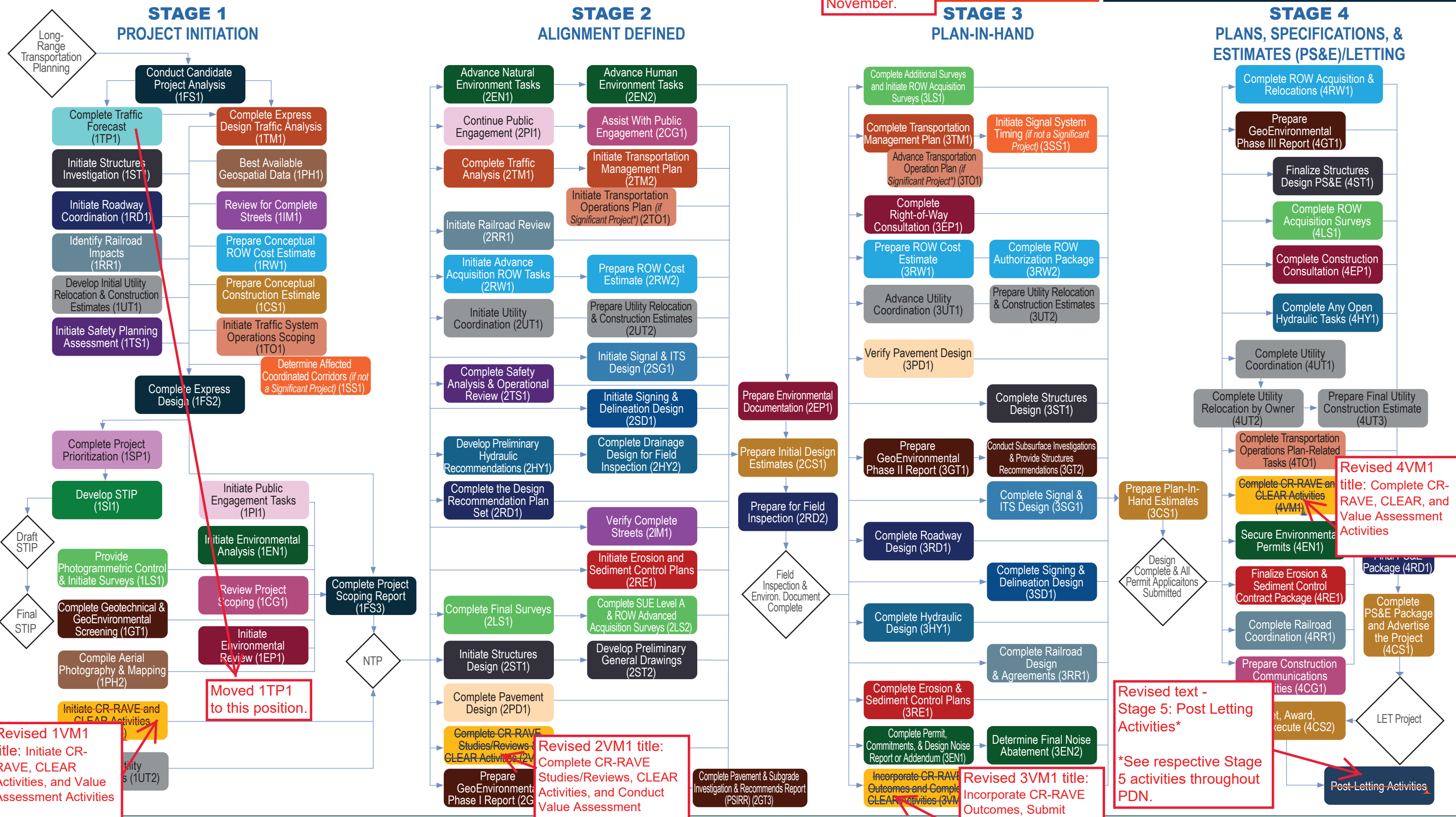


Revised date to November. June 2021



Revised 1VM1 title: Initiate CR-RAVE, CLEAR Activities, and Value Assessment Activities

Moved 1TP1 to this position.

Revised 2VM1 title: Complete CR-RAVE Studies/Reviews, CLEAR Activities, and Conduct Value Assessment Activities

Revised 3VM1 title: Incorporate CR-RAVE Outcomes, Submit CLEAR Activities, and Implement Value Assessment Activities

Revised 4VM1 title: Complete CR-RAVE, CLEAR, and Value Assessment Activities

Revised text - Stage 5: Post Letting Activities\*  
\*See respective Stage 5 activities throughout PDN.

DISCIPLINE LEGEND

Communication Group (CG)	Environmental Analysis (EN)	Feasibility Studies (FS)	Hydraulics (HY)	Location & Surveys (LS)	Photogrammetry (PH)	Roadway (RD)	Railroad (RR)	Signing & Delineation (SD)	State Improvement (SI)	Traffic Management (TM)	Transportation Planning (TP)	Utility Coordination & Design (UT)
Contract Standards & Development (CS)	Environmental Policy (EP)	Geotechnical (GT)	Integrated Mobility (IM)	Pavement Design (PD)	Public Involvement (PI)	Roadside Environmental (RE)	Right-of-Way (RW)	Transportation Signals & ITS Design (SG)	Strategic Prioritization Office (SP)	Traffic Systems Operations (TO)	Traffic Safety (TS)	Value Management (VM)

## 5CS1 Construction Revisions

### Overview

Incorporate construction revisions into the latest version of the Let Plans to address identified field issues and to efficiently update the plans, so construction work can continue to move forward using the latest design information.

### References

- [Roadway Design Manual \(Updated link\) ~~In-Development: The manual is in the process of being updated.~~](#)
- [Construction Revision Process Memorandum](#)
- [Construction Revision Distribution Memorandum](#)

### Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		Project Manager	Roadway Design Lead	Other Unit Design Lead (as identified)
Construction Revision	<ul style="list-style-type: none"> <li>▪ Update the Plans</li> <li>▪ Complete the Construction Revision Package</li> </ul>	X	X	X
Updated Quantities	<ul style="list-style-type: none"> <li>▪ Update the Quantities and Special Provisions</li> </ul>	X	X	X
Updated Special Provisions (if applicable)	<ul style="list-style-type: none"> <li>▪ Update the Quantities and Special Provisions</li> </ul>	X	X	X
Revision Letter	<ul style="list-style-type: none"> <li>▪ Complete the Construction Revision Package</li> </ul>	X		

### Request a Construction Revision

When a potential construction revision is identified, the Division representative (typically the Resident Engineer) sends a revision request to the Project Manager. Throughout the construction revision process, the Project Manager is to coordinate with the Division representative/Resident Engineer regarding completion timelines and to ensure the revisions meet expectations in the field.

### Update the Plans

Upon receiving the request, the Project Manager coordinates with the requestor to understand the reason for the change and to determine next steps in completing the revision. This typically includes identifying the:

- Background details that led to the request
- Limitations involved
- Expectations and next steps (e.g., timing for processing the request, process to revise the plans)

The Project Manager considers both the complexity of the revision and timing for completing the work to direct the affected Design Leads on how to revise the current version of the Let Plans. The Project Manager leads the coordination efforts and establishes the deadlines to revise, review, and comment on the construction revision.

## 2HY1 Develop Preliminary Hydraulic Recommendations

### Overview

Establish the hydraulic vision for the project regarding water quality and quantity management, including preliminary structure sizing where appropriate. A preliminary stormwater management plan (pSMP) is developed to comply with the Department’s statewide National Pollutant Discharge Elimination System (NPDES) stormwater permit, and a scalable Hydraulic Planning Report is prepared to identify discipline recommendations. If applicable for the project, support is provided for Merger meetings.

### References

- [Guidelines for Drainage Studies and Hydraulic Design](#)
- [Hydraulics Unit Web Page Content and Guidance Documents](#)
- [Hydraulics Planning Report Guidance](#)
- [Stormwater Management Plan Template](#)
- [NC SELDM Catalog Application](#)
- [Guidance for the Preparation of a Preliminary Stormwater Management Plan](#)
- [Post-Construction Stormwater Program Post-Construction Stormwater Controls for Roadway and Non-Roadway Projects](#)
- [Stormwater Best Management Practices Toolbox](#)
- [BMP Decision Support Matrix](#)
- [Highway Floodplain Program](#)
- [U.S. Geological Survey Resources](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Hydraulic Design Engineer	Project Manager
Hydraulic Planning Report (HPR) <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ Complete Hydraulic Planning Report (HPR)</li> </ul>	X	X
Preliminary Stormwater Management Plan (pSMP)	<ul style="list-style-type: none"> <li>▪ Complete Preliminary Stormwater Management Plan (pSMP)</li> </ul>	X	

<sup>A</sup> indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench

### Complete Hydraulic Planning Report (HPR)

The Hydraulic Design Engineer completes the Hydraulic Planning Report in accordance with the *Hydraulic Planning Report Guidance* and scope of work. This allows the design team to identify and establish design parameters, assumptions, and any hydraulic considerations for the planning document and subsequent design phases. Completing the Hydraulic Planning Report reduces the amount of potential re-work and schedule delays for the project. The Hydraulic Design Engineer also:

- Coordinates the QC review following the NCDOT *Quality Management Manual* procedures and the respective QC Checklist before distribution.

- Prepares the Hydraulic Planning Report and delivers an electronic copy of the report to the Project Manager (for information) and the Hydraulics Reviewer (for action) to complete a review and QA audit.
- Revises and resubmits as needed to address the Hydraulics Reviewer's comments.

The Project Manager reviews the report for recommendations that may impact the project's scope, schedule, or budget or that may conflict with other disciplines'/Units' recommendations. The Project Manager initiates further coordination when appropriate.

The Hydraulic Design Engineer also provides the report to other technical disciplines/Units.

