

FP-03

Metric Version

FLH SUPPLEMENTAL SPECIFICATIONS

These additions and revisions to the *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-03) Metric Version* are approved by Federal Lands Highway (FLH). They will be used in the special contract requirements of FLH projects according to the instructions for each specification. They may also be incorporated into the next update of the FP.

For additions and revisions to the FP-03 and these FLH Supplemental Specifications, please contact one of the following members of the Specification Coordination Group:

| | | |
|--------------|---|--------------|
| Steve Arnold | Eastern Federal Lands Highway Division steve.arnold@dot.gov | 703-404-6324 |
| Mike Peabody | Central Federal Lands Highway Division micheal.peabody@dot.gov | 303-716-2175 |
| Wade Johnson | Western Federal Lands Highway Division wade.johnson@dot.gov | 360-696-7597 |
| Dave Green | Federal Lands Highway david.green@dot.gov | 202-366-9477 |

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Include the following with all projects:

(7/2/04)

SPECIAL CONTRACT REQUIREMENTS

Project _____

The following Special Contract Requirements amend and supplement the *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-03) Metric Version*, U. S. Department of Transportation, Federal Highway Administration.

{REASON: This is the standard title and lead in paragraph to each project=s special contract requirements.}

Include the following with concrete removal projects:

(6/4/07)

Delete Subsection 203.04 and substitute the following:

203.04 Removing Material.

(a) General. Saw cut sidewalks, curbs, pavements, and structures when partial removal is required.

Construct structurally adequate debris shields to contain debris within the construction limits. Do not permit debris to enter waterways, travel lanes open to public traffic, or areas designated not to be disturbed.

Raze and remove all buildings, foundations, pavements, sidewalks, curbs, fences, structures, and other obstructions interfering with the work and not designated to remain.

Where part of an existing culvert is removed, remove the entire culvert upstream from the removal. The remaining downstream culvert may be left in place if no portion of the culvert is within 1 meter of the subgrade, embankment slope, or new culvert or structure; and the culvert ends are sealed with concrete.

Remove structures and obstructions in the roadbed to 1 meter below subgrade elevation. Remove structures and obstructions outside the roadbed to 0.5 meter below finished ground or to the natural stream bottom.

Abandon existing manholes, inlets, catch basins, and spring boxes according to Subsection 604.07.

Except in excavation areas, backfill and compact cavities left by structure removal with backfill material to the level of the finished ground. Backfill excavated areas according to Subsection 209.10. Compact backfill according to Subsection 209.11.

(b) Concrete removal by mechanical impact methods. Saw cut 20 millimeters deep along all boundaries of repair areas.

Use power-driven hand tools to remove existing concrete with the following restrictions:

- (1) Do not use jack hammers heavier than 140 newtons.
- (2) Do not operate jack hammers and mechanical chipping tools at an angle in excess of 45° from the surface of the slab.
- (3) Do not use chipping hammers heavier than nominal 70-newton-class to remove concrete from beneath reinforcing bar.

Where the bond between existing concrete and reinforcing steel is destroyed, remove all concrete adjacent to the steel to provide at least 20-millimeter clearance for the new concrete to bond to the steel.

Use hand tools (hammers and chisels) to remove final particles of concrete or to achieve the required depth.

After removal of deteriorated and unsound concrete, sandblast all exposed structural steel, reinforcing steel, and concrete surfaces that will be in contact with repair material. Remove all rust and foreign material. Clean the sound concrete surface by flushing with a high-pressure water jet or oil-free compressed air.

(c) Reinforcing steel. Do not cut or damage reinforcing steel designated to remain in place. Repair or replace all damaged or severely deteriorated bars.

Clean all exposed reinforcing steel that is to remain in place. Remove all rust and corrosive products, including oil, dirt, concrete fragments, laitance, loose scale, and other coatings that may destroy or inhibit the bond with new concrete.

If cleaned reinforcing steel will be exposed for more than 7 days, protect the steel from corrosion and contamination. If the steel becomes corroded or contaminated, clean the steel immediately before the concrete pour.

