3.6 Drainage/Semifinal Submission

3.6.1 General

The semifinal design is submitted when the plans are 60% to 70% complete. However, a separate drainage submission is recommended when the drainage aspects of the project appear to be complex or when the drainage facilities may involve right of way impacts. Concurrence of the drainage design by the Department for these types of projects should be obtained to ensure the project schedule is maintained. A pre-submission Quality Assurance/Control Guideline is included in Appendix A. This should be used as a guide to ensure the major aspects of the drainage design have not been overlooked. The design checklist for drainage/semifinal review found in Appendix B of this chapter provides the necessary information for the Hydraulics and Drainage Section to complete the review. The completed checklist should be included with the drainage and semifinal submission.

3.6.2 Resolution of Previous Drainage Comments

The reviewer's initial task is to check the previous comments made at the preliminary design stage and review the plans and accompanying responses to determine how the outstanding issues have been incorporated or addressed. If a comment cannot be incorporated (or the designer does not agree with a comment), then a clear response should be provided, justifying its non-inclusion.

3.6.3 Condition Survey

A condition survey should be conducted for existing drainage facilities (pipes, structures, swales, ditches) that are to remain in use within the project limits to ensure their condition is sound and replacement is not warranted. This should be performed early in the final design phase so that the proposed design includes all systems that are to be replaced. The approach and documentation with respect to verifying the condition of existing facilities that are to remain in use are discussed in Chapter 4, Appendices A and B. A separate independent report shall be included with the Drainage/Semifinal submission.

3.6.4 Drainage Computations

All roadway reconstruction projects require drainage computations. Design criteria and design elements pertinent to drainage facilities are referenced throughout this manual. Drainage design computations should include swale, outlet protection, gutter flow analysis, storm sewer design, and hydraulic gradeline (HGL) calculations as well as computations for other pertinent drainage facilities, as outlined in Chapter 1, Section 1.6. It is important to include the supporting documentation used to develop the drainage design so that the design assumptions and calculations can be verified. Drainage computations should identify structures by station and offset rather than by numerical identifier. If this is not feasible, include an index to correlate the structure with its location on the plans. Topographic mapping should be provided with the watershed areas delineated accordingly.

The drainage system should be brought to a suitable outlet. The drainage computations should show that the proposed improvements will not adversely impact the existing downstream storm system or property owners. If the existing drainage system is found inadequate, an upgrade will be

designed in conformance with the criteria outlined in this manual. Additional drainage rights may need to be acquired if upgrading the storm drainage downstream of the project is necessary.

3.6.5 Right of Way Involvement

Right of way acquisitions can prove to be one of the most expensive and time consuming aspects of a highway project's development. The designer should account for such costs and difficulties when determining suitable drainage appurtenances. Therefore the potential for new or additional drainage rights and easements should be a consideration in developing the drainage design. The existing and proposed rights should be shown on the plans. Properties affected by diversions should also be shown on the plans so that proper rights can be acquired.

3.6.6 Culverts

Chapter 8 (Culverts) discusses the specific design criteria related to culverts. The designer should also refer to Chapter 4, (Culvert Repair, Materials, and Structural Design) if the existing culvert will remain in use. Minor and small culvert design computations should be included with the documentation with a design data sheet similar to that found in Chapter 8, Appendix A.

In areas where cross culverts are being extended or replaced or where outlet protection is being proposed, a profile or cross section of the natural ground should be provided to show how the inverts will tie into the existing topography. The need for additional rights or easements should be addressed.

3.6.7 Outlet Protection

Riprap splash pads are required to dissipate the velocity and prevent erosion at the exit of a pipe. Guidelines for the design of riprap and bedding are discussed in Chapter 8, Section 8.7. Splash pads at inlets are typically not required. Riprap proposed at an inlet requires justification.

Outlet protection should be shown on the plans. A typical detail should also be included with the drawings.

3.6.8 Drainage Patterns

Existing and proposed drainage patterns with respect to pipes, ditches, channels and swales should be shown on the plans by directional flow arrows. The direction of flow should be shown 61 m (200 feet) beyond any drainage outlet, or shown to terminate by dissipation or entrance into a watercourse or body of water. This will show where the proposed drainage is discharging and establish whether additional drainage rights are required.

3.6.9 Grading Plans

Intersection grading plans should be included in the semifinal submission. The grading should be designed such that ponding and icing conditions are avoided. Inlets should be located at the low points. Include top of frame elevations on the grading plan.

3.6.10 Permits

The Hydraulics and Drainage Section reviews permit applications for Floodplain Management, Stream Channel Encroachment Lines, dam construction, and drainage diversions. Section 3.11 of this chapter discusses permit requirements. The necessary applications should be ***forwarded to the Office of Environmental Planning*** for submission to ConnDEP.

3.6.11 Temporary Drainage

Provisions for temporary drainage should be designed in accordance with the procedure outlined in Chapter 6, Section 6.15. These facilities should be designed with the same care as the permanent facilities using the reduced design discharge.

3.6.12 Meetings

There are occasions, depending on the complexity of a project, where a meeting is requested by the designer to discuss specific concerns or questions. Prior to the meeting, an agenda should be prepared by the designer to facilitate the meeting and allow the Hydraulics and Drainage Section time to review and become familiar with the material. It will also ensure that the appropriate parties are represented.