

Addendum to *Transportation Investment Act of 2010 Manual – Processes and Procedures*

Delete *Chapter 8: BRIDGE AND STRUCTURAL DESIGN* and substitute the following:

8 Design Management

8.1 Bridges and Structures

Bridge design as part of a blended project is required to follow the GDOT PDP manual and all policies, procedures and manuals required by GDOT.

Bridge design as part of a 100% TIA funded project is required to follow the TIA Manual. It is preferred that bridge design development include a preliminary bridge plan phase, including Hydraulic and Hydrological Studies (H&H) as required, and a final bridge plan phase.

8.1.1 On-System and Off-System Bridges

For the TIA Program, bridge designs are classified as either On-System or Off-System as defined by Chapter 1 of the TIA Manual.

On-System bridges are to be maintained and inspected by GDOT following the completion of construction.

If a project involves a bridge that carries the interstate or a bridge crossing the interstate, FHWA coordination is required and may involve submitting plans to FHWA for review.

Off-System bridges will be maintained by the local government owner of the bridge. The PgM will develop an Intergovernmental Agreement between GDOT and the local government to define the maintenance responsibilities for Off-System bridges.

8.1.2 Bridge Design Specifications

Bridges are to be designed using the most recent editions of the Georgia DOT *Standard Specification - Construction of Transportation Systems, 2001 Edition*, *GDOT Bridge and Structures Design Manual (DPM)*, *GDOT LRFD Bridge and Structure Design Manual*, and AASHTO Bridge Design Specifications. It is preferred that new bridges be designed using the latest AASHTO *LRFD Bridge Design Specifications* but this will not be required in all cases.

Blended projects must conform to FHWA requirements.

For 100% TIA funded projects, the following are the AASHTO Bridge Design Specifications to be used for bridge design:

- Bridge Widening Projects: Latest version of AASHTO Bridge Specifications or the version of the specifications in place at the time the bridge was originally designed with prior approval from GDOT Office of Bridges and Structures.
- NEW Off-System Bridges: AASHTO *Standard Specifications for Highway Bridges, 2002, 17th Edition* (HS20 Loading) as a minimum.
- NEW On-System Bridges: AASHTO *Standard Specifications for Highway Bridges, 2002, 17th Edition* (HS20 Loading) as a minimum. However, the latest AASHTO *LRFD Bridge Design Specifications* are acceptable.
- NEW On-System Bridges (Interstate): Latest version of AASHTO *LRFD Bridge Design Specifications* (HL93 Loading) to accommodate full FHWA oversight.

In the event of conflicting information or guidance, the Bridge DPM or Bridge LRFD DPM supersedes AASHTO guidelines.

8.1.3 Responsibilities

The roles and responsibilities of GDOT, PgM, EOR and Local Government related to bridge design of TIA projects are outlined in the following sections.

