

R LEVESQUE ASSOCIATES, INC.

40 School Street, P.O. BOX 640, Westfield, MA 01085

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January 21, 2026

Via email: acapra@southhadleyma.gov

Anne Capra, AICP
Director, Planning & Conservation
Town of South Hadley
116 Main Street
South Hadley, Massachusetts 01075

RE: Culvert Capacity Analysis
506 Granby Road
South Hadley, Massachusetts 01075
(Map 32, Parcel 52)
RLA Project File No. 240926

Dear Chairperson Doroski and Commissioners:

On behalf of the applicant and property owner, SAI SHYAM, LLC c/o Mr. Himanshu Patel, R Levesque Associates, Inc. is providing this capacity analysis for the culvert on Conti Drive.

The existing culvert consists of two (2) 16-inch ductile iron pipes spanning under Conti Drive. This report provides an analysis of the hydraulic capacity of the existing pipes. The analysis was performed to demonstrate the capacity of the pipes at peak flow conditions of the intermittent stream.

The calculations used for this analysis include Manning's equation for pipe capacity. Hydraflow Express Extension for Autodesk Civil 3D was utilized to calculate this equation. Manning's equation takes into account pipe diameter, slope, and Manning's roughness coefficient. The pipe diameter used was 16" or 1.33'. The slope was conservatively assumed to be 1%. Manning's roughness coefficient for ductile iron is 0.012. The output of this equation provides peak flow capacity for the pipes in cubic feet per second (CFS). Since the culvert contains two pipes, the capacity will be multiplied by two. The results yielded that the pipe can convey 8.8 CFS, or 17.6 CFS for the combined pipes.

For this analysis, Streamstats, a publicly available hydrologic modeling software, was used to find the peak flow of the area tributary to the culvert's inlet. The threshold used for the stream's flow is a 10-year storm event, typical for culvert sizing. According to Streamstats, the peak flow for a 10-year storm is 12.8 CFS.

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Since the maximum capacity for the culvert is 17.6 CFS, and the peak flow for the 10-year storm is 12.8 CFS, the culvert is **adequately sized**.

Should you have any questions regarding this culvert information, please do not hesitate to contact our office at your convenience.

Sincerely,
R LEVESQUE ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read 'Mike Bowen', written in a cursive style.

Mike Bowen, EIT
Project Engineer

A handwritten signature in black ink, appearing to read 'Filipe Cravo', written in a cursive style.

Filipe Cravo, P.E.
Project Engineer

Channel Report

Conti Drive Culvert (16in D.I.)

