

## **PRELIMINARY ENGINEERING REPORT OUTLINE FOR BRIDGE PROJECTS**

**I. Executive Summary.** *Provide a summary of why the engineering study was undertaken, a brief description of the basic needs or deficiencies of the bridge(s) being studied, a brief description of the alternatives considered, a brief description of the preferred alternative, and the estimated total cost to construct the preferred alternative. Note any other pertinent conclusions.*

**I. Problem Definition.**

**A. Identify the Area Served by the Bridge(s).**

1. Location of Bridge(s) – *Show location of the existing bridge(s) using large and small scale maps and photographs. Indicate property ownership, latitude and longitude, elevations, etc.. Indicate if bridge is on a state-maintained route. Describe the area served by the bridge(s).*
2. Physical Characteristics of the Area – *Describe the physical character of the project area including geology, topography, soil types, flow of water, vegetation, etc. that may have an impact on the project costs, performance, etc. or to allow for a more complete understanding of the problem. Provide a copy of the USGS topographic quadrangle, FEMA floodplain map, and wetlands inventory maps in instances where maps have been published.*
3. Users of the Bridge(s) – *Discuss current use and any expected changes in the functional use of the bridge(s):*
  - a. Use of the Structure – *Discuss the type of traffic that uses the bridge(s) and any changes that might impact the use of the bridge(s).*
  - b. Number of Users – *Discuss number of vehicles using bridge(s). Discuss any specific areas or users dependent on the bridge(s). Include the number of permanent households and farm/ranch properties if discussing a specific area that is dependent on the bridge(s). Indicate if bridge serves a school bus or mail route.*
  - c. Growth Areas and Population Trends – *Within the area served by the bridge, discuss any expected changes in population and identify specific areas of concentrated growth.*

**B. Evaluate condition of existing bridge(s).**

1. History – Provide a brief history of the bridge(s), including when constructed and any major improvements.

2. Condition of Bridge(s) – Discuss the following issues:

a. In general terms, discuss the county's overall bridge needs. Ideally, the condition and capacity, and suitability for continued use of all of the county's bridges should be assessed and the county's bridge needs rationally prioritized. Discuss whether the county assessed all of its bridges and whether it has chosen the selected bridge(s) for this project based on a methodology that prioritized its bridge needs. (Note: an assessment of all bridges within the county is not required, but it will likely increase the number of points that the project receives in the TSEP ranking process.)

b. Specifically describe the present condition and capacity, and suitability for continued use of the bridge(s) included in the proposed project. Include the MDT ratings found in the MDT Bridge Assessment Form for the bridge(s).

*Bridges that have not been rated by MDT will need to be inspected, evaluated and rated. The rating must be based on the National Bridge Inspection Standards, or MDT methodology. Worksheets and other pertinent documentation that were used to determine ratings for structure, deck, superstructure, substructure, and sufficiency rating should be attached. Bridges that have not been properly rated may result in a lower score, or even the minimum score, under Statutory Priority #1.*

*Bridge inspection and the rating of bridges must be performed by individuals that have met the criteria outlined in 23 CFR 650, subpart C. The name and qualifications of the person inspecting and rating the bridge must be clearly stated including documentation of compliance with the criteria listed in 23 CFR 650.309. Inspections performed by individuals that do not meet these criteria may result in a lower score, or even the minimum score, for Statutory Priority #1.*

**C. Describe the need for the project and the problems to be solved. Discuss the following issues:**

1. Current and future bridge standards – Discuss any limitations on use of the bridge(s) as a result of weight limits or other standards.

2. Safety considerations – Discuss any safety limitations imposed by the current bridge(s) and how those issues would be resolved. Discuss any changes to approaches and roadway geometry.
3. Alternative routing options – Discuss the impact of closing the bridge(s) and if alternative routes are available. Include the distances involved if an alternative route is required and show how those routes were calculated.
4. Impact on public and emergency services – Specifically discuss the impact that a closure would have on providing public and emergency services. Provide documentation from the service providers, with specific comments on how the impact will affect their ability to provide services.
5. Utilities location or relocation – Discuss any impact on utilities.
6. Floodway – If the project is intended to resolve issues related to the floodway, discuss those issues in detail and include a preliminary hydraulics analysis (for example HEC-RAS). Include FEMA mapping data.

- D. Describe the Environmental Considerations.** Provide information on the location and significance of important land resources, historic sites, endangered species/critical habitats, etc, within the project area, using maps, photographs, studies and narrative. Discuss any potential environmental impacts that the project may have on the area where the project is to be constructed. Discuss any appropriate short and long-term measures necessary to minimize potentially adverse impacts.

