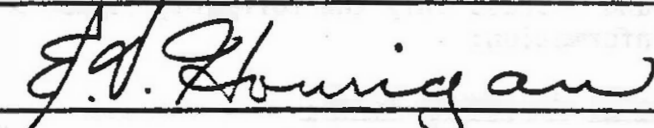


TO: SUPERSEDED BY EB 97-020 EFFECTIVE 4/4/97	<h1>ENGINEERING INSTRUCTION</h1> <p>NEW YORK STATE DEPARTMENT OF TRANSPORTATION</p> <p>SUBJECT: DESIGN REPORTS FOR BRIDGE REPLACEMENT PROJECTS</p> <p>Subject Code: 7.26-1</p> <div style="text-align: right;"> <p>APR 1 1981</p> </div>
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This Engineering Instruction will describe procedures for the preparation of Design Reports for bridge replacement projects. It will apply to any project consisting primarily of the replacement of an existing bridge. For a highway reconstruction project that happens to include the replacement of an existing bridge, the procedures of the Design Procedure Manual will apply. This procedure does not apply to any bridge rehabilitation projects. For those, see the current "Procedure for Bridge Rehabilitation Projects."

The appropriate Category II or III procedures and format in the Design Procedure Manual of the Facilities Design Division shall be followed as supplemented or amended by this instruction. Normally the Preliminary Plan Review Bureau (PPRB) will be the agency responsible for progressing these projects through design approval.

The designer should give early consideration to the possibility of greater benefits, such as improved highway alignment, increased capacity or, the replacement of two bridges with one which might be achieved by replacement of the bridge at a totally different site.

In conformance with current Department policy, all bridge replacement projects which are eligible for Federal Aid shall be progressed to so qualify them. Prior to the preparation of a design report, the PPRB shall set the design criteria for the project in coordination with Structures Division (SD) based on approved traffic from The Project Development Bureau. The Region should submit support data to PPRB and SD such as existing highway widths, functional class of highway and an indication of any right-of-way problems, recognizing different types of structures may require different takings.

The Regional Office (RO) should determine the appropriate type of design report to be used from the Design Procedure Manual based on the project's Category and environmental effect. One of the eight copies of the Phase I report should be sent directly to the SD with a copy of the memorandum transmitting the other

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seven to the PPRB. The S.D. will comment to the PPRB with a copy to the R.O. When appropriate S.D. will discuss the Phase I report with PPRB and the R.O. before making written comments.

The design report would follow the appropriate format from the Design Procedure Manual. It should be staple-bound, preferably with cover sheets, and have an index; the pages must be numbered.

The design report should be brief and discuss only the following items, except where circumstances require more information:

Chapter I INTRODUCTION - See Design Procedure Manual

Chapter II PROJECT IDENTIFICATION, EVOLUTION AND NEED FOR THE PROJECT.

A. Project Location and Identification

Include a general location map, usually 1" = 2000', showing the bridge site. State the legal description of the project including State Highway number, the Project Identification Number, the feature being spanned. Give the Bridge Identification Number.

B. Project Evolution

State how the need for the project was identified and give a brief description of project background.

C. Need for the Project and Resulting Objectives

The purpose of this section is to relate the needs covered by the project into general objectives.

1. Cite the history, description and geometric deficiencies of the bridge, together with relevant approach features or deficiencies.

State whether the bridge is closed, has a posted loading or if it is anticipated that a posting will be required in the near future. List any specific restrictions which may be imposed by public or private agencies such as prohibitions against school buses or fire fighting equipment. Identify vertical clearance restrictions if less than the legal minimum.

Describe the cross section of the existing highway. Give present traffic volumes in terms of both 2 way and 1 way Design Hour and AADT, with percentage of trucks.

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Include a brief statement, provided by or reviewed by the Regional planning Engineer, regarding any plans to reconstruct the highway within 20 years. Generally there should be none. If there is any likelihood that the highway will be reconstructed, justification must be made for replacement of the bridge as a separate, prior project. The statement should include the functional classification of the highway.

State that the accident record for the previous three years is attached. Indicate desirability of improving clearances, alignment or sight distances, if applicable.

2. State why the null alternative does not satisfy the identified needs.

Describe the effect on the traveling public of the loss of the bridge or of limiting loads on the bridge. There should be a brief description of feasible alternate detour routes, their capability to handle the additional traffic, the additional travel distance which will be necessary, and the problems or hazards that might thus be created.

3. Project objective and general criteria. The objective of the project is usually the replacement of the bridge in order to preserve the function of the highway, and to remove structural and geometric deficiencies.

Give the general criteria such as level of service, number of lanes, rural or urban section and need for sidewalks. The replacement structure and its new approaches must provide at least the same service to the highway user as the overall highway of which it is a part.