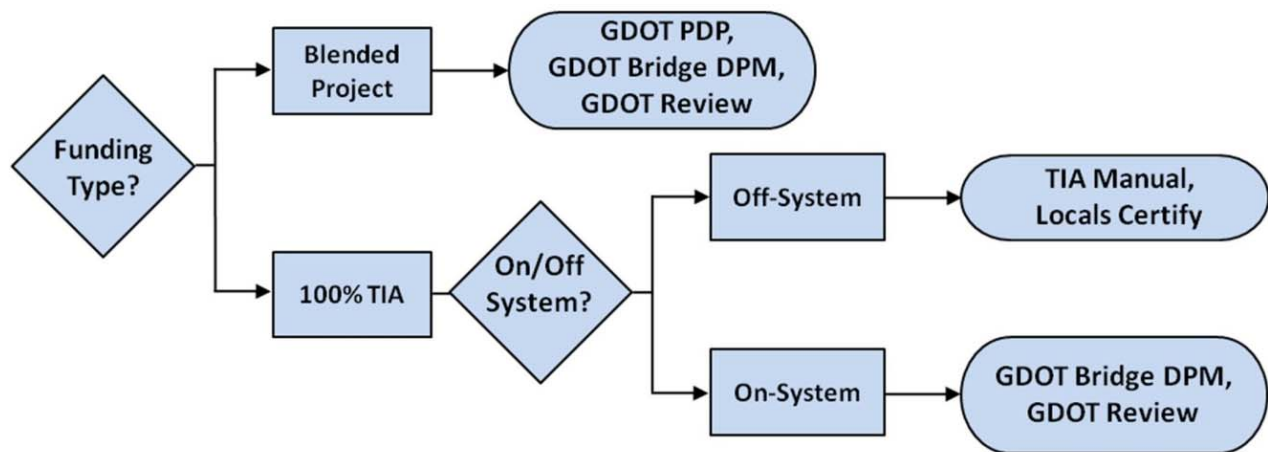


Figure 14-6 TIA Bridge Project Design Guidance

8.1.3.1 GDOT Office of Bridge Design

For On-System bridges and bridges that are part of blended projects, the GDOT Office of Bridge Design will provide the necessary submittal reviews, guidance and design acceptance. Blended projects will follow the PDP.

For all other bridges, the Office of Bridge Design will perform audits on projects for compliance with the TIA Manual.

For additional responsibilities related to Shop Drawings and Request for Information (RFI), see [Section 8.1.10](#).

8.1.3.2 Program Manager

For Off-System projects, the PgM may perform review of bridge submittals. The design and plan reviews will be “peer” review in nature and will be conducted at the completion of the preliminary plan and final plan phases. The peer review will consist of the design drawings for completeness and compliance with the TIA Manual, cost estimates, and constructability. It is expected that bridge plans and designs will be prepared in a format typical to GDOT bridge plans in quality and presentation. Bridge review is not a substitute for the EOR’s own quality control procedures. This review does not relieve the EOR of its overall responsibility for the design.

8.1.3.3 Engineer-of-Record

The EOR is responsible for all aspects of design, plan development and specifications related to a bridge or structure design. Bridge and structure designs and plans for On-System bridges shall follow the Bridge DPM or Bridge LRFD

DPM. Every bridge design must be certified by a licensed engineer registered in Georgia specializing in bridge design.

Engineering firms providing bridge and structure design work bridges are to be prequalified with GDOT in Area Classes 4.01, 4.02, and/or 4.04 as necessary for the project.

The EOR is responsible for ensuring that bridge designs are complete, accurate and constructible. Construction plans should be of sufficient quality to ensure that the contractor can easily understand the design and how the bridge is to be constructed. If errors occur during construction due to errors on the bridge plans, the EOR is responsible to provide a remedy at no additional cost to the project. The EOR may be held responsible for covering the additional contractor costs, liquidated damages or legal claims as a result of errors and/or omissions in the plans.

For additional responsibilities related to Shop Drawings and Request for Information (RFI), see [Section 8.1.10](#).

8.1.3.4 Local Government

For Off-System bridges, the local government and the local government's EOR shall certify that:

- The bridge configuration meets the drainage design and stream crossing requirements of the local jurisdiction and FEMA, and creates no adverse affects to flood elevations or flood plain limits in the surrounding area.
- The bridge is designed to resist the hydraulic forces determined by the applicable design guidelines and imposed on the structure by the waterway.
- The foundations are designed to be installed below the anticipated scour depths, into competent bearing material, and in accordance with the bridge foundation investigation.
- The scour protection is designed to resist anticipated velocities at the crossing.

The Local Bridge Design Certification shall be submitted to the PgM before Final Acceptance of the project.

8.1.4 Bridge Details

The following sections outline guidelines for design and detailing of bridges that will improve safety and lower long term maintenance costs for the owner.

8.1.4.1 Superstructure

Whenever possible, minimize the number of deck joints in bridge spans. Locate deck joints to provide access for future maintenance and replacement.

The use of fracture critical members (FCMs) is not permitted on highway bridges without written authorization from GDOT Office of Bridge Design. Design and detail FCMs to allow full access for inspection. Provide a minimum inside depth of six (6) feet to facilitate interior inspection of box girders. To allow free flow of air during inspections, include access openings of 3'-0" diameter minimum into all cells, and between cells of the girders. Provide outside access opening covers in areas that can be accessed without impacting traffic. Provide hinged access opening covers with hinges located on the inside of the box girder.

Timber bridges, masonry bridges and structural plate arches are not permitted for TIA projects. Intermediate hinges in bridge girders or spans are not permitted for TIA projects.

