STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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SUBJECT: Modeling Flow Through Rails

When representing flow through rails as an average blocked area to create an Equivalent Rail Height in 1D hydraulic modeling, the following conditions must be met:

- Greater than 50% of the rail is open to flow
- Assumptions and calculations associated with the average blocked area and Equivalent Rail Height are clearly documented in the model narrative and including.
    - Proposed bridge rail **Size and Type.**
    - Rail design **post spacing** and a **vertical spacing of the railing**.
    - **Equivalent rail height** of blocked area .
    - Include the **calculations for Top of Rail height** and additional components (such as S**tructure Anchor Units)**

As a reference, the following example illustrates how to calculate the Equivalent Rail Height using an average blocked area and outlines the necessary documentation.

- The proposed bridge rail is the **32" Alaska Rail**.
- The rail design includes a **10' post spacing** and a **1'-2" vertical spacing of the railing**.
- The total blocked area of the railing was evaluated, and an **equivalent rail height** for the blocked area was calculated to be **1.61 ft. (19.32")**.
- The Alaska Rail design, including adjustments for rail height and additional components, is represented as follows:
    - **Top of Rail = Low Chord + 18" CSU height + 2.75" asphalt + 19.32" rail height**.
    - **Structure Anchor Units** (Top of Rail = 2'-7" above the gutter line, extending 12 feet beyond each end of the bridge unit) were modeled as solid obstructions to account for the potential debris blocking openings.

This methodology ensures consistency and accuracy in modeling flow through bridge rails while maintaining transparency in the assumptions and calculations used. This guidance will be incorporated into the next update of the **Coordination and Compliance Plan**.

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