2 PROJECT DEVELOPMENT PROCESS

This Chapter provides an overview of the progression of a typical bridge project including common milestones, deliverables, and expected level of completeness at each milestone. While the guidance provided here targets a typical project developed for a design-bid-build contracting mechanism, the guidance should also be applied to more complex projects and alternative delivery methods (refer to Section 2.10 for additional information). This guidance should also not preclude thorough communication and coordination between the Design Team, Project Manager, and overall Project Team to identify reasonable deviations from this guidance and ensure successful project development. All titles used in this chapter refer to MaineDOT staff (e.g., Project Manager, Senior Structural Engineer) unless otherwise noted.

2.1 MILESTONES

The following milestones define the chronological progression of a typical major rehabilitation or replacement project; simpler projects may deviate from this progression with the specifics discussed/identified at the Project Kickoff:

- Project Kickoff
- Initial Team Meeting
- Preliminary Public Meeting
- Bridge Concept Form (BCF)
- Preliminary Design Report (PDR) (if necessary)
- Formal Public Meeting
- Plan Impacts Complete (PIC)
- 60% Design Plans
- Draft Plans, Specifications, and Estimate (PS&E)
- Final PS&E
- Advertise and Award
- Construction

Each of the above milestones are discussed in the following sections, as well as additional checkpoints and meetings that may be necessary for a successful project.

2.2 DESIGN EXCEPTIONS AND VARIANCES

During the development of a project, situations may arise that warrant deviation from current standards. Deviating from current standards may be acceptable; however, prior to advancing the project, these deviations should be discussed with the Senior Structural Engineer assigned to the project for concurrence and necessary steps to document decisions.

Two primary types of deviation are recognized: Design Exceptions and design variances. Design Exceptions are deviations from specific controlling criteria that require careful thought and, if implemented, formal documentation for project records. These controlling criteria, which are further detailed on the MaineDOT website along with governing requirements, include:

- Design Speed (DS)
- Lane Width (LW)
- Shoulder Width (SW)
- Horizontal Curve Radius (HC)
- Superelevation Rate (SR)
- Maximum Grade (MG)
- Stopping Site Distance (SSD)
- Cross Slope (CS)
- Vertical Clearance (VC)
- Structural Capacity (SC)
- Clear Zone (CZ)

Design Exceptions should be identified by the Design Team during the Preliminary Design phase. All Design Exceptions shall be formally accepted by the Engineering Council or Bridge Program (See Design Exception Approval Matrix) and documented within the BCF and/or PDR, prior to Plan Impacts Complete. Documentation shall occur on the MaineDOT Design Exception Review Team Meeting Worksheet available on the MaineDOT website (https://www.maine.gov/mdot/engineering/highway/).

Design variances are deviations from programmatic guidance and preferences that do not compromise safety of the travelling public. Examples include encroaching upon preferred hydraulic clearances and exceeding live load deflection limits for girder bridges. In all situations, engineering judgement should be used to balance standards, project setting, risk, cost, and construction. Similar to Design Exceptions, design variances should be identified during preliminary design and discussed with the Senior Structural Engineer prior to implementation. However, unlike Design Exceptions, design variances do not require the same formal documentation or acceptance and will only require approval of the Assistant Program Manager which can occur during review of the BCF and/or PDR.

2.3 PROJECT KICKOFF

2.3.1 Capital Work Plan Process

The Department funds new work each year through the Work Plan (WP). This is a three-year plan that describes all projects the Department planned for the next three calendar years. The WP is published annually and is typically approved around the first of the calendar year. Bridge project candidates for capital funding in the WP are evaluated and prioritized by the Bridge Committee. New projects in the WP are either funded for construction or for preliminary engineering (PE). The Bridge Committee typically funds more complex projects for PE only to have a more accurate construction cost for subsequent WP funding and to help balance workload. Funding for PE only also allows projects to progress through design and be ready for construction if the Department receives additional funding. The expectation is to deliver work within the three-year Work Plan that it is initially funded in. Specifically, new construction funded projects are Advertised in the third year of the WP and PE projects will have a completed BCF and/or PDR within the three-year period. The Preliminary Design phase for PE projects is required to be complete no later than the 3rd quarter of the year in order for construction funding to be programmed in the following WP.

Each project, when added to the Work Plan, has an estimated program scope associated with the funding. The program scope will typically be one of fifteen different categories, such as Bridge Replacement, Bridge Painting, Bridge Improvement, or Bridge Rehabilitation; refer to the PDR templates on the Department's website for a full listing of categories. This initially identified program scope should be the starting point for development of alternatives to evaluate. Refer to Sections 2.4 and 2.7 for additional guidance.

2.3.2 Initial Project Scheduling

Once the WP is approved, Bridge Program Management will review the new projects and make preliminary Design Team assignments based on the location and workload. Within one month of approval of the WP, the Project Managers are required to complete State Transportation Improvement Program (STIP) schedules for the new projects. The Bridge Program strives to develop full critical path schedules for each new project during this period. STIP schedules at a minimum must include dates for kick-off, Final PS&E, Advertise, Construction Begin, and Construction Complete. STIP schedules should target a reasonably achievable quarter of a calendar year with the expectation that they will be refined with input from the entire Project Team after the Initial Team Meeting.

When establishing initial project schedules, the Project Managers should focus on the distribution of work over the three-year Work Plan to balance the workload of the Project Teams and the construction industry. A well-distributed team portfolio should not have milestones such as PDR, PIC, and Advertise clustered in one quarter of the year.

STIP schedules should be shared with the resource units such as the Property Office and Environmental office for their initial workload planning. This early notification is critical for these units to plan their work and maximize the use of their resources. For example, sharing the initial survey schedules for the Design Team's portfolio of projects will allow the Regional Survey Supervisors to get an early view of their entire workload so they can look for efficiencies such as grouping projects or utilizing consultant resources.

Resource units typically have funding available to start work on projects prior to Kick-Off to help balance workload and take advantage of synergies.

During the time between WP approval and project Kick-Off, the Project Manager should review projects to establish team member needs and to consider project information needs.

2.3.3 Project Kickoff and Information gathering

Prior to the kickoff date, the Project Manager will need to:

- Establish the Project Team based on the anticipated scope and knowledge of any specific constraints.
- Request that MaineDOT Finance and Administration activate the Work Identification Number (WIN). Prior to activating the WIN, a project must be listed in an approved STIP if the project is federally funded. However, if the project is state-funded, the WIN can be activated at any time. This process is completed annually by the MaineDOT Results and Information Office (RIO) based on the scope and funding that appears in the WP. The Project Manager should notify RIO if the scope or funding of a project changes significantly to determine if a STIP amendment is needed. Additional information on the STIP amendment process can be found at https://www.maine.gov/mdot/stip/.

Once a project's WIN is activated, there are several "start-up" tasks the Project Manager needs to complete to get the project started. The first step on every project is to establish a Kick-Off date and populate the team roster. This notifies other groups within the Department, such as the Environmental Office, Utility Coordinator, and geotechnical group, that work can begin on the project. The Project Manager should also request information for the project in advance of the Initial Team Meeting. This could include traffic data, crash data, survey and existing conditions data from the Property Office, preliminary geotechnical data, utilities, environmental data, bridge condition data, hydrology (where applicable), and any other data required for the specific project.

2.3.4 Survey Request

Ground survey is required on nearly every bridge project and the information collected will be critical for the alternatives analysis during preliminary design. To avoid potential project delays, a survey request should occur as early as possible within the year the project is activated. Regional survey personnel support the entire Department, typically handling requests in the order they are received; therefore, obtaining ground survey in a usable CAD format can take several months. Most projects should have some ground survey with the exception of very limited scopes such as paint projects and joint repairs.

Whenever possible, survey requests should be made in-person with the Region Professional Land Surveyor at the project site. At a minimum, the Project Manager and project engineer should verbally discuss the survey limits with the Region Professional Land Surveyor. Following the discussion with the Region Professional Land Surveyor, an aerial view of the project with dimensioned survey limits and any relevant specific notes should be developed to document and confirm agreed upon survey needs. Determining

survey extents is a balance between requesting an excessive amount of survey and getting enough survey to avoid future requests at the same site.

There are several factors to consider when determining survey extents. Projects that may include a change in alignment, Special Detour construction, and other dramatic changes to the roadway will require longer road survey extents. Curved roadways can be particularly difficult to match into at project limits, so depending on the circumstances, the survey request should strive to get the full roadway at least through the entire curve. Additionally, where overhead utility relocation may be required, obtaining surveyed locations of one or two poles beyond the roadway limits is desirable to aid in relocation efforts and guy-wire angle determination. Similar thoughts can also apply to underground utilities, closed drainage, changes in roadway widths, and adjacent drives, roads, or railroad tracks.

The Region Professional Land Surveyor will also need to understand upstream and downstream survey limits at stream crossings. An understanding of flood history at the site, especially historic flood elevations, is helpful to understand survey extents and the engineer should research this before making the survey request. Ultimately, the survey request should encompass a large enough area to perform hydraulic modeling where applicable. In areas with large floodplains, using traditional ground survey for the entire hydraulic model area may not be practical. Building parts of the hydraulic model from statewide LiDAR data should be considered so that the survey time can be focused on the area directly around the bridge where accuracy is important, and in-water work where LiDAR is not available. Refer to Chapter 4 for additional stream channel survey guidance.

Project environmental requirements may also dictate larger stream survey extents. Culvert replacement projects often require altering stream profiles. The locations of hydraulic and physical grade controls should be included in the initial survey limits, when known. The Environmental Office should also be consulted for input on stream features that are biologically important and may affect the design – habitat connectivity design may require survey to extend further upstream and downstream of a culvert than would otherwise be required for hydraulic analyses.

2.3.5 Project Explorations

In addition to the essential information gathering and ground survey requests, certain projects necessitate more extensive site explorations. These explorations are crucial in gathering the necessary supporting data to accurately assess existing conditions and make informed decisions about viable alternatives for further evaluation.

