# 9.0 STRUCTURES

## 9.1 Bridge Structures General

1. All rehabilitated structures shall be designed for HS20-44 loading in accordance with the 2002 AASHTO Standard Specifications for Highway Bridges, 17th Edition, and subsequent interim specifications. No bridge structure replacements are anticipated as a part of this project. Any elective replacement structures shall be designed for HL-93 loading in accordance with 6th Edition AASHTO LRFD Bridge Design Specifications and subsequent interim specifications. All bridges shall be designed using Indiana Design Manual, INDOT Specifications, and applicable INDOT Design Memoranda.

2. Superstructure designs shall not include side-by-side box beams.

3. Bridges shall be composite and shall also be continuous over interior supports.

4. Steel bridges shall utilize grade 50 or 70 painted or weathering steel. If weathering steel is utilized, details shall be provided to minimize staining of MSE walls, abutments and/or piers. Hinges or pin and hanger type connections are not allowed. Fracture critical elements and fatigue prone details (AASHTO Category “E” or “F”) are not permissible.

5. Place new snowplowable pavement markers and barrier delineators on all bridges.

6. Concrete bridge railing shall be used on all bridge structures and shall be TL-5 for all I-69 structures. For all other structures, Type PF-1 or PS-1 shall be used, as applicable.

7. Concrete bridge railing transitions shall be placed at each bridge corner, and TGB transitions shall be placed where guardrail is warranted.

8. New work shall match the geometry of existing bridges.

9. New approach slab and bridge concrete shall be Surface Sealed in accordance with the Indiana Design Manual. Existing bridge railings and copings to remain shall also be Surface Sealed.

10. New full-width reinforced concrete bridge approach slabs shall be constructed at all bridges. Approach slabs shall be connected to new and existing pavement

ledges, and shall be detailed such that they may not be poured concurrently with bridge deck. Place Type 1A joints as required.

11. Place Sacrificial Anodes per Section 9.3 along all interfaces where cleaned and straightened steel is cast in new concrete.

12. Load Rating Requests for Bridges shall be submitted through IFA and approved before superstructure shop drawings submission. All bridges shall meet a minimum HS-20 Load Rating.

13. The structures shall be constructed in phases to accommodate the MOT Plans and the maintenance-of-traffic requirements. Level One Design Criteria shall be met unless an approved design exception is obtained.

14. Drainage features shall be designed to eliminate or minimize the need for bridge deck drains. Wherever possible, existing bridge deck drains should be preserved, and bridge drainage shall be directed to riprap drainage turnouts. New open bridge deck drains shall be located no closer than 10 feet from a substructure unit.

15. Foundation Design shall be in accordance with the Geotechnical Evaluation Report.

16. If driven pile foundations are used, the number of dynamic pile load tests required and locations where dynamic pile load tests are to be performed shall be in accordance with the recommendations in the Geotechnical Evaluation Report.

17. Any concrete placement with a least dimension of 5.0 feet or more shall be considered mass pour concrete and shall be placed in accordance with the mass pour special provision. Drilled shaft concrete shall not be considered mass pour concrete.

18. If drilled shafts are proposed, the Design-Build Contractor shall submit a special provision for drilled shaft construction to IFA for review. The special provision shall include the name of the proposed drilled shaft subcontractor, the subcontractor's qualifications and experience, proposed materials, construction methods and equipment, proposed use of temporary and permanent casing, slurry, provisions for obstructions, proposed final cleanout and shaft acceptance methods prior to concrete placement, proposed concrete placement methods, preparation for Crosshole Sonic Logging (CSL) and Impact Resistance Spectrum (IRS) testing as described below, and proposed construction tolerances.

