

BRIDGE DESIGN MANUAL

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**CHAPTER 3 • PLAN COMPOSITION -
NEW AND RECONSTRUCTION PROJECTS**

3.00 GENERAL

(revised 9-28-2026)

The 7th Edition of AASHTO's Policy on Geometric Design of Highways and Streets ("Green Book" or "GB7") categorizes projects into three different project types, with the historic 3R/4R classifications following in parentheses:

- New Construction (4R)
- Reconstruction (4R)
- Construction on Existing Roads (3R)

For additional information on project classification for bridge project types see RDM [Section 3.08](#) or BDM [Chapter 12 Appendix 12.02.01B](#)

If a project includes multiple project types such as Reconstruction (4R) (See BDM [Chapter 7](#)) and Construction on Existing Road (3R) (See BDM [Chapter 6](#)) default to either the more conservative requirements or require the identification of the logical limits of each type on the project information sheet.

Projects categorized as capital preventive maintenance (CPM) projects are governed by guidelines that differ from the GB7 guidelines. When CPM work types are packaged with GB7 classified projects, the portion of the project that is outside the GB7 classification work limits is governed by the guidelines that pertain to CPM work types. When describing the work type in the request for the Plan Review Meeting, identify the work type separation so that the appropriate requirements are considered within each structure. Work type overlap within a structure may cause a default to the GB7 classification requirements.

Treat cross road over bridges as individual segments regardless of project work type.

For rehabilitation, e.g., railing replacement and/or deck overlay projects, see BDM [Chapter 4](#).

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3.01 STUDY

(revised 9-28-2026)

The first plan of a structure is a feasibility study showing the basic design concept and the topography in the immediate structure area.

The study is submitted by the Bridge Design Project Manager to the Chief Structure Design Engineer for approval. For definition/clarification of oversight see BDM [Chapter 2](#). Study approval should be obtained before Preliminary Plans are started. The study, as approved, then becomes a permanent record and is to be kept within the Supporting Documents, Structure Study Folder in ProjectWise.

A study must be completed for all new construction and reconstruction projects. Generally, structure studies are not required for deck replacements on slab and beam bridges unless the deck replacement involves widening requiring more than one beam line, the vertical alignment or horizontal alignment changes significantly, or the project has other unique characteristics that would benefit from the structure study process. Structure studies should be completed for deck replacements on complex bridges.

A study must be completed for all projects involving a culvert with a clear span between 10 ft. and 20 ft. that is constructed using staged construction. Construction of these ancillary structures using staged construction presents unique challenges that must be considered, and a feasibility study showing the basic design concept for the selected culvert type is the first step in mitigating these challenges. Specific items that should be discussed include, but are not limited to, water diversion, ground water effects, and unique details required to connect the culvert sections at the stage line.

When a project involves earth excavation, the Project Manager sends a project description and requests a Project Area Contamination Survey (PACS) for a list of potentially contaminated sites identified by Region Resource Specialist. For more detailed information see RDM [Section 14.13](#).

Before starting and during the preparation of the study plans, the following information relevant to the design of the bridge should be considered:

- A. Engineering Report. (Including Early Preliminary Engineering (EPE), Planning and Environment Linkages Study (PEL Study), or Environmental Impact Statement if applicable.)
- B. Topography
- C. Traffic data - If traffic data is unavailable at this time, it should be requested from Statewide & Urban Travel Analysis (SUTA) Section of Project Planning.
- D. Geotechnical Data - Soil borings should be ordered as soon as possible after receiving the project.
 - 1. In general, one soil boring should be requested for each substructure unit less than 100 ft. long and two borings for footings longer than 100 ft. For retaining walls, MSE walls and sewers, borings should be taken every 300 ft. If conditions are found to vary appreciably, additional borings will be required. Refer to the MDOT [Geotechnical Manual](#).