These explorations can encompass a variety of investigative tasks. For instance, tactile soundings of concrete elements can help determine the condition of the concrete and identify any areas of concern. Concrete core sampling can provide valuable information about the strength and integrity of existing structures. Preliminary geotechnical borings can offer insights into the soil conditions and stability, which are critical factors in bridge design. Subsurface utility explorations could offer insight into constructability, schedule, and overall alternative risk. The need for some of these more intensive explorations must be a collaborative decision between the designer and senior Design Team members of the Department. These

research-level tasks often have significant lead times associated with them. Therefore, it's crucial to identify and schedule these tasks early in the project timeline to prevent any potential delays.

2.4 INITIAL TEAM MEETING

The initial team meeting is the first opportunity for all team members (all disciplines) to convene and collaboratively discuss the project. Topics typically include an overview of the project site, structure condition, known environmental or resource constraints, and background data such as traffic volumes and subsurface conditions. The ultimate goal of this meeting is to gain input on the project scope, identify likely alternatives to evaluate, identify feasible maintenance of traffic methods to consider (including accelerated bridge construction), identify potential constraints, and set action items for the various team members to investigate to support the preliminary design process. This meeting should also be used to discuss the programmed scope within the Department's Work Plan to confirm appropriateness or deviations.

Team members at this meeting should include the Project Manager, Senior Structural Engineer, regional maintenance representative, design lead(s), Geotechnical Engineer, Environmental Coordinator, Utility Coordinator, and Right of Way Supervisor. The Program Manager and Assistant Program Manager for Design should also be invited as optional attendees. Additional team members may be warranted, depending on project scope, magnitude, and complexity.

2.4.1 Necessary Preparation and Follow Through

Although no two projects are the same, most projects require similar levels of preparation for this initial team meeting to ensure that project constraints are identified, team members are informed, project scope is appropriate, and reasonable alternatives are identified and evaluated. A standard meeting agenda is provided with the Bridge Design Guide files on the MaineDOT website. The agenda should be prepared by the bridge Design Team ahead of the meeting and updated with any new information, following the initial team meeting.

The Design Team should visit the project site ahead of the initial team meeting to take photos, observe and document conditions, and compare to project survey data (if available). This information should be summarized and presented at the initial team meeting.

Depending on project complexity, the bridge Design Team may wish to prepare potential project solution concepts ahead of this meeting to help supporting team members understand possible project directions. This effort should include potential alternatives, alignments, and/or maintenance of traffic solutions, depending on project scope. Since this is only the initial team meeting, significant effort and engineering should not be placed on these potential solutions, but rather general concepts should be presented for team comment and awareness.

Following the meeting, the Design Team should summarize the discussion held and distribute the meeting summary to the Project Manager. The summary should capture discussions, design criteria established, alternatives to evaluate, and clearly identify Project Team member action items with target completion dates. The Project Manager is responsible for ensuring the meeting summary is produced, saved electronically, and distributed to the Project Team.

2.5 COACHPOINT MEETINGS

Coachpoint meetings are an excellent and proactive tool to resolve project issues or receive feedback on design concepts. The goal of a Coachpoint meeting is to benefit the project, and the process is intended to be informal and user friendly. The overarching purpose of a Coachpoint meeting is to solicit input from attendees to aid in the identification of a path forward. Anybody on the Project Team can schedule a Coachpoint meeting. At a minimum the Program Manager, Assistant Program Managers, and Project Manager should be invited to every Coachpoint meeting. Other Project Team members and personnel from other units should also be invited as needed.

The Design Team should be prepared to provide attendees with an overview of the project evaluations to-date, the challenge(s) that have been encountered, and possible solutions. However, Coachpoint meetings are meant to be informal and therefore presentations are not required.

Coachpoint meetings can be scheduled at any point throughout the life of a project, but are often most useful during the Preliminary Design phase of a project as information is collected, alternatives evaluated, and the project defined. A few examples of when a Coachpoint meeting may be warranted include:

- At kickoff to streamline preliminary design by discussing options to investigate (simple and complex projects)
- Resolve a technical/design issue not addressed by the BDG
- Seek input/direction on maintenance of traffic concepts
- Seek input/direction on structure type concepts
- Seek input/direction on bike/ped accommodations
- Review draft reports/specifications/details for higher profile or cost projects
- Discuss environmental requirements related to design or construction
- Discuss and agree on specific design criteria such as bridge width, clearance, and alignment geometry.

Following any Coachpoint meeting, the Design Team should summarize the discussion held and distribute the meeting summary to the Project Manager. The summary should capture discussions, decisions, additional aspects to evaluate, any required additional coordination with Project Team members or third-party stakeholders, and clearly identify Project Team member action items with target completion dates.

2.6 PUBLIC PROCESS

Public process is required for all MaineDOT projects. Refer to the MaineDOT Public Involvement Plan for additional guidance on public meeting types, timing, and content.

2.6.1 Initial Public Meeting

The initial public meeting occurs early in the project development process. The purpose of this meeting is to inform the public that a project will be occurring, provide background information, and solicit input from the community to help define the project. The overall presentation should typically be limited to direct,

factual information about the existing conditions and potential alternatives to be evaluated. Preferred solutions are not appropriate at this stage.

2.6.2 Formal Public Meeting

The formal public meeting typically occurs soon after final approval of the BCF or delivery of the draft PDR. The purpose of this meeting is to inform the public of what information was collected, alternatives that were evaluated, the recommended alternative to advance, and to solicit final input from the community prior to finalizing the Preliminary Design phase and selecting an alternative to advance.

2.7 PRELIMINARY DESIGN PROGRESSION

Preliminary design efforts and recommendations will be formally documented with either the completion and approval of a Bridge Concept Form (BCF) or a Preliminary Design Report (PDR). All projects will first advance through preliminary design by documenting existing conditions, the purpose and need, recommendations, and corresponding schedule, budget, and program funding levels within a BCF, among other details. The BCF is used to gain concurrence on project direction and, for more straightforward projects, the BCF may be the only formal submittal prior to the Plan Impacts Complete milestone. For more complex projects, as determined by the Design Assistant Program manager, the Preliminary Design phase may continue beyond the BCF with additional evaluations that will be documented within a PDR. The level of documentation and detail within a BCF will be less than a PDR.

Regardless of advancing beyond a BCF or not, the approach to most preliminary design efforts will follow a similar process of collecting information, establishing a purpose and need, and identifying a broad set of alternatives based on this information. The initial, broad set of alternatives should consider different structure types, maintenance of traffic options, rehabilitation solutions, and alignments to ensure all reasonable possibilities have been identified. Note this effort should not occur simply for the sake of developing alternatives, but rather to identify solutions that meet project needs.

The initial set of alternatives should also be developed around the programmed scope identified within the Department's Work Plan. For example, a project with a program scope of Bridge Rehabilitation should not jump to replacement alternatives before fully vetting rehabilitation alternatives. Similarly, rehabilitation alternatives should not be quantitatively considered for a project with a program scope of Bridge Replacement; however, when a PDR is prepared, a qualitative statement should be included in the PDR for completeness to justify why rehabilitation was not considered.

Once this initial set of alternatives is identified, the alternatives should be briefly and qualitatively evaluated to narrow the number of alternatives to those that best meet the purpose and need, as well as project constraints (whether physical, financial, seasonal, etc.). Although numerous alternatives may be qualitatively dismissed at this step, brief documentation/acknowledgement of the consideration should be included in the PDR for completeness. The Designer should seek input from the Project Manager, Environmental Office (if applicable) and/or Senior Structural Engineer regarding the required level of detail and documentation of alternatives qualitatively dismissed at this stage. Quantitative evaluation of the reduced list of alternatives should then occur, followed by the identification of the preferred alternative.

2.7.1 Data Collection

Collection of project information will begin as soon as the project is kicked off, as discussed in Section 2.3.3. This information will be supplemented with a site visit, input collected from the community, and potential third-party sources, depending on the project. All information should be organized in a single project directory and thoroughly reviewed by the Design Team to aid in effective identification of the project needs, possible alternatives and aspects of the project that may require increased consideration.

2.7.2 Purpose and Need

The project Purpose and Need Statement is an essential part of the National Environmental Policy Act (NEPA). This statement establishes "why" a project is occurring by identifying deficiencies and the required performance of the final project. The Purpose and Need Statement will be used to guide the development of alternatives as well as the appropriate amount of data, analysis, and conclusions needed to evaluate and select an appropriate alternative for advancement. Additional guidance on the importance and development of a Purpose and Need Statement can be found in the *Purpose and Need Companion Document* on MaineDOT's environmental website.

https://www.maine.gov/mdot/env/NEPA/guidance/index.shtml

Identifying the Purpose and Need Statement varies by project type and location. Development of the Purpose and Need Statement is a collaborative Project Team effort, with acceptance provided by the environmental group. Development of a concise and complete statement is critical to successful advancement of a project to ensure the right alternatives are evaluated and ultimately the preferred alternative is identified.

In general, projects with greater constraints or environmental and cultural resources will require a more detailed Purpose and Need Statement to best guide the alternative analysis process. Many conventional projects will have a somewhat "standard" Purpose and Need Statement that may include a combination of improving the structural condition of the bridge, improving safety, or improving substandard roadway geometry. The Designer shall coordinate with the Project Manager to understand if a "standard" Purpose and Need Statement will be appropriate, or if a more detailed statement will be required to best guide the project. Example "standard" Purpose and Need Statements can be found in the BCF and PDR template files.

Development of the Purpose and Need Statement should occur during the early stages of Preliminary Design. The statement should be developed after collecting and reviewing project information and prior to developing a list of alternatives to consider.

2.7.3 Project Team Coordination

Ongoing coordination among the Project Team throughout the Preliminary Design phase is critical for setting the project up for success. All team members need to communicate respective information, needs, constraints, and potential solutions throughout the development and evaluation of alternatives.

- Geotechnical: Early in the project, the Design Team should work with the geotechnical team member(s) to identify necessary subsurface explorations or other information that will likely be necessary to evaluate alternatives. As this effort progresses and nears the completion of the Preliminary Design phase, identification of potentially high-risk geotechnical sites, the need for additional subsurface investigations, or the need for additional geotechnical analyses should be identified including impacts to the Project cost and schedule. Refer to Section 3.3 for additional information.

