



Using Atlas 14 – Precipitation Data Frequency Server

April 23, 2013
MnDOT Bridge Hydraulics

Your Destination...Our Priority



NOAA Atlas 14

- ▶ Web based tool to access site specific precipitation frequency data
 - Depth – Duration – Frequency
 - Intensity – Duration – Frequency
 - Cartographic Maps
 - GIS Data
- ▶ The data supersedes TP-40, Hydro-35, and MnDOT Drainage Manual for design precipitation

<http://hdsc.nws.noaa.gov/hdsc/pfds/>



Impacts for Transportation System

Precipitation Frequency data is used with rainfall/runoff methods

- ▶ Ponds, Roadway Culverts, some FIS studies for smaller streams typically use the 24 hour precipitation
- ▶ Storm Drains and Catch Basin Spacing use design rainfall Intensity–Duration–Frequency with Rational Method

Does not affect statistical flow models:

- ▶ Bridges, stream culverts, FIS studies for larger streams/rivers typically use stream gauge analysis or USGS Regression Equations





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NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: MN

DATA DESCRIPTION

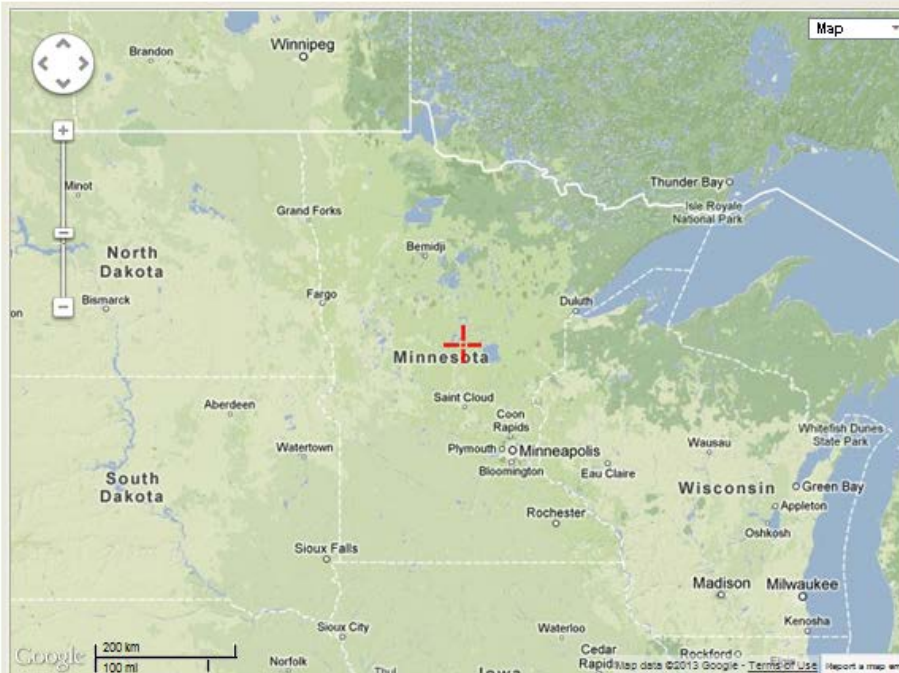
Data type: Units: Time series type:

SELECT LOCATION

1. Manually:

- a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude:
- b) Select station (click here for a list of stations used in frequency analysis for MN):

2. Use map:



- a) Select location
(move crosshair or double click)
- b) Click on station icon
☐ show stations on map

LOCATION INFORMATION:

Name: Brainerd, Minnesota, US*
Latitude: 46.3581
Longitude: -94.2006
Elevation: 1217ft*

