

# CDOT Workflow - Creating a Rainfall Data File

This document describes the procedures for creating an IDF rainfall data file that is used by InRoads Storm & Sanitary. Creating the data for the IDF file requires the use of two Excel spreadsheets; the UD\_Rain\_v1.01.xlsm and the InRoads Rainfall Data.xlsx. The UD\_Rain\_v1.01.xlsm spreadsheet computes the actual data and the InRoads Rainfall Data.xlsx formats the data into a form usable by Storm & Sanitary.

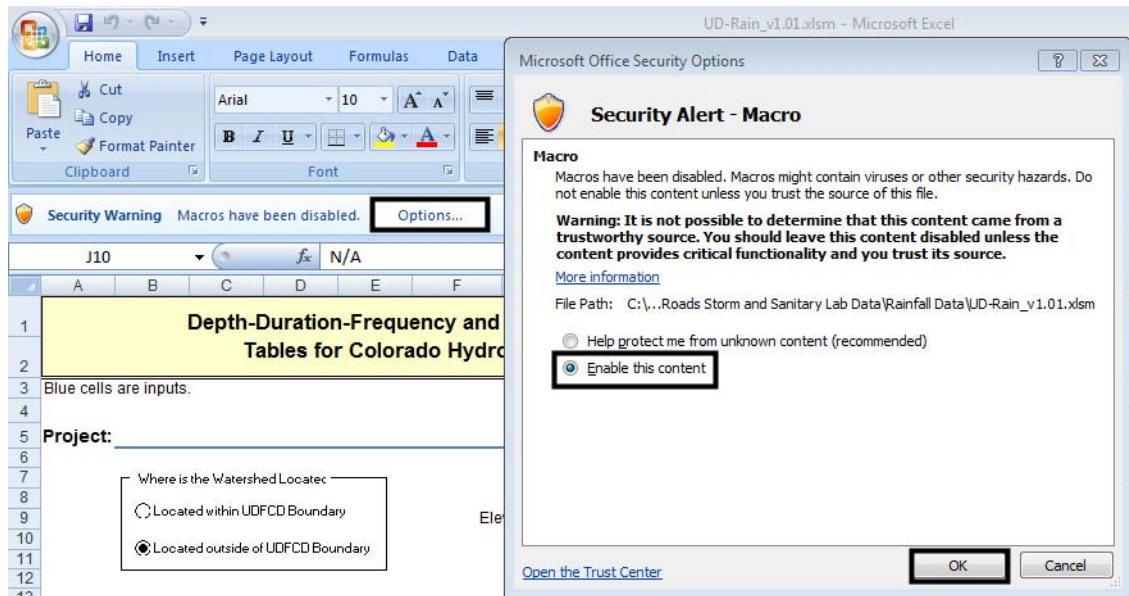
## Creating Rainfall Data

The spreadsheet UD\_Rain\_v1.01.xlsm to compute the rainfall data. This spreadsheet is provided by the Urban Drainage and Flood Control District. Precipitation frequency maps are also used to fill out the spreadsheet.

1. Open the *UD\_Rain\_v1.01.xlsm*, the *InRoads Rainfall Data.xlsx*, and the *#####HYDR\_Rainfall\_Data.idf* files.

**Note:** Open the *#####HYDR\_Rainfall\_Data.idf* using Notepad. Using Word will add formatting to the file that InRoads Storm & Sanitary cannot read.

2. In the *UD\_Rain\_v1.01.xlsm* spreadsheet, <D> the **Options** button.
3. In the **Microsoft Office Security Options** dialog box, toggle on **Enable this content** and <D> **OK**. This allows data to be entered into the spreadsheet.

