

CHAPTER 1 – INTRODUCTION

The *TDOT Design Division Drainage Manual* (herein referred to as the Manual) discusses Tennessee Department of Transportation (TDOT) policies, practices, and procedures for performing drainage design and hydraulic analyses on projects which are the responsibility of TDOT. Chapter 1 provides the purpose for the Manual, background on how the Manual was assembled, how the Manual is maintained, and provides a general project work flow regarding drainage design for TDOT projects. Chapter 2 covers general drainage policies, practice, and legal issues. Chapter 3 provides the designer information required for drainage plans. Chapter 4 discusses procedures and criteria for TDOT hydrologic analyses. Chapter 5 provides guidelines, procedures, and criteria for channels, roadway ditches, and stream relocations. Culvert design guidelines, analysis procedures, and design practices are included in Chapter 6. Storm drainage systems including storm sewers, curb and gutters, and inlet spacing design guidelines, analyses procedures, and design practices are covered in Chapter 7. Chapter 8 explores storage facility design for both detention and retention. Chapter 9 covers the selection, design, and use of energy dissipation devices. Chapter 10 provides the designer with details for the proper selection and design of erosion prevention and sediment control measures. Chapter 11 presents the procedures, methods, and mitigation measures to be used for design of stream relocation plans using natural stream design and construction methods.

SECTION 1.01 – PURPOSE

Various legislation, executive orders, and subsequent rules and regulations influence TDOT drainage design components. In most cases, these must be adhered to in order to promote safety and to obtain adequate funding for roadway projects. To assist the designer performing drainage and hydrologic design, TDOT has developed this Manual to provide a collection of applicable drainage criteria, policies, and examples. All basic design elements are included such that roadway drainage design can be accomplished with minimal assistance. However, this Manual cannot provide complete guidance on complex hydrologic or hydraulic problems. This Manual is not a substitute for experience or engineering judgment. Additional technical aspects beyond the scope of this Manual are referenced throughout the Manual.

SECTION 1.02 – BACKGROUND

Proper drainage control is an essential element of highway construction. TDOT originally provided guidance for drainage design in the *TDOT - Roadway Design Guidelines*. However, over time, further drainage design needs were recognized by the Department, and in 2001 TDOT began developing a comprehensive manual in accordance with the Department's needs. Numerous drainage manuals and guides were obtained from other states, municipalities, and organizations. Beneficial aspects of these manuals and guides were used in the production of this Manual and referenced when necessary.

The American Association of State Highway and Transportation Officials (AASHTO) produced a *Model Drainage Manual* for use by State Departments of Transportation nationwide. The *Model Drainage Manual* presents design theories, concepts, guidelines, criteria, policies, and procedures for use by the drainage engineer. The *Model Drainage Manual* has been prepared in a format suitable for direct use, with state-specific modifications, by any state DOT. The *TDOT Drainage Manual* has been prepared based on the applicable portion of the TDOT -

Roadway Design Guidelines, other state and agency guides and manuals, and the *Model Drainage Manual*. Where practical, the text and graphics in the *Model Drainage Manual* have been incorporated into the TDOT Design Division Drainage Manual with modifications to reflect TDOT policies and practices.

SECTION 1.03 – MANUAL MAINTENANCE

The Manual will be maintained by the Department and notification of any changes, revisions, and/or updates will be issued to all registered holders of the Manual.

SECTION 1.04 – GENERAL PROJECT WORK FLOW

Roadway drainage design serves two major functions: 1) to maintain surface flows crossing the right-of-way, and 2) to promote safety by efficiently removing storm water from the pavement surface. To meet these goals, the Tennessee Department of Transportation has adopted a process that allows for the orderly development of drainage design in context with other design elements and administrative functions required for the development of the project. The flowchart presented in Figure 1-1 provides a graphical overview of the process.

The process begins by identifying the overall volume of surface water runoff that flows within and through the project for the required flood frequency. As discussed in Chapter 4, there are several acceptable methods of determining these flows. To the extent possible, existing channels crossing the right-of-way will be maintained in their natural locations. If it is determined that the flows for a 50 year flood frequency at any given point exceed 500 cubic feet per second (cfs), the data related to those locations will be forwarded to the Hydraulic Section of the Structures Division. The Hydraulic Section is responsible to define the high water elevation and the size and type of structure that will be used to carry these flows through the project. The designer is responsible to size all other cross culverts for the project.

The preliminary plans, based on the approved profile, are used to define the preliminary right-of-way and permanent drainage easement requirements that are presented in a public hearing at the conclusion of the preliminary plans phase.

Detailed elements of the roadway drainage system are designed during the preparation of the Right-of-Way Plans. These elements must include temporary and permanent erosion controls to assure adequate right-of-way is acquired for the project.

Final drainage quantities are tabulated during preparation of the Construction Plans. Any requirements imposed by the environmental permitting agencies should be incorporated before the final Construction Plans are submitted. Detailed guidelines related to this general overview of the drainage design process are presented in the later chapters of this Manual. The relationship of these tasks to the stages of TDOT projects is shown in Figure 1-2.