* source: Google Maps

► http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=mn





NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: MN

DATA DESCRIPTION

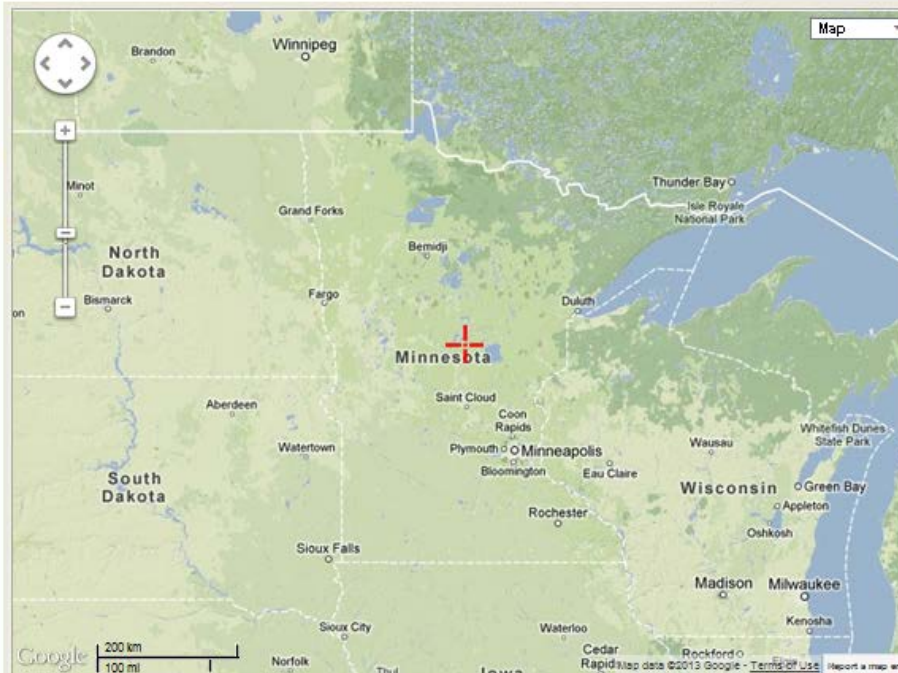
Data type: Units: Time series type:

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Data Description:

Select precipitation depth, English and partial duration

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: IL

DATA DESCRIPTION

Data type: Units: Time series type:

SELECT LOCATION

1. Manually:





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DATA DESCRIPTION

Data type: precipitation depth Units: English Time series type: partial duration

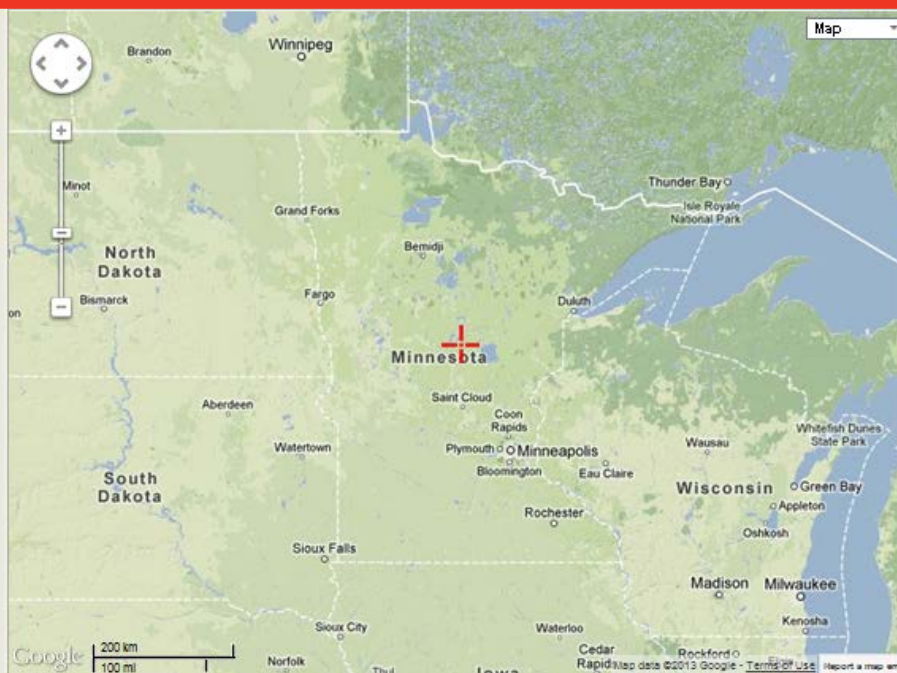
SELECT LOCATION

1. Manually:

a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude: submit

b) Select station (click here for a list of stations used in frequency analysis for MN): select station