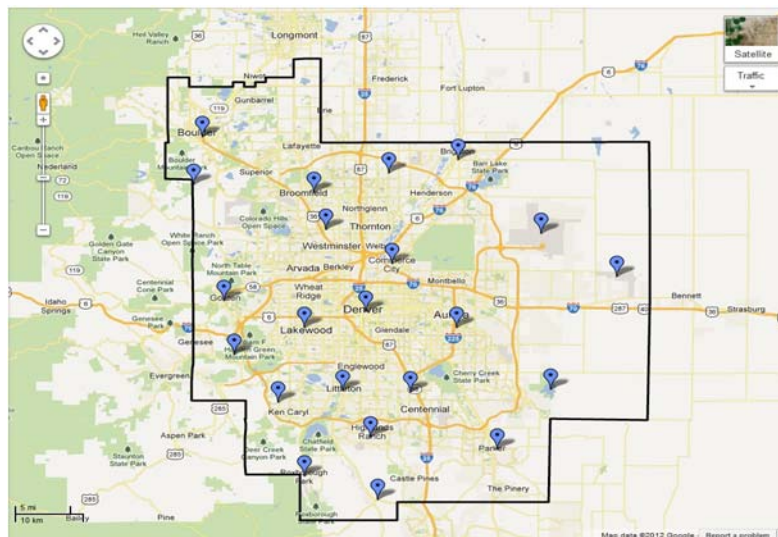


4. <D> on the DDF & IDF Tables worksheet.

5. Set the Where is the Watershed Located toggle.

	A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Depth-Duration-Frequency and Intensity-Duration-Frequency Tables for Colorado Hydrologic Zones 1 through 4</b>											
2												
3	Blue cells are inputs.											
4											<a href="#">Help filling out this worksheet</a>	
5	<b>Project:</b>											
6												
7												
8	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>Where is the Watershed Located</p> <p><input type="radio"/> Located within UDFCD Boundary</p> <p><input checked="" type="radio"/> Located outside of UDFCD Boundary</p> </div>											
9	Hydrologic Zone (1, 2, 3, or 4) = <input type="text" value="3"/> (see map) Elevation at Center of Watershed = <input type="text" value="5,300"/> ft Watershed Area (Optional) = <input type="text" value="N/A"/> sq. mi.											
10	<a href="#">Clear Worksheet</a>											
11												
12												
13												
14	(Optional) Select a location within the UDFCD boundary: <input type="text"/>											
15												

**Note:** The UDFCD Boundary covers the Denver metro area from Boulder to Castle Rock and from Golden to the Front Range Airport. If the project in question is in this region, set the **Where is the Watershed Located** toggle to **Located within the UDFCD Boundary**. Use the map displayed in the spreadsheet to determine if the project is within the boundary.



## Projects Outside the UDFCD Boundary

- If your project is outside the Denver Metro area, key in the Hydrologic Zone as indicated on the map at the right.

Blue cells are inputs.

Help filling out this worksheet

Project:

Where is the Watershed Located:

Located within UDFCD Boundary

Located outside of UDFCD Bounds

Hydrologic Zone (1, 2, 3, or 4) = 3 (see map)

Elevation at Center of Watershed = [ ] ft

Watershed Area (Optional) = [ ] sq. mi.

Clear Worksheet

(Optional) Select a location within the UDFCD bounds: [ ]

1. Rainfall Depth-Duration-Frequency Table

If within the UDFCD Boundary, Enter the 1-hour and 6-hour rainfall depths from the USDCM Volume I.

Otherwise, Enter the 6-hour and 24-hour rainfall depths from the NOAA Atlas 2 Volume III.

Return Period	Rainfall Depth in Inches at Time Duration								
	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	24-hr
2-yr	0.16	0.25	0.31	0.36	0.55	0.64	0.71	0.90	1.20
5-yr	0.22	0.35	0.44	0.50	0.77	0.88	0.97	1.20	1.60
10-yr	0.28	0.41	0.52	0.60	0.91	1.01	1.09	1.30	1.80
25-yr	0.31	0.49	0.62	0.72	1.09	1.22	1.33	1.60	2.10

- Open the Internet Explorer and navigate to the [http://hdsc.nws.noaa.gov/hdsc/pfds/pfds\\_map\\_cont.html?bkmrk=co](http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co) website. This site has an interactive map that provides data from collection stations across Colorado.
- Move the cursor on to the red "+". <D> and hold then drag the "+" to the approximate location of the project.



