

June 18, 2026

Frank Lundy, PE  
County Engineer  
Baldwin County  
P.O. Box 220  
Silverhill, AL36576

**RE: Intersection Improvements at CR-32 & CR-9**

**Attn: Seth Peterson, PE**

Dear Mr. Peterson:

To support the continued advancement of the CR 9 and CR 32 intersection improvement project, this supplemental agreement requests authorization for Michael Baker International (MBI) to perform a comprehensive hydrologic and hydraulic study and update the construction plans. As the project has progressed, additional analysis and design refinement have become necessary to ensure the proposed improvements meet current regulatory requirements, accurately reflect existing site conditions, and provide a resilient, well-engineered solution. This supplemental effort will allow the project team to fully address these needs and maintain compliance with ALDOT standards.

### **PROJECT SCOPE OF WORK**

#### ***Hydrologic Analysis***

Michael Baker International (MBI) will perform a comprehensive hydrologic and hydraulic (H&H) analysis to support the replacement of the existing drainage structure at the intersection of CR 9 and CR 32. The existing structure is a three-barrel 10-ft span × 5-ft rise box culvert conveying runoff from a 2.06-square-mile drainage area, and it is located outside the FEMA Special Flood Hazard Area (Zone X). This effort includes evaluating existing hydraulic performance, developing hydrologic models for design storm events, sizing a replacement culvert, assessing scour potential, and preparing a hydraulic report meeting ALDOT requirements. As part of this work, MBI will conduct a detailed hydrologic evaluation of the contributing watershed using terrain analysis, established USGS methodologies, and hydrologic modeling to develop reliable peak discharge estimates and storm hydrographs for use in hydraulic design.

#### ***Data Collection and Watershed Delineation***

MBI will obtain and process high-resolution LiDAR and Digital Elevation Model (DEM) data to:

- Delineate the contributing drainage area
- Define watershed boundaries and subbasins
- Identify overland and channelized flow paths

This terrain-based analysis will ensure an accurate representation of drainage characteristics and runoff behavior.

***Hydrologic Parameter Development***

Watershed characteristics will be developed using standard engineering practices and available geospatial datasets, including:

- Land use and land cover classifications
- Soil type data (NRCS SSURGO or equivalent)
- Hydrologic soil group assignments
- Curve Numbers (CN) for runoff estimation
- Time of concentration and lag time calculations

These parameters will form the basis for runoff modeling and will be consistent with SCS/NRCS methodology.

***Peak Discharge and Hydrograph Development***

Peak discharges will be initially estimated using USGS StreamStats regression equations for the applicable hydrologic region. These values will be used both as a screening tool and for validation of model results.

MBI will then develop a hydrologic model in HEC-HMS, utilizing:

- SCS runoff methods
- Unit hydrograph procedures
- Design rainfall inputs (NOAA Atlas 14 or applicable design guidance)

The model will be used to generate hydrographs for a range of design storm events, typically including:

- 50% (2-year)
- 10% (10-year)
- 2% (50-year)
- 1% (100-year)
- 0.2% (500-year) annual exceedance probability storms

***Model Validation and Quality Checks***

To ensure defensible and consistent results, hydrologic outputs will be validated using multiple approaches:

- Comparison to USGS regression estimates
- Review of available stream gage data (if applicable)
- Cross-checks with Rational Method calculations for smaller subareas

This multi-method validation approach provides confidence in the final design discharges.

***Hydraulic Analysis***

MBI will perform a hydraulic analysis using a one-dimensional, steady-state HEC-RAS model to evaluate existing conditions and develop design recommendations for the proposed culvert replacement.

***Data Assembly and Existing Conditions Model***

MBI will compile and develop all necessary hydraulic inputs, including:

- Channel cross sections derived from LiDAR data

- Field-verified culvert geometry and structure details
- Manning's roughness coefficients based on site conditions
- Downstream boundary conditions, including tailwater influences

Particular attention will be given to potential backwater effects from Fish River, which may control hydraulic performance.

