Design Manual Revision Highlights

The following revisions are summarized below according to chapter. The number of the page on which the revision appears is located at the left margin. Numbers followed by the designation "(f)" indicate that this revision applies to the figure, rather than the page.

Chapter 2 DESIGN DATA

2-2 Added direction that greater pile embedment may be required in Seismic Performance Category B or where vessel impact analysis is required.

2-3 Renamed Highly Corrosive Areas as Corrosive Sites.

2-4 Added design exception to ignore the moment transferred by the elastomeric bearing when designing superstructures or substructures.

Chapter 3 MATERIALS

3-1 Renamed Highly Corrosive Areas to Corrosive Sites.

Revised ASTM designations to AASHTO designations.

Chapter 4 PRELIMINARY DRAWINGS

4-3 Renamed Highly Corrosive Areas as Corrosive Sites.

Deleted note regarding Corrosive Area.

4-1(f) Replaced existing English figure with figure comparable to Metric version.

4-2(f) Replaced existing English figure with figure comparable to Metric version.

Replaced ¼" per foot superelevation with 0.02 in English figure.

Chapter 5 GENERAL DRAWINGS

5-2 Added direction regarding bridge numbers (MEMO: 1/22/99).

5-4 Revised note for federal aid projects to match General Drawing standard notes (MEMO: 3/31/99).

Revised note for maintaining traffic to match General Drawing standard notes (MEMO: 3/31/99).

Renamed Highly Corrosive Areas as Corrosive Sites.

5-5 Added note for causeways (MEMO: 1/19/00).

Revised notes for corrosion protection (MEMO: 2/29/00).

5-6 Revised HEC 18 note (MEMO: 7/22/99).

5-6 through 5-9:

Revised notes to be consistent with Foundation Recommendations standard notes (MEMO: 6/15/99).

5-9 Added note regarding Standard Penetration Tests (MEMO: 5/3/00)

5-10 Revised note for temporary shoring (MEMO: 3/11/99).

5-11 Added revised note for bridge removal over water (MEMOS: 3/25/99, 3/26/99).

Chapter 6 SUPERSTRUCTURE

6-1	Removed span limit for design of two-span in lieu of four-span bridges.
6-2	Deleted reference to Highly Corrosive Areas.
6-3	Revised bottom mat clear cover to 32 mm.
	Added guidance for reinforcing acute corners of heavily skewed bridge decks.
6-5	Renamed Highly Corrosive Areas as Corrosive Sites.
6-7	Added 5'-6" (1650 mm) sidewalk (MEMO: 5/15/00).
	Added longitudinal spacing requirements for sidewalk dowels.
6-8	Added direction for anchoring barrier rail steel surrounding armored evazote joints.
6-9	Added reference to figure for detailing barrier rail steel for two bar metal rails on cored slabs.
6-12	Clarified requirements for transverse construction joints.
6-13	Clarified beam spacing requirements, longitudinal joint location, and diaphragm usage in staging bays.
	Explained dowel placement through longitudinal joints.
6-15	Revised qualifiers guidance for armored evazote joints (MEMO: 5/28/99).
6-20	Provided instruction on calculating construction elevations for approach slabs with asphalt overlays.
6-21	Provided guidance on specifying release strength for prestressed concrete girders.
6-22	Added direction for using sloped bearing - bearing distances for girder length.
	Renamed Highly Corrosive Areas as Corrosive Sites.
6-23	Added direction to use the same buildup throughout a bridge.
	Clarified reinforcement requirements for offset bent diaphragms and deleted reference to omitted ‘K’ bar at top of diaphragm.
	Revised spacing of #4 (#13) 'U' and 'S' bars in continuous for live load bent diaphragms to 12" (300 mm) (MEMO: 3/31/99).
6-24	Renamed Highly Corrosive Areas as Corrosive Sites.
6-25	Added 5'-6" (1650 mm) sidewalk (MEMO: 5/15/00).
6-26	Renamed Highly Corrosive Areas as Corrosive Sites.
6-27	Inserted paragraphs regarding girder depth and tapered girders from “Design Details.”
6-28	Deleted direction for non-composite design for short spans.
6-29	Added reinforcement requirement for wide bent diaphragms.
6-31, 32	Added requirement and direction for use of bent gusset plates.
6-32	Added requirement for approval prior to use of longitudinal stiffeners (MEMO: 2/15/00).

Revised ASTM designations to AASHTO designations.

6-33 Added note regarding use of direct tension indicators (MEMO: 4/14/00).