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2. Soil boring requests should be submitted to MDOT Geotechnical Services Section. The request should consist of MDOT [Form 1088](#), Request for Foundation Investigation, existing or proposed General Plan of Site Sheet, and the requirements set forth in the form.
 - a. Include the following information:
 - 1) Scope of work.
 - 2) Location of substructure units and borings.
 - 3) Approximate bottom of footing elevations.
 - 4) Notification when piles will be used regardless of soil character.
 - 5) Indicate whether 400 kip nominal pile resistance (60 ton LFD) piles are appropriate (widening jobs).
 - 6) Indicate if continuous superstructure is anticipated, and if integral abutments are being considered.
 - b. If previous plans of an existing structure are available, the previous General Plan of Site and Log of Borings should be included.
- E. Bridge records including existing plans, bridge inspection reports, work history and recommendations (in MiBRIDGE), and the Bridge Scoping Report (reconstruction projects).
- F. Existing and/or proposed utilities.
 1. The Utility coordination process, in particular, should be initiated shortly after the project has been assigned.
- G. Waterway data for stream and river crossings. A scour analysis is required at all stream crossings where reconstruction is proposed.
 1. Stream crossings are to be checked to determine whether they are a part of the county drain system, and the findings are to be recorded as part of the project history. Contact Hydraulic Unit Supervisor or Drainage Coordinator.
 2. Investigate scour potential. Design provisions may be needed to prevent undermining of the substructure. Contact Hydraulic Unit Supervisor and Geotechnical Services Section.
- H. Scoping Document and Region Scoping estimate.
- I. Minutes of city, county, or other meetings that have been held relevant to the project.
- J. Correspondence files.
- K. Existing Plans (reconstruction projects) and web-based street level viewer.
- L. At all stream crossings, contact Roadside Development Unit to determine if an aesthetic or open railing should be considered.

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- M. Project Safety Analyses Requests should be made to Transportation Systems Management and Operations, Safety Programs Section in Lansing and the TSC Traffic and Safety Engineer.
- N. Capacity Analysis – Region/TSC Traffic and Safety (requested for deck replacement and reconstruction projects only). Also consider/evaluate all modes (users) of transportation.

3.01.01 Plan Composition

(revised 9-28-2026)

Include the following information on the study plans:

- A. The survey centerline showing horizontal alignment and stationing. The construction centerline, if different than the survey centerline.
- B. Topographical features and contour lines.
- C. Existing and proposed profiles along the construction centerlines of the roadways (and railroad, if the project includes one).
- D. Benchmarks and witnesses with corresponding coordinates. (Provide coordinates if they are available. If not, add note [8.03 Y](#) to the study plans.)
- E. Alignment sketch where data cannot be clearly shown on the overall plan view.
- F. Utilities.
- G. Traffic Data.
- H. Concept of Maintenance of Traffic
- I. Non-Motorized traffic requirements. Future sidewalk or bike path plans and all other modes of transportation.
- J. Horizontal curve data, if any.
- K. A plan view of the structure and proposed approaches superimposed on the topography.
- L. Elevation view of the structure, showing actual horizontal and vertical clearances.
- M. Typical approach cross section. Provide a road typical cross section sheet in lieu of adding the section to the bridge study plans.
- N. Deck cross section (see [Bridge Design Guide](#) 6.05 series).
- O. Standard note designating the design loading.
- P. Waterway information (stream and river crossing). [Summary of Hydraulic Analysis](#) must be on General Plan of Structure Sheet. See BDM Section [8.05 F](#).

The study is submitted by the Project Manager to the Chief Structure Design Engineer for review. For RBPI projects, FHWA approval may be required. See BDM [Section 2.03](#). Study approval or concurrence from the Chief Structure Design Engineer must be obtained before preliminary plans are started.

3.01.02 Cost Estimate

(12-19-2016)

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Complete a Bridge Cost Estimating Worksheet (located on the [Bridge Management and Scoping](#) website, Project Estimating section) for each study alternative considered. Alternate methods for study cost estimates are acceptable as long as they contain similar level of detail as the Bridge Cost Estimating Worksheet.

3.01.03 Study Write Up

(revised 9-28-2026)

In addition to the study plans and cost estimate, a write-up should be developed that supports the recommended study alternative. The write-up should be sufficiently detailed to describe the following:

- Description of the proposed scope of work
- Brief description of the existing structure condition
- Narrative regarding impacts of utilities
- Description of controlling design criteria when necessary to support the proposed alternative
- Any site constraints that are pertinent to the proposed alternative
- Maintaining traffic concept (if not able to be reflected on the plans)
- Brief description of alternatives considered
- Any unique constructability considerations, including site access, haul road, utility impacts, staged construction, etc (if applicable)
- Brief description of geotechnical investigation that supports the proposed alternative
- Brief description of hydraulic considerations including preliminary scour depths at each substructure (where applicable)
- Summary of proposed option including estimate of cost. Cost should be compared with programmed amount and, if over programmed amount, assurance that funding is available should be noted.