19. If drilled shafts are used, the Design-Build Contractor shall provide and install pipes for CSL tests in all shafts, with a minimum of 4 pipes or one pipe for every foot of diameter, whichever is greater. CSL testing and IRS testing will be provided by IFA. The Design-Build Contractor shall provide site access, test area preparation and staff to facilitate the testing as required. If the tests indicate that there are zones of defective concrete within a shaft, the defects will be jointly evaluated by IFA and the Design-Build Contractor. In cases where the nature or extent of a defect remains uncertain, excavation or core-sampling of the defective zone may be required in order to permit visual or laboratory assessment of the material. Such excavation or core-sampling shall be performed by the Design-Build Contractor while an IFA representative is present.

    a. In the event that a defect is considered deleterious to the performance of the shaft, options for the repair or replacement of the shaft will be considered. Repair or replacement shall be completed to the satisfaction of IFA. No payment will be made for repair or replacement of defective shafts.

    b. If IFA determines that the drilled shaft is unacceptable based on the CSL tests, the shaft shall either be replaced or cored in accordance with the sub-article below to permit further evaluation.

    c. A production shaft which has been determined to be unacceptable on the basis of the CSL tests shall be cored to determine the quality of the concrete. One core shall be taken from each defective shaft for the full depth of the shaft at no additional cost to IFA.

20. If driven pile foundations are used, the number of dynamic pile load tests required and locations where dynamic pile load tests are to be performed shall be in accordance with the recommendations in the Geotechnical Evaluation Report.

21. Design and construct foundations and structures to meet the following performance criteria:

    a. Post-construction settlement of bridge piers and abutments: Less than 1.0 inch total settlement and less than 0.5 inch differential between adjacent piers or abutments.

    b. Lateral deflection at top of foundations for non-seismic loading: As required for serviceability of the Design-Build Contractor’s design, but not to exceed 1.0 inch.

22. Seismic design of the structure shall be based on the soil profile type as recommended in Geotechnical Evaluation Report.

23. Patch piers, crash walls and undersides of decks as necessary to repair all delamination and spalling.

24. Requirements for Structures to be Widened:

    a. The cross-section of the bridges shall be widened to carry the full traveled way width.

    b. Remove existing overlay and mill existing bridge decks, perform hydrodemolition. Milling depth may be variable (no less than ¼") if necessary to maintain HS20 load rating.

    c. On mainline I-69 structures, the existing rail at outside shoulders shall be replaced.

    d. Place a variable depth (1¾" min.) latex-modified concrete overlay on entire deck surface. Minimum cross-slope shall be 1.5%.

    e. Place riprap drainage turnouts at ends of railing transitions, on shoulders that receive drainage. Drainage shall not be turned out above the envelope of structure backfill. Backfill in this area with Type B-borrow when using MSE wall.

    f. Widened end bents shall be poured semi-integral or integral.

    g. Blast Clean end tops of steel beam top flanges, as well as ends of beams at end bents where concrete is to be poured permanently against steel.

    h. Slopewalls and riprap slopes shall be widened to 2' outside widened bridge decks underneath structure.

    i. Widened piers shall emulate the configuration of the existing piers.

25. Requirements for Structures receiving deck replacements:

    a. Remove barrier rails, concrete deck, approach slabs, barrier transitions, and a short section of guardrail at all bridge corners to re-connect to existing guardrails.

    b. Remove mudwalls down to bridge seat.

    c. New end bents shall be poured semi-integral.

d. Blast Clean end tops of steel beam top flanges, as well as ends of beams at end bents where concrete is to be poured permanently against steel.

e. Place new 8” thick concrete deck, barrier rails, approach slabs, barrier transitions and tie new guardrail into existing.

f. Place riprap drainage turnouts at ends of railing transitions, on shoulders that receive drainage.

26. No work is required on the following structures:

a. Structure No. I69-4-05310B (116th Street over I-69)

b. Structure No. 37SB-09803 (SB SR 37 over SB 116th St. Exit Ramp)

c. Structure No. 37NB-09802 (SR 37 NB over I-69)

d. Structure No. I69-5-05312 A (Cumberland Road over I-69)

e. Structure No. I69-6-09834 (Now known as I69-206-09834 (126th Street over I-69)

f. Structure No. I69-10-09133 (Olio Road over I-69)

g. Structure No. I69-12-05319A (Cyntheanne Road over I-69)

h. Structure No. 38-48-04370B (State Road 38 Road over I-69)

27. For modified existing bridges, existing beams shall not be overstressed by more than 5 percent. .This allowance does not apply to Load Rating