6-34 Moved paragraphs regarding girder depth and tapered girders to “Design”.

6-41 Added reference to Standard PB1SM.

Added direction for detailing sole plate width for use with pot bearings.

6-42 Added reference to Standard TFE1SM.

Deleted 50.80 mm (2") diameter from pipe sleeve note.

Revised note regarding cambered girder lengths.

6-43 Revised bolt diameter for fixed TFE bearings (MEMO: 10/4/99).

Added requirement to show anchor bolt length on EB Standards (MEMO: 10/8/99).

6-44 Revised weld size for embedded plates to be consistent with EB Standard Drawings (MEMO: 10/18/99).

Added direction and note for field welding sole plates to steel girders on elastomeric bearings.

6-7(f) and 6-8(f)

Revised to replace Continuous High Chairs with Beam Bolsters Upper and revised note requiring Beam Bolsters Upper for bottom mat (MEMO: 5/15/00).

6-18(f) Revised to accommodate 5'-6" (1650 mm) sidewalk (MEMO: 5/15/00).

Revised cover on top mat of steel in to match Design Manual text.

6-20(f) through 6-23(f) and 6-26(f):

Revised reinforcing steel pattern in back of barrier rail (MEMO: 3/24/99).

6-32(f) Revised horizontal leg, bar length and weight of 'E' bars to comply with CRSI.

Revised Elevation and End Views to show Bolt-through assembly (MEMO: 5/28/99).

6-33(f) Revised Elevation, End and Plan Views to show Bolt-through assembly (MEMO: 5/28/99).

Moved 'B' bar outward as conflict with anchor assembly has been relieved.

6-34a(f) Added figure to detail reinforcement for two bar metal rails on cored slabs.

6-35(f) Revised Elevation, End and Plan Views to show Bolt-through assembly (MEMO: 5/28/99).

Corrected chamfer in End View in English figure (MEMO: 3/31/99).

6-38(f) Revised Elevation and Plan Views to show Bolt-through assembly (MEMO: 5/28/99).

6-44(f) Corrected coefficient in simplified equation for M_{tot} in Metric figure.

6-45(f) and 6-46(f):

Corrected seal width label to “W@60°” in English figures.

6-50(f) Lowered threaded steel insert below steel plate.

6-51(f) Deleted ‘A’ bars directly beneath armor (MEMO: 10/18/99).

6-52(f) and 6-53(f):

Revised to accommodate 5'-6" (1650 mm) sidewalk (MEMO: 5/15/00).

6-56(f) Deleted dimension for sidewalk width.

6-60(f) Revised closure pour width to 750 mm to coincide with asphalt overlay limit on Metric figure.

Replaced Continuous High Chair with Beam Bolster Upper (MEMO: 5/15/00).

6-62(f) Revised to accommodate 5'-6" (1650 mm) sidewalk (MEMO: 5/15/00).

6-63(f) Deleted dimension for sidewalk width.

6-70(f) Revised dimensions for S1 bar and revised size and weight of S2 bar (MEMO: 10/18/99).

6-78(f) Revised figure to show diaphragm reinforcing steel for both precast panels and metal stay-in-place forms.

Replaced Continuous High Chair with Beam Bolster Upper (MEMO: 5/15/00).

6-81(f) Replaced Continuous High Chair with Beam Bolster Upper (MEMO: 5/15/00).

6-82(f) Corrected bar grid to #10 in Metric figure.

6-86(f) Revised reinforcing steel pattern in back of barrier rail (MEMO: 3/24/99).

6-89(f) Converted dowel hole diameter in English figure.

6-92(f) Revised plate thickness ranges in Metric figure to be consistent with AWS Bridge Welding Code.

6-93(f) and 6-94(f)

Replaced Continuous High Chair with Beam Bolster Upper (MEMO: 5/15/00).

6-105(f) Separated weld symbols for connector plate welds.

6-113(f) Deleted welds on back of gusset plate (MEMO: 3/31/99).

6-114(f) Revised to detail a bent gusset plate for simple span bent diaphragms on heavy skews.

6-114a(f) Added figure to demonstrate detailing of bent gusset plate connections.

6-116(f) Revised 1 ¾" (45 mm) edge distance to be a minimum (MEMO: 3/31/99).

6-117(f) Refined Charpy V-notch zones and condensed notes.

6-119(f) Revised note on English figure to match that of the Metric figure.

6-122(f) Revised to be consistent with Standard Drawing PB1SM (MEMO: 10/4/99).

