



# State Highway (SH) 105 Project from East of SH 326 to Pine Island Bayou

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## Drainage Study Executive Summary

TxDOT Beaumont District

December 2020

CSJ: 0339-04-036

**PRELIMINARY**  
**Subject to Change**

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated 12-9-2019, and executed by FHWA and TxDOT.

The Texas Department of Transportation has conducted a drainage study for the further development of the State Highway 105 project. In this study, it was recommended that the proposed project include replacing or modifying thirteen existing cross drainage structures (crossings A through M) to account for the proposed road widening, and updated rainfall statistics (Atlas 14). The project crosses three FEMA-regulated streams: Coleman Gully, Coon Marsh Gully, and an unnamed tributary to Clemmons Gully. All three streams are tributaries to Little Pine Island Bayou. The bridge crossing at Pine Island Bayou is outside of the project limits and no changes are proposed at that structure.

For the entire project area, a comprehensive 1D/2D hydraulic analysis was performed to facilitate the design of drainage structures. This hydraulic model accounts for tail water conditions such as downstream crossings and stream conveyance capacity, 2D flow patterns such as cross-sharing flows upstream of the road, and overflows from Pine Island Bayou that occur during high rain events.

The proposed cross-drainage structures are sized to convey runoff from a 4-percent annual chance rain event (25-year). The 1-percent annual chance rain event (100-year) is also included in the analysis as a check for potential upstream and downstream impacts (if any), especially in areas located within FEMA floodplains, as well as to understand the level of flooding over the road during rain events. The drainage analysis also proposed mitigation measures to mitigate potential upstream or downstream impacts associated with the proposed improvements.

Several options were explored at each crossing including channel clearing, grading, and benching and detention ponds. These options were then evaluated by performing a preliminary desktop environmental delineation for Waters of the United States and cost comparisons. These evaluations are preliminary, and additional environmental field delineation will be needed to verify wetland and stream impacts.

Table 1 below summarizes the recommended drainage improvements. While the proposed drainage mitigation measures utilize the existing easements located near the project area, additional right-of-way and drainage easements would be required to implement the proposed drainage improvements. Roadside ditches within the rural section, along with ten detention ponds totaling approximately 18 acres, will also be needed to provide conveyance of runoff from the road itself and to mitigate the increase in impervious cover due to the road widening.

Table 1: Recommended Drainage Improvements

Crossing	Existing Structure	Proposed Structure	Additional Drainage Mitigation
A	6'x3' RCBC, 30" RCP	2-5'x4' MBC	3,100 linear feet (approx.) of proposed drainage ditch easement along with channel clearing and benching
B	3'x2' RCBC, 30" and 36" RCPs	2-8'x4' MBC	
C	2-5'x2' MBC	467-foot long Bridge	1,910 linear feet (approx.) of proposed drainage ditch easement and clearing 2,670 linear feet (approx.) along existing drainage ditch easement
D	5-5'x3' MBC, 36" RCP	220-foot long Bridge	
E	3-5'x3' MBC	4-6'x3' MBC	37-acre detention pond
F	5-5'x4' MBC	103-foot long Bridge	22-acre detention pond
G	3-5'x3' MBC	3-6'x3' MBC	33-acre detention pond
H	3-5'x2' MBC	3-5'x2' MBC	No downstream improvements proposed
I	3-5'x2', 30" RCP	5-5'x2' MBC	
J	2-5'x2' MBC	5-5'x2' MBC	
K	6'x2' RCBC	6'x2' RCBC	No mitigation required
L	2-5'x2' RCBC	2-5'x2' MBC	
M	2-30" RCPs, 3'x1' RCBC	5'x2' RCBC	

NOTE: Reinforced Concrete Box Culvert (RCBC), Reinforced Concrete Pipe (RCP), Multiple Box Culverts (MBC)