Design bridge superstructures, joints and bearings to allow access for long-term inspection and maintenance.

8.1.4.2 Bridge Foundations

Design foundations for bridges over waterways to accommodate predicted scour depths. The EOR will determine the scour potential of each bridge crossing using the Bridge Foundation Investigation and H&H Study.

8.1.4.3 Bridge Railing and Barriers

All barrier systems shall meet current crash test and other safety requirements as determined by GDOT. Table 14-6 lists current approved GDOT Bridge Railing Standards, which GDOT will update upon request.

Table 14-6: GDOT Standard Bridge Railing

BRIDGE BARRIER, PARAPET AND RAIL		
Description	Std Name	Rev Date
With Sidewalks		
Concrete Parapet (42" tall – 13" wide)		
Concrete Parapet (27" tall- 13" wide) w/Std 3626 (42" tall total)		
Concrete Parapet (34" tall – 13" wide) w/Std 9031N Chain Link Wire Fence for urban area bridge over an Interstate or other limited access highway or a railroad"		
No Sidewalks		
Concrete Jersey Barrier (32" tall) w/ 9" top (No Bicycle route)		
Concrete Type "S" Barrier (42" tall)		
COMBINATION RAILS/FENCES		
Description	Std Name	Rev Date
One-Pipe Aluminum Handrail for mounting on parapets (14.75" high rail)	3626	10-64
Chain Link Wire Fence for mounting on top of parapets	9031N	06-81
Pipe Handrail for mounting on top of parapets & modified barriers	9031R	10-88
ARCHITECTURAL RAILS		
Description	Std Name	Rev Date
Texas Rail (to be used only with GDOT Bridge Office approval)		
Kansas Corral (to be used only with GDOT Bridge Office approval)		

8.1.5 Concept and Preliminary Plans

8.1.5.1 Concept

If required for approval of the Concept Report, provide concept layouts consisting of bridge plan view, elevation view and typical section. Include a cost estimate, based on the concept layout, in the concept Report.

8.1.5.2 Preliminary Plans

Preliminary Design Packages are required for all projects let to construction by GDOT.

Unless required by the local government, Local Let projects do not require submittal of Preliminary Design Packages. Submittal of the bridge layout for review at an early phase of the project is recommended to minimize cost and schedule impacts.

Preliminary bridge layouts must show all required crossing information as outlined in the Bridge Design Policy Manual and the GDOT Bridge Detailing Manual.

8.1.5.3 Hydraulic and Hydrological Studies

Bridge projects crossing or encroaching on FEMA studied waterways must be studied and designed to meet all FEMA requirements.

For On-System bridges, GDOT requires an H&H Study and Preliminary Bridge Layout to be submitted and accepted prior to advancing to the next phase, regardless of funding source. H&H Study Reports for these projects must follow the guidelines and policies in the GDOT Drainage Manual and include the Preliminary Bridge Layout in the study appendices. The GDOT Drainage Manual outlines the content and format of H&H Study Reports.

For Off-System bridges, an H&H Study Report shall be completed to determine bridge configuration, hydraulic opening, scour depths and changes to existing flood elevations and floodplain limits. These bridges must (1) be designed to meet the drainage design requirements of the local jurisdiction; (2) be designed to resist hydraulic forces imposed on the structure by the waterway; (3) have foundations installed below the anticipated scour depths into competent bearing material; and (4) include scour protection designed to accommodate anticipated stream velocities.

For Off-System bridges, the local government and the local government's EOR or representative, shall provide a Local Bridge Design Certification as per the TIA Manual.

8.1.5.4 Preliminary Cost Estimates

A concept level and preliminary cost estimate shall be prepared for the bridges using the latest cost data available from GDOT including square foot cost provided in the Bridge DPM and the most recent GDOT Mean Item Summary Data. It is important that the estimate developed at this stage of the project is as accurate as possible.

8.1.6 Final Plans

Final design of bridges will follow the requirements of the GDOT Bridge DPM and the applicable AASHTO Bridge Design Specifications. For bridges designed using the AASHTO Standard Specifications, the EOR is encouraged to use the GDOT Bridge design programs, which are available from GDOT at no cost. For Bridges that must be designed using the AASHTO LRFD Bridge Design Specifications, it is necessary for the EOR to use software that is capable of designing the bridge using the LRFD Specifications. Design calculations will be required for all portions of the bridge. Calculations should be checked for accuracy in accordance with the EOR's internal quality assurance policy.