Chapter 7, SUBSTRUCTURE

7-1 Renamed Highly Corrosive Areas as Corrosive Sites.

7-1, 2 Added anchor bolt criterion for determining cap geometry for steel superstructures. This requirement will only govern when anchor bolt falls outside a special elastomeric bearing pad.

7-3 Clarified placement of temperature steel in ends of caps.

7-4 Relaxed guidance for sloping caps.

7-5 Highlighted difference in expansion joint material thickness for cored slab structures.

7-7 Expanded use of 'U' bar at ends of interior pile bents, regardless of pile size.

7-8, 9 Revised spiral steel designation and added note (MEMO: 8/17/99).

7-9 Added direction for epoxy coated spiral steel (MEMO: 10/14/99).

7-11 Renamed Highly Corrosive Areas as Corrosive Sites.

7-13 Renamed Highly Corrosive Areas as Corrosive Sites.

7-14 Added direction for column diameter for short columns atop drilled piers.

Added pay item for epoxy coated spiral steel (MEMO: 10/14/99).

Clarified calculation of pay length for permanent steel casing.

7-15 Added direction for reinforcing steel and mechanical couplers for short columns atop drilled piers and added reference to new figure.

Revised spiral steel designation and added note (MEMO: 8/17/99).

Deleted requirement to continue drilled pier spiral steel in column for short columns atop drilled piers.

Added pay item for epoxy coated spiral steel to note (MEMO: 10/14/99).

Added note for mechanical couplers for short columns atop drilled piers.

7-16 Revised note regarding location of drilled pier construction joint to be consistent with General Drawing standard notes (MEMO: 3/31/99).

Deleted notes regarding shafts terminating in rock to reflect Foundation Recommendations standard notes (MEMO: 6/15/99).

7-17 Added requirements for railroad crashwalls.

7-2(f) Revised clear distance to strirrups to be from top of cap (MEMO: 3/31/99).

7-9(f) Shifted bearings to no longer interfere with backwall (MEMO: 3/31/99).

Deleted "CL." for anchor bolt to step distance.

Revised centerline cap to centerline bearing.

7-11(f) Revised pipe diameter in Metric figure (MEMO: 3/31/99).

7-13(f) Corrected Section X-X to show fill face correctly (MEMO: 3/31/99).

7-18(f) Renamed "Retainer Block" as "Lateral Guide" (MEMO: 3/31/99).

Detailed 38 mm (1 ½") expansion joint material between block and cored slab.

7-21(f) and 7-22(f):

Corrected batter of piles (MEMO: 3/31/99).

7-23(f) Revised figure to delete bottom hooked bars and use ‘U’ bar in all interior pile bents, regardless of pile size.

7-32a(f) Added detail for mechanical couplers in short columns atop drilled piers.

7-33(f) Revised crashwall height.

Chapter 9 R. C. BOX CULVERTS

9-2 Clarified that only cast-in-place culverts are designed in-house using the Load Factor Design Method (MEMO: 5/14/99).

Added guidance for detailing bar supports for excessively thick culvert slabs.

Added direction to modify barrel plan view for tapered outlet wings (MEMO: 12/7/99).

9-6 Added note to disallow precast culverts for pedestrian underpasses (MEMO: 12/2/99) and high design fills.

9-6, 7 Added direction for detailing precast culverts (MEMO: 5/14/99).

9-8 Revised section title to "Turned Back Wing Standards" to differentiate between inlet and outlet wings.

9-8, 9 Added direction for designing and detailing tapered outlet wings (MEMO: 12/7/99).

Added recommendation for rounding wing length.

Revised dowel bars to #19 (#6) to match those dowels typically used for culvert extensions.

Added direction to use turned back wings when designing a culvert with a low flow channel (MEMO: 3/21/00).

9-9 Added direction for calculating quantities for culvert excavation for precast culverts (MEMO: 5/14/99).

Deleted note regarding suitable material to be consistent with Foundation Recommendations standard notes (MEMO: 6/15/99).

9-10 Added direction for calculating quantities for foundation conditioning material for precast culverts (MEMO: 5/14/99).

9-11 Added direction regarding bridge numbers (MEMO: 1/22/99).

Revised note regarding existing bridge to be consistent with General Drawing standard notes (MEMO: 3/31/99).

9-12 Added direction and note for detailing low flow channels (MEMO: 3/31/00).

Added direction to use turned back wings when designing a culvert with a low flow channel (MEMO: 3/21/00).

Revised pay item for low flow channel riprap to be consistent with Standard Specifications.

