



MINNESOTA DEPARTMENT OF TRANSPORTATION
Engineering Services Division
Technical Memorandum No. 15-10-B-02
December 8, 2015

To: Electronic Distribution Recipients
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Subject: Use of Atlas 14 Volume 8 Precipitation Frequency Estimates

Expiration

This Technical Memorandum supersedes Technical Memorandum 13-08-B-04 and will expire December 8, 2020, unless superseded prior to this date or placed into the MnDOT Drainage manual.

Implementation

The guidelines contained in this Memorandum are effective immediately for trunk highway projects. Continue to use Atlas 14 precipitation depths or intensities for all trunk highway projects.

For trunk highway projects where National Resources Conservation Service (NRCS) hydrology methods are used, use the Atlas 14 rainfall distribution or the NRCS MSE 3 rainfall distribution. Designs in progress will need District Hydraulic Engineer approval to use a rainfall distribution other than as stated in this Technical Memorandum for projects let prior to 12-31-2017. All projects let after 12-31-2017 must follow this technical memorandum if using rainfall-runoff based design flows.

Local road authorities are encouraged to adopt these or similar guidelines.

Introduction

In 2013, a Technical Memorandum was issued to address using the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation depths. This Technical Memorandum is being issued to update the recommendation because the NRCS has recently published recommendations for rainfall distributions to use with Atlas 14 data. The NRCS Type II rainfall distribution referenced and allowed in the 2013 Technical Memorandum is no longer recommended by the NRCS and MnDOT will discontinue using it.

Purpose

This Technical Memorandum updates MnDOT design precipitation criteria to use a design rainfall distribution derived from Atlas 14 or recommended by the NRCS. This Technical Memorandum continues the use of the Atlas 14 precipitation depths and intensities. This replaces the design precipitation data in the Drainage Manual (2000).

Guidelines

Use Atlas 14 Precipitation Frequency Estimates when using rainfall-runoff models to compute hydrology for the design of hydraulic infrastructure. The Atlas 14 data is obtained from NOAA's Precipitation Frequency Data Server (PFDS) at <http://hdsc.nes.noaa.gov/hdsc/rfds/>.

Rational Method

Use the precipitation intensities from Atlas 14 for the project location to develop a project Intensity-Duration-Frequency (IDF) curve, or use the Atlas 14 regionalized IDF values developed by MnDOT with the Rational Method to calculate flow.

NRCS Method

Use the rainfall distribution derived from Atlas 14 data or use the NRCS MSE 3 rainfall distribution with the NRCS rainfall/runoff hydrology method. Do not use the NRCS Type II rainfall distribution. Use the Atlas 14 depth for the project location or the Minnesota NRCS Atlas 14 county average depth when the 24 hour precipitation depth is used. Use the standard NRCS dimensionless unit hydrograph with the peak rate factor of 484.

For some rural drainage areas, the Minnesota NRCS MSE 3 MN (MSE 3 Rainfall Distribution and dimensionless unit hydrograph with peak rate factor of 400) methodology and Minnesota NRCS Time of Concentration methodology recommendations may be used to determine flow when all of the conditions below are met:

- Drainage area is rural
- Drainage area is not steep
- Predicted flows are consistent with historical observations at the site

Further guidance on the NRCS methodology is available from the Minnesota NRCS Office at:
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mn/technical/?cid=nrcs142p2_023722

Questions

Any questions regarding the technical provisions of this Technical Memorandum can be addressed to the following:

- **Andrea Hendrickson, State Hydraulics Engineer at (651) 366-4466**

Any questions regarding publication of this Technical Memorandum should be referred to the Design Standards Unit, DesignStandards.DOT@state.mn.us. A link to all active and historical Technical Memoranda can be found at <http://techmemos.dot.state.mn.us/techmemo.aspx>.

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