{REASON: The addition of the wording in Subsections (b) and (c) above was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider on 8/1/04. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the wording with some editorial changes and reformatting of Subsection 203.04. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 90 & 91)

When a Superpave hot asphalt concrete pavement design is required, include the following:

(6/4/07)

Delete Table 401-5 and substitute the following:

**Table 401-5
 Asphalt Binder Pay Factor Table**

| Tests on Original | Specifications (See 702.01) | Pay Factor = | | | | | Reject |
|--|--------------------------------|--------------|----------------|--------------------|--------------------|--------------------|---------|
| | | 1.05 | 1.00 | 0.95 | 0.90 | 0.75 | |
| Dynamic shear rheometer, kPa | ≥ 1.00 | ≥ 1.12 | 1.00 to 1.11 | 0.99 to 0.88 | 0.87 to 0.71 | 0.70 to 0.50 | < 0.50 |
| Tests after Rolling Thin Film Oven (RTFO) | | | | | | | |
| Dynamic shear rheometer, kPa | ≥ 2.20 | ≥ 2.584 | 2.583 to 2.200 | 2.199 to 1.816 | 1.815 to 1.432 | 1.431 to 1.048 | < 1.048 |
| Tests on Pressure Aging Vessel (PAV) | | | | | | | |
| Dynamic shear rheometer, kPa | ≤ 5,000 | ≤ 4,711 | 4,712 to 5,000 | 5,001 to 5,289 | 5,290 to 5,578 | 5,579 to 5,867 | > 5,867 |
| Bending beam rheometer, s, MPa | ≤ 300 | ≤ 262 | 263 to 300 | Use direct tension | Use direct tension | Use direct tension | > 600 |
| Bending beam rheometer, m | ≥ 0.300 | ≥ 0.313 | 0.312 to 0.300 | 0.299 to 0.287 | 0.286 to 0.274 | 0.273 to 0.261 | < 0.261 |
| Direct tension ⁽¹⁾ , % | ≥ 1.00 | N/A | ≥ 1.00 | 0.99 to 0.86 | 0.85 to 0.71 | 0.70 to 0.56 | < 0.56 |

(1) Use direct tension for payment if s-values from the bending beam rheometer are between 300 and 600 MPa.

{REASON: At the May 2005 MTT meeting it was decided that the specifications for rotational viscosity and mass loss should be deleted and the specifications for bending beam rheometer and direct tension changed. Brad presented a draft table change at the October 2005 MTT meeting and the above table change was approved.}

When slurry seals or micro-surfacing is required, include the following:

(6/4/07)

Delete the first paragraph of Subsection 410.03 and substitute the following:

410.03 Composition of Mix (Job-Mix Formula). Furnish a slurry seal or micro-surfacing mixture of aggregate, water, emulsified asphalt, or polymer modified asphalt and additives according to ASTM D 3910, ISSA A 105, and ISSA A 143. Conform to the applicable aggregate gradation in Table 703-8 and the residual asphalt contents in Subsection 410.01.

{REASON: In response to an 4/6/06 format question from Wade, Brad reviewed the specification references in Subsection 410.03 and determined that the reference to ISSA T 114 should be changed to ISSA A 105 and A 143 as described in his 4/10/06 e-mail. This change implements Brad's recommendation.}

(FP-03 Metric version, p. 277)

Include the following in all projects with driven piles:

(6/4/07)

Delete the second paragraph of Subsection 551.08 and substitute the following:

Drive piles to within 75 millimeters of plan location at cutoff elevation. No pile shall be closer than 150 millimeters to any cap face. Drive piles so that the axial alignment is within 20 millimeters per meter, along the longitudinal axis, of the required alignment. The CO may stop driving to check the pile alignment. Check alignment of piles that cannot be internally inspected after installation before the last 1.5 meters are driven. Do not pull laterally on piles or splice to correct misalignment. Do not splice a properly aligned section on a misaligned pile.

{REASON: This substitute wording was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider on 8/1/04. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the wording with some editorial changes. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 337)

When class P(AE) structural concrete is permitted, include the following: (6/4/07)

Delete Table 552-1 and substitute the following:

**Table 552-1
 Composition of Concrete**

| Class of Concrete | Minimum Cement Content (kg/m³) | Maximum W/C Ratio | Slump⁽¹⁾ (mm) | Nominal Maximum Aggregate Size⁽⁵⁾ (mm) |
|--------------------------|--|--------------------------|---------------------------------|--|
| A | 360 | 0.49 | 50 to 100 | 37.5 |
| A(AE) | 360 | 0.44 | 25 to 100 | 37.5 |
| B | 310 | 0.58 | 50 to 100 | 63 |
| B(AE) | 310 | 0.58 | 50 to 100 | 63 |
| C | 390 | 0.49 | 50 to 100 | 19 |
| C(AE) | 390 | 0.44 | 25 to 75 | 19 |
| D(AE) ⁽²⁾ | 360 | 0.40 | 25 to 75 | 37.5 |
| E(AE) ⁽³⁾ | 360 | 0.40 | 100 to 150 ⁽⁴⁾ | 19 |
| P (Prestressed) | 390 | 0.44 | 0 to 100 | 25 |
| P(AE) | 390 | 0.44 | 0 to 100 | 25 |
| Seal | 390 | 0.54 | 100 to 200 | 37.5 |

