



Memorandum

To: Paul Holzen, P.E., City of Franklin

From: David Mason, P.E., CDM Smith

Date: November 13, 2015

Subject: SR96 Sidewalk Improvements, LOMR Assessment

The City of Franklin, TN is constructing a sidewalk along Murfreesboro Road. The western portion of this planned sidewalk improvement is within the 100-year flood plain associated with both the Harpeth River and North Ewingville Creek, which is a small tributary to the Harpeth River. This tributary runs roughly parallel to Murfreesboro Road for a section of the planned improvements area. CDM Smith completed a hydraulic model study to investigate if this planned sidewalk improvement would result in any changes of the base flood elevations that would require a Letter of Map Revision (LOMR) from FEMA.

Note that the commonly referred to 100-year flood elevation is more appropriately designated as the 1% annual chance flood elevation and is the Base Flood Elevation (BFE).

Design drawings of the planned improvements were provided to CDM Smith by the City. Information for the Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) and corresponding HEC-RAS hydraulic model data were also obtained from FEMA. The design drawings were imported into ArcGIS and geo-referenced so they could be reviewed alongside information on the FIRM and model data more easily. **Figure 1** shows the geo-referenced drawings and the flood extents from the FIRM.

Two HEC-RAS models were obtained from FEMA. One was for the Harpeth River in Willison County and the second was for the North Ewingville Creek. This second model was referred to as "Unnamed Trib2" and from the FIS and FIRM data it was confirmed to be the correct model.

The impacts of the planned sidewalk improvements were considered separately for each model. The western-most sections of the planned improvements are within the flood plain from the Harpeth River. Only one cross-section in the Harpeth River model would be impacted by planned improvements. This cross-section is used to define the downstream face of the bridge across the Harpeth River for Murfreesboro Road. Since the road is at a higher elevation than the road deck the planned improvements will not impact flood elevations for the Harpeth River. This was verified with the model by raising the elevation of the cross-section within the project area and beyond by two feet. While this is a greater change in elevation than is planned, simulation results under

otherwise identical conditions resulted in no change to the base flood elevation. The modified cross-section and upstream bridge are shown in the **Figure 2**.

The second model referred to as "Unnamed Trib2" is a model of North Ewingville Creek. This small tributary runs roughly parallel to Murfreesboro Road in the area of the planned sidewalk improvements. **Figure 3** shows the modeled tributary including cross-section locations in relation to the project area. The cross-section profiles for the existing model were compared with the existing contours provided on the plan drawings to confirm that the cross-sections were a good representation of the existing conditions. The cross-sections were then adjusted in the project area to match the planned elevation contours representing sidewalk project improvements. An example of how the cross-sections were modified is shown on **Figure 4**. The updated model geometry was then simulated with the same flow as in the existing condition model and the resulting base flood elevations were compared. For most of the model extents there was almost no change in base flood elevations but an increase of approximately 0.5 feet was predicted downstream of Driveway 5 and an increase of approximately 0.23 feet was predicted between Driveway 6 and 7. The flood profile for North Ewingville Creek in the project area is shown in **Figure 5**.

Conclusion

The planned sidewalk improvements decrease the conveyance capacity of the North Ewingville Creek during the 100-year flood event. Model simulations indicate that this would result in approximately 0.23 foot increase in the base flood elevation for approximately 400ft between Driveway 6 and 7 as shown in DRAFT Figure 5 Profile. Based on our evaluation of existing topographic data and aerial photography, this does not appear to impact any existing structures/homes within the corridor study area. However, given this result of a rise in the BFE, a LOMR will be required.