2. Use map:



- a) Select location
(move crosshair or double click)
- b) Click on station icon
(☐ show stations on map)

LOCATION INFORMATION:

Name: Brainerd, Minnesota, US*

Latitude: 46.3581

Longitude: -94.2006

Elevation: 1217ft*

* source: Google Maps

► http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=mn



Select Location – Manual and Map Options

Use one of these options to select location

Manual

- ▶ Enter Location by typing in Latitude or Longitude

SELECT LOCATION

1. Manually:

a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude:

b) Select station ([click here for a list of stations used in frequency analysis for MN](#)):

- ▶ Select nearby station from drop-down list – can turn on station locations on map

SELECT LOCATION

1. Manually:

a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude:

b) Select station ([click here for a list of stations used in frequency analysis for MN](#)):

2. Use map:

☐ Little Falls ☐ Mille Lacs Kathio State Park ☐ State Park

SCHILLIN (80-0295)
SANDY LAKE DAM LIBBY (21-7460)
SANDY_LA (80-0071)
SANTIAGO 3 E (21-7502)
SCHAUER (80-0280)
SCHILLIN (80-0295)
SHERBURN 3 WSW (21-7602)



Select Location – Map Option

NOAA's National Weather Service
Hydrometeorological Design Studies Center
Precipitation Frequency Data Server (PFDS)

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DATA DESCRIPTION

Data type: precipitation depth Units: english Time series type: partial duration

SELECT LOCATION

1. Manually:

a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude: submit

b) Select station (click here for a list of stations used in frequency analysis for MN): select station

2. Use map:

Map

a) Select location (move crosshair or double click on icon on map)

Latitude: 40.0001
Longitude: -94.2006
Elevation: 1217ft*

* source: Google Maps

Move cross-hairs to approximate project location – grab with mouse and pull, or double click on location



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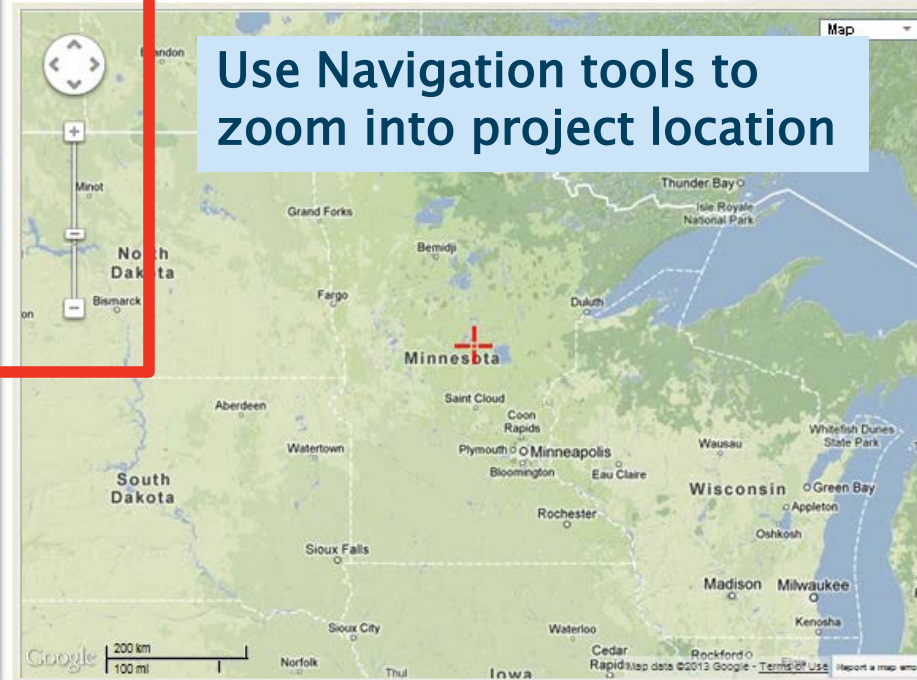
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[List-server](#)**NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: MN****DATA DESCRIPTION**

