

CHAPTER 1
INTRODUCTION

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1.1 INTRODUCTION

1.1.1 Background

In an effort to update and refine the current design tools, UDOT Central Hydraulics in cooperation with the UDOT Region Hydraulics engineers, completed the 2004 UDOT Drainage Manual. The UDOT Drainage Manual is an adaptation of the American Association of State Highway and Transportation Officials (AASHTO) Model Drainage Manual (MDM). Every chapter in the Model Drainage Manual has been reviewed and revised by UDOT's personnel to reflect our regional condition and needs. This Manual will replace the previous version edited in 1998. We tried to incorporate in this manual all pertinent information from the previous versions.

The American Association of State Highway and Transportation Officials Task Force on Hydrology and Hydraulics produced the *Model Drainage Manual* as part of their continuing work to assist the Standing Committee on Highways, Subcommittee on Design, in developing guidelines and in formulating policy. The Task Force, which was established in 1970, has also produced a series of guides that are published as the AASHTO *Highway Drainage Guidelines* (*HDG*). The drainage guidelines provide an overview of the subject area and references to appropriate design procedures.

The first edition of the *Model Drainage Manual*, which was published in 1991, was produced in cooperation with the FHWA Rural Technical Assistance Program and the Georgia Institute of Technology. The second edition of the *Manual*, published in 1999, was produced in cooperation with the Transportation Research Board, National Cooperative Highway Research Program and was developed using the International System of Units (SI). The third edition contains updated procedures and is distributed in two manuals — one manual with updated text using US Customary units and the second manual with the same updated text using the International System of Units (SI).

1.1.2 Overview

UDOT and the AASHTO Task Force has incorporated its numerous years of experience into this comprehensive drainage manual to provide guidance on most aspects of highway drainage. Design theories, concepts, manuals, policies and procedures are condensed and written for use by the designer. Where appropriate, relevant existing AASHTO guidelines, including the *HDG*, are given and/or referenced.

The *Manual* has been developed to provide the designer with a basic working knowledge of hydrology and hydraulics complete with example problems. All basic design elements are included such that the designer can design highway drainage with minimal assistance. However, this *Manual* cannot provide guidance on complex hydrologic or hydraulic problems, and it is no substitute for experience or engineering judgment.

1.1.3 Policy

Each chapter has been written and adapted to conform to UDOT design policies and state-of-the-practice design procedures.

1.1.4 Manuals and Computer Programs

References to specific computer programs, AASHTO guidelines, manuals and regulations will be noted within the *Manual*. It is expected that the designer will be knowledgeable in the use of the referenced items. This *Manual* cannot incorporate computer program user manuals or remain up-to-date with these programs and the latest drainage-related Federal regulations. The designer and issuing agencies should remain up-to-date by contacting either their local, state or federal hydrology/hydraulic departments.

1.1.5 US Customary Conversions/ Metric

In most cases, all units, equations, tables and figures in the *Manual of Instruction Part IV* are given in English Customary units. The SI unit system is used when required by common practice.

1.1.6 References

At locations in the *Manual* where the designer may need more detailed source material, references are provided. The reference section at the end of each chapter has been organized to include these source documents and a short-listing in bold print of those documents that are recommended additions to the designer's library of references.

1.2 USER INSTRUCTION

1.2.1 Instructions

The purpose of this Manual is to give guidance and a quick reference to the engineers and designers of drainage structures. The intent of this Manual is not to replace good, sound engineering judgment and design, but rather to provide additional tools and references. To use this manual to its full extent, the engineers and designers must have a good knowledge of the principles contained in this manual. UDOT is not responsible for the misuse of this Manual and consequent poor design.

1.2.2 Updates

UDOT will publish updates to the manual on line. To receive a hard copy of the updates please contact the UDOT HYDRAULICS SECTION.

1.3 INSTRUCTIONS FOR *MANUAL* USE

1.3.1 Manual Development

The *UDOT Drainage Manual* has been developed for use by State or local agencies by modifying the AASHTO Model Drainage Manual. Each chapter has been written to include all appropriate design concepts, procedures, charts, tables, graphs and example problems and applications. For example, the design procedures for culverts use design charts and formulas that were developed a number of years ago and have become standard procedures throughout the nation.

1.3.2 Recommended Policies and Criteria

The AASHTO Task Force has provided general policies or procedures, which were reviewed and accepted or changed by UDOT. Policies and procedures in the Manual of Instructions do not necessarily reflect an AASHTO consensus. Single, unified policies for all State, county, city or local agencies throughout the nation cannot be developed.

1.3.3 Deletions and Additions

Portions of the *Manual* may not apply to a specific geographic region. This Manual is the product of the modification of the AASHTO Model Drainage Manual. UDOT added specific design policies, methods, standards and other highway drainage-related topics.

1.3.4 Content Questions

Questions on a particular chapter or design procedure must be referred to the originating publications listed in the chapter references. AASHTO is not prepared to provide user services or answer questions. Information can be obtained by contacting various State and Federal agencies (e.g., USGS, NRCS, FHWA, State highway departments, water resource agencies, FEMA, USACE, and colleges and universities).

1.3.5 Errors, Additions and Updates

If errors are discovered in the *Model Drainage Manual*, they should be reported to UDOT Structure Division-Hydraulics Section, so that corrections can be made.