- The Roadway Design Lead is to use the report in the development of the Design Recommendation Plan Set (see 2RD1 for related information).
- The Structures Lead is to review and notify the Hydraulic Design Engineer and Project Manager of any concerns. If the report recommends retaining a hydraulic structure, the Structures Management Unit is to notify the Project Manager and Hydraulic Design Engineer if it recommends replacement of the structure due to structural deficiencies or other reasons.
- The recommendations from the Preliminary Hydraulic Recommendations table included in the report are to be presented during the Merger CP2A meeting (see 2EP1 for related information).
- The report provides general hydraulics information to both internal and external stakeholders and may aid in the development of scopes of work or labor estimates for later project phases.

### Complete Preliminary Stormwater Management Plan (pSMP)

NCDOT's statewide NPDES stormwater permit (NCS000250) requires projects that increase built-upon area to comply with the workflows presented in the Post Construction Stormwater Program (PCSP). The PCSP defines implementation of the BMP Toolbox and preparation of stormwater management plans (SMP). Most of the Department's projects require the preparation of a SMP. An SMP helps to ensure NCDOT is in compliance with the statewide permit and to communicate with those preparing any applicable permits. SMPs are prepared in two phases as follows:

1. A preliminary SMP is prepared following the [Guidance'General guidelines for filling out the PreparationpSMP' which is located in the Overview tab of a Preliminarythe Stormwater Management Plan-Template Excel workbook](#). The primary objective of the pSMP is to establish the stormwater treatment goals for the project, which helps inform subsequent drainage design decisions as well as decisions by other disciplines such as Right-of-Way (RW), Utility Coordination and Design (UT), Geotechnical (GT), etc. [NCDOT in partnership with the USGS has developed an application called the NC SELDM Catalog which is specifically designed to assist the engineer in establishing the stormwater treatment goals for the project. If the NC SELDM Catalog indicates a goal of implementing a stormwater control measure from the BMP Toolbox, then the BMP Decision Support Matrix may be used to refine the choice of control measures selected for the goal in conjunction with sound engineering judgement. Detailed instructions for running the NC SELDM Catalog application are included in the application along with a project example. Training videos for how to use the NC SELDM Catalog application are available through the NC Learning Center website \(requires an NCID\).](#)

## 3HY1 Complete Hydraulic Design

### Overview

Complete the final drainage designs to be shown on the Right-of-Way Plan Set and complete all required environmental permit drawings and Federal Emergency Management Agency (FEMA) compliance packages.

### References

- [Guidelines for Drainage Studies and Hydraulic Design](#)
- [Hydraulics Unit Web Page Content and Guidance Documents](#)
- [Post-Construction Stormwater Program Post-Construction Stormwater Controls for Roadway and Non-Roadway Projects](#)
- [Stormwater Best Management Practices Toolbox](#)
- [BMP Decision Support Matrix](#)
- [NCDOT's Compliance Documentation Workflow for Rule 15A NCAC 04B .0109](#)
- [Highway Floodplain Program](#)
- [Guidance for Concurrence Point 4C Meetings and Plans](#)
- [Completing 3D Series Hydraulic Summary Plan Sheets](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Hydraulic Design Engineer	
Final Drainage Design	<ul style="list-style-type: none"> <li>▪ Complete Final Drainage Design</li> </ul>	X	
FEMA Compliance Packages (MOA/CLOMR) <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ Prepare and Submit FEMA Compliance Packages</li> </ul>	X	Hydraulics Unit (Floodplain Management)
Hydraulic Summary Sheet(s)	<ul style="list-style-type: none"> <li>▪ Complete Drainage Summary Sheet(s)</li> <li>▪ Complete Stormwater Control Measures Summary Sheet</li> </ul>	X	
Stormwater Management Plan <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ Finalize Stormwater Management Plan</li> </ul>	X	
Environmental Permit Drawings <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ Complete/Submit Environmental Permit Drawing Package</li> </ul>	X	
Merger CP4C Meeting Package and Minutes	<ul style="list-style-type: none"> <li>▪ Conduct Merger CP4C Meeting (if applicable for the project)</li> </ul>	X	Project Manager (as applicable)

<sup>A</sup> indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench

### Complete Final Drainage Design

The final Redline Drainage Plans are completed after the Field Inspection Review Meeting and may require ongoing incorporation of drainage revisions due to field inspection comments, revisions to the roadway design plans during the Plan-in-Hand Stage, constructability concerns (notably those coming out of the Constructability Review), and/or utility conflicts. To complete this task, the Hydraulic Design Engineer is to:



## Complete Stormwater Control Measure Summary Sheet

The stormwater control measure (SCM) Summary Sheet is auto-populated based on content entered in the Stormwater Management Plan. The purpose of the SCM Summary Sheet is to provide Roadside Environmental Field Operations Engineers a means to verify that the SCM was constructed and then enter the SCM into NCDOT's Stormwater Control Management System for subsequent inspection and maintenance as required in the Department's statewide NPDES stormwater permit (NCS000250).

The Hydraulic Design Engineer submits the SCM Summary Sheet concurrent with the Drainage Summary Sheet(s). The guidance document entitled *Completing 3D Series Hydraulic Summary Plan Sheets* provides additional information for preparing and submitting the SCM Summary Sheet.

## Finalize Stormwater Management Plan

In activity 2HY1, the Hydraulic Design Engineer prepared a preliminary stormwater management plan (pSMP) that established the stormwater treatment goals for the project- [using the NC SELDM Catalog application and if necessary, the BMP Decision Support Matrix](#). In this activity (3HY1), the Hydraulic Design Engineer finalizes the SMP to document stormwater management decisions and whether the treatment goals were able to be achieved. For those situations where pSMP treatment goals could not be attained due to various constraints, the finalized SMP describes such constraints and the alternative management decisions that were made. This description defines the maximum extent practical stormwater management applied to the project in compliance with the NPDES permit Post-Construction Stormwater Program (PCSP). The SMP also serves to document compliance with Rule 15A NCAC 04B .0109 and is intended to ensure that stormwater discharges do not erode receiving channels.

The Hydraulic Design Engineer submits the finalized Stormwater Management Plan as compliance documentation with the NPDES stormwater permit (NCS000250) and, when required, for review as part of the Environmental Permit Drawing Package.

## Complete/Submit Environmental Permit Drawing Package

The Hydraulic Design Engineer prepares the environmental permit drawing permit package used for the environmental permit application(s) in accordance with *Guidelines For Drainage Studies and Hydraulic Design* and the Guidance for Concurrence Point 4C Meetings and Plans document as follows:

- Obtain information needed from others.
  - The Structures Lead provides impact quantities for temporary and permanent bridge bents.
  - The Structures Lead coordination may be required to determine impacts due to temporary work pads, work bridges, causeways, etc.
  - Others are coordinated with depending on project specifics.
- Complete environmental permit drawings, including (as applicable to the project):
  - Wetland and surface water permit drawings
  - Buffer permit (NCDWR) drawings
  - Coastal Area Management Act (CAMA) (NC Division of Coastal Management) permit drawings
  - Federal Energy Regulatory Commission (FERC) permit drawings
- Coordinate the QC review following the NCDOT *Quality Management Manual* procedures and the respective QC Checklist before upload and distribution.

## 4HY1 Complete Any Open Hydraulic Tasks

~~The Hydraulics Unit is to complete any outstanding tasks from the previous stages, continuing work toward securing FEMA compliance and continuing to provide support to other disciplines/Units as needed to incorporate plan revisions and secure the permits. The Hydraulic Designer is to complete any outstanding tasks from the previous stages. This includes submitting all outstanding deliverables with their appropriate QC checklist(s), ensuring all deliverables are current, continuing to work toward securing FEMA compliance and continuing to provide support to other disciplines/Units as needed to incorporate plan revisions and secure the permits.~~

The QA reviewer is to review all outstanding tasks to ensure that the design is in compliance with the Guidelines for Drainage Studies and Hydraulic Design and applicable standards, and deliverables are current and stored in the appropriate location.

## 5HY1 Hydraulic Construction Support

### Overview

Provide timely reviews and technical expertise throughout the project’s construction phase as needed. The importance of this phase is to provide technical support to the resident engineer’s office.

### References

- [Guidelines for Drainage Studies and Hydraulic Design](#)
- [Hydraulics Unit Web Page content and guidance documents](#)
- [Field Guide For Post-Construction Stormwater BMPs](#)
- [Post-Construction Stormwater Program Post-Construction Stormwater Controls for Roadway and Non-Roadway Projects](#)
- [Stormwater Best Management Practices Toolbox](#)
- [Highway Floodplain Program](#)
- [CLEAR Program](#)

### Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
		Hydraulic Design Engineer
Drainage Investigation Documentation	<ul style="list-style-type: none"> <li>▪ Complete Drainage Investigation</li> </ul>	X
Construction Support Documentation	<ul style="list-style-type: none"> <li>▪ Complete Hydraulic Construction Support (tasks vary)</li> </ul>	X

### Complete Drainage Investigation

Upon request from Division staff, the Hydraulics Unit investigates and reviews drainage-related issues. The Hydraulic Design Engineer is to complete a drainage review, report findings, determine the Department’s responsibility in resolving the issue, and provide recommendations if warranted.

- Review may include a site investigation, compiling data including mapping, topography, and historical plans, the analysis of pre and post conditions, development of calculations, and analysis.
- For central-managed projects, submit findings and recommendations to the Hydraulics Unit for review and delivery to Division staff. For Division-managed projects, submit findings and recommendations as directed by Division staff.

### Hydraulic Construction Support

Upon request from Division staff or the Hydraulics Unit, the Hydraulic Design Engineer provides the following support during the Construction Phase:

- Provides technical expertise and answers questions on the project’s hydraulic design- including post-construction stormwater BMPs.
- Responds to requests for information (RFI) from the Contractor on behalf of the Division office.
- Completes drainage design component of a construction revision in accordance with 5CS1 and hydraulic references noted above.
- Reviews shop drawings for stormwater control measure devices as needed.



## 2IM1 Verify Complete Streets

### Overview

Review the roadway design plans (e.g., the Design Recommendation Plan Set) to assess if the facility type is appropriate for the project’s design, matches the facilities from the *Complete Streets Project Sheet*, meets the design standards as dictated by the Complete Streets Policy, and adheres to the authoritative design standards of the *NCDOT Complete Streets Policy*.

