

Hydraulic Planning Report

The primary purpose of the Hydraulic Planning Report is to provide preliminary hydraulic structure recommendations for the project. The Hydraulic Planning Report is also required to provide information required for the preparation of the Planning Document and during the subsequent design phase, including identification of hydraulic-related issues that may pose significant risk of cost or delay to the project development.

The report will identify existing and/or proposed crossings for all major drainage structures and determine the proposed project impacts on each structure. Hydrologic and hydraulic analyses will be performed to determine the hydraulic performance for existing and future conditions. A recommendation will be made for the retention and/or extension of the structure, supplementation of the structure to provide additional conveyance or total replacement of the structure. The preliminary hydraulic recommendations will be used in the planning phase to help determine costs and the extent of natural and human environmental impacts of the project. If public involvement is required for the project, the major crossings will be plotted on public meeting maps. During Hydraulic Planning Report Scoping, care should be exercised to determine the risk to cost and environmental impacts based on the project type. For example, if an existing structure is hydraulically inadequate, it can significantly impact cost and schedule to rectify. This is especially true for high traffic and high fill situations. High utility impacts also affect cost and schedule significantly. Such information is critical to good project planning. The report should be comprehensive enough to discuss and include design aspects that can significantly affect cost and environmental impacts. It should not be an excessive exercise that contains project or programmatic information that is repetitive and redundant.

If there are no major drainage structures, those items specific to major drainage structures may be omitted. However, there are items that will need to be included for all widening and new location projects; for example, these may include mapping of project limits, permit requirements, analysis of anticipated levels of future urbanization, and site-specific items such as documentation of and recommendations for minimizing impacts to existing stormwater treatment devices.

References and Resources

[2016 Guidelines for Drainage Studies and Hydraulic Design](#)

[Post-Construction Stormwater Program Manual](#)

[Hydraulic Forms and Checklists](#)

[Flood Risk Information System \(FRIS\)](#)

[Environmental Sensitivity Map](#)

[USGS StreamStats](#)

Scope of Work

The ENGINEER will prepare a Hydraulic Planning Report for the project. The process for developing the report and the items to include, at a minimum, are specified below. The Report will address the tasks listed below based on the following number of anticipated crossings:

_____ major drainage structures.

Task 1.1 - Research/Data Collection

- a. If available, review NRTR.
- b. Develop list of blue line streams for all major stream crossings. Major stream crossings are defined as one which would require a water way opening of 30 square feet or more. (*2016 Guidelines for Drainage Studies and Hydraulic Design* section 3.3)
- c. Review existing reports/data for existing structures and upstream and downstream structures (Structure Maintenance Unit and NCDOT Hydraulics Unit files).
- d. Determine if there are Scour Reports or accounts of scour at the existing structures.
- e. Determine FEMA involvement at all streams by reviewing community FIS and FIS maps.
 - If applicable, determine if effective hydraulic model from [FRIS](#) if available; otherwise, contact NCDOT Highway Floodplain Program to request the FEMA model. (Use the [Flood Insurance Study Data Request](#) form on Hydraulics website)
- f. Determine if stream gages are located near any crossing.
- g. [Contact](#) appropriate NCDOT maintenance personnel to determine flood history and past performance of structures (historical high water, roadway overtopping, and debris potential).

Task 1.2 - Hydraulics Field Review

- a. Obtain data as noted in items 1, 2, and 3 of the "[Preliminary Hydraulic Field Visit Checklist](#)" (*2016 Guidelines for Drainage Studies and Hydraulic Design*, Appx. D Item 3).
- b. Record any reliable information on flooding or overtopping events obtained from local residents, other local individuals familiar with area.
- c. Document any site constraints that should be considered during development of the project (such as presence of existing permitted stormwater basins).

Task 1.3 - Preliminary Design Calculations and Structure Sizing

1.3.1 Compute Hydrologic Calculations

- a. Determine appropriate hydrologic method for anticipated watershed land use and compute discharges.
- b. If in detailed FIS, compare FEMA discharges to computed discharges and evaluate appropriate discharges to use for design.
- c. Evaluate appropriate level of future urbanization to apply in hydrology (even if no major drainage structures).

1.3.2 Determine Structure Size

- a. Assess hydraulic adequacy of existing structures.
- b. Determine preliminary structure size recommendation for each stream crossing studied.
- c. Determine stream stability by such means as reviewing historical plan and profile data.

Task 1.4 - Assimilate Data and Prepare the Hydraulic Planning Report

- a. Dated cover page noting project and firm's name, sealed by an NC registered professional engineer responsible for the report's contents.
- b. Brief description of the overall project.
- c. Site map showing all stream crossing sites and overall project limits. (Also provide the digital mapping files as a separate attachment)
- d. "[Preliminary Hydraulic Recommendations for Major Crossings](#)" table (*2016 Guidelines for Drainage Studies and Hydraulic Design*, Appx. D Item 4). Mark N/A for Site No. if no major drainage structures.
- e. Descriptions and recommendations for each site separately. Details to include are as follows:
 - Describe the existing conditions/structure at each stream crossing site.
 - Describe upstream and downstream hydraulic structures.
 - Discuss the impact that the proposed structure could have on the adjacent floodplain and upstream properties, including description and number of structures (buildings) and their location relative to the site. Identify if an MOA or CLOMR submittal will be required and if there is anything special about the site that will significantly affect design and construction or possibly delay the project schedule.
 - Provide copy of FEMA mapping with sites marked, even those without FEMA involvement. Include applicable tables/data from the FIS with site locations indicated.
 - Identify and list any Green Sheet commitments required by the hydraulic design (such as coordination with NCFMP and as-built surveys for FEMA crossings).
 - Note the locations of existing utility lines (e.g. sewer, telephone, power, etc.) that could affect the hydraulic recommendations or selection of alternatives. This information does not need to be included in the site narrative if it is adequately depicted and described on the field sketch.
 - Assess environmental considerations (such as stream classification) and permit requirements (Buffer, CAMA, NPDES Permit etc.). Review the NCDOT's NPDES [Post-Construction Stormwater Program](#) (PCSP) and summarize measures needed for compliance. Identify existing stormwater BMPs which may be impacted by the project.
 - Recommend proposed hydraulic structure at each site. Recommend location for replacement structure, if warranted.
 - For existing routes, if a detour structure may be required, recommend size, location, and approximate roadway grade relative to main roadway.
 - Describe and identify adequacy of the existing proposed roadway alignment (horizontal and vertical), especially as it may relate to hydraulic design concerns, such as streams and wetlands, floodplain impacts, or hydroplaning.
 - Sketch plan and profile view(s) to scale, showing existing site data, historical stream profiles, and recommended structure. If recommended structure is a bridge, include assumed superstructure size/type and recommended span arrangement.
 - Photographs of crossing site and copy of USGS Quad with drainage area delineated.
 - Site hydrology data and computations.
 - Hydraulic computations used in determining recommended structure size.

- Preliminary Design Report ([PDR](#)) form (2016 *Guidelines for Drainage Studies and Hydraulic Design*, Appx. D Item 1).

Deliverables

One electronic copy of the Preliminary Hydraulic Technical Report will be provided to NCDOT for NCDOT review, and additional electronic copy/ies as needed after the NCDOT comments have been addressed. Also provide any digital mapping files created during the development of this report. Each page in PDF report should be formatted to print on either 8 ½ " x 11" or 11" x 17" paper.