- Use the scale slider to zoom into the area. This zoom centers on the location of the “+”.



- Adjust the location of the “+” as needed.
- Once the “+” is positioned, enter the elevation information from the map into the *UD\_Rain\_v1.01.xlsm* spreadsheet.

**Depth-Duration-Frequency and Intensity-Duration-Frequency Tables for Colorado Hydrologic Zones 1 through 4**

Blue cells are inputs.

Project:

Where is the Watershed Located?

- Located within UD/CFD Boundary
- Located outside of UD/CFD Bounds

Hydrologic Zone (1, 2, 3, or 4):

Elevation at Center of Watershed (Optional):

(Optional) Select a location within the UD/CFD bounds:

1. Rainfall Depth-Duration-Frequency Table

LOCATION INFORMATION:  
 Name: MAYBELL, Colorado, US\*  
 Latitude: 40.5470  
 Longitude: -108.1800  
 Elevation: 5884 ft\*

- From the website, transcribe the precipitation frequency data to the *UD\_Rain\_v1.01.xlsm* spreadsheet. Use the 6-hr and 24-hr rows for the 2, 5, 10, 25, 50, and 100 columns.

The screenshot shows the 'UD\_Rain\_v1.01.xlsm' spreadsheet. The left pane displays the 'Depth-Duration-Frequency and Intensity-Duration-Frequency Tables for Colorado Hydrologic Zones 1 through 4'. It includes a 'Project' section with a map location, 'Where is the Watershed Location?' options (Inside/Outside UDFCD Boundary), 'Hydrologic Zone' (1, 2, 3, or 4), 'Elevation of Center of Watershed' (ft or m), and 'Watershed Area (Optional)'. Below this is a 'Rainfall Depth-Duration-Frequency Table' with columns for 'Period' and 'Rainfall Depth in Inches @ Time Duration' (5-min, 15-min, 30-min, 1-hr, 3-hr, 6-hr, 24-hr). The right pane shows a 'PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)' table. The table has columns for 'Duration' (5 min, 10 min, 15 min, 30 min, 60 min, 2-hr, 3-hr, 6-hr, 12-hr, 24-hr, 2-day, 3-day) and 'Average recurrence interval (years)' (1, 2, 5, 10, 25, 50, 100, 200, 500, 1000). The 6-hr and 24-hr rows are highlighted in the original image.

Another option for getting data from the website is from the data reporting station.

- From the website, toggle on b) Click on station icon. This displays the stations as green squares on the map.
- <D> on the square closest to the project location.
- Fill out the *UD\_Rain\_v1.01.xlsm* spreadsheet as described in steps 11 and 12 above.

## Projects Inside the UDFCD Boundary

If the project is within the UDFCD Boundary, the NOAA website is not needed. All the information is contained within the *UD\_Rain\_v1.01.xlsm* spreadsheet.

- In the *UD\_Rain\_v1.01.xlsm* spreadsheet, use the (Optional) Select a location within the UDFCD boundary drop down menu to select the reporting station nearest the project. This fills out the tables below.