### References

- AASHTO Bicycle Design Guide*
- AASHTO Pedestrian Design Guide*
- [Complete Streets Policy and Implementation Guide](#)
- [Roadway Design Manual \(Updated link to the new manual\) ~~In Development: The manual is in the process of being updated.~~](#)
- [Integrated Mobility Division \(IMD\) Project Scoping and Design Concurrence Portal](#)
- FHWA Guidance*
- NACTO Urban Design Guide*

### Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader	Additional Support	
		Integrated Mobility Division Staff	Complete Streets Coordinator	Roadway Design Lead
Integrated Mobility Division Concurrence Review Memo	<ul style="list-style-type: none"> <li>▪ <i>Prepare Memo Confirming Review of Roadway Plans for Compliance with Complete Streets Policy</i></li> </ul>	X	X	X

### Prepare Memo Confirming Review of the Roadway Design Plans for Compliance with Complete Streets Policy

The Roadway Design Lead initiates an Integrated Mobility Division design concurrence review by submitting a design review request to designated Integrated Mobility Division staff via the Smartsheet Portal. The request for project review is to include the items listed for the Alignment Defined (Stage 2) selection on the Integrated Mobility Division (IMD) Project Scoping and Design Concurrence Portal.

Integrated Mobility Division staff review the roadway design plans, coordinates with the project team, and returns an Integrated Mobility Division Design Concurrence Review Memo to the Roadway Design Lead (for action) and Project Manager (for information). The design concurrence review considers the context classification as well as transportation characteristics. The context classification of a roadway, together with its transportation characteristics, provides information about who the users are along the roadway, the regional and local travel demand of the roadway, and the challenges and opportunities of each roadway user.

The design concurrence review is also saved to the project SharePoint site by the Roadway Design Lead/Project Manager.

## 1RD1 Initiate Roadway Coordination

### Overview

Ensure that the Express Design is both consistent with the vision established for the corridor by internal and external stakeholders and represents sound roadway design principles and practices.

### References

- American Association of State Highway Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*
- [Roadway Design Manual](#) (~~Updated link to the new manual in Development: The manual is in the process of being updated.~~)
- ~~[Complete Streets Memo/Policy](#) (In Development: The design guidance will ultimately be housed in the updated NCDOT Roadway Design Manual.)~~
- [Mapping & Surveys for Planning and Design Activities Guide](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Comments on Express Designs	<ul style="list-style-type: none"> <li>▪ <i>Provide Roadway Input on Express Design</i></li> </ul>	Roadway Design Engineer	
Comments on Mapping Limits	<ul style="list-style-type: none"> <li>▪ <i>Perform Independent Review of Mapping Limit Polygon</i></li> </ul>	Roadway Design Engineer or Appropriate Division Personnel	Division Location and Surveys Engineer and/or Photogrammetric Engineer

### Provide Roadway Input on Express Design

Considering the need for early coordination as an Express Design is developed (see 1FS2 for related information), the NCDOT Roadway Design Engineer is to engage as follows:

- Review the roadway design elements of the Express Design as provided by the Feasibility Studies Engineer by:
  - Evaluating the design to confirm design elements are in alignment with the AASHTO *A Policy on Geometric Design of Highways and Streets* and NCDOT’s *Roadway Design Manual and Complete Streets Memo/Policy*.
  - Evaluating the design to confirm it reflects any multimodal accommodations coordinated with municipalities, metropolitan or rural planning organizations, and/or that which is recommended by the NCDOT.
- Generate comments on the Express Design, considering that:
  - Comments are to focus on any issues that could adversely affect decision-making as they are being evaluated in the prioritization process.
  - Comments are submitted to Feasibility Studies Engineer in written format with all necessary accompanying documentation that assist in the comments being understood.

In all, the Roadway Design Engineer provides roadway design technical expertise during this activity that involves:

- Responding verbally or in writing, as appropriate, to questions or concerns that may arise about roadway design policies, practices, and/or procedures as the Express Design is being developed.
- Participating in meetings in which the Roadway Design Unit or Roadway Design Engineer is requested to attend.

### Perform Independent Review of Mapping Limits Polygon

To perform this review task, the NCDOT Roadway Design Engineer or Division designee reviews mapping limits polygon [for final surveys](#) as provided by the Feasibility Studies Engineer to:

- Evaluate limits to check that they are sufficient for design, but not so excessive that it overburdens resources.
  - There are times where further coordination with Location and Surveys and/or Photogrammetry may be needed.
- Provide comments to the Feasibility Studies Engineer in written format with all accompanying documentation that assist in the comments being understood.

## 2RD1 Complete the Design Recommendation Plan Set

### Overview

Complete the project's Design Recommendation Plan Set and associated roadway tasks to establish the essential roadway design elements that facilitate multiple activities across multiple disciplines early in this stage. This activity provides needed data that is incorporated into the environmental document, serves as a visual aid during public engagement activities, and sets a foundation for coordination activities with other technical disciplines/Units, so that the technical leads can develop and advance their design recommendations and plans early.

### References

- American Association of State Highway Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets and Errata*
- American Association of State Highway Transportation Officials (AASHTO) *Roadside Design Guide 4<sup>th</sup> Edition and Errata*
- [Roadway Design Manual](#) (~~Updated link to the new manual In-Development: The manual is in the process of being updated.~~)
- [Roadway Standard Drawings](#)
- ~~[Complete Streets Memo/Policy](#) (In-Development: The design guidance will ultimately be housed in the updated NCDOT Roadway Design Manual)~~
- ~~[Subregional Tier Guidelines](#) (In-Development: The design guidance will ultimately be housed in the updated NCDOT Roadway Design Manual)~~
- ~~[Resurfacing, Restoration, and Rehabilitation \(R-R-R\) of Highways and Streets](#)~~
- [Roadway Design Consultant Coordination Guidelines](#) (In Development: The guidelines are being updated -Part or all of this may be incorporated into the updated NCDOT Roadway Design Manual or remain a separate guidance)
- ~~[Public Involvement and Mapping Guidelines](#)~~
- ~~[Public Involvement and Mapping Guidelines](#) (In-Development: This will ultimately be housed in the updated Roadway Design Manual.)~~
- ~~[Design Exception Guidelines](#) (In-Development: The guidelines are being updated and will ultimately be housed in the updated Roadway Design Manual.)~~
- American Association of State Highway Transportation Officials (AASHTO) *Roadway Lighting Design Guide*
- ~~[Roadway Lighting Policy](#) ~~Roadway Lighting Policy~~ (In-Development: This will ultimately be housed in the updated Roadway Design Manual.)~~
- National Cooperative Highway Research Program (NCHRP) *Report 152 "Warrants of Highway Lighting"*
- Location and Design Approval Procedures*
- [NCDOT Quality Management Manual](#)

- Reviews the design criteria package to verify the appropriate references are used and values for each element are correct based on those references.
- Confirms consistency between the design criteria and typical sections.
- Provides comments and any associated documents to the Roadway Design Lead (for action) and Project Manager (for information). Once complete, a meeting can be requested to discuss concerns or gain clarity on statements.

The Roadway Design Plan Review Group Leader or appropriate Division personnel then issues design criteria approval, and once comments have been adequately resolved, the Roadway Design Plan Review Group Lead or appropriate Division personnel provides documentation of approval to the Roadway Design Lead and Project Manager.

### Complete the Design Recommendation Plan Set

The development of final surveys is a coordinated effort between the Locations and Surveys and Photogrammetry leads or Units, which begins in the Project Initiation Stage. The final survey product is then delivered to the Roadway Design Lead prior to initiating the Design Recommendation Plan Set. The designs developed for this plan set is also be used to facilitate the completion of the environmental document.

To develop this plan set, the Roadway Design Lead develops the horizontal and vertical alignments for all affected roadways that involves:

- Developing the roadway designs to be in compliance with the approved design criteria, the AASHTO *A Policy on Geometric Design of Highways and Streets* and NCDOT's Roadway Design policies, procedures, and practices as defined in the *Roadway Design Manual*.
- Coordinating with the other technical disciplines/Units (e.g., Hydraulics, Utilities, Geotechnical, Structures Management, etc.) and Division staff to verify that no new issues presented themselves based on the delivery of the final surveys.
- Evaluating the horizontal and vertical alignments to ensure each fits the context of the subject roadways.
- Design decisions deviating from the guidance in the previous bullet are to be thoroughly documented in written format.

Additionally, as part of this task, the Roadway Design Lead is to:

- Layout roadway and structural design elements, basing both on the layout of following:
  - Roadway design elements identified in the Traffic Operations Analysis Technical Memorandum from the Congestion Management Project Engineer (see 2TM1 for related information).
  - Coordination with the Signing and Delineation Designer to ensure lane continuity is met and the proposed design can be signed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) (see 2SD1 for related information).
- Structural design elements on the approved design criteria, recommendations from the Hydraulic Design Engineer (if bridging a body of water), the Rail Division and Structure Management Units (if bridging a railroad), and coordination with the Structures Lead on the bridge type.
- Layout superelevation transitions that involve:

- ♦ Verifying that the superelevation transitions conform to the current *AASHTO Policy on Geometric Design of Highways and Streets* and NCDOT Standard Drawings.
- ♦ Coordinating with the Hydraulic Design Engineer to identify areas and address concerns where hydroplaning concerns exist.
- Calculate vertical clearance, if applicable, and document the vertical clearance calculations in a format that is easy to understand and verify.
  - ♦ Note: The minimum clearances for each structure over a roadway or railroad are provided in the approved design criteria.
  - ♦ Vertical clearance calculations are generated to confirm they have been met.
- Develop gore calculations, if applicable, and document the calculations in a format that is easy to understand and verify.
  - ♦ Note: The gore calculations are generated to ensure the rollover limitations are not violated as detailed in the *Roadway Design Manual*.
- Perform sight distance calculations as prescribed in the *Roadway Design Manual* documenting the calculations in a format that is easy to understand and verify.