Figure 1 Design Drawings and Flood Extents on Base Map

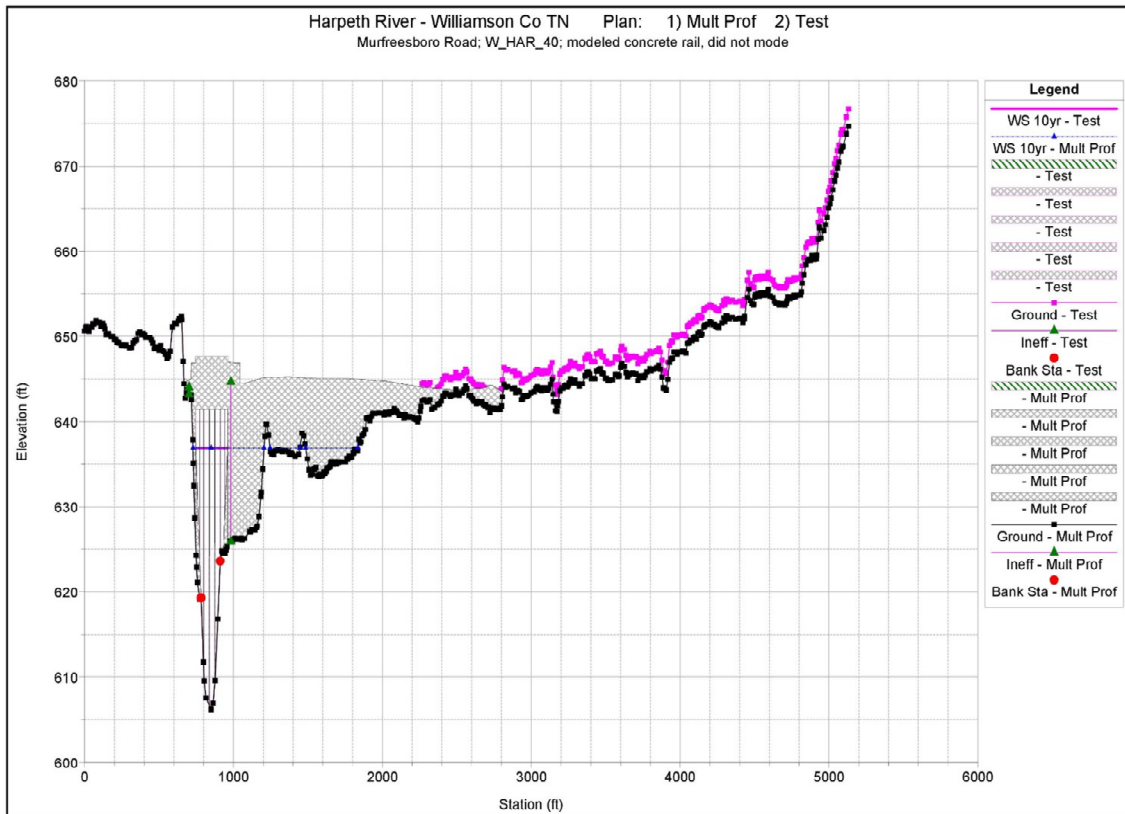


Figure 2 Harpeth River Model Cross-Section-- No BFE Change



Figure 3 North Ewingville Creek Modeled Cross-Sections (green lines)

