

Culvert Sizing Process

Utilizing StreamStats and HY-8

Stream Stats – Peak Flows

<https://streamstats.usgs.gov/ss/>

1. Open StreamStats and zoom into the general area of North Dakota to Level 8. The zoom level is shown in the bottom left of the map
2. On the left of the screen, select North Dakota when it pops up
3. Zoom in to Level 15 and scroll to the location of the culvert crossing. Change the basemap to imagery if necessary.
4. On the left of the screen, select the delineate button. Then click on the blue stream line where the culvert crossing is located. Wait for basin to be delineated.
5. Select Continue
6. Select “Peak-Flow Statistics”. Scroll to bottom and select Continue. If the Ruggedness Number is not calculated, manual input an appropriate number
7. Identify the 10, 25 and 100 flows from the report.

Calculate Appropriate Pipe Size

<https://www.fhwa.dot.gov/engineering/hydraulics/software/hy8/>

- Download HY-8 Version 7.50 and install on PC
- Open HY-8 and Create a New Project by selecting Continue
- Fill in the following parameters
 - **Discharge Data**
 - Min Flow = 0
 - Design Flow = 10 or 25 year peak flow from Streamstats
 - Max Flow = 100 year peak flow from Streamstats
 - **Tailwater Data**
 - Channel Type = Trapezoidal
 - Bottom Width = 10 feet
 - Side Slope = 4
 - Channel Slope = Ruggedness Number from Streamstats divided by 5280
 - Mannings n = 0.03
 - Channel Invert Elevation = 1000 - Elevation from CL of roadway to ditch bottom in feet
 - **Roadway Data**
 - First Roadway Station = 0.00
 - Crest Length = 100
 - Crest Elevation = 1000
 - Roadway Surface = Paved or Gravel
 - Top Width = Width of roadway in feet
 - **Continued on next page**

- **Culvert Data**
- Shape = Select Shape
- Material = Concrete or Steel
- Diameter = Start with existing culvert size in feet
- Embedment Depth = 0
- Culvert Type = Straight
- Inlet Configuration = Thin Edge Projecting
- Inlet Depression = No
- Site Data
- Site Input Data Option = Culvert Invert Data
- Inlet Station = 0.00
- Inlet Elevation = 1000 – Elevation from CL of roadway to culvert inlet invert
- Outlet Elevation = Length of the culvert in feet
- Outlet Elevation = Elevation from CL of roadway to culvert outlet invert
- Number of Barrels = Number of culverts
- Select Analyze Crossing
- Select Close on next screen
- In the upper left of the screen, select Culvert 1
- The blue line on the left of the picture is the water line. If this line is above the horizontal brown line (top of roadway), the culvert is undersized. In the upper left of the screen, select Crossing 1.
- Modify the culvert size and number of barrels until the water does not go over the roadway in the diagram.



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