### 3D Model Development

The Roadway Design Lead also generates a 3D Model, of the proposed design for the construction proposed by the project, and layout cross sections and limits of construction (slope stakes), considering:

- The cross sections and limits of construction are to be reflective of the 3D model.
- Design elements shown in the plan view are to be the same as the 3D model.

The appropriate version of software to be used is to be detailed in the scope of work.

### Right-of-Way and Easement Layout

The Roadway Design Lead is to also layout initially proposed right-of-way and easements generated based on guidance in the *Roadway Design Manual* and in coordination with the appropriate technical discipline/Unit. Station and offset labels are not required for the Design Recommendation Plan Set.

### Maintenance of Traffic Narrative

The Roadway Design Lead coordinates the development of the maintenance of traffic narrative, which is meant to be:

- A viable plan for maintenance of traffic conveyed in written format to demonstrate the project can be constructed as designed.
- The Work Zone Traffic Engineer is engaged early in the design process to discuss potential traffic management challenges and solutions (see 2TM2 for related information).

### Public Involvement Engagement

For public engagement at this stage, the Roadway Design Lead develops design public meeting maps to conform with the ~~*Public Involvement and Mapping Guidelines*~~ *public involvement and mapping guidelines (found in the Roadway Design Manual)* and coordinates the QC review following the NCDOT *Quality Management Manual* procedures and the QC Checklist. The Roadway Design Lead coordinates with the Project Manager and Public Involvement Lead to set up a review meeting to confirm what is represented on the map conveys the intent of the project.



- The pavement designs are evaluated to determine if any are incompatible with the proposed designs.
- If concerns arise or the recommendations are incomplete, the Pavement Design Engineer is contacted for further discussion.
- The final pavement designs are to be accurately reflected in the pavement schedule, typical sections, and paving details per the guidance in the *Roadway Design Manual*.

The Roadway Design Lead also develop an earthwork summary, which is all to be provided in the plans per the guidance in the *Roadway Design Manual*.

Lastly, the Roadway Design Lead completes the QC Checklist following the NCDOT *Quality Management Manual* procedures before upload and/or distribution of Design Recommendation Plan Set.

#### Design Recommendation Plan Set Review and Finalization

~~Once~~Since the ~~Design Recommendation Plans are complete,~~character and complexity of each project is different, a determination of how to generate feedback on the Design Recommendation Plan Set should be made when the work is scoped. The Roadway Design Lead ~~notifies the Project Manager, so that~~coordinates with the Project Manager ~~can~~to either distribute plans to the technical disciplines/Units and appropriate Division personnel for a comment period or schedule the Design Recommendation Plan Set Review Meeting. If a Design Recommendation Plan Set Review Meeting is to be held, the Roadway Design Lead (or assigned designee) distributes the plans to the technical disciplines/Units and ~~/or~~ appropriate Division personnel ahead of the meeting.

For roadway designs developed by a Private Engineering Firm/consultant firm, the NCDOT Roadway Design reviewer or Division designee is to use appropriate resources, including the applicable QA checklist in the *Quality Management Manual* to complete a quality assurance review. This review confirms the plan set is complete and in compliance with current NCDOT and Roadway Design Unit guidance, policies, and procedures.

From there, the Roadway Design Lead updates the plans based on comments from the Design Recommendation Plan Set Review Meeting, considering the following.

- Comments and recommendations from the review meeting are analyzed to determine if they are feasible.
- If results of the analyses do not provide a clear resolution, results are circulated to all relevant technical design Leads and Division personnel for a final determination.
- The designs and plans are updated to include all final recommendations.

The Roadway Design Lead distributes the updated plan set to the technical disciplines/units and/or appropriate Division personnel through the project SharePoint site. The Project Manager is included on the correspondence.

#### Formalize Design Exceptions

During the development of the Design Recommendation Plan Set, it may not be feasible to meet all the required design criteria. If it is determined that design element identified in the design exception checklist cannot be met, a formal design exception is required.

Where the lighting evaluation shows that lighting is not justified, the Division Engineer works with the affected municipality to determine if the municipality is interested in partnering with the NCDOT on including lighting in the project.

### Issue Location and Design Approval (LADA)

~~The Roadway Design Lead requests To review and issue a Location and Design Approval, which includes the location of the final environmental document and current project plans to the State Roadway Design Engineer, Division Engineer, or their designee. Once performs a consistency review has been completed and agreement between the documents confirmed, they draft environmental document and the roadway design plans in accordance with the Location and submit the approval Design Approval procedures. Upon review, a letter is drafted for the signature of the Technical Services Director or Division Engineer, with supporting documentation attached. The signed copy is placed on project SharePoint site by Please see the designee for the State Roadway Design Engineer or Division Engineer. Manual for more background on the LADA process.~~

## 2RD2 Prepare for Field Inspection

Develop a coordinated set of design plans (the Field Inspection Plan Set) that can be used for the Field Inspection Review Meeting and a constructability review, so that all vested parties are able to review and discuss concerns that could impact how a project is built.

### References

- American Association of State Highway Transportation Officials (AASHTO) *Roadside Design Guide 4<sup>th</sup> Edition and Errata*
- [Roadway Design Manual](#) (~~Updated link to the new manual In-Development: The manual is in the process of being updated.~~)
- [Roadway Standard Drawings](#)
- [Roadway Design Consultant Coordination Guidelines](#) (*In Development: The guidelines are being updated-Part or all of this may be incorporated into the updated NCDOT Roadway Design Manual or remain a separate guidance.*)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Roadway Design Lead	Other Technical Discipline/Unit Leads
Field Inspection Plan Set	<ul style="list-style-type: none"> <li>▪ Complete Field Inspection Plan Set</li> </ul>	X	X
Quantities for Construction Estimate		X	X

### Complete Field Inspection Plan Set

To complete the Field Inspection Plan Set, the Roadway Design Lead incorporates input from several sources as follows.

#### Hydraulic Design Input

The relevant information in the completed major structure reports (e.g., the Bridge Survey and Hydraulic Design Reports (BSRs), Detour Survey and Hydraulic Design Reports (DSRs), and Culvert Survey and Hydraulic Design Reports (CSRs)) and the completed drainage plans for field inspection are evaluated to confirm consistency between the hydraulic design and the roadway design plans (see 2HY2 for related information). The Roadway Design Lead incorporates the hydraulic design, details, and quantities into the 3D model and the roadway design plan, profile, and cross section sheets per the guidance in the *Roadway Design Manual*.

The Roadway Design Lead discusses concerns about the intent and/or accuracy of the hydraulic design with the Hydraulics Design Engineer to determine possible solutions. If the recommended solution has the potential to jeopardize the scope, schedule, or budget, the Roadway Design Lead notifies the Project Manager, so that the Project Manager can determine what further coordination is needed.

## 3RD1 Complete Roadway Design

### Overview

Evaluate and/or incorporate decisions from the field inspection, constructability review, and all remaining design recommendations from technical disciplines/Units into the plans, resulting in a set of plans with no major constructability or right-of-way issues.

### References

- American Association of State Highway Transportation Officials (AASHTO) *Roadside Design Guide 4<sup>th</sup> Edition and Errata*
- [Roadway Design Manual](#) (~~Updated link to the new manual in Development: The manual is in the process of being updated.~~)
- [Roadway Standard Drawings](#)
- [Roadway Design Consultant Coordination Guidelines](#) (*In Development: The guidelines are being updated. Part or all of this may be incorporated into the updated NCDOT Roadway Design Manual or remain a separate guidance*)
- [Standard Specifications for Roads and Structures](#)
- American Association of State Highway Transportation Officials (AASHTO) *Roadway Lighting Design Guide*
- ~~[Roadway Lighting Policy](#)~~
- ~~[Roadway Lighting Policy](#) (*In Development: This will ultimately be housed in the updated Roadway Design Manual.*)~~
- National Electrical Code (NEC)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Right-of-Way Plan Set w/ Noise Wall Locations	<ul style="list-style-type: none"> <li>▪ <i>Complete the Right-of-Way Plan Set</i></li> </ul>	Roadway Design Lead	Other Technical Discipline/Unit Leads (Roles noted in the descriptions below)
Quantities for Construction Estimate		Roadway Design Lead	Other Technical Discipline/Unit Leads (Roles noted in the descriptions below)
Roadway Design Plans Set for Permit Application	<ul style="list-style-type: none"> <li>▪ <i>Conduct Permit Drawing Consistency Review</i></li> </ul>	Roadway Design Lead	Hydraulics Design Engineer
Photometric Layout	<ul style="list-style-type: none"> <li>▪ <i>Complete Lighting Layout</i></li> </ul>	Roadway Lighting Design Engineer	
Lighting Plans Prepared in MicroStation		Roadway Lighting Design Engineer	
Voltage Drop Calculations		Roadway Lighting Design Engineer	
Typical Sections for Pavement Design Review	<ul style="list-style-type: none"> <li>▪ <i>Submit/Review Typical Sections (Pavement Management)</i></li> </ul>	Roadway Design Lead	Pavement Design Lead

### Plan Set QC Review, Review Meeting, and Finalization

The Roadway Design Lead completes the respective QC Checklist following the NCDOT *Quality Management Manual* procedures before upload and/or distribution of Right-of-Way Plan Set.

Once the Roadway Design Lead determines the Right-of-Way Plan Set is complete, the Roadway Design Lead distributes the plans to the technical disciplines/Units and/or appropriate Division personnel. [The Project Team can evaluate the risk of releasing the Right-of-Way Plan Set for acquisition before the end of Stage 3 based on the schedule and the complexity of the project. These plans utilize the most current design and recommendations from the other technical disciplines/Units.](#) Right-of-way acquisition can begin once the Project Manager has authorization for funding.

After the other technical disciplines/Units have uploaded their completed plans and notified the Roadway Design Lead and Project Manager, the Project Manager coordinates the scheduling of the Plan-in-Hand Review Meeting. If needed (depending on the complexity of the project or if significant changes have occurred from the Alignment Defined Stage), the Roadway Design Lead and Project Manager determine the need for an additional Constructability Review (see 3VM1 for related information).