## Creating the Rainfall Intensity – Duration – Frequency File (\*.IDF File)

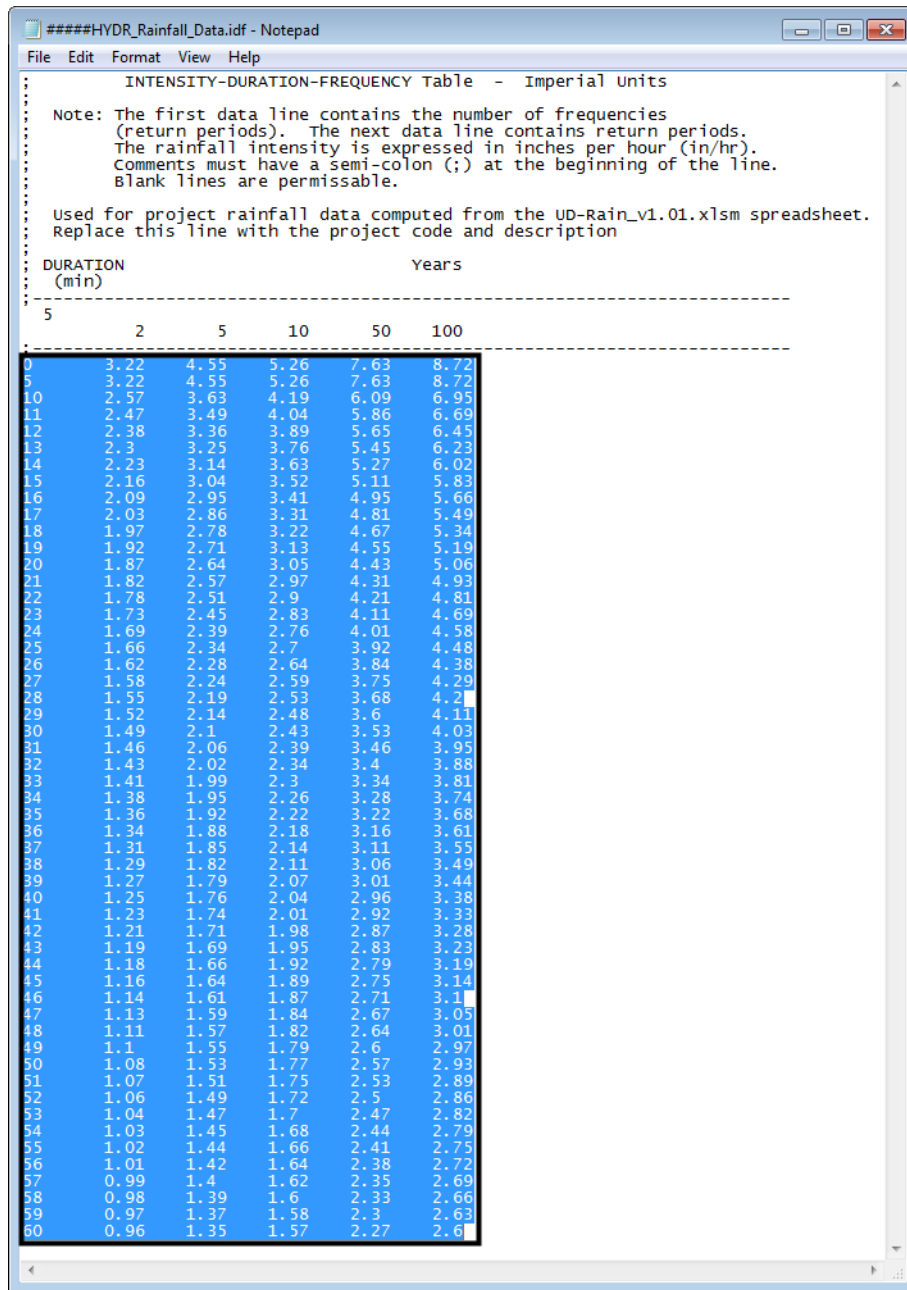
With data entered into the UD\_Rain\_v1.01.xlsm spreadsheet, the InRoads Rainfall Data.xlsx file is automatically filled in. This data is used to create the project IDF (Intensity-Duration-Frequency) file used by the storm drain part of InRoads Storm & Sanitary.

1. In the *InRoads Rainfall Data.xlsx* file, highlight the shaded area.
2. <R> within the highlighted area and select **Copy** from the menu.

