Texas Department of Transportation

IH 635 Managed Lanes Project
Technical Provisions

Attachment 12-2A

Amendment For The
IH-635 Drainage Criteria Manual, October 2006
(Revised February 2008)

Chapter 1 – Introduction

Section	Subheading	Modification
1.1	Purpose	Retain
1.2	Scope	Delete
1.3	Design Criteria Summary	Retain all text except criteria for pipe material, minimum pipe velocity, and maximum pipe velocity for all roadway types presented in Table 1.3.1.

Chapter 2 – Policy and Guidelines

Delete all text except: "No rise in water surface of the 100-year storm will be permitted, therefore Conditional Letters of Map Revision (CLOMR's) will not be necessary."

Chapter 3 – Data Collection, Evaluation, and Documentation

Section	Subheading	Modification
3.1	General	Delete
3.2	Hydraulic Reports	Retain
3.3	Drainage Plans Preparation	Delete
3.4	Submittals	Delete

Chapter 4 – Hydrology

Section	Subheading	Modification
4.1	General	Delete text in first paragraph. Retain text in second paragraph.
4.2	Design Frequency	Retain
4.3	Frequencies of Coincidental Occurrences	Retain
4.4	Time of Concentration	Replace first sentence in first paragraph with: "The computation of the time of concentration will be based on subdividing the flow path into three categories: overland flow (sheet flow), shallow concentrated flow (gutter flow), and conduit and/or open channel flow. Delete the first sentence in the second paragraph.
4.5	Rational Method	Retain Table 4.5.1, Table 4.5.2, Table 4.5.3 and all text except: "The TxDOT Hydraulic Design Manual provides a specific description of the theory and assumptions for the Rational Method." Replace " Each city within the IH 635 corridor has determined the rainfall intensity for various storm events. The values determined by the Cities are published in their respective drainage manuals. A comparison made between the intensities published in these manuals and those computed using TxDOT's criteria revealed that the Cities' 100-year intensities were generally lower than the 25-year intensities computed by TxDOT's criteria for times of concentration less than 20 minutes. Therefore, the rainfall intensity to be used for the IH 635 corridor is based on the following equation from the TxDOT manual:" with "The rainfall intensity to be used for the IH 635 corridor is based on the following equation:"
4.6	NRCS Runoff Curve Number Method	Retain Table 4.6.1 and replace text with the following: "The Natural Resources Conservation Services Runoff Curve Number Method (NRCS RCN Method) with a TY II 15-minute rainfall distribution shall be used to compute runoff for drainage areas greater than 200 acres. With any modeling software, the computational interval shall not exceed one-third of the shortest lag time of any basin in the model. Table 4.6.1 summarizes the

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		curve numbers that are to be used for the IH 635 corridor."
4.7	Flood Hydrograph Routing Methods	Retain all text except: "A detailed description of Flood Hydrograph Routing techniques can be found in Chapter 5, Section 9 of the TxDOT Hydraulic Design Manual and "TxDOT approved."

Chapter 5 – Hydraulic Crossing

Section	Subheading	Modification
5.1	General	Retain all text except: "A detailed discussion of hydraulic principles and theory can be found in Chapter 6 of the TxDOT Hydraulic Design Manual."
5.2	Survey	Retain
5.3	Roughness Coefficients	Retain
5.4	Requirements	Retain all text except: "In addition to complying with the USACE's requirements and TxDOT's requirements".
5.5	Channels	Delete all except Table 5.5.1.
5.6	Stream Analysis	Delete

Chapter 6 – Storm Drainage Systems

Section	Subheading	Modification
6.1	General	Delete
6.2	Design Frequencies	Retain all text except: "Critical elevations are given in Sections 6.5 and 6.7."
6.3	Runoff Calculations	Delete all text except: "Storm drain design should maintain the pre-project drainage boundaries when possible to avoid diverting runoff flows from one major watershed to another."
6.4	Pavement Drainage	Retain Table 6.4.1 and all text except: "Gutter flow and ponding spread should be calculated using the method's given in Chapter 10 Section 4 of the TxDOT Hydraulic Design Manual."
6.5	Storm Drain Inlets	Delete all text except: "Dallas Area Rapid Transit (DART) light rail crossings, inlets shall be coordinated with the street profile so that no runoff enters the trackway."
6.6	Location of Storm Drain Appurtenances / Conduit Runs	Delete
6.7	Conduit Systems	Retain all except delete the text in Table 6.7.1: "D-loads calculated according to Chapter 14 in the TxDOT Hydraulic Design Manual" and replace the text in Table 6.7.1: "Inlets – meet critical elevation requirements listed in Table 6.5.2 and 6.5.3" with the text: "Curb inlets and combination curb & grate inlets – a minimum of 1.0' below gutter depression. Grate inlets – a minimum of 1.0' below top of grate. Slotted drain – a minimum of 1.0' below guide opening."
6.8	Roadside Channels	Retain Table 6.8.1, Figure 6.8.1, and all text except: "and in Chapter 7, Section 3 of the TxDOT Hydraulic Design Manual."
6.9	Head Losses	Retain
6.10	Output	Delete

Chapter 7 – Culverts

Section	Subheading	Modification
7.1	General	Delete all text except: "Refer to Table 5.3.1 for Channel roughness coefficients to be used in IH 635 corridor." And "The

Section	Subheading	Modification
		following discussion clarifies these sections as they relate specifically to the IH 635 corridor."
7.2	Runoff Calculations	Retain
7.3	Tailwater Determination	Retain
7.3.1	Culverts That Tie Into a Downstream Channel	Retain all text except first sentence.
7.3.2	Culverts That Tie Into a Closed System	Retain
7.4	Hydraulic Coefficients	Retain
7.5	Headwater	Retain all text except: "Refer to Chapter 8 of TxDOT's Hydraulic Design Manual for headwater computation procedure."
7.6	Culvert Sections	Retain all text except the last 2 sentences in the second paragraph.
7.7	Culvert Velocity	Retain all text except: "Methods of reducing the proposed velocities are discussed in Chapter 8, Section 5 of TxDOT's Hydraulic Design Manual."
7.8	Output	Delete

Chapter 8 – Bridges

Section	Subheading	Modification
8.1	General	Delete all text except the first and second sentence.
8.2	Runoff Calculations	Retain
8.3	Bridge Sections	Retain
8.4	Hydraulic Operation	Retain all text except: "Headwater shall be determined with methods listed in Chapter 9 Section 4 of TxDOT's Hydraulic Design Manual."
8.5	Bridge Scour	Delete
8.6	Output	Replace all text with the following: "In the IH 635 corridor, HEC-RAS will be used for hydraulic modeling, except where an existing HEC-2 hydraulic model is available."