*The information collected through the Uniform Environmental Checklist is the basis for identifying the environmental resources in the area that may be affected. The checklist must be included as an attachment to the PER and must be signed by a professional engineer. If there has been a previous environmental assessment completed for the project area, please include a copy of the assessment in addition to the completed checklist. Refer to the Uniform Application booklet for information related to environmental requirements. Attach any exhibits or maps that may be applicable to help identify environmental resources present.*

- E. General Design Requirements for Improvements.** Describe the design requirements that will need to be met. Include loadings and lane widths. Include design flood event and freeboard information. Describe the ‘ballpark’ hydraulic analyses used to preliminarily size the bridge(s). Describe any geotechnical investigations that are planned for final design.

*Describe bridge and approach rail, and end treatments.*

- II. ALTERNATIVE SCREENING PROCESS.** *Briefly describe all available alternatives to remedy the problems to be solved. Discuss any alternative that is not to be discussed further in Section IV. Alternative Analysis, noting why the alternative is obviously not suitable for further consideration. A sound justification is required for eliminating an alternative. Also discuss the “no action” alternative at this point, by explaining the implications of not resolving the problem.*

*This section documents that an option was not overlooked, but rather was considered and ruled out as a viable option during the early stages of the planning process. All alternatives that are not eliminated in the screening process should be evaluated in Section IV. Alternative Analysis.*

- III. ALTERNATIVE ANALYSIS.** *(Provide the following information for each alternative bridge design.)*

- A. Description.** *Describe feasible technologies and design criteria. Discuss the rationale for how the bridge(s) were sized.*
- B. Schematic Layout.** *Provide a schematic layout for the proposed bridge(s).*
- C. Regulatory Compliance and Permits.** *Describe compliance with appropriate federal, state, local or tribal requirements. Discuss any permits that will be required to complete the project.*
- D. Land Requirements.** *Identify sites and easements required. Specify whether these properties are currently owned, to be acquired or leased, and whether options have been obtained contingent upon receipt of funding. For any site not currently being used for the intended alternative, identify adjacent land uses and any potential conflicts.*
- E. Environmental Considerations.** *Discuss any specific impacts that a particular alternative may have, if any, beyond those already discussed in Section II. Problem Definition. There is no need to repeat information previously presented.*
- F. Construction Problems.** *Discuss unique concerns such as geotechnical considerations, limited access, or other conditions that may affect cost of construction of the bridge(s). Provide an estimated dollar amount to mitigate such problems.*
- G. Cost Estimates.**

1. Project costs (i.e., administrative, financial, engineering, and construction costs) – Provide unit costs and basis of estimated costs. For projects to be completed by county crews, include a comparison of construction costs by force account versus contractor's bid.
2. Present Worth Analysis – Evaluate the cost-effectiveness of the bridge(s), considering capital and O&M costs, and expected life of the structure.

**H. Basis of selection of a preferred alternative.** Provide a comparative analysis of all of the alternatives discussed above. Clearly define the criteria utilized for the comparison of each alternative and consistently apply those criteria to each alternative. At a minimum, the evaluation and selection should take into account technical feasibility, environmental impacts, and cost considerations. Briefly summarize the reasoning for selecting the preferred alternative over the other alternatives. A matrix or spreadsheet should be used to summarize the logic of the selection process.

## **V. DESCRIPTION OF THE PREFERRED ALTERNATIVE.**

- A. Site.** Briefly summarize the site location of the proposed bridge(s), and the characteristics of the site(s) and provide any additional information that is pertinent to the proposed solution.
- B. Design.** Briefly summarize the design criteria and provide any additional information that is pertinent to the proposed solution. Provide a schematic layout for the selected alternative(s).
- C. Environmental.** Briefly summarize any environmental impacts that the selected alternative may have on environmental resources, and any appropriate short and long-term measures necessary to minimize each potentially adverse impact. Provide any additional environmental information that is pertinent to the proposed solution. Attach any exhibits or maps applicable to the environmental consequences. Attach the required environmental related correspondence and agency comments. Include a sample copy of the letter(s) that were sent to the various agencies, as listed in the Uniform Application, and include copies of responses received.
- D. Cost Summary for the Selected Alternative.** Provide an itemized estimate of the project administration and construction costs based on the anticipated period of construction. Include administrative line items such as personnel, office costs, training, legal services, interim interest, audit costs and other costs associated with the proposed project. Include

*construction line items for preliminary engineering, engineering design services, construction management, construction costs, land purchase costs, and contingency.*

## **VI. RECOMMENDATIONS AND IMPLEMENTATION.**

- A. Funding Strategy.** *Describe the proposed sources of funding.*
- B. Implementation.** *Describe how the project will be implemented and any special concerns regarding implementation. Provide a project schedule. Identify any items that have the potential to delay or prevent the project from going forward.*
- C. Public Participation.** *Describe any public participation, meetings, hearings, or comments received from the public about the PER, environmental concerns, or the proposed project in general. Include minutes of meetings, copies of notices, and sign-in sheets.*