- (1) Maximum slump is 200 millimeters if approved mix design includes a high-range water reducer.
- (2) Concrete with a water reducing and retarding admixture conforming to AASHTO M 194, type D.
- (3) A latex modified concrete with 0.31 liters of modifier per kilogram of cement.
- (4) Measure the slump 4 to 5 minutes after the concrete is discharged from the mixer.
- (5) Meet the processing requirements of AASHTO M 43, Table 1 – Standard Sizes of Processed Aggregate.

{REASON: The addition of class P(AE) concrete was proposed by CFL on 3/13/05. This proposal was supported by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider. The SCG reviewed the proposal and in a conference call on 7/20/06 agreed to update Table 552-1. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 346)

When structural concrete is required, include the following:

(6/4/07)

Delete Table 552-2 and substitute the following:

Table 552-2
Minimum Air Content for Air Entrained Concrete

| Nominal Maximum Aggregate Size⁽¹⁾ | As Delivered Minimum Air Content⁽²⁾⁽³⁾ (%) |
|---|--|
| 63 mm | 3.5 |
| 50 mm | 3.5 |
| 37.5 mm | 4.0 |
| 25 mm | 4.5 |
| 19 mm | 4.5 |
| 12.5 mm | 5.5 |

(1) Meet the processing requirements of AASHTO M 43, Table 1 – Standard Sizes of Processed Aggregate.

(2) These air contents apply to the total mix. When testing these concretes, aggregates larger than 37.5 millimeters is removed by handpicking or sieving, and air content is determined on the minus 37.5-millimeter fraction of the mix. Air content of the total mix is computed from the value determined on the minus 37.5-millimeter fraction.

(3) For P(AE) concrete, reduce the as delivered minimum air content by 1.0 % and use a maximum air content of 6.0 %

{REASON: The removal of the 75-millimeter aggregate size and the addition of class P(AE) concrete was proposed by CFL on 3/13/05. This proposal was supported by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider. The SCG reviewed the proposal and in a conference call on 7/20/06 agreed to update Table 552-2. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 347)

When structural concrete is required, include the following: (6/4/07)

Delete the third paragraph of Subsection 552.12 and substitute the following:

When the joint is between two fresh concrete placements, rough float the first placement to thoroughly consolidate the surface and leave the surface in a roughened condition. Clean the joint surface of laitance, curing compound, and other foreign material. Use an abrasive blast or other approved method to expose the aggregate on the joint surface. Re-tighten forms where the joint overlaps the first placement. Immediately before placing new concrete, flush the joint surface with water and allow to dry to a surface dry condition.

{REASON: Norm Schneider commented that the AASHTO LRFD Construction Specifications allow horizontal construction joints to be constructed without shear keys. Current FP wording does not address cleaning the joint surface or the surface dry condition before placing fresh concrete. The reference to coating joint surfaces with a thin coating of fresh mortar before placing new concrete is no longer recommended practice and should be omitted. Substitute wording was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm on 8/1/04. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the wording with some editorial changes. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 361)

When structural concrete is required, include the following: (6/4/07)

Delete footnote (3) in Table 552-9 and substitute the following:

(3) A single compressive strength test result is the average result from 2 cylinders cast from the same load and tested at 28 days.

{REASON: On 6/2/06, Wade noted a typo in footnote (3) of Table 552-9 where the word “lead” was used instead of “load.” This correction was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 373)

Include the following in all projects with reinforcing steel:

(6/4/07)

Delete the first paragraph of Subsection 554.08 and substitute the following:

554.08 Placing and Fastening. Place fasten, and support the bars according to the CRSI *Manual of Standard Practice*. Use precast concrete blocks or metal supports. Attach concrete block supports to the supported bar with wire cast in the center of each block. Use class 1 (plastic protected) or class 2, type B (stainless steel protected) metal supports in contact with exposed concrete surfaces. Use stainless steel conforming to ASTM A 493, type 430.