- Utilities and Railroad: The Design Team should work with the Utility Coordinator to understand existing utility and railroad infrastructure, potential impacts, potential relocation, and/or potential temporary stoppages to best define the project schedule and necessary site impacts. Refer to Section 3.1.4.3 and Section 3.4 for additional information.

- Environmental: The Environmental Coordinator should provide the Design Team an understanding of sensitive site conditions, historic and archaeological constraints, in-water work windows, bankfull width requirements, and dredge spoil requirements, among other aspects, to best define project layout, cost, and schedule. Refer to Section 3.2.1.1 for additional information.

2.7.4 Alternatives Evaluation

Generally, for projects only requiring a BCF prior to PIC, the documented alternatives evaluation within the BCF can vary from zero discussion to a few bullet points explaining the major decisions. For example, culvert replacements with a new concrete box culvert may not need any competing structure alternatives since it is the preferred structure type in certain situations. Where there is more than one alternative that meets the project needs, the evaluations may include site impacts, construction risk, site access, schedule, construction costs, traffic impacts, and service life among other metrics. More complex, high impact, and/or sensitive projects requiring a PDR will need a more robust discussion comparing the remaining alternatives.

Construction risk refers to the potential problems and uncertainties that can arise during a construction project. These risks can be broadly categorized into three areas: unpredictability, tight restrictions, and factors outside the Contractor's control. Unpredictability refers to unforeseen circumstances such as weather conditions or unexpected site conditions. Tight restrictions could be stringent timelines, environmental permit constraints, or narrow construction access. Factors outside of the Contractor's control might include changes in market conditions, supply chain issues, or public opposition.

Evaluating the alternatives is a collaborative process that starts with the Designer, Project Manager, and Senior Structural Engineer. Depending on the level of complexity, a decision may be made relatively quickly, or the Design Team may identify areas that need more research or feedback from other project stakeholders to properly compare alternatives.

2.8 BRIDGE CONCEPT FORM

The Bridge Concept Form is designed to be an early submittal that gets buy-in on the general direction of the project before many parts of the detailed design are done. For most projects, the BCF will be the only formal submittal before Plan Impacts Complete, but more complex projects may require a Preliminary Design Report as well. The determination of whether a PDR is required will be made by the Design Assistant Program Manager as part of the BCF process.

Generally, the BCF milestone should be completed between six and twelve months after the initial team meeting depending on project needs and constraints.

2.8.1 Deliverables

Deliverables at this milestone include the following items and may include additional files if requested by the Department. Additional detail and guidance are provided in the subsequent sections.

- Bridge Concept Form
- Preliminary Estimate
- Backup documentation (as requested)

2.8.1.1 Bridge Concept Form

The BCF shall be submitted as a Word file so that the Department can easily update sections of it, such as the funding summary. Templates for the BCF are available on the MaineDOT website and shall be used on every project as a starting point. Filling out the BCF should focus on conciseness and only including the relevant information. However, recognizing every project has different needs, space has been provided for bullet points or short paragraphs providing additional information that does not fit in the template information tables.

2.8.1.2 Preliminary Estimate

For the BCF, the estimate can take either of two formats, depending on the level of development of the design:

- A total cost or square foot estimate based on similar projects.
- A quantity line-item estimate using the standard Preliminary Estimate form (see Section 2.9.3).

2.8.1.3 Backup documentation

Additional information such as plans, boring logs, or hydraulic modeling shall be submitted as separate files along with the BCF, when they are requested or available. If the preliminary estimate is only reported as a total cost or square foot estimate based on similar projects, backup documentation for how the estimate was determined shall be submitted.

2.8.2 Estimating Assumptions

For a total cost or square foot estimate, the design team should look at similar past projects to judge the approximate cost range of the project. Specific attention should be paid to these factors in the estimate:

- Geographic location (e.g. Downeast projects are often significantly more expensive than projects in central or southern Maine).
- Maintenance of Traffic type and costs such as temporary bridges.
- Age of example projects.
- Difficulty of water control and cost of cofferdams.
- Significant schedule restrictions and general risk for the contractor.

2.8.3 Level of Completeness

The BCF may, and often will be, completed at a very early stage in the project before major parts of the design have been done. When needed, the BCF may include "TBD" or similar labels in sections of the form rather than a final determination. For many projects, plan layouts, geotechnical evaluations, or hydraulic modeling will not be complete and the BCF process should focus on evaluating risk and identifying when the design team can make an early determination of structure type and when additional information is needed.

2.8.3.1 Historic Bridges

For bridges identified as historic (either listed on the National Register or eligible for the National Register, individually or as a contributing element to a historic district), the BCF process will be different. These types of projects will require coordination between Bridge Program Management and the Environmental Office to determine project specific expectations.

2.8.4 Approval Process

The draft BCF is reviewed by the Project Team, typically led by the Project Manager and Senior Structural Engineer. Once all the comments and corrections requested by the Project Team are answered and completed, the Project Manager will update the project estimate on internal project systems and the Project Manager, Senior Structural Engineer, or designee will send it to the Design Assistant Program Manager for approval. Once approved at the Program level, the document is sent out by the Design Assistant Program Manager in a general distribution to other parts of the Department for comments. Upon completion of the review period, the schedule must be updated on internal project systems by the Project Manager in accordance with applicable Administrative Policy Memorandums (APMs).

2.9 PRELIMINARY DESIGN REPORT

The Preliminary Design Report, when developed as noted in Section 2.8, is a major milestone that documents the justification for decisions made during the Preliminary Design phase. Key outcomes from the PDR include a recommended scope and solution, Preliminary Plans, hydraulic and/or geotechnical

reports (if applicable), and an updated Project Estimate. At the end of the Preliminary Design phase, all those invested in the project will have reviewed the proposed project scope of work defined in the PDR, and this scope is considered final. The PDR is then used as the starting point to proceed to final design.

2.9.1 Deliverables

Deliverables at this milestone include the following items and may include additional files if requested by the Department. Additional detail and guidance are provided in the subsequent sections.

- Preliminary Design Report (PDR)
- Working Cross Sections
- Project Estimate
- Construction Schedule
- Hydrology and Hydraulics (if applicable)
- Geotechnical Reports (if applicable)
- CAD Files
- Plans (22x34)

2.9.1.1 Preliminary Design Report

The PDR will include draft versions and a final version submitted in pdf format. In some cases, such as complex projects or rehabilitation projects relying heavily upon engineering judgement, finalization of the PDR may require several draft versions. Templates for the preliminary design report are available on the MaineDOT website and shall be used on every project as a starting point. However, recognizing every project has different needs, minor departures from the template are acceptable to more concisely and appropriately document project evaluations and decisions. This is especially true for the Summary of Preliminary Design. The template for this portion of the PDR is meant to be a guide for what topics could be covered, not necessarily a fixed outline. Additional topics or subsections may be warranted, and the subsections listed in the template may be rearranged or omitted depending on significance. This write-up portion of the PDR should be organized in a logical, somewhat chronological order to skillfully guide the reader to the recommended alternative. Justification of recommendations should be convincing yet concise. In situations where the project estimate is greater than the available budget, the Designer should include an explanation and justification of the overrun – this will likely require coordination with the Project Manager to understand how the original budget was established.

The PDR appendices should not include copies of supporting project reports that are readily available, such as inspection reports, load rating reports of the existing bridge, existing plans, or entire geotechnical reports. The documentation included should only include information that is both relevant and important (for example, the detailed information from the crash reports is often unnecessary unless it identifies a specific safety issue at the bridge). Design Teams can request example PDRs from the Senior Structural Engineer to reference during preparation of their PDR.

2.9.1.2 Working Cross Sections

A full size, pdf set of working cross sections of the roadway(s) should be provided with the Draft PDR as a separate file, but not included with the Plans within the PDR. These cross sections aid with the review of the PDR and should only be developed sufficiently to show roadway surface and approximate toe of slope limits.

2.9.1.3 Project Estimate

The PDR should include estimated Project costs for each viable alternative discussed within the PDR; the estimated costs should be presented using the standard templates and include both the Engineer's Estimate of construction as well as all design, oversight, and right of way costs to form a holistic total Project cost. Alternatives discussed and dismissed qualitatively should not include estimates. All assumptions on quantities, unit costs, and contingency should be clearly identified. Refer to Sections 2.8 and 2.9.3 for relevant economic comparisons and additional estimating guidance.

2.9.1.4 Construction Schedule

The Designer should prepare a preliminary, estimated construction schedule to substantiate construction duration and any necessary road closure durations. The level of detail, format, and content will vary depending on the magnitude, risk, and requirements of the project. For projects of a larger scale and greater complexity, this schedule should be developed in collaboration with construction staff, including Residents, Construction Engineers, and/or the Assistant Program Manager, to ensure it is realistic and reflective of the local industry's capabilities.

In general, critical path schedules should be developed for most bridge replacement projects and be updated/refined as the project progresses. Schedules for simpler, more routine projects may be developed with bulleted lists or spreadsheets provided that logical progression, limitations, and critical path items are identified. Any assumptions, allowances or needs, or schedule risks identified in the preparation of the schedule should be identified within the PDR narrative.

In general, development of construction schedules should consider:

- an estimated progression of work activities,
- applicable material curing and testing periods as well as any significant hold points for QA,
- seasonal and weather limitations (e.g., paving dates),
- environmental work windows,
- railroad work windows,
- key local events or schedules that the project may need to avoid,
- advertisement and contracting durations,
- Contractor submittal preparation and shop drawing review durations, and
- fabrication lead times.

2.9.1.5 Hydrology and Hydraulic and/or Geotechnical Reports

In some cases, the preliminary design scope of work will include the development of hydrology and hydraulic reports and/or a geotechnical report to support the bridge type selection. The geotechnical

reports are standalone documents, with only relevant summary information provided for reference in the PDR. Hydrology and hydraulic reports may be standalone documents depending on the scope of the project but are typically included in the PDR as an appendix. Refer to Chapters 3 and 4 for additional information regarding the development of these deliverables.