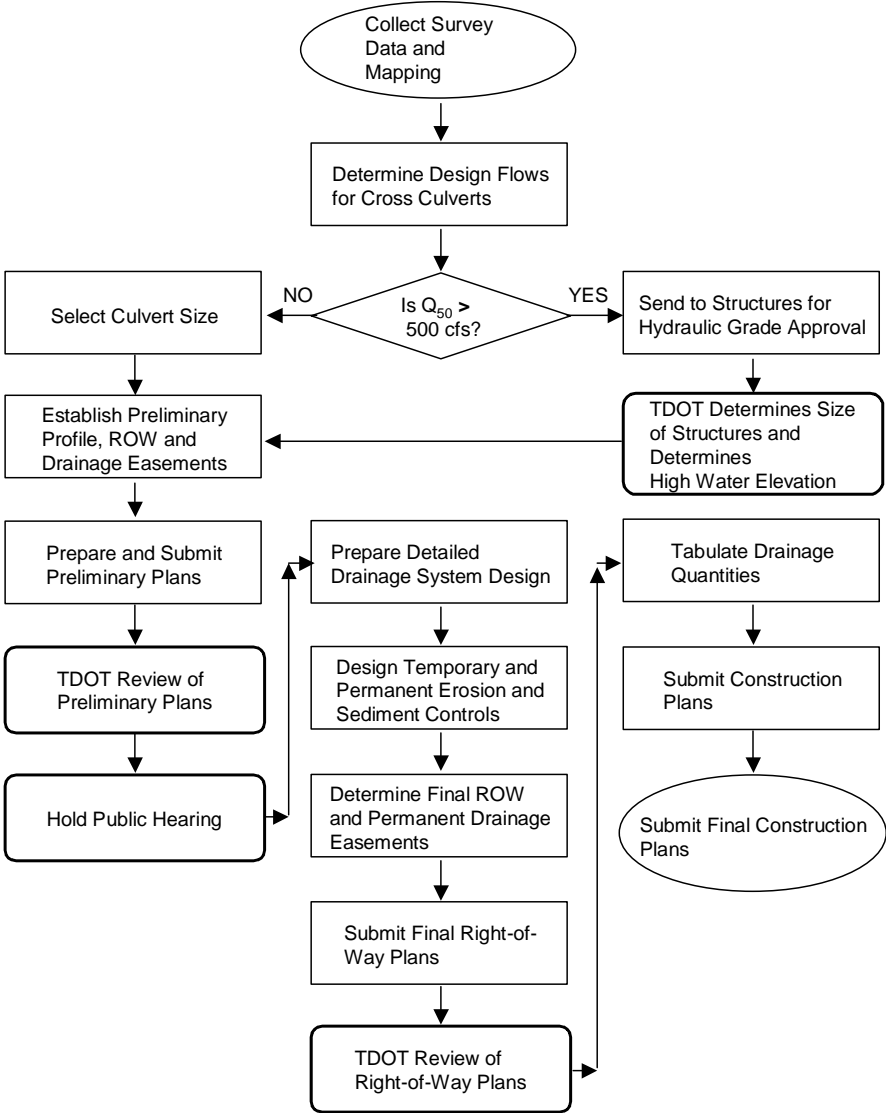


Figure 1-1
TDOT Drainage Design Flowchart

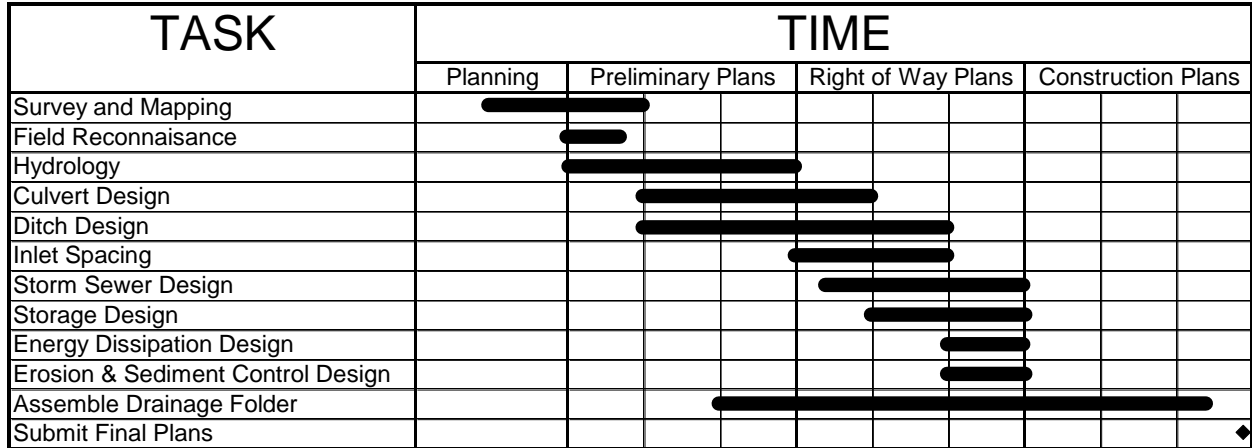


Figure 1-2
Relationship of Drainage Design Tasks to Project Stages

SECTION 1.05 – REFERENCES

American Association of State Highway and Transportation Officials. *Model Drainage Manual [Metric Edition]*. Washington, D.C. 1999.

Tennessee Department of Transportation. *Roadway Design Guidelines - English*. Nashville, TN. May, 2012.