Bridge plans and details shall follow the requirements of the latest GDOT Bridge Detailing Guide where applicable. Final plans will be of sufficient detail and quality to let the project for construction.

8.1.6.1 Final Cost Estimates

A final construction cost estimate for each bridge will be required prior to letting the project. The estimate should be developed using estimated final quantities of materials and the most recent GDOT Item Mean Summary Data.

8.1.6.2 Foundation Investigations

A Bridge Foundation Investigation (BFI) will be required for all bridge projects regardless of the funding source. In cases where they are available for use on bridge replacement projects, existing BFIs may be used in lieu of a new BFI Report. Prior to undertaking a TIA project, an initial search shall be undertaken with GDOT's Office of Materials

and Testing to determine if approved BFI Report(s) are available for use. The BFI will make all necessary recommendations for the project and will follow the format required by GDOT's Office of Materials and Testing. For On-system bridges, the BFI shall be submitted to GDOT for review and approval.

Requirements and procedures for Wall Foundation Investigations (WFI) reports shall closely follow those specified for BFIs above.

8.1.7 Retaining Walls

Retaining walls will be designed according to the guidelines in the GDOT Bridge DPM. Wherever possible, the use of GDOT standard walls and contractor designed walls is encouraged. A WFI will be required for walls as recommended by the GDOT Bridge DPM.

For On-System and blended projects, wall layouts will be submitted with the preliminary design package for acceptance. For Off-System projects, it is recommended that wall layouts be submitted with the preliminary design package for acceptance.

8.1.8 Bridge Condition Surveys

For On-system bridges to be widened and/or rehabilitated, the Office of Bridge Design - Bridge Maintenance Section shall complete Bridge Condition Surveys in accordance with the PDP. The PgM will obtain Bridge Condition Surveys for these projects from Office of Bridge Design - Bridge Maintenance Section. As determined eligible by the TIA Administrator, recommendations from Bridge Condition Survey reports shall be incorporated into the final design of the bridge.

8.1.9 Bottomless Culverts

Bottomless or three-sided culverts may be used on projects. These culverts consist of precast concrete sections that are founded on spread footings or pile supported foundations. Foundations for these structures must be designed and protected from anticipated scour depths. Requirements for design capacity, H&H studies and foundations shall follow applicable sections of the TIA Manual.

8.1.10 Construction Phase

During construction, the EOR will provide shop drawing review and technical support consisting of addressing contractor RFI's, attending project status meetings and site visits as needed to resolve problems or issues in the field.

8.1.10.1 Shop Drawings

During construction, the EOR will provide shop drawing review. The Design Consultant or its designated EOR will review the shop drawings for bridges and structures designed by the EOR. For On-System bridges, GDOT will process and return shop drawings to the contractor following acceptance by the EOR. The PgM will coordinate processing of the shop drawings, RFIs and construction correspondence. All submittal related correspondence will be submitted to the PgM for distribution to appropriate review personnel. The PgM is to ensure that contractor submittals and RFI's are addressed and processed in a timely manner.

Review of Shop drawings will be performed and approved by the EOR. The PgM will keep a record of all shop drawing submittals and approvals over the course of the project. This record will be turned over to the Local Government and/or GDOT at the conclusion of the project. The EOR will review shop drawings to ensure that fabrications are consistent with the designer's intent. A partial list will include, but not be limited to:

- Structural steel framing
- Precast, prestressed concrete beams
- Precast segmental concrete units
- Bearings

- Expansion joints
- SIP deck forms
- Sound Barriers
- Sign structures
- Signal poles
- Bridge appurtenances
- High mast lighting

Shop drawing review may be required for major items of temporary works that might affect the public, impose significant loadings on the permanent works, and/or require an engineered design. A partial list includes, but is not limited to:

- Temporary structures
- Cofferdams
- Falsework, shoring and formwork
- Superstructure erection
- Construction staging and traffic control
- Demolition plans

8.1.10.2 Requests for Information

Requests for Information (RFI) will be coordinated between the PgM, Local Government (if required) and the EOR. The PgM will keep a record of all RFI submittals and outcomes over the course of the project. This record will be turned over to the Local Government and/or GDOT at the conclusion of the project.