{REASON: This substitute wording was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider on 8/1/04. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the wording change. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 391)

Include the following in all projects with bearings, rockers, or rollers: (6/4/07)

Delete the second paragraph of Subsection 555.21 and substitute the following:

Measure structural steel computed according to the AASHTO *Standard Specifications for Highway Bridges*. Include all metal items incidental to the structure and required by the contract such as castings, steel plates, anchor bolts and nuts, pins and nuts, expansion dams, roadway drains and scuppers, weld metal, bolts embedded in concrete, cradles and brackets, posts, conduits and ducts, and structural shapes.

{REASON: This substitute wording was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider on 8/1/04 to eliminate the measurement and payment of bearings, rockers, and rollers under Section 555. These items are measured and paid for under Section 564. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the wording change. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 415)

Include the following in all projects with temporary works:

(6/4/07)

Delete Subsection 562.02 and substitute the following:

562.02 Select material consistent with the safety and quality required by the design assumptions. Furnish factory fabricated components of vertical shoring towers complying with the *Certification Program for Bridge Temporary Works* (FHWA-RD-93-033).

{REASON: This substitute wording was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider on 8/1/04 to replace “manufactured devices” with “factory fabricated components of vertical shoring towers.” The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the wording change. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 432)

Include the following in all projects with temporary works:

(6/4/07)

Delete the seventh paragraph of Subsection 562.03 and substitute the following:

Do not use deck overhang form brackets that require holes to be cast or drilled into the bridge girders.

{REASON: This substitute wording was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider on 8/1/04. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the wording change. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 433)

When coarse aggregate for concrete is required, include the following:

(6/4/07)

Delete the first paragraph of Subsection 703.02 and substitute the following:

703.02 Coarse Aggregate for Concrete. Conform to AASHTO M 80, class A including the reactive aggregate supplementary requirement, except as amended or supplemented by the following:

{REASON: During the October 2005 MTT meeting it was noted that the reactive aggregate supplementary requirement in Subsection 703.01 also applied to coarse aggregate for concrete. This change adds the requirement to 703.02.}

(FP-03 Metric version, p. 599)

Include the following in all projects with precast reinforced concrete box sections: (6/4/07)

Delete Subsection 706.07 and substitute the following:

706.07 Precast Reinforced Concrete Box Sections. Conform to ASTM C 1433M. Meet the design requirements for HS20 loading.

{REASON: This substitute wording was proposed by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider on 8/1/04. The point is to reference the ASTM spec, which is much more user friendly than the AASHTO spec for precast concrete box culverts. The loading requirement (HS20) can be modified for any given project. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the change with minor editorial changes. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 622)

When reinforcing bars are required, include the following: (6/4/07)

Delete Subsection 709.01(b), and substitute the following:

(b) Reinforcing bars. Furnish deformed, grade 420 bars conforming to AASHTO M 31M or M 332M.

When tie bars are required, include the following: (3/10/05)

Delete Subsection 709.01(d), and substitute the following:

(d) Tie bars. Furnish deformed, grade 420 bars conforming to AASHTO M 31M.

When hook bolts are required, include the following: (3/10/05)

Delete Subsection 709.01(e), and substitute the following:

(e) Hook bolts. Furnish plain, grade 420 bars conforming to AASHTO M 31M with M14 rolled threads or M16 cut threads. Furnish a threaded sleeve nut capable of sustaining a minimum axial load of 67 kilonewtons.

{REASON: In a 12/22/04 e-mail, Jeffrey noted that AASHTO M 42 and M 53 were deleted from the AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 24th Edition 2004. In Transmittal No. 2, FLH Supplemental Spec, the references to these specifications were deleted. A bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider suggested that a reference to AASHTO 322 be included in 709.01(b) on 3/7/05. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the change. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 628)

Include the following in all projects with prestressing steel: (6/4/07)

Delete the first paragraph and the three bullets in Subsection 709.03 and substitute the following:

709.03 Prestressing Steel. Fabricate from one of the following:

- Stress-relieved steel wire, AASHTO M 204M, type BA or WA;
- Uncoated seven-wire steel strand, AASHTO M 203M, grade 1860; or
- High-strength steel bars, AASHTO M 275M, type II.

{REASON: The substitute name changes in the first two bullets were proposed by CFL on 3/15/05 and were agree to by a bridge spec review team consisting of Marc Veneroso, Mark Clabaugh, and Norm Schneider. The SCG reviewed this proposal and in a conference call on 7/20/06 agreed to the change. This change was incorporated into the FLH SS in Transmittal No. 3}

(FP-03 Metric version, p. 629)