

displayed on the roadway geometric plans in both plan and profile.

Basic hydrologic conditions should be fully quantified and discussed. Analysis of preconstruction hydrologic conditions should be performed in order to evaluate hydraulics (capacity, velocity, flood over-topping elevations etc.) of any existing structures and the impacts of alternatives considered.

The engineer shall research and evaluate potential future development (20 year planning horizon) within the watershed which may have an impact on future drainage flows and ultimately the performance of existing or proposed hydraulic structures.

The engineer shall carefully document and photograph all existing drainage problems, carefully evaluate recommended solutions and assure existing conditions are not impacted by roadway improvements.

The engineer shall document drainage problems, design approaches, solutions, and initial hydraulic structures requirements in a separate Initial Drainage Study which will be included in the Appendix. A summary will be presented in the DCR.

312 SUBSURFACE INVESTIGATIONS

Once the project location, horizontal and vertical alignment and structure requirements have been generally defined, the engineer will formulate subsurface exploration and testing program. The objective of the exploration program, is to provide, specific subsurface information along successive design sections or reaches of the project. The data will allow some basic judgments to be made, i.e., the most suitable type(s) of foundations for structures and recommended pavement designs to be developed during the design phase.

In the case of either the structure borings or roadway borings, the geotechnical program will serve to reveal the type, severity and extent of geotechnical design problems.

The Geotechnical Report will assemble the results of the subsurface exploration program, analyze, and make geotechnical engineering recommendations using the field boring and lab test data. This will be presented in an engineering report, prepared by the engineer for the project and included in the Appendix. The results will be summarized in the DCR.

The Report is to contain the following information:

- Summary of previous geotechnical investigations
- description of the program undertaken to identify geotechnical and subsurface elements which affect project design
- results of surface visual observations
- groundwater data
- a summary of the information obtained from and the location diagram of the soil borings
- the general description of the subsurface geologic strata obtained from the soil borings, including any areas of unacceptable soil conditions
- particle size analysis and potential for scour
- results of any material testing
- analysis and recommendations for embankment construction including settlement and surcharging
- an analysis and preliminary recommendations for pavement structural section and foundations.

313 BRIDGE TYPE SELECTION

Selection of the most suitable type of structure involves investigating alternate superstructure and foundation types including variation of span length, structure depth and number of girders to determine the best bridge type and arrangement for a particular site. This is an iterative phase where assumptions must be made and later verified or modified during the process. Detailed design should not be performed unless it is necessary to confirm the adequacy of a concept.

When performing the concept studies the following shall be considered as a minimum:

- Cost
- Constructability
- Maintenance