Section 6 - Preliminary Bridge Plans

These provisions generally govern submissions for the design of new bridges and structures. Refer to Section 8 of this Manual for provisions governing submissions for Reconstruction and Rehabilitation Contracts.

6.1 General

1. In the submission of Preliminary Plans, the submission should, as applicable, contain the following information:

   a. Plan and elevation of a structure showing the following:

      - elevation grades of the structure and immediate approaches
      - span lengths
      - skew
      - controlling minimum horizontal and vertical clearances (also show the actual vertical clearance obtained)
      - type of superstructure
      - location of expansion and fixed bearings
      - proposed elevations of bottom of footing shall be indicated together with the original ground line, finished ground line, and assumed rock line (if any)

   b. Typical section of bridge showing the following:

      - type, spacing and arrangement of beams
      - widths of median
      - traveled roadway
      - shoulder (or curb offset) and curb or sidewalk
      - type of railing or chain link fence
      - type of parapet
      - cross-slopes or superelevation

      A preliminary drainage design and layout arrived at through accepted means, as described in Section 22 - Deck Drainage of this Manual, shall be included in these documents.

   c. Typical section of approach roadway showing median, roadway and shoulder dimensions, and location of guide rail, if any.

   d. The plan sheet should include Notes about design loading, design allowable stresses, etc. and the specifications under which the structure is to be designed (see Subsection 6.3).

   e. The plan sheet should show the location of borings and log identification number.

   f. Foundation pile design loadings shall be noted on the preliminary plan.

   g. Profiles of roadway on the bridge and lower roadway should be shown.

   h. Location of bridge mounted signs shall be shown if information is available at the time of submission.

   i. Location of subsurface utilities and proposed utilities in the superstructure should be shown.

   j. Hydraulic and hydrologic data shall be noted on plans for waterway structures.

k. If a railroad crossing, show existing tracks, profile on tracks, proposed horizontal and vertical clearances and topography along the railroad. (A separate Railroad Agreement Plan is to be prepared in accordance with Subsection 1.4.5 of this Manual).

l. Where water crossings are involved, horizontal and vertical clearances selected should be covered in the submission. Any special inlet-outlet treatment should be shown. A copy of required permits should be included.

m. In designing the rehabilitation or reconstruction of existing bridges, substandard underclearances and load carrying restrictions are to be suitably addressed.

2. The Preliminary Submission shall include an evaluation of the proposed superstructure to determine if the structure warrants provision of an access mechanism whereby maintenance activities or inspections may be performed. If deemed warranted, the Designer shall recommend for approval to the Manager, Structural Engineering, installation of an underbridge access mechanism.

3. The Preliminary Submission shall consist of the following items:

- Preliminary Bridge Plans
- Design Recommendation Summary
- Foundation Report and Recommendation (Refer to Section 34 of this Manual)
- Construction Cost Estimate
- Seismic Retrofit Report (if applicable) (Refer to Section 38 of this Manual)
- Hydraulic and Scour Report (if applicable) (Refer to Section 39 of this Manual)
- Vessel Collision Report (if applicable) (Refer to Subsection 19.9 of this Manual)

4. Preliminary bridge plans shall be on 22 inch by 36 inch sheets and be in bound sets.

6.2 Alternate Retaining Wall Systems

The following methodology shall be followed in presenting a Preliminary Submission in which construction of alternate retaining walls is planned. Also, refer to Sections 3 and 17 of this Manual for design guidance.

1. Based on his preliminary engineering study of a project, the Designer shall recommend at the Preliminary submission if either Mechanically Stabilized Earth (MSE) or Prefabricated Modular Wall proprietary wall types; such as, Doublewal or the T-Wall system can be included in the contract preparation or if site conditions limit the type of alternate wall that can be utilized. This information should be provided in the Design Recommendation. Approved proprietary wall systems shall be listed in the Project Special Provisions. The Designer shall prepare a Control Plan, that provides sufficient information to the proprietary wall supplier, for the design of the wall system. Refer to 4. below for information that is to be provided on the Control Plan.

   Refer to Subsection 5.6 of this Manual for governing site conditions that may limit the wall type selection.

2. The Standard Specifications should be referred to for fabrication and construction requirements of approved proprietary wall systems.

3. If it is determined that only one type alternate wall system (MSE or modular wall) is suitable for a specific site, then the Control Plans may be developed with the intent that only that wall system is to be constructed. However, if it is somehow determined that only one particular MSE wall system or modular wall system is suitable for a project site, then a waiver must be obtained for use of the identified sole proprietary wall system.
4. The Sample Plans package of drawings provide an illustration of a Control Plan presentation. Standard Drawings within this Manual shall be used to provide these plans in a project. The guidance provided in Subsection 17.3 of this Manual shall also be followed in completing the Control Plan. The Control Plans shall include, but not be limited to, the following information:
   a. Plan and elevation views of the wall(s)

