per megagram (ton).*

~~If increaser or reducer connections are made, payment will be made as the larger diameter of the connection for the full length of the section forming such connections.~~

*B borrow for structure backfill will be paid for in accordance with 211.10.*

*The final accepted quantity video inspection for underdrain will be paid for at the contract unit price per meter (linear foot).*

Payment will be made under:

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<b>Metric Pay Item</b>	<b>Metric Pay Unit Symbol</b>
<b>(English Pay Item</b>	<b>English Pay Unit Symbol)</b>
<b>Pay Item</b>	<b>Pay Unit Symbol</b>
Aggregate for Underdrains .....	m3 (CYS)
Geotextile for Underdrains .....	m2 (SYS)
HMA for Underdrains.....	Mg (TON)
Outlet Protector, _____	EACH
type	
Video Inspection for Underdrain.....	m (LFT)

~~Where the depth of trench does not exceed 1.2 m (4 ft), the cost of trench excavation shall be included in the cost of aggregate for underdrains.~~

120 ~~Where the depth of trench exceeds 1.2 m (4 ft), trenching shall be completed as extra work. Payment will be established in accordance with 104.03.~~

Geotextile for underdrains which has been rejected due to contamination or other reasons shall be replaced with no additional payment.

The costs of excavation, forming, ~~placing~~ reinforcing steel, concrete, ~~and~~ curing materials, ~~and sod~~ shall be included in the cost of outlet protector.

*The cost of providing the video inspection equipment, technician, videotapes, or computer disks shall be included in the cost of the underdrain video inspection. The cost of repair of underdrain pipes, aggregates, backfill, outlet protectors, geotextile fabric, etc. shall be included in the cost of the other pay items. The cost of providing video reinspection of the repairs shall be included in the cost of the other pay items.*

The costs of disposal of unsuitable excavated materials, ~~concrete collars, installation of pipe end caps, rodent screens, elbows, increaser or decreaser connections delineator posts, B borrow for structure backfill, mortar, and other~~ incidentals shall be included in the costs of ~~the~~ other pay items.

130

SECTION 722, BEGIN LINE 58, DELETE AND INSERT AS FOLLOWS:

waiting period for the slump test. The air content test shall be in accordance with ~~501.03(b)~~ 505. Any concrete mixture which is not properly proportioned or does not conform to the specified slump ~~shall~~ will be rejected.

SECTION 722, BEGIN LINE 278, DELETE AND INSERT AS FOLLOWS:

damage. The finished surface shall be in accordance with ~~501.16~~ 504.03.

SECTION 722, BEGIN LINE 286, DELETE AND INSERT AS FOLLOWS:

surface or bringing coarse aggregate to the top. The grooves shall be in accordance with ~~501.15(d)2~~ 504.03. ~~However, until December 1, 1995, the spacing of the grooves, unless otherwise directed, may be 22.2 mm (7/8 in.), 19 mm (3/4 in.), 19 mm (3/4 in.), 25 mm (1 in.), 19 mm (3/4 in.), 19 mm (3/4 in.), 28.6 mm (1 1/8 in.), then repeat. The grooves shall be terminated approximately 457~~ 450 mm (18 in.) from vertical faces such as curbs and concrete railing.

SECTION 722, BEGIN LINE 305, DELETE AND INSERT AS FOLLOWS:

The minimum curing shall be 24 h of wet cure followed by 72 h of dry cure. ~~In lieu of 72 h of dry cure, an~~ An overlaid bridge deck may be opened to traffic *during the minimum curing duration when if* the compressive strength of test cylinders is ~~27,500~~ 27 500 kPa (4,000 psi) or greater. The strength