Data type: Units: Time series type:

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- a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude:
- b) Select station ([click here for a list of stations used in frequency analysis for MN](#)):

2. Use map:



a) Select location
(move crosshair or double click)

b) Click on station icon
(☐ show stations on map)

LOCATION INFORMATION:
Name: Brainerd, Minnesota, US*
Latitude: 46.3581
Longitude: -94.2008
Elevation: 1217ft*

* source: Google Maps



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- a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude:
b) Select station ([click here for a list of stations used in frequency analysis for MN](#)):

2. Use map:

a) Select location
(move crosshair or double click)
in
map)

LOCATION INFORMATION:
Name: Saint Paul, Minnesota, US*
Latitude: 44.9971
Longitude: -92.9537
Elevation: 1001ft*

* source: Google Maps

Move cross-hairs
to project location
– grab with mouse
and pull, or double
click on location

**POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION**

Depth/Duration/Frequency at bottom of page along with 90% confidence interval

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 8, Version 2

PF tabular PF graphical Supplementary information [Print Page](#)

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)¹

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.360 (0.279-0.468)	0.425 (0.330-0.554)	0.537 (0.415-0.700)	0.633 (0.487-0.827)	0.771 (0.576-1.04)	0.882 (0.644-1.19)	0.987 (0.700-1.47)	1.12 (0.759-1.56)	1.28 (0.839-1.83)	1.41 (0.900-2.03)
10-min	0.527 (0.409-0.685)	0.623 (0.483-0.811)	0.786 (0.607-1.02)	0.927 (0.712-1.21)	1.13 (0.844-1.52)	1.29 (0.943-1.75)	1.49 (1.00-2.29)	1.64 (1.11-2.29)	1.88 (1.23-2.68)	2.07 (1.32-2.97)
15-min	0.643 (0.499-0.836)	0.760 (0.589-0.988)	0.959 (0.741-1.25)	1.13 (0.869-1.48)	1.38 (1.03-1.85)	1.58 (1.15-2.13)	1.83 (1.26-2.65)	2.00 (1.36-2.79)	2.29 (1.50-3.26)	2.52 (1.61-3.62)
30-min	0.897 (0.696-1.17)	1.07 (0.828-1.39)	1.36 (1.05-1.77)	1.61 (1.24-2.10)	1.96 (1.47-2.64)	2.25 (1.64-3.04)	2.61 (1.80-3.69)	2.85 (1.94-3.99)	3.28 (2.14-4.66)	3.61 (2.30-5.17)
60-min	1.17 (0.908-1.52)	1.38 (1.07-1.80)	1.76 (1.36-2.29)	2.11 (1.62-2.76)	2.64 (1.99-3.58)	3.09 (2.26-4.21)	3.59 (2.50-5.04)	4.09 (2.79-5.76)	4.83 (3.17-6.92)	5.44 (3.46-7.80)
2-hr	1.44 (1.13-1.85)	1.69 (1.33-2.18)	2.16 (1.69-2.79)	2.61 (2.03-3.37)	3.31 (2.54-4.48)	3.92 (2.92-5.31)	4.59 (3.30-6.40)	5.33 (3.68-7.45)	6.39 (4.25-9.10)	7.27 (4.68-10.3)
3-hr	1.61 (1.28-2.06)	1.88 (1.48-2.39)	2.40 (1.89-3.06)	2.92 (2.28-3.74)	3.75 (2.91-5.08)	4.50 (3.38-6.09)	5.36 (3.80-7.50)	6.27 (4.36-8.75)	7.64 (5.11-10.8)	8.78 (5.68-12.4)
6-hr	1.89 (1.52-2.38)	2.18 (1.75-2.75)	2.79 (2.22-3.51)	3.40 (2.70-4.30)	4.42 (3.48-5.94)	5.34 (4.07-7.17)	6.31 (4.50-8.79)	7.56 (5.33-10.5)	9.31 (6.30-13.1)	10.8 (7.04-15.1)
12-hr	2.12 (1.72-2.63)	2.48 (2.01-3.08)	3.19 (2.57-3.97)	3.88 (3.11-4.84)	4.97 (3.93-6.54)	5.93 (4.55-7.83)	7.00 (5.18-9.39)	8.18 (5.81-11.2)	9.91 (6.77-13.8)	11.3 (7.49-15.8)
24-hr	2.85 (2.37-3.44)	3.17 (2.63-3.83)	3.83 (3.17-4.64)	4.50 (3.70-5.47)	5.61 (4.56-7.22)	6.61 (5.21-8.54)	7.74 (5.88-10.2)	8.61 (6.19-11.7)	10.4 (7.20-14.4)	11.9 (7.96-16.5)
2-day	2.85 (2.37-3.44)	3.17 (2.63-3.83)	3.83 (3.17-4.64)	4.50 (3.70-5.47)	5.61 (4.56-7.22)	6.61 (5.21-8.54)	7.74 (5.88-10.2)	9.02 (6.56-12.1)	10.9 (7.62-15.0)	12.5 (8.41-17.1)
3-day	3.14 (2.63-3.76)	3.44 (2.88-4.13)	4.09 (3.41-4.91)	4.75 (3.94-5.73)	5.86 (4.80-7.49)	6.87 (5.45-8.82)	8.02 (6.13-10.5)	9.31 (6.82-12.4)	11.2 (7.90-15.3)	12.9 (8.71-17.5)