2.9.1.6 CAD Files

All CAD files used to produce the Preliminary Plans and working cross sections shall be submitted for project records and for use by supporting team members within the Department. Base files (e.g., survey, topo, right of way) produced by MaineDOT should not be submitted. Refer to the *Bridge Plan Development Guide* for guidance on plan sheet detail(s) and the CADD Standards website (https://www.maine.gov/dot/doing-business/cadd/standards) for information related to level management and file naming conventions.

2.9.1.7 Plans

The Preliminary Plans within the PDR report shall be scaled to 11x17 paper. An additional, full size (22x34) pdf set of Preliminary Plans shall be submitted separate from, and concurrent with, the PDR.

The Design Team should verify with the Project Manager and Senior Structural Engineer which drawings should be included in the PDR plan set. Most projects will have a title sheet, plan view, profile view, typical sections, staged construction drawings, and an on-site detour plan view where applicable.

2.9.2 Economic Comparisons

The intent of preliminary design is to find the project scope that meets applicable design standards, permit requirements, and the Purpose and Need Statement. This process must strike a balance between maintaining high quality solutions, ensuring the longevity of the structure, and optimizing cost-effectiveness. The Designer should consider both the initial construction cost and the costs over the life of the structure (service life costs) when determining the most cost-effective solution for a specific project. Estimating the initial construction cost of a project is covered in Subsection 2.9.3.

For more complex projects that compare different structure types, span arrangements, or replacement vs. rehabilitation of major structures, the Bridge Program uses two approaches to estimate service life costs: the estimated total cost approach (ETCA) and life-cycle cost analysis (LCCA). Note that these approaches to estimating service life costs should not be used on routine projects. The Designer should coordinate with the Project Manager to determine whether to utilize these service life cost estimate approaches on a given project.

Economic analyses are a useful tool in comparing the relative merit of competing project implementation alternatives. By considering all the costs (agency and user) incurred during the service life of an asset, this analytical process helps transportation officials to identify the lowest cost option. Agency costs include initial construction, future preservation/rehabilitation, operation, and maintenance costs. User costs include costs associated with increased congestion experienced during initial and future maintenance and construction activities on the bridge. Economic analysis comparisons are appropriate to compare project implementation alternatives that yield the same level of service and safety benefits to the project user.

Economic analyses are not the appropriate tool to compare alternatives that do not yield identical benefits (e.g., bridge replacement alternatives that vary in the level of traffic they can accommodate). Comparison of alternatives that do not yield identical benefits requires an evaluation of how well the option satisfies the project's Purpose and Need Statement.

Although two methods of estimating service life costs may be used and both methods may be necessary in certain situations, most projects that require this level of economic comparison will require only the use of one method to aid in the decision-making process. The Department's preferred method for estimating service life costs is ETCA, however LCCA may be used when deemed appropriate. It is important to note that the lowest ETC or LCC may not be the best alternative when consideration is given to all project goals and constraints. These methods of estimating service life costs merely provide information to aid the decision-making process. The exact format and presentation of the service life cost analysis should be coordinated with the Senior Structural Engineer prior to commencing the effort.

2.9.2.1 Service Life Cost Estimating Approaches

- Estimated Total Cost Approach: The Estimated Total Cost Approach (ETCA) compares the sum of all estimated costs for each alternative under consideration without discounting (constant dollars) or adjusting future costs for inflation. The use of unadjusted constant dollars in this approach allows the Department to gauge the total lifetime costs of the alternatives, recognizing that current money is not invested or set aside for future maintenance and rehabilitation needs. Since future costs are not discounted, the Designer can better evaluate if a higher initial investment could significantly reduce the lifetime costs associated with an option.

- Life-Cycle Cost Analysis: The value of Life Cycle Cost Analysis (LCCA) as an economic comparison tool is contingent upon its proper use. It is essential that the Designer have a thorough understanding of LCCA principles and techniques to help ensure meaningful results. The Designer is encouraged to review the latest FHWA guidance on LCCA including the *Life-Cycle Cost Analysis Primer* and the *RealCost User Manual*, both of which include LCCA examples.

  LCCA uses the concept of the time value of money to compare estimated costs in discounted current dollar equivalents. This concept assumes that a given amount of money received now has a chance to increase and is worth more in the future. Conversely, a deferred expense can be paid for by a smaller amount of current dollars. To implement this, LCCA totals all estimated bridge costs throughout the life of the alternative and then translates future costs to an adjusted present value using an annual discount rate. LCCA does not account for the effects of inflation on future bridge construction activities. Since future costs are discounted and not adjusted for inflationary increases, LCCA tends to favor an alternative with lower up-front costs, sometimes at the expense of higher long term maintenance cost that could be avoided with a modestly higher initial investment.

The formula to discount future costs to present value is:

$$Present\ Value = Future\ Value * \frac{1}{(1+r)^n}$$

where:

r = discount rate
n = number of years in the future when the cost will be incurred

2.9.2.2 Service Life Cost Estimating Assumptions

Unless otherwise noted, the following assumptions and considerations apply to both the ETCA and LCCA methods:

- The cost estimating methods should not be used to compare alternatives that provide differing levels of service or safety. For example, if it has been determined that a bridge needs a third lane to increase capacity or a sidewalk to improve pedestrian safety, it would not be appropriate to use either method to compare an alternative that does include these capacity improvements to one that does not.

- For ETCA, costs should be in constant dollars and are not discounted or adjusted for inflation. For LCCA, costs should be in discounted current dollars with no adjustment for inflation.

- Agency costs such as bridge inspections, maintenance repairs, preservation, and rehabilitation costs should be included unless they are determined to be the same for all options. Bridge Maintenance should be consulted with to determine inspection and maintenance costs for the bridge. PDR level estimates should be used in the ETCA and/or LCCA for all other costs. If they are significantly different between alternatives, right of way and engineering costs should be included as agency costs.

- User costs should be included for traffic disruptions associated with initial construction as well as future anticipated preservation and repair actions. The MaineDOT Office of Safety and Mobility should be consulted to provide user costs.

- The anticipated service life of bridge repair activities used in ETCA are established through knowledge of the proposed design, history of similar bridge types, and engineering judgement. Table 2-1 provides a starting point for a useful life span for conventional bridge repairs which should be adjusted for site specific criteria such as exposure conditions, traffic volumes, and construction methods and materials. For example, a bridge deck built with corrosion resistant reinforcing such as glass fiber reinforced polymer rebar will typically last longer than one constructed with plain steel bar.

Table 2.9.2.2-1: Approximate Service Life of Various Bridge Repair Activities

Bridge Repair Activity	Approximate Service Life (years)
Bituminous Wearing Surface Mill & Fill	7 - 20
Bituminous Wearing Surface, Membrane Replacement & Deck Repairs	25 - 40
Concrete Wearing Surface Replacement	20
Bridge Deck Replacement	40 - 60
Substructure Rehabilitation	15 - 60
First Steel Coating System (NEPCOAT approved paint systems)	20 - 30
Subsequent Steel Coating (NEPCOAT approved paint systems)	20
Steel Coating (metalizing/galvanizing)	30 - 50
Bridge Replacement	75 to 100

- For ETCA, the analysis period is equal to the estimated service life of the alternative. The analysis period need not match for all alternatives and residual value is not considered. If alternatives have different estimated service lives, the Estimated Total Cost is simply divided by the estimated service life and expressed in current dollars per year.

- For LCCA, competing alternatives should be evaluated over equivalent analysis periods to yield fair LCCA comparisons. The analysis period should be selected to demonstrate total cost difference between alternatives, but each alternative does not need to have the same number of maintenance or rehabilitation cycles. If one or more alternatives is expected to be in service beyond the analysis period, the value of the remaining service life (often referred to as "residual value") should be included in the LCCA.

- For LCCA, a deterministic approach that assigns each LCCA input a fixed value is an adequate level of analysis for most MaineDOT projects. If there is considerable uncertainty in the agency and user costs, the LCCA should include a sensitivity analysis that varies these inputs to calculate present value range.

- For LCCA, a discount rate of 4% is recommended. If a sensitivity analysis is used, the discount rate should vary between 3% and 5%.

2.9.3 Estimating Guidance

The estimate developed in support of the PDR should be commensurate with the level of completion, yet provide an accurate reflection of the anticipated project budgetary needs and allow for comparison among alternatives. Each alternative seriously considered should have a preliminary cost estimate. The following guidelines should be followed to support the estimate development at this phase of the project:

- High-Cost Items: The quantity development effort should focus on the high-cost items that will likely account for approximately 80% of the total construction cost, as well as items that are easy to estimate such as light poles or bridge drains. The high-cost item quantities should be developed with estimated major dimensions/weights and need not consider lesser influential aspects such as pier cap tapers, deck haunches, and girder field splice plates.

- Low-Cost (Miscellaneous) Items: Lower cost items should be lumped together into a miscellaneous cost category that accounts for approximately 20% of the project costs. Example items that typically fall into this category include concrete waterproofing, final signing and striping, and erosion control.

- Rebar estimates: Rebar may be estimated at the Preliminary Design phase of the project, and only this phase of the project, with the following values. Designers are also encouraged to review similar projects to better define the rebar estimates at this phase.

    - Abutment Rebar – 120 lb/cy
    - Pier Rebar – 150lb/cy
    - Deck Rebar – 330 lb/cy, 10 lb/sf (steel), 8-lf/sf (GFRP)

- Dredge Material: Dredge material disposal estimation should occur for the PDR milestone and final locations for beneficial reuse be determined by the PIC milestone. Refer to Section 3.2.1.1.2 for estimating and reuse guidance.

- Contingency: A contingency should be provided within the estimate(s) for undefinable, uncertain, or complex items using a separate line-item within the estimate template. Contingency should be thought of as a cost to cover project risk, and not a category to cover quantifiable project needs. This line item may cover items such as construction risk, unknown rehabilitation limits, undefined aesthetic items, or influence from overlapping third-party stakeholders (e.g., utilities). Not all projects warrant the use of a contingency line item and Designers should strive to avoid the need to use a contingency line item by refining the detail of the cost estimate. The Design Team should coordinate with the Project Manager and Senior Structural Engineer on the need for, and magnitude of, this contingency. Suggested contingency ranges are as follows:

    - Complex Replacement Project: 5 – 15%
    - Rehabilitation Project: 10 – 20%

- Inflation: The preliminary cost estimate should not include an estimate for inflation to account for the cost of construction in a future year. Estimates should be based on the best information at the time of the estimate and updated accordingly throughout the life of the project.