For roadway designs developed by a Private Engineering Firm, the Roadway Design reviewer or Division designee uses appropriate means, including the applicable QA checklist in the *Quality Management Manual* to complete a quality assurance review. This review is to ensure the plan set is complete and in compliance with current NCDOT and Roadway Design Unit guidance, policies, and procedures.

The Roadway Design Lead updates the plans based on comments from the Plan-in-Hand Review Meeting, considering the following.

- Comments and recommendations from the review meeting are analyzed to determine if they are feasible.
- If results of the analyses do not provide a clear resolution, results are circulated to all relevant engineers and Division personnel for a final determination.
- The designs and plans are updated to include all final recommendations.

The Roadway Design Lead notifies the Project Manager once the plan set is complete.

### Conduct Permit Drawing Consistency Review

The development of environmental permit drawings is a critical component for obtaining approval from the appropriate environmental agencies prior to let. To complete this task, the Roadway Design Lead compares the draft environmental permit drawings with the current roadway design plans.

- Upon receipt of the draft environmental permit drawings from the Hydraulics Design Engineer, the Roadway Design Lead compares the plans to verify the impacts are the same.
- The elements under review include slope stakes, proposed right-of-way and easement impacts, clearing methodology, and the data associated with major hydraulic crossings.

The Roadway Design Lead provides written comments on any inconsistencies and provides all associated documents to the Hydraulics Design Engineer. If needed, the Roadway Design Lead coordinates with the Hydraulics Design Engineer and any other technical experts to resolve the concern.

## 4RD1 Finalize the Final PS&E Package

### Overview

With right-of-way acquisition and utility relocations well underway, compile the Final Roadway Design Plans, Specifications, and Estimate (PS&E) with all other required documentation to assist the Contract Standards and Development Unit to develop the contract for the Advertisement and Letting Process.

### References

- [Roadway Design Manual](#) (*Updated link to the new manual ~~In Development: The manual is in the process of being updated.~~*)
- [Roadway Design Consultant Coordination Guidelines](#) (*In Development: The guidelines are being updated.) Part or all of this may be incorporated into the updated NCDOT Roadway Design Manual or remain a separate guidance.*)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Roadway Design Lead	Other Technical Discipline/Unit Leads
Review Set of Final Plans	▪ Complete Contract Package	X	
Final Construction Quantities for Roadway Design Plans		X	
Sealed Contract Roadway Design Plans	▪ Submit Contract/Final Plans	X	X (Roles noted in the descriptions below)

### Complete the Contract Package

For compiling a complete contract package, the Roadway Design Lead updates the plans, as needed, for any design changes that occurred after the end of the Plan-in-Hand Stage. The process includes completing:

- The appropriate documentation required by the Contract Standards and Development Unit or Division Contract Engineer in proper format to either be included in the plans or provided as standalone documents.
- Items include the index of sheets, list of standard drawings, general notes, special provisions, relevant summary plan sheets summaries, quantities, and key documents.

The Roadway Design Lead completes the respective QC Checklist following the NCDOT *Quality Management Manual* procedures before upload and/or distribution of Final PS&E contract package.

For roadway designs developed by a Private Engineering Firm, the Roadway Design reviewer or Division designee is to use appropriate means, including the applicable QA checklist in the *Quality Management Manual* to complete a quality assurance review.



## 1RR1 Identify Railroad Impacts

### Overview

Determine impacts when the Rail Division Unit is contacted concerning a potential project rail corridor impact or invite the Rail Division Unit to a scoping or planning meeting.

### References

- [American Railway Engineering and Maintenance-of-Way Association \(AREMA\) Manual for Railway Engineering](#)
- [Federal Highway Administration \(FHWA\) Manual on Uniform Traffic Control Devices \(MUTCD\)](#)
- [FHWA Highway-Rail Crossing Handbook](#)
- [CSX Public Projects Manual](#)
- [Norfolk Southern \(NS\) Public Projects Manual](#)
- [Roadway Design Manual \(Updated link to the new manual\) ~~In Development: The manual is in the process of being updated.~~](#)
- [Rail Grade Separation Guidelines](#)
- [Complete Streets Memo/Policy \(Updated link to Complete Streets site\) ~~In Development: The design guidance will ultimately be housed in the updated NCDOT Roadway Design Manual~~](#)
- [Guidelines for Median Separations at Highway-Railway At-Grade Crossings](#)
- [State Maintained Road/Railroad Crossing Closure Procedures](#)
- [Summary of State Highway-Railroad Grade Separation Policies](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	
		Railroad Coordination Engineer	
Scoping Response Letter	<ul style="list-style-type: none"> <li>▪ Determine a Finding of No Rail Impacts</li> </ul>		
	<ul style="list-style-type: none"> <li>▪ Determine a Finding of One or More Rail Impacts</li> </ul>		
	<ul style="list-style-type: none"> <li>▪ Submit Scoping Letter</li> </ul>		X

### Determine a Finding of No Rail Impacts

To determine a “Finding of No Rail Impacts,” the Railroad Coordination Engineer is to:

- Examine rail corridor mapping to determine proximity of the project to nearest rail corridor(s) and determine whether the proposed project is not proximate to a rail corridor.
- In the event there is a no rail impact finding, review the project to determine if there is an abandoned corridor maintained by NCDOT or if there are other rail impacts that are not obvious (e.g., newly built tracks that only the Rail Division are familiar with).

If examinations result in a negative (or no) finding, the Railroad Coordination Engineer sends a “Finding of No Rail Impacts” to the Feasibility Studies/Corridor Development Unit Lead.

## 2RR1 Initiate Railroad Review

### Overview

Initiate railroad review and design (if necessary) when there are identified rail corridor impacts on a project.

### References

- [American Railway Engineering and Maintenance-of-Way Association \(AREMA\) Manual for Railway Engineering](#)
- [Federal Highway Administration \(FHWA\) Manual on Uniform Traffic Control Devices \(MUTCD\)](#)
- [FHWA Highway-Rail Crossing Handbook](#)
- [CSX Public Projects Manual](#)
- [Norfolk Southern \(NS\) Public Projects Manual](#)
- [Roadway Design Manual \(Updated link to the new manual\) ~~In Development: The manual is in the process of being updated.~~](#)
- [Rail Grade Separation Guidelines](#)
- [Complete Streets Memo/Policy \(Updated link to Complete Streets site\) ~~In Development: The design guidance will ultimately be housed in the updated NCDOT Roadway Design Manual~~](#)
- [Guidelines for Median Separations at Highway-Railway At-Grade Crossings](#)
- [State Maintained Road/Railroad Crossing Closure Procedures](#)
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- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Railroad Discipline Lead(s)	Railroad Coordination Engineer
Railroad Design Line and Grade	<ul style="list-style-type: none"> <li>▪ Approve Railroad Design Line and Grade</li> </ul>	X	X
Railroad PE Agreement	<ul style="list-style-type: none"> <li>▪ Establish Railroad PE Agreement</li> </ul>	X	X
Roadway Plans for Rail Review	<ul style="list-style-type: none"> <li>▪ Submit Roadway Plans for Rail Review</li> </ul>	X	X
Crossing Scope for Off-Site Detour	<ul style="list-style-type: none"> <li>▪ Define Crossing Scope for Off-Site Detour</li> </ul>	X	X

### Approve Railroad Design Line and Grade

The Roadway Design Lead (or assigned design lead) and appropriate Rail Discipline Lead coordinate on the roadway design and rail design to establish the project footprint. The Railroad Design Reviewer receives the current railroad design plans from the consultant/Private Engineering Firm (PEF) for review and initial comments. Once revised, the appropriate Rail Discipline Lead submits the revised design to the appropriate railroad. The appropriate Rail Discipline Lead works with the railroad to obtain comments and coordinates with the Roadway Design Lead (for action), the Railroad Coordination Engineering (for information), and the Project Manager (for information) on required plan revisions necessary for railroad approval.

## 3RR1 Complete Railroad Design and Agreements

### Overview

Complete the railroad design and execute all necessary railroad agreements.

### References

- [American Railway Engineering and Maintenance-of-Way Association \(AREMA\) Manual for Railway Engineering](#)
- [Federal Highway Administration \(FHWA\) Manual on Uniform Traffic Control Devices \(MUTCD\)](#)
- [FHWA Highway-Rail Crossing Handbook](#)
- [CSX Public Projects Manual](#)
- [Norfolk Southern \(NS\) Public Projects Manual](#)
- [Roadway Design Manual \(Updated link to the new manual\) ~~In Development: The manual is in the process of being updated.~~](#)
- [Rail Grade Separation Guidelines](#)
- [Complete Streets Memo/Policy \(Updated link to Complete Streets site\) ~~In Development: The design guidance will ultimately be housed in the updated NCDOT Roadway Design Manual~~](#)
- [Guidelines for Median Separations at Highway-Railway At-Grade Crossings](#)
- [State Maintained Road/Railroad Crossing Closure Procedures](#)
- [Summary of State Highway-Railroad Grade Separation Policies](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Railroad Discipline Lead(s)	Railroad Coordination Engineer
Railroad Signal Planimetric	<ul style="list-style-type: none"> <li>▪ Prepare Railroad Signal Planimetric and Complete Railroad Crossing Signal Design</li> </ul>	X	X
Railroad Crossing Signal Design		X	X
Railroad Design Plans	<ul style="list-style-type: none"> <li>▪ Provide Final Railroad Design Plans to the Railroad</li> </ul>	X	X
Relevant Railroad Agreements	<ul style="list-style-type: none"> <li>▪ Complete Railroad Agreements</li> </ul>	X	X

### Prepare Railroad Signal Planimetric and Complete Railroad Crossing Signal Design

The Rail Signals Lead receives the Field Inspection Plan Set, which includes advanced drainage design from the Hydraulics Design Engineer, that is used to prepare a planimetric for railroad signal locations.

The Rail Signals Lead sends the railroad planimetric and Authorization for Preliminary Engineering (A4PE) to the railroad to complete their final design for the railroad crossing signal plans. The Railroad sends the signal design back to the Rail Signals Lead, who complete an Approved for Construction (A4C) upon completion of the final signal design and informs the Railroad Coordination Engineer and Project Manager for information.