Circular

Diameter (ft) = 1.33

Invert Elev (ft) = 100.00

Slope (%) = 1.00

N-Value = 0.012

Calculations

Compute by: Q vs Depth

No. Increments = 10

Highlighted

Depth (ft) = 1.20

Q (cfs) = 8.800

Area (sqft) = 1.32

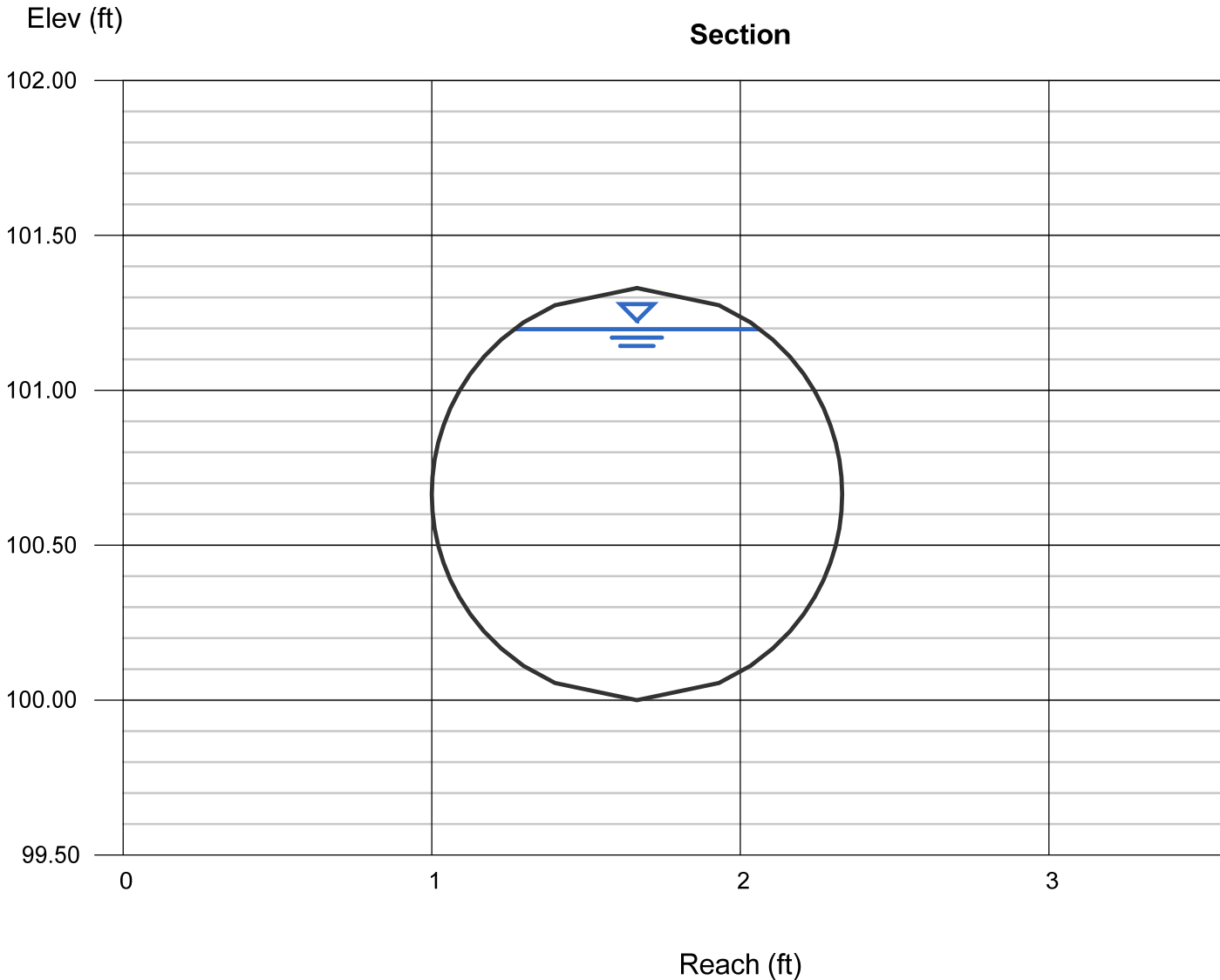
Velocity (ft/s) = 6.68

Wetted Perim (ft) = 3.33


Crit Depth, Yc (ft) = 1.16

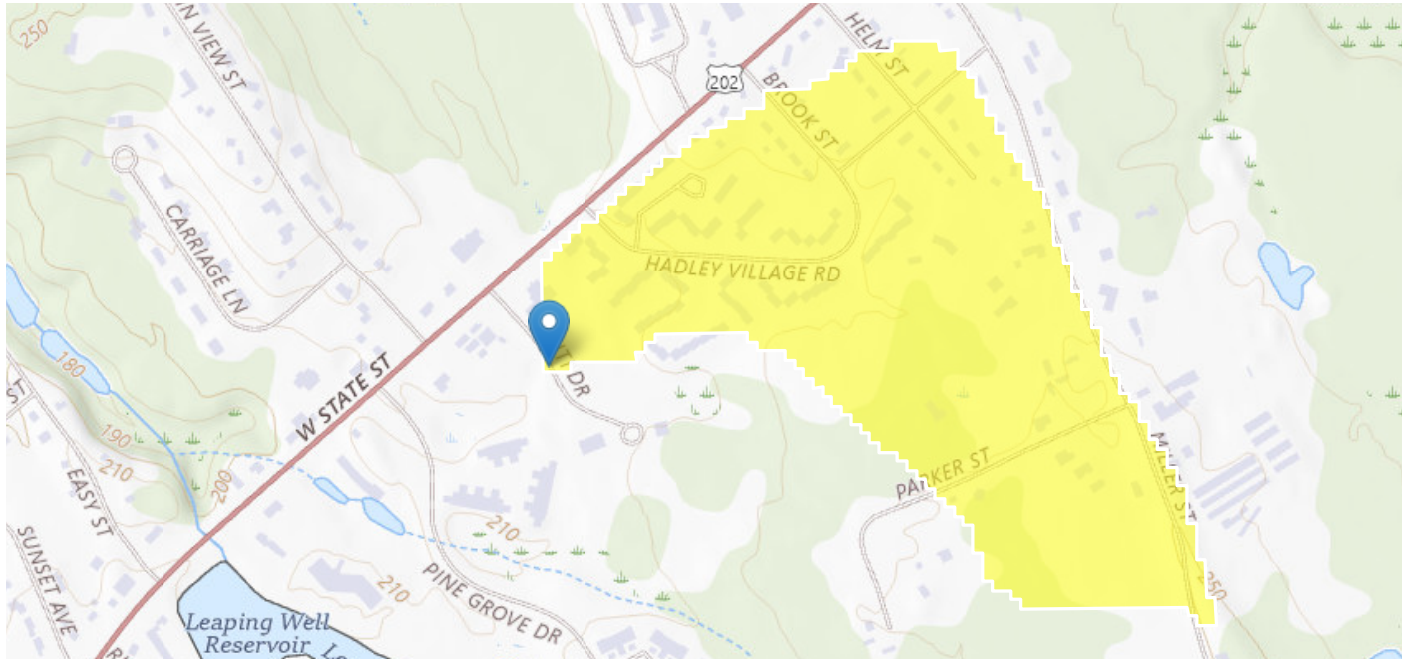
Top Width (ft) = 0.80

EGL (ft) = 1.89



StreamStats Report - 506 Granby Road, South Hadley MA

Region ID: MA
 Clicked Point (Latitude, Longitude): 42.23575, -72.55965
 NHD Stream GNIS Name of Click Point:  Stream name not found
 Time: 2026-01-21 13:58:09 -0500



StreamStats Update

Starting with version 4.30.0, the StreamStats application uses services that were redeveloped with open-source software components. Users may observe minor variations in computed results when compared to those from previous versions. These differences are expected and do not reflect errors in the underlying data or analytical methods. Users are advised to consider these potential variations when interpreting or comparing results generated across different versions of StreamStats. Please email streamstats@usgs.gov with any questions or concerns. A full list of changes can be found at <https://www.usgs.gov/streamstats/news/streamstats-data-updates-open-source-code-release> (<https://www.usgs.gov/streamstats/news/streamstats-data-updates-open-source-code-release>).

 Collapse All

➤ Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.08	square miles
ELEV	Mean Basin Elevation	233.77	feet
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	4.69	percent

Parameter Code	Parameter Description	Value	Unit
MA_SVI2025	Streamflow Variability Index for Massachusetts, as described in SIR 2025-5058	0.45	dimensionless

➤ Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Statewide 2016 5156]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.08	square miles	0.16	512
ELEV	Mean Basin Elevation	233.77	feet	80.6	1948
LC06STOR	Percent Storage from NLCD2006	4.69	percent	0	32.3

Peak-Flow Statistics Disclaimers [Peak Statewide 2016 5156]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Peak Statewide 2016 5156]