Go to Bottom of Table to export Table as a csv file

	(3.89-4.46)	(4.63-5.29)	(5.51-6.30)	(6.19-7.08)	(7.09-8.16)	(7.78-9.02)	(8.47-9.92)	(9.17-10.9)
20-day	5.65 (5.30-6.02)	6.71 (6.30-7.15)	7.94 (7.46-8.47)	8.88 (8.33-9.47)	10.1 (9.48-10.8)	11.1 (10.3-11.9)	12.1 (11.2-13.0)	13.1 (12.1-14.1)
30-day	6.97 (6.56-7.40)	8.25 (7.77-8.76)	9.65 (9.09-10.3)	10.7 (10.1-11.4)	12.0 (11.3-12.8)	13.1 (12.2-13.9)	14.1 (13.1-15.0)	15.1 (14.0-16.2)
45-day	8.79 (8.28-9.31)	10.4 (9.80-11.0)	12.1 (11.4-12.8)	13.3 (12.6-14.1)	14.9 (14.1-15.9)	16.2 (15.2-17.2)	17.4 (16.2-18.6)	18.6 (17.3-19.9)
60-day	10.6 (10.0-11.2)	12.5 (11.8-13.2)	14.4 (13.6-15.2)	15.8 (14.9-16.7)	17.6 (16.6-18.6)	18.9 (17.8-20.0)	20.2 (18.9-21.4)	21.4 (20.0-22.9)