## 4RR1 Complete Railroad Coordination

### Overview

Complete all railroad coordination. The other mechanism for continuing this task is getting involved in stakeholder meetings and coordination meetings.

### References

- [American Railway Engineering and Maintenance-of-Way Association \(AREMA\) Manual for Railway Engineering](#)
- [Federal Highway Administration \(FHWA\) Manual on Uniform Traffic Control Devices \(MUTCD\)](#)
- [Federal Highway Administration \(FHWA\) Highway-Rail Crossing Handbook](#)
- [CSX Public Projects Manual](#)
- [Norfolk Southern \(NS\) Public Projects Manual](#)
- [Roadway Design Manual \(Updated link to the new manual\)~~in Development: The manual is in the process of being updated.~~](#)
- [Rail Grade Separation Guidelines](#)
- [Complete Streets Memo/Policy \(Updated link to Complete Streets site\) ~~in Development: The design guidance will ultimately be housed in the updated NCDOT Roadway Design Manual~~](#)
- [Guidelines for Median Separations at Highway-Railway At-Grade Crossings](#)
- [State Maintained Road/Railroad Crossing Closure Procedures](#)
- [Summary of State Highway-Railroad Grade Separation Policies](#)
- [Division Let Guidance](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Railroad Discipline Lead(s)	Railroad Coordination Engineer
Railroad Agreements	<ul style="list-style-type: none"> <li>▪ <i>Receive/Execute Relevant Railroad Agreements</i></li> </ul>	X	X
Project Special Provisions	<ul style="list-style-type: none"> <li>▪ <i>Provide Project Special Provisions to Contract Standards</i></li> </ul>	X	X

### Receive/Execute Relevant Railroad Agreements

The Rail Encroachment Lead coordinates the execution of the final railroad agreement for the railroad encroachment (if needed), except for structures over/under the railroad, which are handled by the Structure Management Unit. The Rail Encroachment Lead then distributes the agreement to the Railroad Coordination Engineer and Project Manager when finalized.

### Provide Project Special Provisions to Contract Standards

The appropriate Rail Division Lead provides any project-specific Special Provisions to the Contract Standards and Development Unit (for action) and the Railroad Coordination Engineer and Project Manager for information.

## 2SD1 Initiate Signing and Delineation Design

### Overview

Using the roadway model as a guide, develop a signing and delineation design for the project. Locate overhead and ground mounted type A and B-signs and establish pavement delineation in accordance with *Manual of Uniform Traffic Control Devices (MUTCD)*, *NCDOT Roadway Standard Drawings*, and *NCDOT Signing and Delineation Manual*.

### References

- Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*
- FHWA *Standard Highway Signs and Markings*
- [Signing and Delineation Unit Website](#)
- [Signing and Delineation Procedure Manual](#)
- [Standard Specifications for Roads and Structures](#)
- [Traffic Engineering Practices, Policies, and Legal Authority \(TEPPL\)](#)
- [Roadway Standard Drawings](#)
- [Roadway Design Manual \(Updated link to the new manual\) ~~In-Development: The manual is in the process of being updated.~~](#)
- [Construction Manual](#)
- [NC Supplement to the Manual on Uniform Traffic Control Devices](#)
- [Logo Manual](#)
- American Association of State Highway Transportation Officials (AASHTO) *Roadside Design Guide*
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Signing and Delineation Designer	Regional Signing and Delineation Engineer
Preliminary Signing and Delineation Strip Map	<ul style="list-style-type: none"> <li>▪ <i>Complete Preliminary Signing and Delineation Layout</i></li> </ul>	X	X
Document Conflicts	<ul style="list-style-type: none"> <li>▪ <i>Identify Conflicts with Utilities, Right-of-Way, Wall, and ITS Device Conflicts</i></li> </ul>	X	X
Plan Submittals	<ul style="list-style-type: none"> <li>▪ <i>Distribute Plans</i></li> </ul>	X	X

### Complete Preliminary Signing and Delineation Layout

The Signing and Delineation Designer is to develop the plans using *NCDOT Roadway Standard Drawings*, the *MUTCD*, *TEPPL*, and *NCDOT Signing and Delineation Procedure Manual*. [Review the Traffic Operations Analysis Technical Memorandum and proposed lane configuration with the Roadway Design Lead to ensure lane continuity is met and the proposed design can be signed in accordance with the MUTCD on](#)

[complex projects \(see 2TM1 and 2RD1 for related information\)](#). QC review is required before distribution for all labels, callouts, notes, and information. In reference to Chapter 4 of the NCDOT *Signing and Delineation Procedure Manual*, the Signing and Delineation Designer is to complete the following:

- Develop Signing and Delineation Strip Map.
- Identify Overhead Sign locations (stations).
- Identify if a Work Zone Signing Staging plan is needed.
- Determine Cantilever or Full Span.
- Determine Barrier needs/foundation protection and guardrail.
- Determine sign messaging.
- Identify sign locations.
- Determine simple (guardrail) or break away support.

The Signing and Delineation Designer is to coordinate with the Signing and Delineation Unit, Division Office for approval of routing and sign messaging in accordance with MUTCD, TEPL, FHWA, and AASHTO.

- Review for safety, [-operational, or other](#) elements that may cause require roadway modifications [\(i.e., lane drops and option lanes.\)](#)
- Review for compliance with MUTCD, TEPL and *Roadway Standard Drawings*.
- Review lane configuration and complex interchanges, exit only, ~~and~~ lane drops, [and option lanes](#).
- Replace, modify, or upgrade existing signs where necessary in accordance with MUTCD and TEPL.
- Send plans and communicate with appropriate Division Traffic Engineer and Regional Traffic Engineer to acquire and review for combined comments with Signing and Delineation Unit staff (see 2TS1 for related information).

In reference to Chapter 5 of the NCDOT *Signing and Delineation Procedure Manual*, the Signing and Delineation Designer is to complete the following for delineation design:

- Acquire a pavement marking recommendation letter from Signing and Delineation Standards Section.
  - This letter can be found under the SharePoint site Preconstruction Projects file structure or by contacting the Signing and Delineation Standards Engineer.
- Base the striping plan on the roadway model.
- Ensure lane continuity (also see Chapter 2 of the NCDOT *Signing and Delineation Manual*).
- Note lane configurations, such as lane drops, ~~and~~ lane reductions, [and option lanes](#) (additional signs may be required). [Coordinate with the Roadway Design Lead, Congestion Management Project Engineer, and Division Traffic Engineer as required.](#)
- Design lane widths and intersection layouts.
- Coordinate with the Signal Lead on stop bar and crosswalk locations.
- Locate and determine curb ramps types.

The Signing and Delineation Designer is to send plans and fully communicate with appropriate Division Traffic Engineer and Regional Traffic Engineer to acquire and review for combined comments with Signing and Delineation Unit staff.



## 3SD1 Complete Signing and Delineation Design

### Overview

Complete the signing and delineation plans in reference to NCDOT *Roadway Standard Drawings*, the MUTCD, TEPL, and NCDOT *Signing and Delineation Procedure Manual*.

### References

- Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*
- FHWA *Standard Highway Signs and Markings*
- [Signing and Delineation Unit Website](#)
- [Signing and Delineation Procedure Manual](#)
- [Standard Specifications for Roads and Structures](#)
- [Traffic Engineering Practices, Policies, and Legal Authority \(TEPL\)](#)
- [Roadway Standard Drawings](#)
- [Roadway Design Manual \(Updated link to the new manual\) ~~In-Development: The manual is in the process of being updated.~~](#)
- [Construction Manual](#)
- [NC Supplement to the Manual on Uniform Traffic Control Devices](#)
- [Logo Manual](#)
- American Association of State Highway Transportation Officials (AASHTO) *Roadside Design Guide*
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Signing and Delineation Designer	Regional Signing and Delineation Engineer
Approved Strip Map	<ul style="list-style-type: none"> <li>▪ <i>Complete Unsealed Signing and Delineation Plans</i></li> </ul>	X	X
Overhead Sign Locations		X	X
Three Way Check-QC/QA	<ul style="list-style-type: none"> <li>▪ <i>Final Signing and Delineation Plans</i></li> </ul>	X	X
Final Plans		X	X
Sign Designs and Support Chart		X	X
Project Special Provisions		X	X
Quantities		X	X
Guardrail/Barrier Locations		X	X

### Complete Unsealed Signing and Delineation Plans

The Signing and Delineation Designer is to complete and submit the strip map to the Roadway Design Lead and Project Manager. This includes steps that involve:

- Submit coordinated pole/cabinet locations to the ITS and Signals Unit (Signal Design Section) and Utilities [UnitCoordinator](#) for review.
- Transmit final accepted pole/cabinet locations to the ITS and Management Section), Utilities [UnitCoordinator](#), and the Project Manager.

### Complete QC/QA Procedures

The Signals Lead is to coordinate the applicable QC review following the NCDOT *Quality Management Manual* procedures and the respective QC Checklist before upload and distribution.

### ITS Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		ITS Lead	Utility Lead/Utility Owners
Utility Make Ready (UMR) Sheets and ITS Device Diagrams	<ul style="list-style-type: none"> <li>▪ Complete UMR Sheets and ITS Device Diagrams</li> </ul>	X	X

### Complete UMR Plans and ITS Device Diagrams

To establish the UMR Plans and ITS device locations and diagrams, the ITS Lead is to finalize the boundaries of the project and develop a base map for the UMR plans. Develop (if applicable) ITS Device Location Diagrams following the references noted herein. This includes:

- Identifying, recording and mapping all roadways and driveways, cabinet and signal inventory numbers and all poles in which cable is to be attached aerially (UMR plan sheets).
- Developing a tree map, identifying proposed and all existing utility cable heights (UMR plan sheets).
- Avoiding conflicts by coordinating with utility owners and other Units/disciplines, including utilities, roadway design, and hydraulics.
- Providing device cabinet locations to ensure the availability of power at proposed locations. (ITS Device)
- Collaborate with the applicable utility company to identify closest power source. (ITS Device)

For acceptance and transmittal, the ITS Lead is to:

- Provide written responses to each related comment from the previous submittal of UMR plan sheets.
- Submit draft final UMR plans to utility companies for review and comment.
- Submit final UMR plans and request estimates from utility companies for utility work.
- Submit coordinated device locations to the ITS and Signals Management Section for review. (ITS Device)
- Transmit final accepted pole/cabinet locations to the ITS and Signals Management Section. (ITS Device)

### Complete QC/QA Procedures

The ITS Lead is to coordinate the applicable QC review following the NCDOT *Quality Management Manual* procedures and the respective QC Checklist before upload and distribution.