      The Elevation view of wall(s) shall show existing and proposed ground lines, elevations at 25 foot intervals at the top of wall and proposed ground line (used to compute quantities), wall embedment (maximum elevation at top of levelling pad) and beginning and end of wall stations.
   b. Control data for horizontal and vertical alignment
   c. Specific/nominal limits of the wall(s)
   d. Locations of existing and proposed utilities
   e. Boring locations
   f. General Notes
   g. Right of Way limits / construction easements
   h. If warranted, construction sequence requirements, traffic control, access, and stage construction sequence
   i. Work Item Quantities table
   j. Estimate of Quantities Table
   k. Limits of Common Structure Volume
   l. Limits and requirements for drainage features within the Common Structure Volume, limits and requirements which will affect the construction or stability of the wall beneath, on top of, and behind the retaining wall.
   m. At stream location, high water and normal water levels and scour protection
   n. Design parameters to establish External Stability factors, which shall include, but not be limited to, the following:
      - Nominal Bearing Resistance, Bearing Resistance Factor and Sliding Resistance Factor
      - Soil Unit Weight of Porous Fill
      - Angle of Internal Friction for the Foundation Subgrade, Retained Soils, and the Soils within the Wall System
      - Anticipated settlement
      - If required, Foundation Subgrade Treatment
      - Soil Unit Weight of Broken Stone
      - Friction Factor of Broken Stone

o. Magnitude, location and direction of external loads due to bridges, sign structures, traffic surcharge, etc.

p. Seismic criteria

q. Sections through wall showing offset control point, pay area, ditches, sidewalks, superelevation and any unusual features

r. General details showing:

- End of wall interfaces
- Wall/coping/barrier or barrier interfaces
- Drainage pipe and inlet details, slip joint details
- Compatibility with roadway plans
- Excavation, temporary sheeting, cofferdam requirements
- Architectural details (such as dimensional requirements, special wall features; such as facing finish, texture, color or planting)
- Location and size of any existing or proposed structures
- Location of overhead signs or roadway lighting
- Location and height of noise barrier, if applicable

Guide Plates 3.4-7 through 3.4-12 may be used in presenting this information.

5. Foundation Report and Recommendation

a. When alternate retaining walls are to be included in a project, the Foundation Report shall provide complete detailed information as to the reason for recommendation of alternate type retaining wall systems. The Designer shall evaluate global external stability, sliding, overturning, slope stability, bearing pressure, settlement.

b. The Report shall indicate the maximum elevation at the top of leveling pads or footings and the design foundation pressures at those elevations.

c. If soil subgrade treatment, soil enhancements and/or unsuitable material removal is required, the Report shall clarify such recommendations along with potential effects that the recommendations may have on the various alternates.

d. In order to permit the availability of the Report to the Contractor, the Designer shall assure that the most current Report is provided to the Project Manager. The Designer must verify that the copy of the Report that is to be provided to the Contractor does not include calculations.

6.3 General Notes

The following notes (as applicable) shall be provided to indicate the design and construction criteria for a project. The notes shall be shown in the right hand corner of the General Plan and Elevation Sheet for each structure. Note 10 shall be deleted from the plan sheet at the time of the final submission.

1. Design Specifications

The *AASHTO LRFD Bridge Design Specifications*, with current interims, as modified by Section 3 of the NJDOT Design Manual for Bridges and Structures. The year of the current *AASHTO LRFD Bridge Design Specifications* should be inserted.

2. Construction Specifications

   The *NJDOT Standard Specifications for Road and Bridge Construction* with current Supplemental Specifications, as modified by the Special Provisions. This note may be modified to insert the current year and to refer to any updated specifications.

3. Live Load

   AASHTO LRFD HL-93 Vehicular Live Loading or NJDOT Permit Vehicle, whichever governs.

4. Concrete Compressive Stresses

   Design Compressive Strength - f'_c
   Class A..... 4,000 psi
   Class B..... 3,000 psi

   (Insert other designations, as required, for specific project requirements.)

5. Reinforcement Steel

   ASTM A615 (Grade 60)

6. Superstructure

   a. Dead load includes a 25 lbs/sq.ft. provision for a future 2 inch thick concrete overlay protective system on the bridge deck.

   b. Structural Steel: AASHTO M 270, Grade _____

      (ASTM A 709), Grade _____) with Supplementary Requirements for Notch Toughness for all member components marked (T).

      (Refer to Section 24 of this Manual for permitted structural steel designations.)

   c. See Structural Steel Plans for Cleaning and Painting Systems, and Finish Coat Color.

   d. See Structural Steel Plans for any member or member components designated FCM's under the Fracture Control Plan.

   e. See Precast/Prestressed Concrete Beam Plan Sheets for details and notes.

7. Seismic Design Notes

   Seismic Design Category = _____
   Site Class Definition = _____

   (Section 38 of this Manual should be referred to for guidance in providing this information.)

8. Borings

   a)  Indicates location of borings.

   Log No.

9. Foundation Design Criteria

   (Summary on Project to Project basis)

- For those construction projects with pile foundations, the following information shall be provided. For such projects, the Geotechnical Engineering Unit should be contacted for verification of required plan notes or to verify if any additional notes should be provided. Reference to Subsection 16.3.2.e of this Manual is directed for additional guidance.
- Pile type, size, and the associated material properties
- Nominal Axial Compression Resistance
- Factored Axial Compression Resistance
- Nominal Uplift Resistance
- Factored Uplift Resistance
- Required Driving Resistance for Determination of the Bearing Value using PDA and CAPWAP
- Required Resistance for WEAP Analysis of the Pile Driving System
- Estimated Pile Tip Elevation
- Minimum pile Tip Elevation (only specified if necessary)

10. Estimated Cost $ _____ Based on (Insert Year) prices.