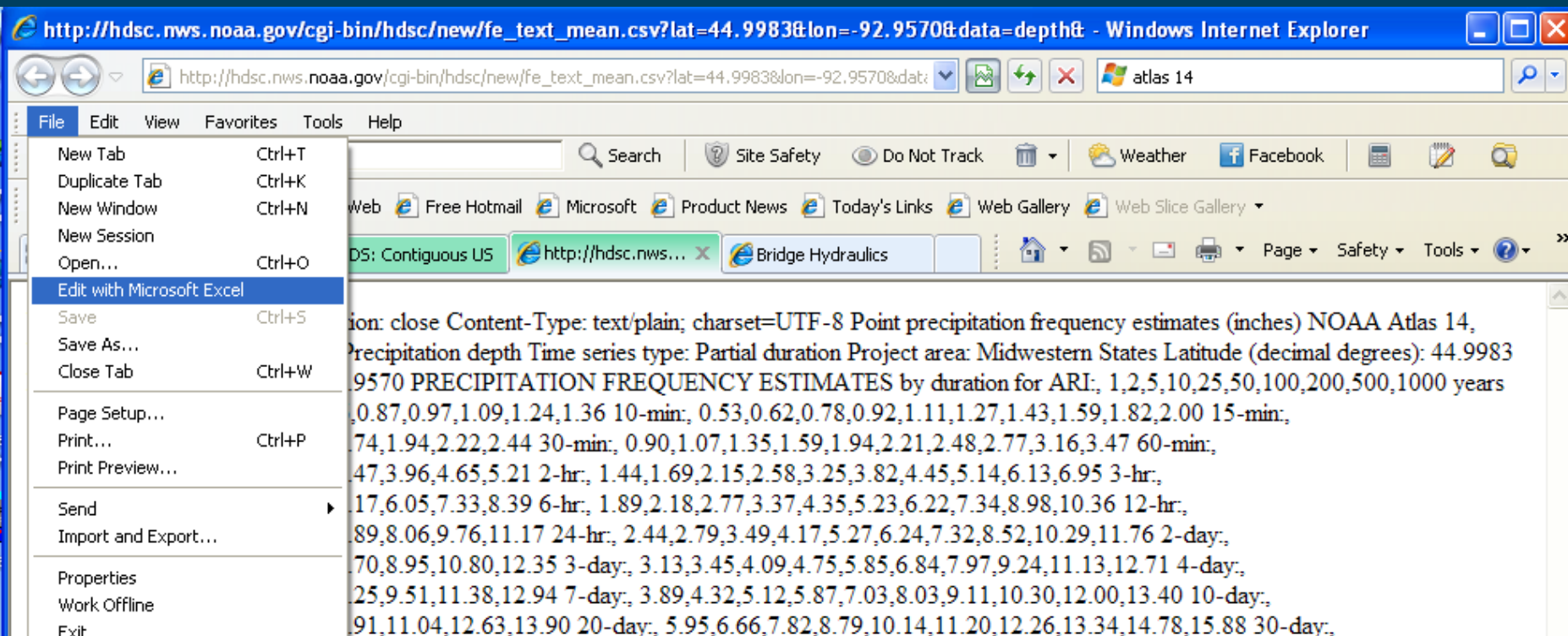
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in csv format: precipitation frequency estimates Submit

Main Link Categories:



Should get screen with data, select File > Save As (Text or Plain Text) or Edit with Microsoft Excel– output format may vary depending on Browser



Helpsheet for saving data from internet explorer v8 at:

http://www.dot.state.mn.us/bridge/hydraulics/atlas14/pdf/Atlas_14_DownloadingDataUsingInternetExplorer8.pdf



Atlas 14 – Rainfall Intensity

- ▶ Rainfall Data can be displayed/exported as intensity (in/hr) for Rational Method Analysis

