

### 1.1.2.11 Type, Size, and Location (TS&L) Design

The end product of a TS&L design includes:

- TS&L Plan and Elevation drawing
- TS&L Estimate of structure construction cost
- TS&L Narrative

**(1) TS&L Plan and Elevation Drawing** - In its final form as part of the approved TS&L design, the TS&L Plan and Elevation drawing is produced on a half size CAD paper print. See Section 2.6, "Type, Size, and Location Plan and Elevation".

**(2) TS&L Estimate** - Normally, the TS&L Estimate of structure quantities and costs is based on a rough calculation of quantities. However, if time is short and the structure is ordinary or typical, square-foot costs may be adequate. A bridge with tall end bents would not be considered typical, and would, therefore, require a rough quantity estimate to account for the greater abutment costs.

**(3) TS&L Narrative** - A TS&L Narrative is required for each design project except those minor ones such as deck joint rehabilitations, rail retrofits, or projects. The purpose of the TS&L Narrative is to provide enough background information so that reviewers can effectively evaluate the proposed final design. The following is a general outline of possible discussion items:

- General Background:
  - Project development and justification.
  - Right-of-way restrictions.
  - Permits and restrictions.
  - Utility conflicts or restrictions.
  - Railroad clearances and restrictions.
- Geometry and layout:
  - Roadway width, ADT, grades, and alignment. (If design does not meet current AASHTO standards, note that a design exception has been or will need to be made.)
  - Sidewalks, rails, and protective fencing.
- Hydraulics:
  - Waterway openings, high water elevation, and clearances.
  - Bank or bent protection.
  - Floodway information, when appropriate.
- Foundations:
  - Piling, drilled shafts, spread footings.
  - Fills, surcharges.
  - Settlement.
  - Lateral earth or seismic loads.
  - Liquefaction potential.

### 1.1.2.11 Type, Size, and Location (TS&L) Design – (continued)

The following is a general outline of possible discussion items: - (continued)

- Structure Features:
  - Span length and span arrangement.
  - Type of superstructure.
  - Type of bents and location.
  - Type of bridge bearings
  - Accessibility to bridge bearing and joint for inspection, maintenance or replacement.
  - Alternate structure types considered and estimated costs.
  - Stage construction and detour requirements.
- Design concepts - Rationale for decisions about:
  - Building new bridge versus widening existing one.
  - Use of bridge versus culvert.
  - Foundation support assumptions.
  - Assumed pile or drilled shaft loads.
  - Assumed lateral soil pressure against end bent.
  - Seismic load assumptions.

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Many bridge replacement projects require a Biological Assessment. To aid in the process, try to address as many of the following subjects as practical.

- 1) Project timing and chronology.
- 2) Alignment and size of the new bridge in relation to the existing bridge (i.e., number of spans, length).
- 3) Quantity of impervious existing bridge surface removed and added by the new bridge.
- 4) Type of the new deck surface and construction methods.
- 5) Type of the new bridge railing and construction methods.
- 6) Proposed treatment of the runoff (i.e., number of scuppers or direct discharge drains on the old bridge vs. number of drains on the new bridge)
- 7) Number and sizes of the existing bents/footings to be removed within the OHWM and the wetted channel. Discuss the removal methods of the existing bents, footings and piles.
- 8) Number and sizes of bents/footings added for the new bridge, within the OHWM and the wetted channel. Discuss the construction methods for the new footing, bents and piles.
- 9) Type of isolation method used during construction (i.e., coffer dam).
- 10) For bridges with lead based paints, discuss the method of removal and disposal.
- 11) If a detour bridge, working bridge, or falsework are required, discuss how many bents and types of temporary supports that may be within the OHWM and wetted channel. Discuss the construction and removal methods that might be used.
- 12) Extent and duration of in-water work (i.e., heavy machinery in wetted channel).
- 13) Amount or extent of fill and/or rip-rap.
- 14) Possible staging areas and access.
- 15) Amount and type of vegetation to be removed (outside and within the OHWM).
- 16) Amount of wetland impacted.
- 17) Any planned mitigation.

Note: Even though the *Hydraulics Report* or *Foundation Report* may not be available at the time the TS&L Narrative is written, always include comments about assumptions made in consultation with the Hydraulics or Foundation Designer.