9-9(f) Deleted reinforcing details consistent with new precast culvert detailing practice (MEMO: 5/14/99).

9-12(f) Clarified 2" (50 mm) dimension from top of top slab to top of wing.

9-13(f) Corrected reference to Figure 9-12 for wing length.

Corrected English equation for calculation of ‘H1’ dimension.

9-13a(f) through 9-13d(f):

Added figures for tapered outlet wings (MEMO: 12/7/99).

9-15(f) Revised sill height and revised dowel size and spacing for low flow channels. Added direction for determining dowel length (MEMO: 3/31/00).

Chapter 10 REINFORCING STEEL

10-3 Renamed Highly Corrosive Areas as Corrosive Sites.

Increased cover on bottom mat of deck steel when using removable forms.

10-4 Added reference to Figures 10-7 and 10-8 for required embedment of 'V' bars into caps and footings.

10-5 Clarified criteria for epoxy coating bar supports (MEMO: 2/29/00).

Deleted epoxy coated steel from prestressed members (MEMO: 2/29/00).

Deleted paragraph regarding Corrosive Areas and renamed as Corrosive Sites.

10-7(f) Revised reference to Figure 10-4 in “Example” (MEMO: 3/31/00).

Added minimum embedment depth of column steel into caps and footings.

10-8(f) Revised reference to Figure 10-4 in “Example”.

10-10(f) Corrected stirrup height calculation in English figure.

10-11(f) Revised chart to show #14 and #18 bars in English figure.

Converted 180° hook extension length in English figure (MEMO: 3/31/99).

Corrected hook dimensions in Metric figure.

Chapter 11 BRIDGE LAYOUT

11-2 Revised reference to Figure 11-5 for determining railroad overhead bridge lengths.

11-5(f) Revised figure to clarify the determination of bridge length for railroad overheads. Removed section for heavy snow areas.

Chapter 12 MISCELLANEOUS

12-1 Added references to Standard BAS6SM (MEMO: 5/25/99).

Added 5'-6" (1650 mm) sidewalk (MEMO: 5/15/00).

12-4 Added guidance, notes, and reference to figures for detailing closed drainage systems when required by the Hydraulics Unit.

12-5 Revised to require reinforced bridge approach fills unless otherwise instructed by Soils and Foundations.

Added reference to Standard BAS6SM.

12-8 Added reference to reinstated aid for calculating concrete slope protection quantities.

12-10 Added definition and direction for detailing temporary shoring for the maintenance of traffic (MEMO: 3/11/99).

Revised designation to be used on the General Drawing for Temporary Shoring for the Maintenance of Traffic.

12-12 through 12-14:

Reorganized section to include General Drawing notes and refer to flowchart for determination of corrosion protection measures.

Renamed Highly Corrosive Areas as Corrosive Sites.

Added reference numbers for notes for use with new Figure 12-16a.

Added mineral admixtures to list of corrosion protection measures (MEMO: 2/29/00).

Added note for fly ash or slag in bridge decks (MEMO: 2/29/00).

Required all substructure concrete at Corrosive Sites to contain calcium nitrite and revised note accordingly (MEMO: 2/29/00).

Added note for epoxy coated bar supports (MEMO: 2/29/00).

Revised note for calcium nitrite in prestressed concrete to be consistent with Superstructure standard notes.

Added direction and note for the use of silica fume (MEMO: 2/29/00).

Deleted cored slabs from grouted recess requirements for highly corrosive areas. Recesses for cored slabs are grouted regardless of location.

12-15 Deleted requirement for three pay items for MSE walls (MEMO 10/22/99).

12-1(f) and 12-3(f):

Revised details and notes to be consistent with BAS Standard Drawings (MEMO: 4/5/99).

Corrected spacing of ‘A’ bars and number of ‘B’ bars.

12-2(f), 12-6(f), and 12-7(f):

Modified direction of section arrows.

12-8(f) Revised to accommodate 5'-6" (1650 mm) sidewalk (MEMO: 5/15/00).

Revised longitudinal spacing of dowels in approach slab.

12-8a(f) through 12-8c(f):

Added figures to illustrate details for Closed Drainage Systems.

12-9(f) Revised Section T-T for approach slabs with asphalt overlay (MEMO: 4/5/99).

12-12a(f) Reinstated figure for calculation of concrete slope protection quantity.

12-15(f) Revised to differentiate shoring requirements between CSX and Norfolk Southern Railroads.

12-16a(f) Added flowchart to determine required corrosion protection measures.