- Rehabilitation Quantities: Quantities for substructure concrete patching, crack injections, structural steel repairs, and deck repairs shall be estimated at this phase based upon a combination of concrete soundings by the Design Team, inspection report observations, and possibly concrete core test results if alkali-silica reaction (ASR) issues are thought to be present.

  The final estimated deck repair quantities, as a percentage of the overall deck surface area, should be based upon visual inspection of the underside of the deck, the wearing surface condition, and concrete cores to evaluate chloride intrusion, strength, ASR, and possible delaminations. The Design Team should gain concurrence from the Senior Structural Engineer on the assumed quantity of deck repairs to balance risk and provide accurate comparisons among alternatives.

- Unit Cost Development: Itemized unit costs should be developed based upon specific project needs, quantity, location, duration, and challenges. A typical approach involves reviewing bid tabs of at least two representative projects (preferably three to five projects) that were advertised within the past one to three years. The Designer should consider the lowest three bidders of the representative projects and discount any apparent outlier costs. Adjustments to the bid costs should occur to account for differences in project requirements, such as night work, recent market trends, magnitude of respective quantities, required speed of construction, and geographic project location.

- Estimate Format: Alternative cost estimates shall be documented using the Bridge Program standard template, which can be found with the Bridge Design Guide files on the MaineDOT website. The preliminary cost estimates require all high-cost items to be identified, quantified, and unit price estimates provided, as noted within this section. There are also line-items for rehabilitation contingencies, miscellaneous, and mobilization as percentages of the major work. Major line-items may be added or subtracted as needed to convey other large lump sum items or categories of work.

- Preliminary Engineering and Construction Engineering (PE/CE): PE and CE costs should be estimated as a percent of the estimated construction cost. The PE cost identifies all engineering related costs (engineering, management, survey, borings, permitting, etc.) that occur between establishment of the project's WIN through construction bid opening. The CE cost accounts for construction oversight (Resident and Inspectors), fabrication QA inspection, and submittal reviews, among other efforts. Typical values are approximately 14% and 10% for PE and CE, respectively, on conventional projects. However, these percentages should be adjusted on a project-by-project basis to account for potentially disproportionate construction costs versus project design complexities/simplicities, project location, project duration, number of anticipated inspectors, and other factors deemed relevant using engineering judgement.

2.9.4 Expected Level of Completeness and QC

The Draft PDR should be considered "complete" by the Design Team and only requiring minor updates as a result of the Department's review period. To accomplish this, all design criteria, existing bridge information, analyses, plan production, estimating, and narrative shall be completely checked and verified prior to submitting. Since the information presented within the PDR is based on preliminary designs, the accuracy of many items such as specific wingwall lengths, quantity calculations, and schedules should be commensurate with the preliminary nature of this milestone. The level of completeness and QC should be sufficient to adequately compare alternatives, justify a recommended solution, and serve as design criteria in final design.

The hydrology, hydraulics, and scour for a project should undergo a design review. Consultant PDRs should be peer reviewed by an experienced engineer, preferably one familiar with MaineDOT policies and practices, prior to being submitted to the Department.

2.9.5 Approval Process

The completed PDR is reviewed by the Project Team, typically led by the Project Manager and Senior Structural Engineer. Review of the PDR will generally focus on appropriateness of scope, justification of the recommended alternative and alternatives analysis, maintenance of traffic decisions, constructability, hydraulic analysis (where applicable), conformance to standards, Project cost estimate, and the Preliminary Plans. Once all the comments and corrections requested by the Project Team are answered and completed, the Senior Structural Engineer or designee will sign the final draft of the PDR and send it to the Design Assistant Program Manager for approval. Once approved at the Program level, the document is uploaded to the Department's archival database, placed in a network folder of all Department PDRs, and sent out in a general distribution to other parts of the Department for comments. Upon completion of this milestone, the schedule and Project estimate must be updated on internal project systems by the Project Manager in accordance with applicable Administrative Policy Memorandums (APMs).

2.10 CONTRACTING METHODS

As noted in the introduction to this Chapter, the guidance provided in this Chapter is mainly in the context of traditional design-bid-build project deliveries. However, in certain situations alternative project delivery methods can be employed to allocate and manage construction risk, efficiently handle unique project requirements, or allow the contractor flexibility with construction alternatives. When projects seem to fall into one of these situations, the Designer should discuss the possibility of alternative delivery methods with the Project Team and Program management. The decision to use alternative delivery methods will require coordination with the Quality through Innovative Contracting Team (QUIC Team). Keep in mind, the list of possible alternative delivery methods is continually evolving; other methods not listed may be considered. Below is a brief description of common alternative delivery methods:

- Contractor-In-Design (CID) Process: This process will generally include the Project Team participating in group and/or individual meetings with Contractors where the general project challenges, design assumptions, and constraints are presented. The first meeting, as a group, is mainly to present the project information and solicit general feedback. Once that is complete, a

round of 1-on-1 meetings are performed with each prequalified Contractor. This gives the Contractors time to digest the information provided in the group session and confidentially provide detailed feedback on the project. The CID process is a great way to determine the major constructability challenges related to a complex project. In return, only Contractors engaged in this process are allowed to bid on the project and the low bid is selected.

- Detail-Build: This project delivery method includes advertising contract documents that provide general design constraints (e.g., span length, roadway width, vertical clearances, preselected structural systems, etc.) of the project and allows the Contractor to select, design, and detail the bridge they feel is the most cost-effective and feasible. This is commonly employed for buried structure projects and short span structures where multiple solutions meet project needs, and corresponding construction costs and long-term maintenance are considered equivalent by the Design Team.

- Bid Alternates: This project delivery method includes design-bid-build contracting methodology but presents multiple alternates for specific structural elements (e.g., foundation type, superstructure type, etc.) in the contract documents. This approach allows the Contractor to choose between specific alternates to ensure that the most cost-effective structural system will be constructed. This contracting method can be useful for specific bridge elements that have clear-cut distinctions between multiple methods of construction, but where it is unclear during design which method is most cost-effective.

- Construction Manager/General Contractor (CM/GC): The CM/GC project delivery method uses an integrated team approach where the selected Construction Manager (CM) participates in the preconstruction phase of the project, providing expertise and feedback pertaining to cost, schedule, and constructability while the Designer develops the proposed design. The CM is solicited and contracted using a Qualifications Based approach. When the design has advanced sufficiently, the CM is asked to provide a bid for constructing the project. If this bid is considered acceptable by the Owner, the CM is awarded the construction project and becomes the General Contractor (GC).

- Design-Build (DB): The DB project delivery method employs one entity to perform both engineering and construction under a single contract. This single entity performs a preliminary design, provides a single lump sum cost to complete the work, and documents their proposed work in a proposal to the Owner. The contract selection process typically provides a competitive process in which a combination of price, construction schedule, and applicant qualifications are considered. With this method, the Contractor bears much more of the risk and responsibility when compared to the traditional design-bid-build.

2.11 TRAFFIC ANALYSIS MANAGEMENT AND EVALUATION (TAME) PROCESS

All bridge projects will need to consider methods of controlling traffic during construction. This pertains to all modes of travel, including vehicular, pedestrian, bicycle, and others where applicable. In 2016, MaineDOT introduced a Traffic Analysis Management and Evaluation (TAME) process to document and substantiate methods and/or restrictions of controlling traffic on each project. This process typically begins during the Preliminary Design phase as various maintenance of traffic scenarios are identified and evaluated, and construction durations estimated. For projects with significant traffic volumes or significant traffic impacts, additional attention to phasing, potential restrictions, and accelerated bridge construction may also need to be considered and included in the PDR. Detailed guidance on the TAME process, including criteria for determining which projects need to be reviewed by the TAME Committee, can be found on the MaineDOT website.

During preliminary design, the Design Team needs to identify the conceptual maintenance of traffic (MOT) solutions that meet project needs, as well as the general parameters in which the solutions would work. For simple projects or MOT methods, the TAME process may only warrant a conversation with the Work Zone Safety Engineer or Region Traffic Engineer and would not require approval at a TAME committee meeting.

Pedestrian access during construction must be considered as part of the MOT evaluations during preliminary design. The amount of effort and level of consideration for pedestrian access will be very site dependent. In many cases, where there are no current pedestrian facilities present at a particular bridge site or significant pedestrian traffic, the BCF and/or PDR can simply state this fact, and the process is considered complete. This effort should be discussed with the Project Manager during preliminary design. For more information on pedestrian accommodation, refer to the Department's Complete Street Policy.

When road closures with an off-site detour during construction are recommended, a well-documented discussion is required that demonstrates the Design Team has done enough outreach and analysis to justify the closure. The discussion should include the following items:

- Detour route including names of roads or route numbers and jurisdiction
- Abutment-to-abutment detour route length and net through detour route length(s)
- Detour route condition
- Turning movements on route regarding truck maneuverability and safety
- Impacts to emergency services in terms of mileage and response time
- Seasonal impacts to users such as schools, summer camps, or seasonal businesses
- Documentation of outreach to:
    - Town/County Officials
    - Emergency Services
    - Region Traffic Engineer
    - General Public
    - Nearby Businesses

For more complex projects or MOT methods, the TAME process may ultimately require presentation at a TAME Committee meeting. In these more complex cases, the TAME Committee will ultimately approve the traffic control solution(s) to be used by the project. The TAME Committee should not be relied upon to brainstorm solutions during the meeting, but rather consider the solution(s) presented by the Design Team and make requested adjustments. The Design Team should thoroughly prepare for this meeting and should consider holding a Coachpoint meeting with the Work Zone Safety Engineer, Regional Traffic Engineer and/or State Traffic Engineer to discuss traffic control options before seeking approval from the TAME Committee.