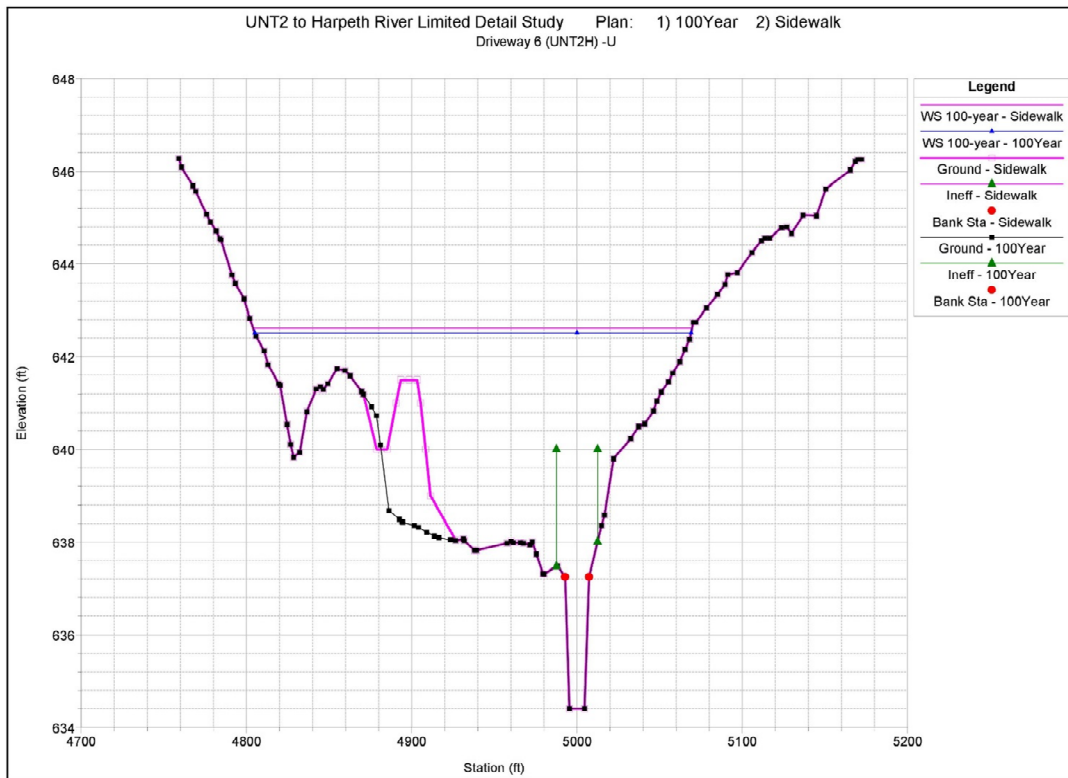


Figure 4 Example of Changed Cross-Section for North Ewingville Creek

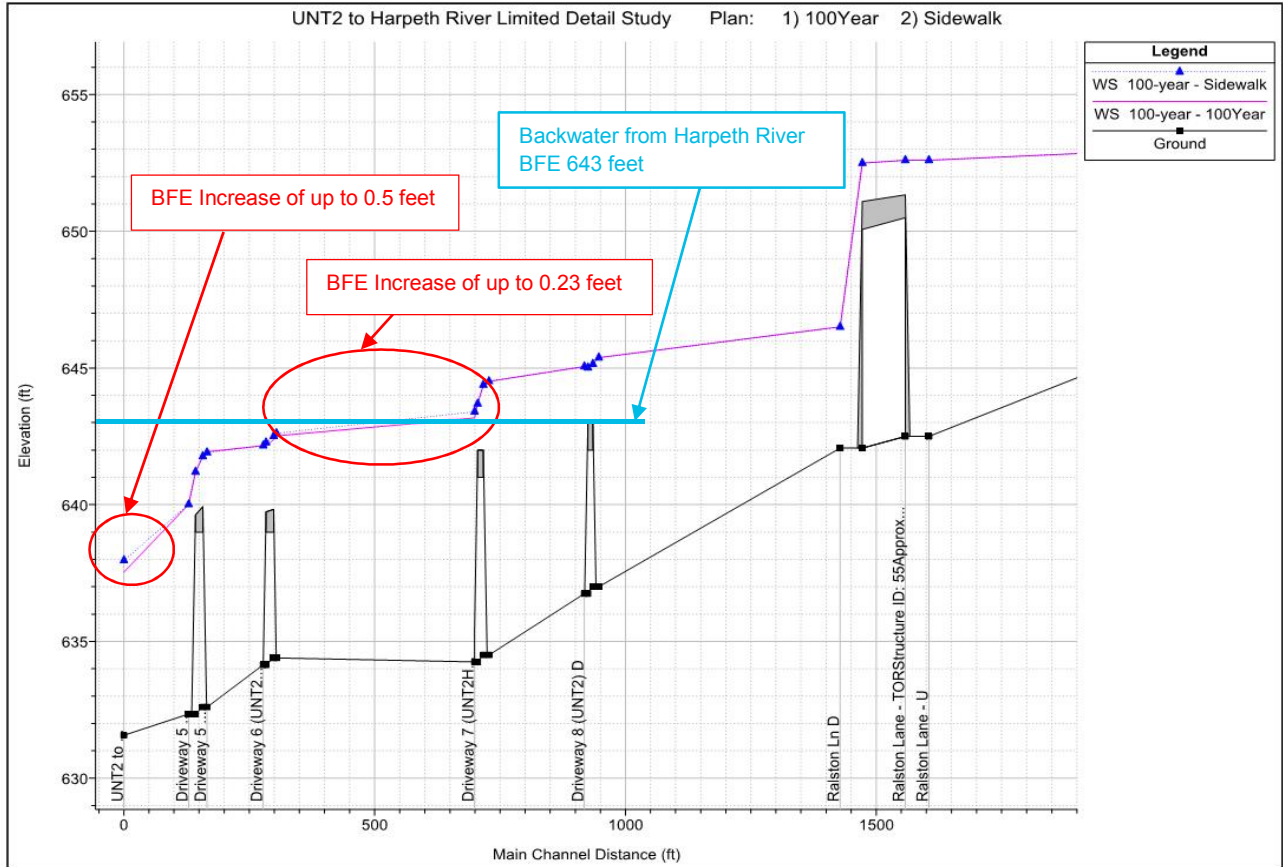


Figure 5 Profile for North Ewingville Creek within the Project Area