PDN Stage 2HY2 – Hydraulics QA Checklist

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| --- | --- |
| **SPOT ID/Project TIP #:** | Click or tap to edit. |
| **County:** | Click or tap to edit. |

2HY2: Drainage Design for Field Inspection

Deliverables: Drainage Plans for Merger CP4B Meeting & Minutes

Drainage Plans for Field Inspection

Railroad Drainage Submittals

| **Item #** | **Review Item** | **Acceptable** | **Unacceptable** | **N/A** |
| --- | --- | --- | --- | --- |
|  | **Drainage Design - General** |  |  |  |
|  | QC procedures have been followed and are complete |  |  |  |
|  | Drainage design conforms to agreed design assumptions and direction from Hydraulics Pre-Design Meeting and the pSMP, with any deviations documented, and approved by the QA reviewer |  |  |  |
|  | Drainage design meets or exceeds existing performance and provides an acceptable Level of Service or an exception has been obtained from the Hydraulics Unit |  |  |  |
|  | For Merger projects, the 4B meeting has been held and final meeting minutes sent to meeting attendees and posted as a “final” key document on the project’s Preconstruction SharePoint Site |  |  |  |
|  | Hydraulic Engineer reviewed Design Recommendations Plan Set and recommendations were either incorporated into roadway plans or documentation shows coordination to resolve concerns. |  |  |  |
|  | All deliverables for 2HY2 have been provided and stored in the appropriate location(s). |  |  |  |
|  | Drainage design follows the NCDOT Guidelines for Drainage Studies and Hydraulic Design. |  |  |  |
|  | Drainage design exceptions have been documented and approved by the State Hydraulics Engineer. |  |  |  |
|  | NCDOT Pipe Material Selection Guide has been followed appropriately |  |  |  |
|  | **Redline Drainage Plans** |  |  |  |
|  | Drainage redlines are complete, readable, and contain all required information |  |  |  |
|  | All CADD files are in correct location on ProjectWise |  |  |  |
|  | A complete PDF copy of the redlines is located on the project’s Preconstruction SharePoint site |  |  |  |
|  | Diversions have been avoided to the maximum extent practicable. Outlet analysis is provided to justify any diversions and demonstrate flow changes can be accommodated without causing damages to NCDOT or other property owners, and appropriate measures are taken to mitigate for any impacts. |  |  |  |
|  | Appropriate hydrological methods, design frequencies, and future development were used for all permanent and temporary drainage design |  |  |  |
|  | Drainage easements are shown and are the appropriate type (temporary or permanent) and provide adequate access for construction and maintenance of drainage features |  |  |  |
|  | Proposed stormwater BMPs are necessary to meet compliance with current laws and regulations or to mitigate for project impacts |  |  |  |
|  | Proposed stormwater BMPs can be adequately constructed and maintained. BMPs are not behind sound walls, CA fencing, guardrail, or at the bottom of steep slopes without access. |  |  |  |
|  | BMPs used are the most practical and cost-effective method of managing stormwater impacts and treatment requirements |  |  |  |
|  | Outlet analyses have been completed for all locations where drainage leaves NCDOT right of way and documentation shows appropriate mitigation measures have been taken where necessary to minimize downstream impacts. |  |  |  |
|  | Drainage design, including storm drain systems and ditches, are designed for efficient conveyance of stormwater with consideration given to design requirements, public health and safety, construction and maintenance considerations, topography, environmental impacts, conflicts with other resources (utilities, FEMA buyout properties, contaminated soils, etc.), mitigation of existing problems, etc. |  |  |  |
|  | Division has been consulted on any potential problematic construction or maintenance issues. |  |  |  |
|  | Drainage design exceptions have been documented and approved by the State Hydraulics Engineer. |  |  |  |
|  | Where drainage design deviates from Hydraulics Unit guidelines, policies, or procedures, documentation is provided to justify the final design and show coordination with appropriate NCDOT staff. |  |  |  |
|  | Computational results appear reasonable, based on engineering judgement |  |  |  |
|  | Spread calculations and deck drain requirements are shown on redlines for bridges such as grade separation bridges which don’t require a Bridge Survey Report |  |  |  |
|  | Structures lead has been notified of any deck drain requirements. |  |  |  |
|  | Design could not be construed as making improvements on private property that go beyond standard practice of mitigating the project’s impact where practical |  |  |  |
|  | Project is in compliance with NCDOT’s NPDES Post-Construction Stormwater Program requirements |  |  |  |
|  | Pipe Data Sheets were completed for all pipes conveying significant discharge from one side of the roadway to the other and proposed pipes provide an appropriate level of service for the roadway. |  |  |  |
|  | Pipe crossings where driveway or roadway grades are being raised consider any water surface elevation increases due to reduction in overtopping weir flow area that may occur due to the increased grade. |  |  |  |
|  | Shoulder berm gutter is used in front of guardrail with steep slopes in coordination with Division |  |  |  |
|  | Design appears to meet all anticipated environmental permitting requirements, PCSP requirements, and implements avoidance and minimization measures to the maximum extent practical. |  |  |  |
|  | Existing drainage problems are adequately documented, and drainage design provides adequate remedy for any that may be the responsibility of NCDOT or present future liability issues. |  |  |  |
|  | **HEC-RAS Models** |  |  |  |
|  | HEC-RAS modeling conforms to guidance on [Hydraulics Highway Floodplain Program Connect page](https://connect.ncdot.gov/resources/hydro/Pages/FEMA-Interagency-Design.aspx) where appropriate |  |  |  |
|  | **FEMA Compliance** |  |  |  |
|  | Design conforms to FEMA floodplain regulations where applicable |  |  |  |
|  | State Floodplain Compliance (SFC) or CLOMR is planned where appropriate |  |  |  |
|  | Design does not increase base flood elevation at any existing structure (building), or existing structure with base flood elevation increase has been coordinated with Project Manager and Hydraulics Unit |  |  |  |
|  | Evaluation of cost and practicality of avoidance has been made for any existing structure (building) with an increase in base flood elevation |  |  |  |
|  | Detour structures intended to stay in place longer than 1 year, have been reviewed and coordinated with NCFMP. |  |  |  |

*For items marked* ***Unacceptable****, provide comments or action items in the table below.*

| **Item #** | **Comments and Action Items** |
| --- | --- |
| Click to edit. | Click to edit. |

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| --- | --- | --- | --- |
| **This checklist may not be comprehensive to every project. All items may not be applicable for smaller projects. It is the responsibility of the reviewer to ensure that all necessary information has been provided and an adequate review performed.** | | | |
| **QA Reviewer Name:** | | Click to edit. | **Date:** | Click to edit. | |
| **QA Reviewer (Signature):** | |  |  |  | |