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3.02 PRELIMINARY PLANS

(revised 12-16-2019)

Preliminary Plans are the second set of plans prepared. They are for distribution to various agencies which are involved with the bridge project to show them our intent. This allows each agency to make its comments or requests and give approval where such is required.

Preliminary Plans are required for projects. For minor rehabilitation, e.g., railing replacement and/or deck overlay projects, see BDM [Chapter 4](#).

Traffic volume information (if available) must be included in the Preliminary Plans.

Include any recommendations or comments by the Geotechnical Services Section with the Preliminary Plan set that is turned into the Chief Structure Design Engineer.

A public hearing must be held for all major projects or where we intend to close a portion of a route and detour all modes of transportation during construction. In general, the hearing will have been held as a prerequisite of the Environmental Impact Statement, and it is unnecessary for one to be requested by the Bridge Unit Leader. Should there be a question, contact the Public Hearings Officer, Environmental Services Section, Bureau of Development.

If a project is in the vicinity of an airport or airfield, run an FAA Determination. Additionally, verify if a Michigan Tall Structure permit or Local Airport Zoning Permit are required and have been obtained for the project. See BDM [Section 12.14](#) for guidance and information on applicable permits and filing notice with the FAA.

3.02.01 Composition

(revised 2020)

Generally, plan sheets required are as follows:

- A. Title Sheet: Show job numbers, location map, notes and traffic data.
- B. General Plan of Site Sheet: If a bridge project doesn't have a Study, show all information that was to be shown on the study plans on the General Plan of Site Sheet and/or General Plan of Structure Sheet. Include the following information on the General Plan of Site Sheet:
 1. The plan view of the structure and approaches as shown on the approved study.
 2. Typical approach roadway cross section is no longer required on bridge plans because duplicate information is shown on road plans. It can be added on a case-by-case basis for unique situations or if the road plans do not supply the information.
 3. Applicable notes from BDM [Chapter 8](#) and any unique general notes INCLUDING a note designating all major items of work that are part of the project. This note should also identify items that are not part of the bridge plans but are included in road plans which are part of the project.
 4. Any proposed relocation of existing utilities. Because of legal problems in other states, Designers should not label abandoned or out of service utilities as "abandoned". Such utilities should be labeled "Utility Line Out of Service". The name of the utility owner, if known, should also be placed on the plans.

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5. Where a bridge will cross a waterway or wetland and where project site access is otherwise restricted, the plans should show a plan view, profile and cross section for any haul route required to access the project site where applicable. See BDM [Section 2.02.15](#) for additional information.

C. Log of Boring Sheet:

1. Required for all new bridges and projects that involve substructure widening.
2. In addition to soil data, the elevations of the bottoms of footings, minimum pile penetration, and estimated pile tips shall be shown.
3. All borings are to be plotted to a common datum utilizing the proposed stationing whenever possible.
4. See [Guidelines for Bridge Plan Preparation](#) (MDOT Sample Plans Bridge) of the MDOT Development Guide for various details and sample plan sheets. See BDM [Section 1.02](#).

D. General Plan of Structure Sheet

1. In general, include the following:
 - a. Plan view of the structure including approach features such as pavement, shoulders, curb and gutter, and guardrail.
 - b. An elevation of the structure as follows:
 - 1) For stream crossings, parallel to the roadway over.
 - 2) For grade crossings, perpendicular to the roadway under
 - c. A cross section of the deck showing the abutment, or half abutment and half pier.
 - d. Typical cross sections through the substructure units showing excavation and backfill limits.
 - e. Any other significant features peculiar to the project.
 - f. If temporary supports are to be used, they should be shown or noted on this sheet.

E. Existing General Plan of Site Sheet:

1. If available, this sheet is required for all reconstruction and rehabilitation projects (4R). Create a new General Plan of Site for new structure or structure replacement projects and submit existing General Plan of Site as Reference Information Document (RID). See BDM [Section 3.04.02](#). Include the existing General Plan of Site for all other projects.