Although much of the TAME evaluations and discussions occur during Preliminary Design, the Design Team must complete the TAME process and receive the TAME Certification during Final Design once the final durations and MOT details are refined. The Design Team needs to plan and allow sufficient time for presentation/approval at the TAME Committee meeting if required. Once a TAME certification is received, any schedule changes that increase impacts to the traveling public, such as requiring a longer road closure duration, may result in the need to update the TAME process.

2.12 PLAN IMPACTS COMPLETE

The Plan Impacts Complete (PIC) milestone is one of the most critical milestones of a project. The intent of this milestone is to define the overall "footprint" required to construct the project. The final PIC Plans will be used by supporting team members to develop permits, commence the right of way process, and serve as documentation of the agreed upon relocations with utility owners.

2.12.1 Deliverables

Deliverables at this milestone include the following items. Additional detail and guidance are provided in the subsequent sections. Updating the construction schedule and Engineer's Estimate is not required at this milestone if a PDR was developed, unless significant changes have occurred since the PDR was finalized. If the Preliminary Design phase concluded with a BCF, deliverables at this stage also include a construction schedule and Engineer's Estimate – refer to Section 2.9.1 for additional guidance.

- Plans (22x34 pdf)
- CAD files

2.12.1.1 Plans

The plan set shall include all final approach roadway layout, profile, typical sections, staged construction sheets, and cross sections. Additionally, onsite traffic detour layout sheets shall be included that identify plan impacts. Specific structural details, other than information provided on the typical section, general plan, and/or the profile sheets, do not need to be included at this milestone.

2.12.1.2 CAD Files

The CAD files used to produce the Plans shall be submitted for project records and for use by supporting team members. Base files (e.g., survey, topo, right of way) produced by MaineDOT should not be submitted.

2.12.2 Expected Level of Completeness and QC

The PIC Plans shall show all temporary and final slope limits and clearing limits required of the project, as well as any utility or third-party infrastructure relocations. To accomplish this, the approach roadway shall be completely designed and checked, including drainage, guardrail layout, superelevation transitions, and ancillary elements such as lighting and signals. Additionally, the bridge layout and any other structure required of the project shall be defined. Changes to project impacts after this milestone can create significant rework and have significant effects on project schedule. **Any changes to the project footprint, utility relocations, or drainage outlets after PIC has been declared require approval by the Senior Property Officer and Program Management.**

In addition to roadway design, the following items shall be complete and checked at this milestone:

- Utilities: Proposed utility installations including relocations must be known prior to PIC. Specific details or a pole list is not required for PIC. However, the Utility Coordinator must certify that sufficient ROW exists or note on the PIC submission where additional rights are needed to accommodate utility installations.

- Temporary Road/Bridge: Onsite temporary detours, including temporary signal locations, shall be designed and checked to sufficiently identify appropriate site impacts and confirm constructability of the project. This includes clearing limits for temporary roads/bridges as well. The Designer is responsible for identifying that feasible solutions exist which meet applicable code and Specification requirements, such as ensuring that design vehicles can navigate through the proposed temporary roads or bridges. Additionally, the Designer or Project Manager should be aware of any unique circumstances regarding the route that could impact project stakeholders (e.g., regular travel of oversized loads). However, the Contractor is ultimately responsible for preparing the detour design. The Designer is also responsible to identify any "off site" improvements to existing intersections along a prescribed detour route to be used by the project.

- Access Restrictions: If construction activities are expected to limit access to private property, the restriction must be noted on the PIC submission.

- Constructability Review: A constructability and construction access assessment shall also occur prior to finalizing the PIC Plans. This may include a review of potential locations for cranes or similar overhead equipment, temporary structural supports, earth support systems, cofferdams, and any conflicts between existing, proposed, and temporary structures.

- Contractor Access Needs: Any necessary temporary access, utility relocations, and associated cut/fill limits shall be identified on the PIC Plans – both for construction and demolition. The Designer is responsible for identifying sufficient space (rights and/or impacts) and access points to complete the project; however, MaineDOT does not identify impacts or provide rights for Contractor laydown/staging areas or for the convenience of the Contractor.

Contractor access and other similar temporary impacts on a project will typically need to be portrayed as clearing limits on the plan view. Temporary structures such as temporary bridges, cofferdams, or trestles should also be drawn and labeled in preliminary and PIC Plans but must be removed in the final contract Plans. These temporary impacts are important for obtaining rights and permits, but because most temporary structures are designed by the Contractor, they should not be shown on Final Plans.

Any changes after PIC has been declared requires approval by the Senior Property Officer and Program Management.

2.13 60% DESIGN

The 60% Design milestone is generally the midway point between completion of Plan Impacts Complete (PIC) and the finer detailing efforts and specifications required of the Draft PS&E milestone. The Plans associated with the 60% Design milestone should identify major design decisions and overall structural geometry, such as girder sizing and concrete outlines of substructure units. However, specific detailing such as reinforcing layout and girder camber do not need to be completed. Some of the important structural details that need to be included in the Plans at this stage are items such as concrete joints, deck end details, bridge seat details, substructure elevations, and anything else that will impact final reinforcing sizing and layout.

The intent of this submittal is to allow for review of, and adjustments to, the anticipated project prior to advancing detailing efforts. This milestone represents the last chance for major changes to structural and roadway elements.

The 60% Design milestone is also a good time to receive feedback on significant, complex, or highly influential Special Provisions in the construction contract. These would be the type of Special Provisions that are likely to take multiple revisions and need input from multiple disciplines or authority levels. This could include provisions such as the Section 107, Time Special Provision on an accelerated bridge construction project or provisions for unique items, like specifying how Contractor access will be paid for under a particular pay item.

2.13.1 Deliverables

Deliverables at this milestone include the following items. Additional detail and guidance are provided in the subsequent sections.

- Plans (22x34 pdf)
- CAD files
- Engineer’s Estimate
- Construction Schedule
- Special Provisions Matrix

2.13.1.1 Plans

In addition to the plan sheets provided with the PIC submittal, this milestone plan set should include all major structural sheets (e.g., typical section, deck plan view, framing, and substructure geometry). Any temporary works shown in the PIC Plans, such as cofferdams, trestles, or temporary bridges, should be removed from the 60% Plans, or provided separately. The permanent impacts associated with temporary works, such as clearing limits or final slope limits, shall remain in the Plans.

2.13.1.2 CAD Files

See Subsection 2.12.1.2 for guidance.

2.13.1.3 Engineer's Estimate

An Engineer's Estimate of the project's construction cost shall be provided at this milestone, in Excel (unless developed directly in the Department's estimating software) and pdf formats and be commensurate with the level of design completion. Note this is a summary of estimated, itemized construction costs and *not* the quantity calculations. The estimate should include all pay items (Standard Specification and Special Provision) anticipated to be used on the project, regardless of being able to accurately quantify the item.

Fully detailed quantity calculations (separate file from the Engineer's Estimate) shall be developed for all defined items such as roadway approaches and major bridge items such as structural steel and structural concrete. Approximate quantities shall be developed for all other items, such as reinforcing and structural earthwork. An Estimated Quantities sheet does not need to be developed or included with the plan set at this milestone. Similarly, a compiled set of quantity calculations need not be submitted at this milestone.

2.13.1.4 Construction Schedule

The Designer shall update the estimated construction schedule to substantiate project duration and support the determination of the advertisement date. The schedule refinement should include any updates or refinements to fabrication lead times, environmental work windows, or other third-party influences (e.g., utility relocations, dam restrictions, railroad activity, right of way entry, etc.).

2.13.1.5 Special Provisions Matrix

The Design Team is responsible for the preparation of a list of Special Provisions required for construction of the project. The Design Team should work with the Project Manager and Senior Structural Engineer to determine which Special Provisions are necessary and who will be responsible for preparation of each one. There are many "standard" Special Provisions that the Department maintains, so it is important to avoid duplicating efforts and having consultants provide Special Provisions that are unnecessary.

2.13.2 Expected Level of Completeness and QC

Content produced between the PIC and this milestone generally includes definition of overall structure geometry, concrete outlines, railing layout, expansion joint types, and girder sizing. Project designs and Plans should be advanced sufficiently to identify the intent of the final structure without expending effort

to detail reinforcing, joint opening and adjustment tables, camber, and similar details. Sufficient detail should be provided to identify how the bridge will be constructed, such as identification of construction/contraction joints in substructure units, deck pour sequencing, and any other project-specific limitations such as age of prestressed concrete beams prior to erection, if warranted.

The Design Team should review the preliminary right of way mapping prepared by the Property Office between the PIC and 60% Plans milestones. This review of the Draft Plans is to ensure all temporary and permanent impacts identified by the Design Team at PIC have been understood and are reflected on the ROW Plans. This review should occur immediately following the development of the preliminary right of way layout, and prior to the Property Office commencing map peer review and appraisal efforts.

In a similar manner to above, the Design Team should review temporary impacts with the Environmental Office to ensure the appropriate limits are shown in permit applications.

The following items (as applicable) should be preliminarily designed and checked prior to completing this milestone:

- Steel framing layout including cross frame spacing, drip bar locations, and any unique bracing requirements, such as lateral bracing
- Steel girder plate sizes and splice and transition locations
- Prestressed beam size, strand type and strand patterns
- Substructure element sizes (e.g., column thickness, pier cap depth and width, abutment bridge seat width)
- Foundation layouts shall occur prior to this milestone, including all elevations
- Culvert layout and wingwall/headwall geometry
- Concrete repair mapping of substructure units

Prior to submitting the Plans for review, all geometry (concrete outlines, elevations, girder framing, railing layout, and other pertinent information) depicted on the Plans shall be checked for accuracy, including any relevant notes. Reinforcing type in all major structural elements shall be confirmed with the Senior Structural Engineer. Since this is the last milestone prior to final detailing, all relevant information that could affect construction approaches or difficulties should be included and checked.

2.14 DRAFT PS&E

All aspects of the project should essentially be complete at the Draft PS&E milestone. This milestone provides all design details in an organized set of plans and identifies the intended Special Provisions and pay items for use in the construction bid documents. Completion of this milestone should be approached by the Design Team as though the deliverables could be immediately used for construction advertisement. The deliverable package is then distributed to a wide array of internal resources for review, including construction staff, environmental, geotechnical, right-of-way, and other Department staff. This broad distribution ensures that the package aligns with all permits, best practices, and other relevant considerations.