The screenshot shows an Excel spreadsheet titled 'Rainfall Intensity Data'. The data is organized in a table with columns for 'Time Duration' and 'Return Period' (2, 5, 10, 50, 100). The rows represent different time durations from 0 to 60 minutes. A context menu is open over the data, with 'Copy' selected. A list of instructions is visible in the background of the spreadsheet.

Time Duration	2	5	10	50	100
0	3.32	4.68	5.53	7.84	9.06
5	3.32	4.68	5.53	7.84	9.06
10	2.65	3.73	4.41	6.25	7.22
11	2.55	3.59	4.24	6.01	6.96
12	2.48	3.46	4.09	5.80	6.70
13	2.38	3.35	3.95	5.60	6.47
14	2.30	3.24	3.82	5.42	6.28
15	2.22	3.13	3.70	5.24	6.08
16	2.16	3.04	3.59	5.08	5.88
17	2.09	2.95	3.48	4.94	5.71
18	2.04	2.87	3.39	4.80	5.54
19	1.98	2.79	3.29	4.67	5.39
20	1.93	2.71	3.21	4.54	5.25
21	1.88	2.65	3.12	4.43	5.12
22	1.83	2.58	3.05	4.32	4.99
23	1.79	2.52	2.97	4.22	4.87
24	1.75	2.46	2.91	4.12	4.76
25	1.71	2.40	2.84	4.03	4.66
26	1.67	2.35	2.78	3.94	4.56
27	1.63	2.30	2.72	3.85	4.46
28	1.60	2.25	2.66	3.77	4.36
29	1.57	2.21	2.61	3.70	4.27
30	1.54	2.17	2.56	3.62	4.19
31	1.51	2.12	2.51	3.55	4.11
32	1.48	2.08	2.46	3.49	4.03
33	1.45	2.05	2.42	3.42	3.96
34	1.43	2.01	2.37	3.36	3.89
35	1.40	1.97	2.33	3.30	3.82
36	1.38	1.94	2.29	3.25	3.75
37	1.35	1.91	2.25	3.19	3.69
38	1.33	1.88	2.22	3.14	3.63
39	1.31	1.85	2.18	3.09	3.57
40	1.29	1.82	2.15	3.04	3.52
41	1.27	1.79	2.11	2.99	3.46
42	1.25	1.76	2.08	2.95	3.41
43	1.23	1.74	2.05	2.91	3.36
44	1.21	1.71	2.02	2.86	3.31
45	1.20	1.69	1.99	2.82	3.26
46	1.18	1.66	1.96	2.78	3.22
47	1.16	1.64	1.94	2.74	3.17
48	1.15	1.62	1.91	2.71	3.13
49	1.13	1.60	1.88	2.67	3.09
50	1.12	1.57	1.86	2.64	3.05
51	1.10	1.55	1.84	2.60	3.01
52	1.09	1.53	1.81	2.57	2.97
53	1.08	1.52	1.79	2.54	2.93
54	1.06	1.50	1.77	2.50	2.90
55	1.05	1.48	1.75	2.47	2.86
56	1.04	1.46	1.73	2.45	2.83
57	1.03	1.44	1.71	2.42	2.79
58	1.01	1.43	1.69	2.39	2.76
59	1.00	1.41	1.67	2.36	2.73
60	0.99	1.39	1.65	2.33	2.70