F. Existing General Plan of Structure Sheet:

1. If available, this sheet is required for all reconstruction (4R) and rehabilitation (3R) projects. Any removal of portion of structure is to be designated on this sheet. For projects with a new superstructure, create a new General Plan of Structure, and submit existing General Plan of Structure as Reference Information Document (RID).

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See BDM [Section 3.04.02](#). For all other projects include the existing General Plan of Structure.

G. Interchange Layout:

1. An interchange layout is required for all projects where the bridge is in a complex interchange area.

H. Concept for Maintaining Traffic:

1. Preliminary plans of structure should include a proposed concept for maintaining all modes of transportation through the construction zone. Depending on the method selected, the plans or attachments should show or note the following:
 - a. Detours
 - 1) Show the proposed detour route
 - 2) Indicate the use of expressway crossovers
 - b. Part width Construction
 - 1) Note the number of lanes to be maintained
 - 2) Indicate one way or two way traffic
 - 3) Note whether signals will be required
 - 4) Note if traffic is diverted on existing shoulders or temporary widening
 - 5) Show construction staging details
 - c. Traffic under a Grade Separation
 - 1) Indicate the number of lanes to be maintained
 - 2) Note if traffic is diverted on existing shoulders
 - 3) Note any time restrictions on lane closures
 - d. Temporary Runaround
 - 1) Show the centerline alignment
 - 2) Show a cross section of the temporary road
 - e. Navigable Water Traffic
 - f. Pedestrian
 - 1) Show maintaining traffic routes for sidewalks (pedestrian) or other multi-use facilities.

The Project Manager/Cost and Scheduling Engineer should consult with the Region Traffic Engineer and the Design Division, Geometrics Unit in Lansing to arrive at the concept for maintaining traffic.

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3.02.02 Preliminary Estimate

(revised 8-20-1999)

The preliminary estimate consists of only the major items for the project. Unit prices are obtained from the weighted average unit price report, found on the [MDOT Design Page](#), and used by the Unit to determine project costs.

The Engineering and Contingencies on the Preliminary Estimate are to be approximately 15 percent for all projects. The total estimate is to be rounded off to the nearest \$100.

Preliminary Estimate Items should include the following elements, at a minimum:

1. General
 - Temporary Structures
 - Removal of Existing Structures
 - Removal of Portions of Structures
 - Cofferdams
2. Substructure
 - Unclassified Excavation
 - Temporary Steel Sheet Piling
 - Permanent Steel Sheet Piling
 - Foundation Piling
 - Tremie Concrete
 - Substructure Concrete
 - Steel Reinforcement Substructure
 - Substructure Repair
3. Superstructure
 - Superstructure Concrete
 - Steel Reinforcement Superstructure
 - Structural Steel Fabrication & Erection
 - Shear Developers
 - Prestressed Concrete Beams
 - Prestressed Concrete Deck
 - Expansion Joint, if cost is a major item
 - Bridge Railing

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- Concrete, Bridge Deck Overlay
- Cleaning and Coating Structural Steel
- 4. Miscellaneous
 - Structure Backfill
 - Slope Protection
 - Riprap
 - Structure Embankment
 - Drainage Items
 - Temporary Supports
 - Channel Excavation
 - Approach Work (If included in Bridge Plans)
 - Maintaining Traffic costs
 - Miscellaneous Road Costs

Where some of the above items represent a minor percentage of project cost, they may be grouped and given a lump sum price.

3.02.03 Reviews

(revised 12-17-2018)

3.02.03A Utility Coordination and Review Process

(revised 12-17-2018)

For information see RDM [Section 14.16](#).

3.02.03B The Plan Review Meeting Required

(revised 12-17-2018)

For additional information see RDM [Section 14.36](#).

In conjunction with Preliminary Plan distribution, time should be taken to investigate and initiate any construction permits necessary for the project. Complete details are contained in RDM [Chapter 14](#).

A written response is required to reply to any review recommendations made during preliminary plan review or the Plan Review Meeting. The response should verify compliance with review recommendations that will be incorporated into the plans, and provide an explanation for any comments received that cannot be included with the project.

In addition to recipients listed in RDM [Section 14.36](#), send to the following, if applicable:

A. MDOT Bridge Load Rating Unit:

1. Preliminary Plans with estimate. No transmittal letter is required.

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B. USGS Stream Gauges:

1. At sites where USGS stream gauges are located, Preliminary Plan files should be sent to the U.S. Department of Interior for review and comments. If relocation of gauges is necessary, a letter requesting approval of relocation site, as shown on the plans, must accompany the prints.