Chapter III DESIGN CRITERIA AND ALTERNATIVES

A. Design Criteria

This section must give the design criteria which the alternatives must meet to satisfy specific project objectives. List:

1. Degree of access control
2. Design speed
3. Geometrics (usually in tabular form)
Indicate lane, shoulder or curb to curb and sidewalk widths; give stopping and/or headlight sight distances; maximum grade and degree of curve. If bridge crosses another highway or railroad give required clearances for the feature being crossed.
4. Sections of bridge and approaches, if common to all alternatives. The bridge section normally should show deck only; note that type of supporting members and railing will be determined during structural design phase. Include curb to curb or railing-railing dimensions. (Both the project objectives and design criteria must be specified so that reviewers can evaluate design alternatives to see if they meet project objectives and thus satisfy the identified project needs.)

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B. Description of Alternatives

1. Enumerate and briefly describe those alternates which have been determined, after consideration and evaluation, to be deficient compared to the design alternates described in the succeeding section. Indicate that these discarded alternates failed to satisfy the project objective, engineering considerations and/or environmental considerations. Include in this category the null alternate and the reconstruction alternate with estimates of cost and effectiveness of continued maintenance or reconstruction, and mention consequences of continued substandard conditions, posted loadings and/or eventual loss of the structure and closure of the highway.

Variations of one or more of the feasible design alternates might be included in this category, together with an explanation of the reasons for rejecting such variations.

For replacement of existing railroad grade separation structures, the alternate of permitting a crossing at grade should be explored, and if not considered safe or feasible, should be discarded and described in this category.

2. Enumerate and describe those feasible design alternates which remain to be considered candidates for final recommendation, after the deletion of the unsatisfactory alternates described above.

Usually, only two alternates will remain: to replace the existing structure with a new structure at the same location, and to replace it at an adjacent location. If only one alternate is determined feasible after all alternates are considered, that decision should be stated and supported.

Should the replacement of an existing railroad grade separation structure with an at-grade crossing be considered safe and feasible, it should be described here. Attach an appropriate plan and highway profile of the crossing.

This section must include the following information about the feasible, alternatives, specifying whether it applies to all or only one:

3. An appropriate scale map showing proposed alternatives, existing conditions and alternatives discarded. Detours must be shown on this or a similar scale map.
4. Plans and profiles of a scale suitable to the length of the project. Show existing and replacement structures, alignment of proposed improvement and feature being spanned, and approximate right way to kings.
5. Typical sections, if sections vary with alternatives.

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6. Give 20 and 30 year projected traffic volumes in terms of both 2 way and 1 way Design Hour and AADT, with percentage of trucks. If there are intersections within the project limits include projected traffic flow diagrams with turning movements.
7. Engineering considerations including:
 - a. How the design geometrics for each alternative meet or deviate from the geometrics set under Design Criteria for the project.
 - b. The proposed bridge type should not be given unless there are specific areas of concern such as aesthetics which necessitate discussion of bridge type at this stage.
 - c. Hydraulics State that the structure's waterway opening will be sized to pass, with 2' of freeboard, a design flood of a 50-year frequency and convey, with reduced freeboard, a 100-year frequency flood or the greatest flood of record, whichever is greater. If another hydraulic design standard is applicable, such as required by a flood control project, state that standard. Describe any specific problems anticipated, and any proposed channel improvements. Indicate that consideration has been given to the effect of the new structure on the floodplain, and that final design will provide adequate safeguards. (See FHPM 6-7-3-2, Transmittal 315 and related instructions.)
 - d. Drainage and foundations: The anticipated presence or absence of drainage or foundation problems should be mentioned.
 - e. Maintenance: The permanent maintenance responsibility should be stated.
 - f. Maintenance of traffic: Traffic can usually be maintained by one of four separate methods. The first is on the existing structure while the replacement structure is constructed at an adjoining location. The second is on the existing structure, at reduced levels of service (such as one-way traffic) while the structure is replaced using stage construction methods. The third is on a temporary detour including any necessary detour structures. The fourth is by detouring to existing alternate routes. Each of these methods, if applicable to one or more of the feasible design alternates, should be considered and evaluated. Those determined to be acceptable for final recommendation should be described in some detail and shown on the plans for the design alternates, to which they apply. Those considered unsatisfactory should be described as discarded, with some brief support for that decision.
 - g. Traffic flow and safety consideration. Describe any work to alleviate problems in this area and any problems which remain.

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- h. Utilities: list those to be carried on the structure along with the owner of each. Describe any major utility relocation necessary off-structure.
- i. Landscaping: Do not discuss landscaping unless it is felt that special treatment will be required.
- j. Provisions for pedestrians and bicyclists. Occasional traffic of this type normally is accommodated in the shoulder areas of bridges.
- k. Right-of-way: Describe the extent of right-of-way taking necessary. This must also be discussed as necessary in Section C., below.

C. Social, Economic and Environmental Impacts

See the appropriate section of the Design Procedure Manual. Some bridges are, or maybe, considered historic. The most recent transmittals from the Environmental Analysis Bureau should be consulted to determine whether this must be discussed for any specific bridge.

D. Comparison of Alternatives

See the Design Procedure Manual. The costs should be listed in a table, giving highway, bridge, detour and ROW costs for each alternate.

Chapter III LIST OF AGENCIES AND PERSONS CONSULTED

See the Design Procedure Manual. This chapter is not necessary for some reports.

Appendices

See the Design Procedure Manual. For some projects it will be appropriate to include the Bridge Inspection and Condition Report. The accident report should be here.