On occasion, for complex or fast-paced projects, there may be unique outstanding coordination items or minor detailing elements that require attention following this milestone. In these situations, the Design Team shall provide the Project Manager with a complete listing of these outstanding items for reviewer awareness.

The Draft PS&E package should be submitted to the Project Manager a minimum of five weeks before the Final PS&E date. This period of time is considered a baseline, minimum amount of time necessary for review, changes, and a final review by a Contract Developer. More complex or larger projects may need additional time at the discretion of the Project Manager and Design Team. Simple projects may be able to have a shorter review duration. There will also be situations requiring an expedited review schedule like emergency projects, projects in danger of losing grant funding, or other critical factors. The expectations for a review period must be coordinated with the Project Manager.

2.14.1 Deliverables

Deliverables at this milestone include the following items. Additional detail and guidance are provided in the subsequent sections.

- Plans (22x34)
- Special Provisions
- Engineer's Estimate
- Quantity Calculations
- CAD Files
- Construction Schedule
- Draft Geotechnical Design Report

2.14.1.1 Plans

The Plan set should include all sheets required for construction of the project. Development of sheets outside of the Design Team's control, such as right of way sheets or utility relocation sheets prepared by a town's engineer, should also be included with this set. The Design Team should coordinate with the Project Manager to determine the best method to include such sheets.

2.14.1.2 Special Provisions

Consistency among commonly used Special Provisions is important. Prior to commencing the development or modification of a Special Provision, the Designer should first inquire with the Senior Structural Engineer to identify the most recent and applicable version to avoid unnecessary work and inconsistent language. In some cases, there will be a standard template for a Special Provision requiring no changes for the project. However, the Design Team should collect and review all Special Provisions required of the project to ensure the requirements and pay methods are coordinated with the Plans and estimate. The entire set of Special Provisions, even those that are not modified by the Design Team, should be submitted with the Draft PS&E pdf package as well as individual Word files. Individual files shall be named with the following convention: "### SP - Description", where the description is succinct

and generally follows the header description within the file. Following this naming convention allows for improved archiving, sorting, and retrieval of files for use on future projects.

Note that the date in the header of the Special Provision should reflect the last time the content within the provision was modified. It is acceptable for a template Special Provision without any new changes to have an older date if there were no modifications since then.

2.14.1.3 Engineer's Estimate

The Engineer's Estimate shall be provided in Excel and pdf format. The estimate should be an itemized summary of project quantities; however, the Engineer's Estimate is an independent file from the actual quantity calculations and is confidential. Backup quantity calculations shall always accompany the estimate at this milestone, but as a separate document. All project pay item numbers, descriptions, supplemental descriptions, quantities, units, and unit costs shall be provided in a format consistent with the Estimated Quantities plan sheet. The summation of any items for which the Department will seek reimbursement, such as utility relocation costs from a utility company, should also be provided with a separate estimate value.

2.14.1.4 Quantity Calculations

The quantity calculations, used to establish the summarized quantities in the Engineer's Estimate, shall be compiled into a single quantity calculations book. The quantity book is referenced during construction to aid in identifying payment to the Contractor for work performed or potential contract modifications.

The quantity book shall be a single pdf file that is detailed and well organized to clearly identify the author's approach to determining quantities, including narratives to explain the approach, if warranted. The quantity book shall be numerically sorted and organized by pay item number and bookmarked by pay item series (e.g., 200-series items, 300-series items, etc.) for ease of use. Reinforcing details (bar bends, individual quantities, etc.) shall be provided in the quantity book; however, lap splice lengths and similar calculations with a direct structural implication shall be provided with the respective design element in the calculation book (Subsection 2.15.1.8).

2.14.1.5 CAD Files

The CAD files used to produce the Plans shall be submitted for project records and for use by supporting team members. Base files (e.g., survey, topo, right of way) produced by MaineDOT should not be submitted.

2.14.1.6 Construction Schedule

The Designer shall update the estimated construction schedule to substantiate contract completion dates, interim completion dates or milestones, and identify any new schedule risks. The schedule refinement should include any updates or refinements to the project advertisement date, fabrication lead times, environmental work windows, or other third-party influences (e.g., utility relocations, dam restrictions, railroad activity, right of way entry, etc.). Any schedule changes that increase impacts to

the traveling public, such as requiring a longer road closure duration, may result in the need to revisit the TAME process.

2.14.2 Expected Level of Completeness and QC

Development and checking of all designs, Plans, Special Provisions, quantities, and estimates as well as coordination with third party stakeholders shall be complete at this milestone in accordance with the quality control practices outlined in Section 1.3. The Design Team shall consider all project elements final and advertisement-ready at this milestone. The design calculations and independent check calculations do not need to be submitted at this milestone but should be available in the event they are requested by the Department.

2.15 PS&E

This milestone marks the end of the design phase of a project. The intent of the milestone is to provide a suite of documents that can be used for construction of the project with minimal need for clarity and adjustments during construction.

2.15.1 Deliverables

The Design Team is responsible for the following deliverables at this milestone. Additional detail and guidance are provided in the subsequent sections.

- Plans (22x34)
- Stamped Title Sheet
- Special Provisions (pdf & Word)
- Engineer's Estimate
- Quantity Calculations
- CAD Files
- Construction Schedule
- Calculation Book(s)
- Load Rating Report
- Approved Design Exceptions (if applicable)
- Plans of the Existing Bridge
- Hydrology and Hydraulic Report (if applicable)

In addition to Design Team deliverables, the Project Manager is responsible to coordinate and collect the following documents to complete the design phase and allow the project to advance toward advertisement:

- Right of Way Certification (from the Bridge Program Senior Property Officer)
- Utility Certification (incl. SP and agreements) (from the Team Utility Coordinator)
- Environmental Package (incl. SP) (from the Environmental Team Member)
- Construction Authorization Form
- Grant Agreement/Term Sheet (if applicable)

- TAME Certification
- Geotechnical Design Report (from the Geotechnical Team member)
- USCG Bridge Permit (if applicable)
- FAA Construction Notice (if applicable)
- Municipal Agreements (if applicable)

2.15.1.1 Plans

The Plan set Title Sheet shall be stamped by a Professional Engineer licensed in the State of Maine. Plan sheets not produced by the Design Team, such as utility relocation sheets, should bear the stamp of the engineer responsible for their design.

2.15.1.2 Stamped Title Sheet

The Designer shall provide a separate full size, stamped Title Sheet for distribution and signature within the Department.

2.15.1.3 Special Provisions

The Special Provisions shall be updated to incorporate any changes resulting from the Department's review of the Draft PS&E package. Refer to Section 2.14.1.2 for additional information regarding delivery of the files.

2.15.1.4 Engineer's Estimate

The Engineer's Estimate shall be updated to incorporate any changes resulting from the Department's review of the Draft PS&E package. Refer to Section 2.14.1.3 for additional information regarding file format or delivery.

2.15.1.5 Quantity Calculations

The quantity calculations shall be updated to incorporate any changes resulting from the Department's review of the Draft PS&E package. Refer to Section 2.14.1.4 for additional information regarding file format or delivery.

2.15.1.6 CAD Files

The CAD files used to produce the Plans shall be submitted for project records and for use by supporting team members. Base files (e.g., survey, topo, right of way) produced by MaineDOT should not be submitted. All CAD files shall be "cleaned up" at this milestone by removing any "working" or draft linework and extraneous reference files.

2.15.1.7 Construction Schedule

The construction schedule shall be updated to incorporate any changes resulting from the Department's review of the Draft PS&E package. Refer to Section 2.14.1.5 for additional information.

2.15.1.8 Calculation Book(s)

The calculation book shall be a single pdf file that is detailed and well organized to clearly identify the engineer's approach to the design including all assumptions, methods, and software used. All design

calculations and independent check calculations required to complete the project should be included and accompanied by narratives to explain the approach to design, if warranted. The calculation book shall be organized by grouping common design elements into chapters (e.g., superstructure, girders, abutments, piers, etc.) and bookmarking chapters and subsections for ease of use. The calculation book shall be stamped by a Professional Engineer licensed in the State of Maine and will be part of the bridge record that is retained for the life of the structure. The Project Manager is responsible for uploading the calculation book into the Department's electronic file system as well as informing the Assistant Bridge Program Manager for Design of the document number. All calculation books shall use a consistent cover sheet - refer to files located with the Bridge Design Guide on the MaineDOT website for the calculation book cover sheet template.

Input values for commercial software or automated calculation spreadsheets shall be provided and easily identifiable, as well as output summary reports identifying code provisions that were evaluated. Where finite element modeling is used, the Designer should provide additional narrative regarding approaches to modeling decisions, model validations or calibrations, staged analyses, and approaches to post-processing results.

Calculation books should generally only include 8.5x11 pdf sheets and may contain 11x17 sheets. Full size plan sheets and Final Plan set sheets should not be included. Raw computer calculation files need not be submitted but may be requested by the Department.

2.15.1.9 Load Rating Report

Load rating analyses and reports are required for all bridge replacement and superstructure replacement projects, and for major rehabilitation projects that alter the loading or structural capacity of the superstructure. The load rating analysis and report shall be in accordance with the MaineDOT *Load Rating Guide* available on the Department's website.

For rehabilitation projects, the load rating analysis shall be produced during the development of the Draft PS&E milestone and completed and checked prior to the final PS&E milestone.

The Load Rating Report shall be stamped by a Professional Engineer licensed in the State of Maine. The Project Manager is responsible for uploading the Load Rating Report into the Department's electronic file system as well as informing Bridge Maintenance of the document number.

2.15.1.10 Approved Design Exceptions

Design Exceptions (if applicable) shall be submitted at this milestone to help complete the PS&E package. However, identification, documentation, and bridge program concurrence with any Design Exception shall occur during the Preliminary Design phase – refer to Section 2.2 for additional guidance.

