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ABSTRACT
Massie’s Creek is a small tributary of the little Miami River, located in southwest Ohio near the village of Cedarville. For approximately 1.5 miles (2.4 km) it flows westward through the Indian Mound Reserve Park, an area which occasionally undergoes flooding. In the first ½ mile (0.8 km) of the park, the stream is confined by a deep gorge, 40 feet (12 m) or more tall, and quickly flattens to a meandering stream through the rest of the park. The present study describes the application of HEC-RAS with the integration of ArcGIS for steady flow analyses and flood inundation mapping, as well as numerical data for stream velocity and shear stress through the area of interest (AOI). A Digital Elevation Model (DEM) of the Indian Mound Reserve Park is used in addition to bathymetric data points for flood inundation mapping. USGS stream gauge discharges equal to the 10%, 2%, 1%, and 0.2% chance annual floods are used for investigation of various flood scenarios. Longitudinal profiles describe the energy gradients and critical flow levels through the AOI for respective floods. Color-coded stream velocity and shear stress maps indicate heightened values for the gorged portions of the AOI which settle out downstream. The steady flow simulation results of 10%, 2%, 1%, and 0.2% chance annual floods through the AOI for respective floods. Color

RESULTS
Longitudinal profiles show one hydraulic jump of one to two feet for the 10% and 2% chance annual floods. The 1% and 0.2% chance annual flood exhibit two areas of hydraulic jump, between two and five feet. Stream velocity data as well as shear stress data consistently shows heightened values in gorged sections of the AOI. Flood inundation maps do not reach any homes of the near Cedarville Township residents. 0.2% chance flood levels inundate the gorged portion of the AOI to about four feet under the top of the Cedarville dolomite, though none of the flood events analyzed here would overtop the gorge.

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References