## 2ST1 Initiate Structures Design

### Overview

Following the development of Design Recommendation Plan Set and the Bridge Survey Report, initiate and finalize structure-related scope and estimating in coordination with the Project Manager.

### References

- ❑ *Structures Management Unit Scoping Sheet*
- ❑ *NCDOT Scope and Manday Estimate Form*
- ❑ American Association of State Highway Transportation Officials (AASHTO) *Load and Resistance Factor Design (LRFD) Bridge Design Manual*
- ❑ [Structures Management Unit Design Manual](#)
- ❑ [Structures Management Unit Design Manual – Standard Letters/Policy Memos](#)
- ❑ [Structures Management Unit SharePoint Guidelines](#)

### Deliverables

Deliverable	Task	Responsible Party		
		Activity Leader		Additional Support
		Project Manager	Design Firm Structures Lead	Structures Management Unit <del>Professional</del> Private Engineering Firm Coordination Group
Preliminary / Final Scoping Sheet	<ul style="list-style-type: none"> <li>▪ <i>Develop and Finalize Structure Scoping Sheet</i></li> </ul>		X	X
Preliminary / Final Manday Estimate	<ul style="list-style-type: none"> <li>▪ <i>Develop Preliminary Manday Estimate</i></li> </ul>		X	X
	<ul style="list-style-type: none"> <li>▪ <i>Finalize Manday Estimate</i></li> </ul>	X	X	X
	<ul style="list-style-type: none"> <li>▪ <i>Initiate NTP</i></li> </ul>	X		

### Develop and Finalize Structure Scoping Sheet

After development of the Design Recommendation Plan Set (after Preliminary Plans and Bridge Survey and Hydraulic Design Reports (BSR) are finalized), the Design Firm Structures Lead develops the Structure Scoping Sheet. The Design Firm Structures Lead can coordinate with Structures Management Unit ~~Professional~~Private Engineering Firm (PEF) Coordination Group to develop the Structures Scoping Sheet. The Scoping sheet includes:

- Structure Data for each site
- Delivery Schedule for structure deliverables

### Develop Preliminary Manday Estimate

To develop the Preliminary Manday Estimate, the Design Firm Structures Lead develops and submits an initial “blank” manday estimate to the Project Manager. The Project Manager sends the “blank” manday estimate and the Scoping Sheet to the Structures Management Unit PEF Coordination Group for preparation of the in-house estimate.

## 2ST2 Develop Preliminary General Drawings

### Overview

Complete and distribute the Preliminary General Drawings (PGDs) for all structures on the project.

### References

- [Structures Management Unit Scoping Sheet](#)
- [Structures Management Unit Estimate Sheet](#)
- [NCDOT Scope and Manday Estimate Form](#)
- American Association of State Highway Transportation Officials (AASHTO) *Load and Resistance Factor Design (LRFD) Bridge Design Manual*
- [Structures Management Unit Design Manual](#)
- [Structures Management Unit Design Manual – Standard Letters/Policy Memos](#)
- [Structures Management Unit SharePoint Guidelines](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Design Firm Structures Lead	Structures Management Unit Professional/Private Engineering Firm Coordination Group
Draft Preliminary General Drawings (PGDs) for Review	Develop Draft Preliminary General Drawings (PGDs)	X	X
	Submit Draft PGD for Review to Structures Management Unit Professional/Private Engineering Firm Coordination Group	X	X
Preliminary Header Elevations (if required)	Submit Draft PGDs to Project Manager for Review (Structures Management Unit Professional/Private Engineering Firm Coordination Group)	X	X
Final Preliminary General Drawings (PGDs) for Distribution	Finalize and Distribute Final PGDs	X	X

### Develop Draft Preliminary General Drawings (PGDs)

When developing the draft Preliminary General Drawings (PGDs), the Design Firm Structures Lead is to reference the current Roadway Design plans (i.e., the Design Recommendation Plan Set) and the Bridge Survey and Hydraulic Design Reports (BSR) and coordinate as needed with the project Design Geotechnical Engineer.

- For grade separations, determine bridge length, clearances, and girder type
  - Develop preliminary span lengths
  - Develop preliminary girder designs
  - Evaluate potential utility conflicts
  - Evaluate constructability, temporary access
- For stream crossings, verify span lengths provided in the BSR

- Developing preliminary span lengths
- Developing preliminary girder designs
- Evaluate potential jurisdictional impacts
- Evaluate constructability, temporary access

The Design Firm Structures Lead drafts the Profile and Plan sheet, Typical Section, and Location Sketch sheet as per Chapter 4 of the *Structure Management Unit Design Manual*.

### Submit Draft PGD for Review to Structures Management Unit ~~Professional~~Private Engineering Firm Coordination Group

Following initial draft, the Design Firm Structures Lead uploads the draft PGDs to the project SharePoint site for review, which includes:

- Structures Management Unit ~~Professional~~Private Engineering Firm (PEF) Coordination Group
- Division (if applicable)
- Project Manager

The Design Firm Structures Lead is to allow up to 10 days for review comments.

If needed, the Design Firm Structures Lead develops the preliminary header elevations in accordance with Section 6.2.2.9 of the *Structures Management Unit Design Manual*.

### Finalize and Distribute Final PGDs

After review and comments are returned to the Design Firm Structures Lead, and comments are addressed, the Design Firm Structures Lead submits the Final PGD to the Structures Management Unit PEF Coordination Group and the project team.

In coordination with the Project Manager, the Structures Management Unit PEF Coordination Group emails the Final PGD using the distribution list that includes the following:

- Area Bridge Construction Engineer
- Geotechnical Unit
- Hydraulic Unit
- Structures Management Unit
- Roadway Design Unit
- Transportation Mobility Unit
- Utilities Unit
- Construction Unit

The Final PGD package includes links for the following:

- Construction Unit Questionnaire
- Google Map of bridge
- Structure Inspection Report and existing bridge plans (if available)
- Bridge Survey Report
- Project Commitments
- Design Recommendation Plat Set

- To finalize the Memorandum, the final version is sealed by the North Carolina Professional Engineer that was in responsible charge of the analysis.
- The final Memorandum is uploaded to the project SharePoint site by the Congestion Management Project Engineer, with a notification to the Roadway Design Lead [and the Signing and Delineation Designer \(see 2RD1 and 2SD1 for related information\)](#).

All of the requirements to develop and complete the technical memorandum are described in the *Capacity Analysis Guidelines* and *Simulation Guidelines*.

## 2TM2 Initiate Transportation Management Plan

### Overview

Begin this activity based on the Design Recommendation Plan Set in order to verify the overall transportation management strategy with the Division, identify any impacts to right-of-way, and identify all items that require coordination with other disciplines/Units for inclusion in the final Transportation Management Plan (TMP).

### References

- American Association of State Highway and Transportation Officials (AASHTO) *Roadside Design Guide 4<sup>th</sup> Edition and Errata*
- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets and all Errata*
- Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*
- Federal Highway Administration (FHWA) *Standard Highway Signs*
- Federal Highway Administration (FHWA) *Rule on Work Zone Safety and Mobility (23 CFR 630 Subpart J and K)*
- Transportation Research Board (TRB) *Highway Capacity Manual*
- [Roadway Design Manual \(Updated link to the new manual\)](#) ~~In-Development: The manual is in the process of being updated.~~
- [Standard Specifications for Roads and Structures](#)
- [Roadway Standard Drawings](#)
- *Supplement to the Manual on Uniform Traffic Control Devices (NCSMUTCD)*
- *Guidelines for Transportation Management Plan Development*
- *Work Zone Traffic Control (WZTC) Design Manual*
- *Guidelines for the Use of Positive Protection in Work Zones*
- *Temporary Shoring Policies and Procedures*
- *Policy for Providing Temporary Pedestrian Accommodations in Work Zones*
- *Americans with Disabilities Act of 1990 (ADA)*
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		WZTC Project Engineer	WZTC Project Design Engineer
Temporary Traffic Control (TTC) Concept Plans	<ul style="list-style-type: none"> <li>▪ Complete Concept TTC Plans</li> <li>▪ Lead TTC Concept Review Meeting</li> </ul>	X	X

### Complete Concept Temporary Traffic Control (TTC) Plans

The WZTC Project Engineer, with support from the Work Zone Traffic Control (WZTC) Project Design Engineer, develops the conceptual temporary traffic control (TTC) plans to demonstrate how traffic



(motorists, pedestrians, and cyclists) is to be safely maintained during construction activities in a manner that does not overly degrade mobility, compromise worker safety, or prevent timely and efficient completion of the project. The plans are to include overview drawings, details, preliminary general notes, and written construction staging.

For this task, the WZTC Project Engineer is to:

- Facilitate resolution of constructability concerns and identify all areas where additional coordination with other disciplines/Units is needed.
- Review with and receive concurrence from Division construction staff and provide action items to other disciplines/Units responsible for temporary components of the Final TTC Plans (see 3TM1 for related information).

To prepare the concept plans, the WZTC Project Engineer, with support from the WZTC Project Design Engineering, is to:

- Analyze the Design Recommendation Plan Set (see 2RD1 for related information), Preliminary General Drawings (see 2ST2 for related information), and current hydraulics design (see 2HY1 and 2HY2 for related information), coordinating directly with each discipline/Unit to ensure the WZTC Project Engineer is reviewing the most up-to-date information.
- Initiate coordination with the [Utilities Lead, Utilities Coordinator, and Utility Design Engineer](#) to discuss any known issues regarding ~~wetthe construction of utilities (waterlines and sanitary sewer relocation) constructed by the contractor~~ or during the term of the highway construction.
- Initiate coordination with the Signing and Delineation Designer to discuss potential signing (notably for overhead signs, consequential guide signs, temporary regulatory signs that direct temporary traffic patterns).
- Perform a field review/site investigation.
- Determine work zone capacity, obtain hourly traffic counts or Annual Average Daily Traffic (AADT), and determine lane and road closure restrictions.
- Develop a transportation management strategy for vehicles and pedestrians.