8.1.10.3 As-Built Plans

As-Built Plans will be prepared for all structures on the project. This will include the as-built foundation drawings as well as the construction documents used for the structure, noting all field change corrections made to the drawings. The PgM will store As-built drawings produced from construction and transfer the final drawings to the appropriate project sponsor upon project closeout.

8.1.11 Load Rating

The EOR will complete a load rating and develop a Load Rating Report for each bridge design which includes a statement certifying that the bridge has the capacity to carry the minimum design loading specified in the TIA Manual and does not require posting for current state legal loads. The Statement of Load Rating Certification will include the professional seal and signature of a registered professional engineer in the state of Georgia.

Load rating procedures outline in AASHTO's *The Manual for Bridge Evaluation*, current edition, shall be followed. Bridges designed using the AASHTO Standard Specifications may be rated using either LFR or LRFR methodologies. Bridges designed using the AASHTO LRFD Specifications must be rated using LRFR methodologies.

Load Rating Reports will be submitted to the PgM upon certification of final bridge plans. The PgM will submit the reports to the Office of Bridge Design for verification of load capacity and acceptance prior to project letting. If changes occur between submittal of final plans and construction of the bridge that affect the load capacity of the bridge, it is the responsibility of the EOR to submit revised Load Rating Reports to the PgM and GDOT for rerating. A certified copy of the Load Rating Report and Final Bridge Plans will be submitted to Office of Bridge Maintenance for inclusion in the maintenance records for each bridge.

If an independent load rating, performed by the Department, demonstrates that the capacity of the bridge design is less than 95% (<95%) of the design load, the EOR will be responsible for any additional design and construction

costs associated with correcting the deficiency in a manner that increases the capacity to a level that meets the design load requirements.

8.1.12 Final Acceptance

For On-System bridge projects, all project deliverables will be in accordance with GDOT PDP and Bridge DPM.

For Off-System bridge projects, the following will be required to be submitted to GDOT for Final Acceptance:

- Design and As-built Plans
- Load Rating Report
- H&H Studies Reports including scour calculations
- As-built Foundation Plans
- BFI used for design
- Shop Drawings

DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

TRANSPORTATION INVESTMENT ACT (TIA) PROJECT

Local Bridge Design Certification

P.I. NO.: _____

LOCATION [*City or County*]: _____

PROJECT BAND: _____

BRIDGE ID: _____

DESCRIPTION: _____

I hereby certify that I am a principal and duly authorized representative of _____
whose address is _____ and further certify that the
_____ and its Engineer of Record attests that:

1. The bridge configuration meets the drainage design and stream crossing requirements of the local jurisdiction and FEMA, and creates no adverse affects to flood elevations or flood plain limits in the surrounding area.
2. The bridge is designed to resist the hydraulic forces determined by the applicable design guidelines and imposed on the structure by the waterway.
3. The foundations are designed to be installed below the anticipated scour depths, into competent bearing material, and in accordance with the bridge foundation investigation.
4. The scour protection is designed to resist anticipated velocities at the crossing.
5. Engineer of Record Certifies to all above.

Duly Authorized City/ County
Representative

Date

City / County Seal

DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

TRANSPORTATION INVESTMENT ACT (TIA) PROJECT

Local Bridge Design Certification

P.I. NO.: _____

LOCATION [*City or County*]: _____

PROJECT BAND: _____

BRIDGE ID: _____

DESCRIPTION: _____

I hereby certify that I am a licensed Engineer in the State of Georgia and that my address is _____
_____ and further certify and attest that:

1. The bridge configuration meets the drainage design and stream crossing requirements of the local jurisdiction and FEMA, and creates no adverse affects to flood elevations or flood plain limits in the surrounding area.
2. The bridge is designed to resist the hydraulic forces determined by the applicable design guidelines and imposed on the structure by the waterway.
3. The foundations are designed to be installed below the anticipated scour depths, into competent bearing material, and in accordance with the bridge foundation investigation.
4. The scour protection is designed to resist anticipated velocities at the crossing.

Engineer of Record Seal /
Certification