C. Railroads (Grade Separations):

1. For projects that involve railroads (grade separations), Send Preliminary Plans to the Railroad Coordination Unit – Office of Rail. For additional information see BDM [Chapter 11](#).

D. Hydraulic Unit:

1. The Hydraulic Unit is included on the electronic notification send-out of the Preliminary Plans for all projects involving waterways.

E. County Drain Commissioner:

1. For projects that involve county drain crossings. Send Preliminary Plans to the County Drain Commissioner whose county the highway or structure is to be constructed. For additional information see MDOT [Drainage Manual Appendix 2-D](#).

F. Project Files:

1. The Design Unit is required to keep the Preliminary Plan files with a Preliminary Estimate in ProjectWise.

3.02.03C The Plan Review Meeting Not Required

(revised 12-17-2018)

Occasionally, a project will not require the Plan Review Meeting. In this case, the Project Manager/Cost and Scheduling Engineer shall distribute the Preliminary Plans as shown previously in BDM [Section 3.02.03B](#) and RDM [Section 14.36](#).

3.02.04 Municipal Participation - Act 51

(revised 11-22-2021)

For bridge construction work, only certain activities qualify for participation by municipalities pursuant to [Act 51](#) and the [State Trunk Line Highway System](#) excerpt. For more information on Act 51 Participation and participating cities, see RDM [Sections 14.41.03](#) through [14.41.06](#).

Guidelines for determining types of work which should or should not be included in Act 51 for participating Cities and Villages are posted at [Act 51 Participating and Non-participating Items](#).

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3.03 FINAL PROJECT COORDINATION (FPC)

(revised 12-17-2018)

The Final Project Coordination indicates 90 - 95% completion of the plans, proposal and supporting documents herein after referred to as the FPC package. See RDM [Chapter 14](#) for FPC Requirements and Procedures.

3.03.01 Composition

The FPC package should be as complete as possible to ensure that items essential to the FPC reviewers are present and complete. The FPC package must include all items in the Milestone Checklist and as noted in BDM [Section 3.04](#) with the following exceptions/clarifications:

1. Final Plans

- Project information sheet index should include all anticipated plan sheets, even if not included in FPC package
- Miscellaneous Quantities are included even if unfinalized.
- Abutment/Pier Details – rebar may not be finalized, and miscellaneous details may not be complete.
- Superstructure Details – All details must be present. Rebar may not be finalized.
- Reinforcement Details – sheet(s) may be omitted.
- Slab and Screed Details – sheet(s) may be omitted.

2. Proposal

- Progress clause will be Draft.
- Unique Special Provisions must be submitted for approval (as early as possible) but may not be approved.
- Notice to Bidders, coordination clauses and permits will be submitted for approval but may not be approved.
- Railroad Coordination – special provisions, coordination clause and agreement (if required) must be complete, pending final approval.
- Cost Summary – some items may be estimated.

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3.04 PLAN COMPLETION (OEC AND CERTIFICATION ACCEPTANCE)

(revised 12-17-2018)

The Plan Completion date indicates 100% completion of the plans, proposal and supporting documents. See RDM [Chapter 14](#) for Plan Completion Requirements and Procedures.

Final plans are required for all projects. For minor rehabilitation (3R), e.g., railing replacement and/or deck overlay projects, see BDM [Chapter 4](#).

Also, See RDM [Section 14.57](#) for more details regarding plan completion and OEC/Certification Acceptance.

3.04.01 Plan Composition

(revised 12-17-2018)

The following list and ordering of sheets is suggested for final plans:

1. Title Sheet - all projects.
2. Project information Sheet
3. Legend Sheet
4. Note Sheet
5. Miscellaneous Quantities
6. Typical Cross Sections (if applicable)
7. Miscellaneous Details
8. Guardrail Details
9. Survey Information Sheet
10. Any road plans as applicable.
11. Interchange Layout - for bridges in complex interchanges.
12. Staging Plans - all part width construction projects let separately from road projects.
(May be shown on General Plan of Structure)
13. Traffic Detail Sheets - where maintaining traffic is part of the project.
14. General Plan of Site Sheet - all projects.
15. Log of Borings Sheet - all new bridges and widening projects.
16. General Plan of Structure - all projects.
17. Abutment Details - all new bridges and widening projects.
18. Pier Details - all new bridges and widening projects.
19. Structural Steel, Prestressed Concrete, etc., Detail Sheets - all new bridges and widening projects.
20. Expansion Joint Detail Sheet (when applicable).