3. In the #####HYDR\_Rainfall\_Data.idf file, highlight the data as shown in the illustration below.

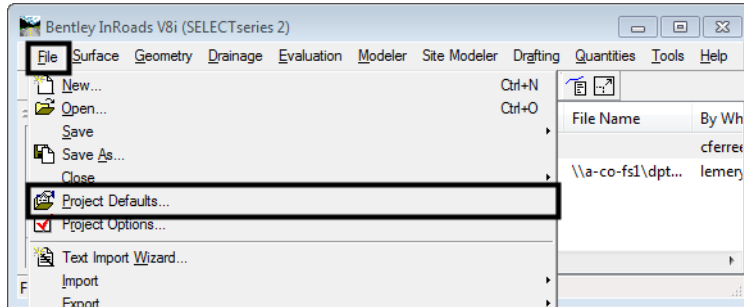


4. <R> and select Paste from the right click menu. This replaces the data with that copied from the *InRoads Rainfall Data.xlsx* file.
5. Select File > Save from the Notepad menu bar to save the changes made to the #####HYDR\_Rainfall\_Data.idf file.

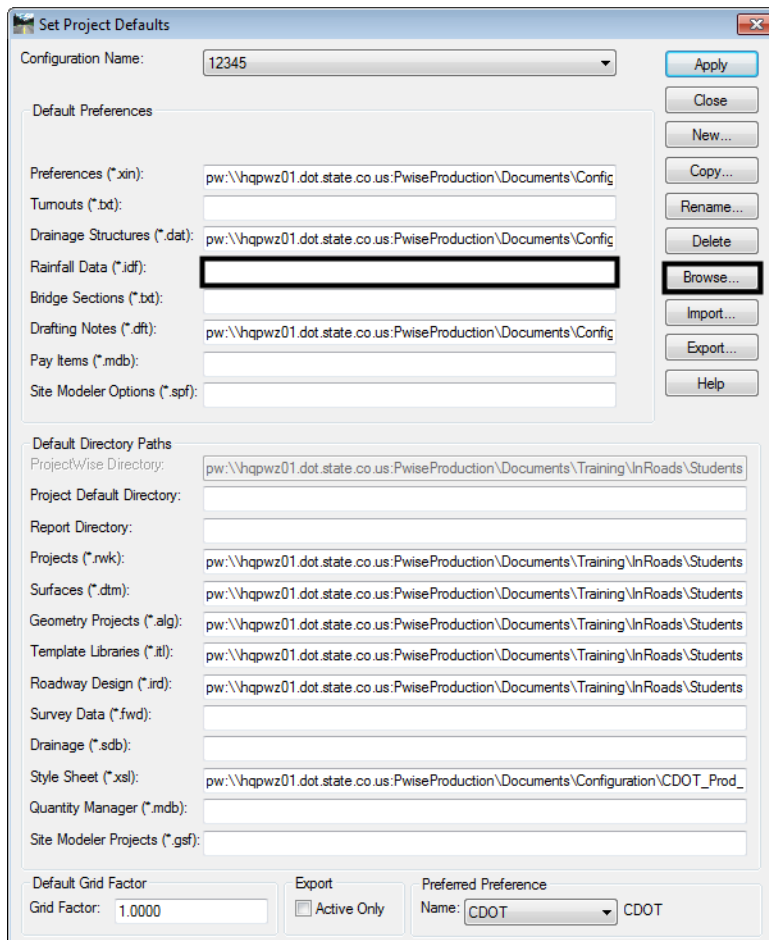
## Using The Project IDF File In InRoads

The completed #####HYDR\_Rainfall\_Data.idf file is added to the InRoads Project Defaults so that it can be accessed by Storm & Sanitary.

1. From the InRoads menu bar, select **File > Project Defaults**. This displays the **Project Defaults** dialog box.



2. In displays the **Project Defaults** dialog box, <D> in the Rainfall Data (\*.idf) field.
3. <D> the Browse button.





4. Navigate to the location of the #####HYDR\_Rainfall\_Data.idf file.
5. Highlight the #####HYDR\_Rainfall\_Data.idf file and <D> the **Open** button. This adds the file to the **Project Defaults** dialog box and dismisses the **Open** window.
6. In the **Project Defaults** dialog box, <D> the **Apply** button then <D> **Close**. This loads the data from the file and dismisses the **Project Defaults** dialog box.