2.15.1.11 Plans of the Existing Bridge

If available, the Design Team shall provide a single set of plans of the existing structure to aid the Contractor during the bidding process. The Designer should filter through available plans to remove redundant sheets, bridge components that have been replaced during the structure's history, and/or

sheets that will not impact the Contractor's understanding of demolition approaches and difficulties. The resulting set of plans shall be compiled into a single pdf file. This effort may have already occurred during the Preliminary Design phase of the project, but the file should be submitted at this milestone for completeness.

2.15.1.12 Hydrologic and Hydraulics Report

The Hydrologic and Hydraulics Report (if applicable) shall be submitted at this milestone to help complete the PS&E package. However, initial development of this report shall occur during the Preliminary Design phase and be finalized before finalizing the PIC milestone. Refer to Chapter 4 for additional guidance. Generally, only the base report (no appendices) summarizing hydrology and the hydraulic analyses are required for the bid documents. Key pieces of information for the Contractor from this report will be flows of different flood frequencies, tidal elevations, and flood elevations of the existing and proposed structures.

2.15.2 Expected Level of Completeness and QC

All development, checking, file compilation, and formatting of all deliverables identified in Subsection 2.15.1 shall be complete at this milestone in accordance with the quality control practices outlined in Subsection 1.3. All files shall be advertisement-ready for a safe, biddable, and constructable project.

2.15.2.1 Comment Resolution

The Bridge Program does not expect an exhaustive comment resolution log for every project and every comment. Any comments that are not fully incorporated due to disagreements, or any questions about why a certain approach was taken, should be addressed by providing relevant documentation to the Project Manager for resolution. The Department review team may also, as an option, highlight comments during the review that require comment resolution. Editorial comments, such as spelling or plan cleanup, do not need resolution documentation. The Engineer(s) responsible for the information contained in the Plans and Special Provisions will need to use some discretion when determining which comments need documented resolution.

2.16 ADVERTISE AND BID PHASE

The Project Team will continue to support the project throughout the construction advertisement period by providing responses to questions from bidders and preparing amendments to the contract documents, if necessary. The Final Design Phase (Phase II) of the project concludes upon contract award to the successful bidder.

2.16.1 Responding to Questions from Bidders

Potential bidders may submit questions during the bid phase to gain clarity of the design intent or contractual language and to request adjustments to the project prior to bidding. Since this is a contractual process with limited timeframe, consistent response format, content, and timing of the responses is critical.

- Response Format: The Contracts Section will distribute questions, from bidders, to the Project Manager in Microsoft Word format without indication of which bidder submitted the RFI.

Responses from the Project Team should occur, and be transferred to the Contracts Section, within the same Microsoft Word file.

- Response Content: Responses to questions should be clear, concise, and not suggestive. Whenever possible, the response should make reference to the Plans, Special Provisions, or Standard Specifications for the response. The response should only, and directly, address the question as received. Do not expand a response to include adjustments or clarifications to other project provisions unless an error or omission is identified during the response preparation that warrants an addendum.

- Timing: Questions are typically allowed to be submitted by bidders until a few days ahead of opening bids, as defined in the Notice to Contractors. A typical project process, as defined by Standard Specifications, includes bidder questions being received 48 hours before Bid Opening, and the question responses being posted by noon on the Tuesday before the bid opening. Due to the limited time Contractors have to review the project and prepare a bid estimate, timing of the response(s) is critical to avoid delays in bid opening. As a general rule, responses should be provided back to the Contracts Section within 48-72 hours. The Contracts Section should be immediately notified if the Project Team believes the response may take longer than this.

2.16.2 Bid Amendments

Revisions to the Plans and/or Special Provisions may be necessary during the bid phase as a result of Contractor questions. Most changes will be issued as formal Bid Amendments; however, minor textual changes or deletion of notes may occur through a notification to the Bidders to make a change using "pen and ink."

Revisions to the plans should be easily identifiable to avoid Contractor confusion during the bidding process. Revisions should be clouded on the plan sheet with a revision triangle, and corresponding revision description in the title block of the plan sheet. Changes to a plan sheet need to be clear whether the revision is replacing or adding new information. Revisions that result in information being removed should be struck out with lines on the plans, but not simply removed – this allows the bidder to understand what has been struck from the plans. Revised plan sheets shall retain the sheet number and replace the associated sheet in the bid documents. New plan sheets that need to be added to the bid set will need a letter added to the sheet number (e.g. 6A). Refer to the Bridge Plan Development Guide for additional file naming and document control practices.

Revised Special Provisions require an update to the date in the header to match the date the Bid Amendment is issued. Typically, there are no indications of what was changed in the amended Special Provision; however, a notice to bidder or response to a question issued as part of the overall Bid Amendment package should indicate the general change.

2.16.3 Bid Analysis Review

The construction bids shall be reviewed prior to the low bid being accepted and advanced for recommendation to award. Bids should be reviewed for unbalanced bidding, potential quantity errors,

potentially unclear specification language, bidding trends among bidders and/or similar recent projects, and potential errors in the Engineer's Estimate, among other items. Generally, for a bid analysis review, the Contract Engineer checks if bids are responsive, balanced, and come from qualified bidders. The Project Manager is responsible for reviewing trends in the bids and checking for possible mistakes in quantities and unclear contract terms, though these might be hard to spot just from the bid results. The level of analysis and detail is dependent on the project and the bids received. With more straightforward projects, only the Project Manager will review the bids. As project complexity increases, or at the Project Manager's request, the Design Team may be engaged to analyze the bids.

Construction bids are typically opened on Wednesdays and bid review meetings are typically every Friday; therefore, the bid review should take place within one to two days of the bid opening to support the review meeting discussion. The need for a bid review meeting is determined by the Bureau of Project Development in accordance with the MaineDOT Bid Review Policy. Ultimately, the Bridge Program is responsible for providing backup information to the Bureau of Project Development for preparation of a letter of recommendation for either award or readvertisement when the project is required to go through the bid review meeting.

2.17 CONSTRUCTION SUPPORT

The Project Team is expected to support the project throughout construction with review of shop drawings, RFI responses, review of contractor-submitted design change requests, and non-conformance reports.

2.17.1 Communication

Communication protocols among the Contractor, Resident Engineer, Area Construction Engineer, Design Team, and other involved parties during construction are important to avoid potential claims. In general, the Contractor's primary communication should be with their subcontractors, fabricators/suppliers, and the Resident. The Resident will then communicate with the remainder of the Design Team, Area Construction Engineer, and Fabrication Engineer for any needs.

At times, to expedite decisions, the Resident may permit the Design Team to coordinate directly with the Contractor. In these cases, the Resident and Area Construction Engineer should be made aware of the details of the discussion. The Design Team shall not reach out to the Contractor or their team unless specifically asked to do so by the Resident.

2.17.2 File Exchange

The Contractor may request CAD files to support their operations in accordance with Standard Specification 105.6. Typically, the requested files include survey files, plan views of proposed work, and cross sections. This request is made through the Resident Engineer.

2.17.3 Shop Drawings and Other Submittals

The Contractor is responsible to provide shop drawings and other submittals to the Department for review. The reviewer is responsible to review and comment on the completeness and appropriateness of these

submittals; this includes reviewing the submittal against specifications and plan set requirements and checking for conformance with the design intent of the project.

Review durations are identified in the Standard Specifications. Note that these review durations are total durations that include any time that occurs between transfer of information among the Contractor, Resident, fabrication group, and reviewers. The reviewer shall prioritize submittal reviews to help construction activities progress in a timely manner.

The necessary level of detail for each review varies by submittal type and project risk. In all cases, the reviewer should ensure all contractually required components of a submittal are provided. Shop drawing reviews should consider materials, geometry, coatings, testing requirement, and erection sequencing. Since the intent of the review is to ensure contract requirements and design intent are met, the review should not include recreation of fabrication geometry, but rather a review that major geometric requirements are met. If needed, the reviewer may contact the Fabrication Engineer for guidance on the level of detail necessary on a specific submittal.

2.17.4 Responding to Requests for Information (RFIs)

Contractors may submit RFIs during construction to gain clarity of the design intent or contractual obligations. Since this is a contractual process, the content and timing of the responses is critical.

- Response Format: Responses should generally be provided directly on the RFI file, in pdf format. This keeps the initial RFI and response in a single document for project records. The individual providing the response (typically the Resident or Designer) should include their name and the date of the response on the RFI.

- Response Content: Responses to RFIs should be clear, concise, and not suggestive. Whenever possible, the response should refer to the Plan Sets, Special Provisions, or Standard Specifications for the response. The response should only, and directly, address the RFI as received. Do not expand a response to include adjustments or clarifications to other project provisions unless an error or omission is identified during the response preparation that warrants an addendum.

- Timing: Per the Standard Specifications, the Contractor is required to request a reasonable timeframe for a response with the RFI. The Resident should be immediately notified if the Project Team believes the response may take longer than what was requested. Responding to RFIs shall receive high priority and response times shall avoid or minimize delays to the construction schedule when possible.

2.17.5 Design Change Requests

The Contractor may request minor design changes during construction that don't rise to the level of a formal value engineering proposal but still may require review and approval from the Engineer of Record. Examples include requesting to change a mechanical splice to a lap splice, introduce a construction joint, or a similar change that may improve the Contractor's means and methods. In these cases, the Design Team is responsible to confirm the requested change meets design intent and code provisions, the change will

not impact long-term durability, and that the Contractor is aware of the corresponding construction specifications. The Engineer of Record is also responsible to review and approve the change. Design change requests typically do not result in a change in payment to the Contractor.

2.17.6 Nonconformance Reports (NCRs)

An NCR is used to document completed construction work that does not conform to project requirements, as well as the proposed corrective action to be implemented. The report should identify the issue, how/why work does not conform, how reoccurrence will be prevented, and propose a corrective action. The Engineer of Record shall be asked to review the proposed corrective action and offer comment or approval. In these situations, the Engineer of Record is responsible to confirm the proposed corrective action meets design intent and design code provisions, that the correction will not impact long-term durability or future construction phases, and that the Contractor is aware of the corresponding construction specifications for the corrective work.