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21. Superstructure Detail Sheets - all new bridges, widening, and slab replacement projects.
22. Slab and Screed Data Sheet.
23. Steel Reinforcement Sheets - all projects.
24. Special Detail sheets as required.

Existing General Plan of Site, existing General Plan of Structure and other existing sheets deemed necessary must be placed in Reference Information Document (RID) process as electronic data files. See BDM [Section 3.04.02](#) for process and definition.

3.04.02 Reference Information Documents

(revised 12-17-2018)

3.04.02A Process and Definition

The Reference Information Document (RID) process provides availability of electronic data files through the e-Proposal website. RID files are non-contractual items for prospective bidders and awarded contractor to use to gain a better understanding of the project. RID can include design CADD files, survey deliverable files and other miscellaneous items pertinent to the project.

Milestone reviews by [MDOT RID Support](#) are intended to be on the same timeline as other reviews mentioned in the previous sections. RID files will be submitted to the Specifications and Estimates Unit and MDOT RID Support for review prior to final turn in. The files are subsequently published at the same time as the Proposal and Plans. Any changes made to the RID files after this time, due to an addendum, will be the responsibility of the Project Manager. Each published 'set' released after the original publication must include a revised [RID Index.xlsm](#) using the Project Changes tab that includes only the changed files and a brief explanation of the changes made to the files.

See [Design Milestone Submittals](#) page of the [MDOT Development Guide](#) for more information.

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3.04.02B Common Bridge RID Files and Criteria for Use

The Design Project Manager/Cost and Scheduling Engineer is responsible for ensuring that all appropriate RID files (including files from resource areas outside of Bridge Design) are incorporated into the RID folder for the project and in the RID_Index.xlsx file. Below are several types of RID files that are common to bridge projects.

1. Geotechnical Recommendations – The final Geotechnical Foundation Engineering Report must be included in the RID if foundation analysis was performed for a project.
2. Existing Plans – PDFs of all applicable existing plans (including shop drawings) for a bridge should be included on all projects.
3. Pictures – If photos of the project would be helpful to illustrate the site or existing bridge conditions, they may be included.
4. CADD Files – For projects that are detailed on geospatial coordinates, CADD files including the general plan of site and structure as well as corresponding base files may be included.
5. Survey Information – If survey was performed for the project, the Survey Support Area will place final survey files in the RID folder in the survey deliverable folder structure. The Project Manager/Cost and Scheduling Engineer must copy this information to the RID folder for the project. Verify that the files contained in the folder are the latest version utilized on the project.
6. Asbestos Survey – Include completed Asbestos Survey for all bridges with concrete elements under construction as part of the project scope. For more information regarding Asbestos Surveys see BDM [Section 12.13.05](#)
7. Other Information – If the Design Project Manager/Cost and Scheduling Engineer has other information not described above that may be useful to the contractor, MDOT RID Support or the Bridge Design Supervising Engineer should be consulted to confirm whether disclosing additional information causes any concerns for the Department.

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3.05 PROGRAMMED COST ESTIMATES

(revised 12-17-2018)

The project estimate should be reviewed at the following stages of plan development:

- A. Upon completion of Study.
- B. Upon completion of Preliminary Plans.
- C. Whenever the scope of work changes.
- D. When lettings are delayed appreciably (review yearly).

The programmed cost estimate must be updated whenever the current cost estimate exceeds that shown on the Status of Plans by more than 10 percent.

Projects funded by bond issues may not be significantly altered in scope or cost. To avoid the need for a change, all items contributing to a project's cost should be conservatively evaluated and included in the Engineer's Estimate.

If the final cost estimate and the programmed estimate differ, the Project Manager will be notified and should then contact the Bridge Program Performance Engineer and appropriate funding manager (Region Bridge Engineer, Big Bridge Engineer, etc). In this case, the Project Manager should request the Statewide Transportation Planning Division's approval of the final estimate.