DATA DESCRIPTION

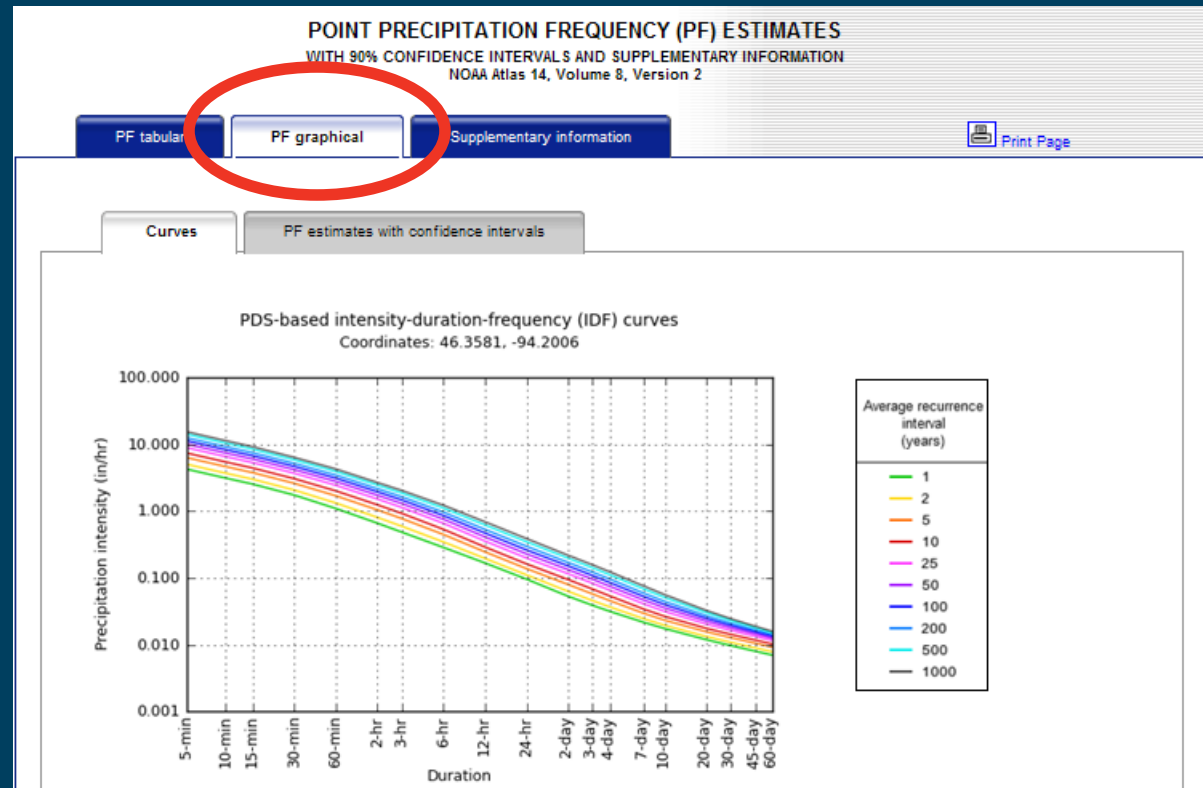
Data type: Units: Time series type:

SELECT LOCATION



Atlas 14 – Graphical Data

Graphics of
Curves for
Depth/
Intensity
Duration
Frequency are
available from
the PF
Graphical tab



Atlas 14 – Supplementary Information

Documentation,
Maps, GIS data
and other
analysis
available on the
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POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 2, Version 2

PF tabular PF graphical **Supplementary information**  Print Page

I. Document
[Click here](#) for this volume's document.

II. PF in GIS format
Spatially interpolated precipitation frequency estimates (with upper and lower bounds of the 90% confidence interval) area available in GIS compatible format (ascii file). For default download page [click here](#).
Select: Average recurrence interval: 2-year duration: 60-minute set: Precipitation frequency estimates

III. PF cartographic maps
Cartographic maps of precipitation frequency estimates were created for selected average recurrence intervals and durations. We recommend that these color maps are used as visual aids only. For default cartographic maps' page [click here](#).
Select: average recurrence interval: 2-year duration: 60-min

IV. Temporal distributions
Temporal distributions are provided for 6-hour, 12-hour, 24-hour, and 96-hour durations. The temporal distributions for the duration are expressed in probability terms as cumulative percentages of precipitation totals (see documentation for more information). To provide detailed information on the varying temporal distributions, separate temporal distributions were derived for four precipitation cases defined by the duration quartile in which the greatest percentage of the total precipitation occurred.
Select duration: 24-hour



Resources

- ▶ Atlas 14 Resource Website on internal MnDOT Bridge Hydraulics

<http://ihub/bridge/hydraulics/atlas14/index.html>

- ▶ Atlas 14 Resource Website on external MnDOT Bridge Hydraulics

<http://www.dot.state.mn.us/bridge/hydraulics/atlas14/index.html>