The existing conditions model will be developed to:

- Simulate current hydraulic performance
- Identify roadway overtopping thresholds
- Evaluate flow distribution through existing structures

### ***Hydraulic Computations***

The HEC-RAS model will be used to compute:

- Water surface elevations (WSELs)
- Flow velocities
- Headwater and tailwater conditions
- Overtopping depths and flow patterns

These analyses will be performed for all design storm events developed in the hydrologic model.

### ***Proposed Conditions and Culvert Design***

Following assessment of existing conditions, MBI will develop a proposed conditions model to:

- Size the replacement culvert(s) in accordance with ALDOT design criteria
- Optimize hydraulic performance while minimizing upstream impacts
- Evaluate roadway overtopping frequency and allowable risk

Alternative culvert configurations may be evaluated as needed to identify the most effective design solution.

### ***Scour Analysis and Stability Evaluation***

MBI will perform a detailed scour assessment, including:

- Contraction scour within the channel
- Local scour at culvert inlets and outlets
- Long-term channel degradation or instability

Based on the results, MBI will develop conceptual countermeasures, which may include:

- Riprap armoring
- Energy dissipation measures
- Channel stabilization improvements

These recommendations will be tailored to ensure long-term performance and resilience of the structure.

***Hydraulic Recommendations***

Final recommendations will be prepared summarizing:

- Culvert size, type, and configuration
- Required scour protection measures
- Any channel modifications or stabilization needs
- Compliance with ALDOT hydraulic design requirements

MBI will prepare a comprehensive Hydraulic Report documenting all analyses, assumptions, and findings.

***Draft Report***

The draft report will include:

- Hydrologic analysis and modeling methodology
- Hydraulic modeling approach and results
- Scour evaluation
- Recommended culvert sizing and design criteria

The draft will undergo an internal quality assurance/quality control (QA/QC) review by senior engineering staff to ensure:

- Technical accuracy
- Compliance with ALDOT standards
- Consistency with industry best practices

***Final Report***

Following receipt of comments from Baldwin County, MBI will:

- Address review comments
- Revise the report as necessary
- Prepare and submit a final signed and sealed Hydraulic Report

The final report will be suitable for:

- Engineering design
- Regulatory review
- Permitting and coordination with project stakeholders

***Roadway Plans***

The construction plans will be revised to incorporate a full replacement of the existing triple-barrel box culvert rather than extending the current structure. In conjunction with this modification, the traffic signal plans will be updated to reflect the most current detection technology utilized by the Alabama Department of Transportation (ALDOT). These design changes necessitate updates to multiple plan sheets as well as the addition of new sheets. Revisions will include, but are not limited to, the title sheet, index, sequence of construction, plan and profile sheets, typical sections, erosion control sheets, and drainage section sheets. Additionally, a detour plan sheet will be required to accommodate the removal and replacement of the box culvert.

### FEE PROPOSAL:

Based on the Scope of Work described herein, the proposed fee for completing the hydraulic analysis and associated tasks is **\$45,000.00**. A detailed breakdown by task is provided below:

- |                                  |                    |
|----------------------------------|--------------------|
| • <b>Hydrologic Analysis:</b>    | \$38,750.00        |
| • <b>Roadway Plan Revisions:</b> | <u>\$6,250.00</u>  |
| <b>Total Fee:</b>                | <b>\$45,000.00</b> |

Michael Baker International appreciates the opportunity to support the County on this project and is committed to delivering high-quality technical services. Should you have any questions or require additional information, please feel free to contact me at your convenience.

Respectfully,

**MICHAEL BAKER INTERNATIONAL, INC.**



Brian Morgan, PE  
Project Manager

Encl.

Cc: Jeff May, PE, *Michael Baker International*  
Brooks Miller, PE, *Michael Baker International*