Statistic	Value	Unit
50-percent AEP flood	5.51	ft ³ /s
20-percent AEP flood	9.51	ft ³ /s
10-percent AEP flood	12.8	ft ³ /s
4-percent AEP flood	17.7	ft ³ /s
2-percent AEP flood	21.7	ft ³ /s
1-percent AEP flood	26.2	ft ³ /s
0.5-percent AEP flood	31	ft ³ /s
0.2-percent AEP flood	38.1	ft ³ /s

Peak-Flow Statistics Citations

Zarriello, P.J., 2017, **Magnitude of flood flows at selected annual exceedance probabilities for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2016-5156, 99 p.** (<https://dx.doi.org/10.3133/sir20165156>)

➤ NHD Features of Delineated Basin

NHD Streams Intersecting Basin Delineation Boundary

This functionality attempts to find the stream name at the delineation point. The name of the nearest intersecting National Hydrography Dataset (NHD) stream is selected by default to appear in the report above. NHD streams do not correspond to the StreamStats stream grid and may not be accurate. If you would like a different stream to appear in the above section, please make a

selection below.

No NHD streams intersect the delineated basin.

Watershed Boundary Dataset (WBD) HUC 8 Intersecting Basin Delineation Boundary

This functionality attempts to find the intersecting HUC 8 of the delineated watershed. HUC boundaries do not correspond to the StreamStats data and may not be accurate.

HUC 8	Name
01080201	Ashuelot River-Connecticut River

NHD Hydrologic Features Citations

**U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL <https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6>.
(<https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6>) U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL <https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4>.
(<https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4>)**

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Application Version: 4.30.0
 SSHydro Services Version: 1.0.0
 SSDelineate Services Version: 1.0.0
 NSS Services Version: 2.2.1
 GageStats Services Version: 1.2.1
 Pourpoint Services Version: 1.2.0
 Batch Processor Version: 1.6.0