The plans also include identifying several items for the plans that include:

- Proposed road closures and detours, including need and expected duration.
- Proposed temporary alignments and grades.
- Location and type of work zone positive protection.
- Locations of proposed temporary drainage.
- Location of proposed temporary shoring for the maintenance of traffic.
- Location and number of temporary signals and signal timing (see 2SG1 and 2SS1 for related information).

The WZTC Project Engineer is to also develop:

- Preliminary general notes, limited to proposed lane and road closure restrictions, as well as hauling restrictions.

## 3TM1 Complete Transportation Management Plan

### Overview

Begin this activity after Division concurrence with temporary traffic control (TTC) concept, where early and effective coordination with other disciplines/Units is needed to deliver a final Transportation Management Plan (TMP).

### References

- American Association of State Highway and Transportation Officials (AASHTO) *Roadside Design Guide 4<sup>th</sup> Edition and Errata*
- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets and all Errata*
- Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*
- Federal Highway Administration (FHWA) *Standard Highway Signs*
- Federal Highway Administration (FHWA) *Rule on Work Zone Safety and Mobility (23 CFR 630 Subpart J and K)*
- Transportation Research Board (TRB) *Highway Capacity Manual*
- [Roadway Design Manual \(Updated link to the new manual\) ~~In-Development: The manual is in the process of being updated.~~](#)
- [Standard Specifications for Roads and Structures](#)
- [Roadway Standard Drawings](#)
- *Supplement to the Manual on Uniform Traffic Control Devices (NCSMUTCD)*
- *Guidelines for Transportation Management Plan Development*
- *Work Zone Traffic Control (WZTC) Design Manual*
- *Guidelines for the Use of Positive Protection in Work Zones*
- *Temporary Shoring Policies and Procedures*
- *Policy for Providing Temporary Pedestrian Accommodations in Work Zones*
- *Americans with Disabilities Act of 1990 (ADA)*
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		WZTC Project Engineer	WZTC Project Design Engineer
Final Transportation Management Plan (TMP) Submittal	<ul style="list-style-type: none"> <li>▪ Complete Final TTC Plans</li> </ul>	X	X

### Complete Final TTC Plans

To complete this task, the WZTC Project Engineer, with the support of the WZTC Project Design Engineer, advance the TMP by incorporating all previously agreed upon transportation management strategies and

recommendations, completing the required coordination with other disciplines/Units and progressing to final plan format.

Upon receiving Division concurrence with the TTC concept, the WZTC Project Engineer is to directly coordinate with the previously identified disciplines/Units around several specific elements of design.

- Roadway Design Unit/Roadway Design Lead
  - Temporary shoring for staged embankment construction
  - Temporary alignments
  - Temporary pavement
  - Temporary guardrail, end units, guardrail to portable concrete barrier transitions, re-lapping of guardrail
- Structures Management Unit/Structures Lead
  - Temporary shoring for substructure construction
  - Staged bridge construction (construction joint locations)
  - Girder erection over open roads including need and location of shoring towers
  - Anchored portable concrete barriers on bridge decks
- Hydraulics Unit/Hydraulics Design Engineer and Roadside Environmental Unit/Roadside Environmental Engineer
  - Temporary drainage
  - Staged culvert construction
- Geotechnical Engineering Unit/Design Geotechnical Engineer
  - Temporary shoring
  - Temporary slopes
- ITS and Signals Unit/Signal Lead and Signal System Engineer
  - Temporary traffic patterns at signalized intersections
- Utilities ~~Unit Lead/Utilities Coordinator/Utilities Design Engineer~~
  - Relocation of ~~in-plan wet utilities (waterlines and sanitary sewer relocation by~~ utilities by the contractor
- Signing and Delineation Unit/Signing and Delineation Designer
  - Coordinate on development of intermediate signing plans (notably for overhead signs, consequential guide signs, temporary regulatory signs that direct temporary traffic patterns) for each phase of construction
- Regional Traffic Engineer
- Statewide Transportation Operations Center (STOC)
- Transportation Operations and Incident Management

The WZTC Project Engineer documents all coordination efforts, completing coordination with the identified disciplines/Units prior to Plan-in-Hand Review Meeting. Upon request, the WZTC Project Engineer also provides WZTC pay items, estimated quantities, and estimated cost for use by the Contract Standards and Development Unit to prepare the project for letting.

Concurrent with the on-going coordination, the WZTC Project Engineer is to progress the TMP for the PS&E phase, including:

## 1UT1 Develop Initial Utility Relocation and Construction Estimates

### Overview

Develop a preliminary estimate for both utility construction and relocation costs to establish the baseline estimate to be used for subsequent utility estimates.

**Note:** *Actions during the Project Initiation Stage may be led and completed by staff from several different NCDOT groups. Any person who has overall responsibility for a project during this Stage is referred to as the “Project Lead.” This lead could be the Feasibility Studies Engineer, the Corridor Development Engineer, the Division Planning Engineer, or someone in a similar role as tasked by a state or local agency.*

*Additionally, because job titles within NCDOT overlap with job titles in the consulting firms, and because different project management centers within the Department divide project management and technical duties differently, this section clarifies who is filling each role as identified in the deliverable table and task descriptions below.*

#### Utilities Coordinator

*The Utilities Coordinator role is typically filled by a Professional Engineering Firm (PEF)/Consultant providing Utilities Coordination services for the project. The Utilities Coordinator coordinates the relocation activities of all utilities on the project but does not provide any design service for any utility.*

*If a utility is providing complete Utilities Construction Plans for inclusion in the contract, the Utilities Coordinator is responsible for the coordination and delivery to NCDOT of the deliverables assigned to the Utilities Design Engineer that are instead being produced by the utility. The Utilities Coordinator is not responsible for the production of those deliverables.*

#### Utilities Design Engineer

*The Utilities Design Engineer role is typically filled by Professional Engineering Firm (PEF)/Consultant providing Utilities Design Services for the project. This firm may or may not be the same firm providing Utilities Coordination Services. There may be more than one PEF providing Utilities Design Services, depending on the number and types of utilities included for construction in the contract and the areas of expertise of each firm.*

*The role of the Utilities Design Engineer is to design the relocation of the assigned utility facilities. The Utilities Coordinator coordinates the location of those facilities with the other utilities.*

*If a utility chooses to provide a complete design plan for inclusion in the project, the agreement with the utility should require the utility to complete the tasks expected of the Utilities Design Engineer. The Utilities Coordinator provides the deliverables to NCDOT.*

#### Utilities Lead

*The Utilities Lead is an NCDOT representative responsible for the oversight of the utility’s relocation effort and the technical review of the utility’s deliverables. Depending on the design center where the project is managed, this role may be filled by more than one person managing different portions of the relocation. The Department representatives and roles are to be clear in the scopes.*

## 1UT2 Initiate Utility Investigations

### Overview

Inventory utility facilities in the project area. Identify utilities that are costly to relocate, have long design or construction times, or otherwise create risks for project construction or schedule if they are relocated.

### References

- [Utilities Accommodation Manual](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Risk Analysis and Inventory Report	▪ <i>Initiate Utility Owner Contacts</i>	Utilities Coordinator	Utilities Lead
	▪ <i>Conduct Preliminary Utility Investigations</i>		
	▪ <i>Submit Utility Risk Analysis and Inventory</i>		
Utility Project Outline	▪ <i>Determine Utility Relocations</i>	Utilities Coordinator	Utilities Lead
Utility Construction Requests	▪ <i>Submit Utility Construction Requests</i>	Utilities Coordinator	

### Initiate Utility Owner Contacts

The Utilities Coordinator is to meet with the utility owners to discuss utility facilities in the project study area and vicinity. These meetings are to be with employees of the utility who are familiar with the existing facilities and with plans for future facilities in the study area. These meetings are likely held individually with each utility at a location convenient for the utility employees. Other projects may be discussed in these meetings, if possible and appropriate.

In this meeting, the Utilities Coordinator:

- Explains the scope of the project and the location of all alternatives/alignments.
- Explains the projected schedule and expected project duration.
- Requests that the utility:
  - ♦ Provide a description of the type, size, and function of all facilities in the area of the project.
  - ♦ Identify critical facilities that have restrictions on service interruption for relocation or may be difficult to relocate. A facility may be difficult to relocate because of difficulty in acquiring property for the relocation of the facility, difficulty in coordination of outages with customers being served, or for other reasons, as well as difficulty in construction.
  - ♦ Identify facilities with a high cost of relocation.
  - ♦ Identify off-site work required to perform relocation on the project.
  - ♦ Provide a description of factors that may affect the project schedule, such as lengthy design times, need to establish a construction budget, long-lead times when ordering materials, or long times between construction of the new facilities and abandonment of the old facilities. Provide a preliminary estimation of durations for the relocation of critical facilities with the

understanding that it is to be further refined as the overall project design develops and actual impacts identified and evaluated.

- Discusses the expected impact of each of the utility facilities on the project and the impact of the project on the utility facilities.

This meeting may also involve a site visit to verify and correlate information provided by the utilities and to search for previously unknown utilities.

### Conduct Preliminary Utility Investigations

Using the information collected from the utilities, the Utilities Coordinator analyzes reasonably expected conflicts between existing and planned utilities and the project. For each alternative/alignment, the Utilities Coordinator is to:

- Provide an inventory of utilities encountered.
- Provide a preliminary estimate for utility relocation costs.
- Analyze risks to the project budget and schedule by identifying:
  - Facilities that can be relocated without significant burden to the utility.
  - Facilities that cannot be taken out of service at all or for more than a short period of time.
  - Facilities that are expensive to relocate because of size or conditions of the construction.
  - Facilities that have a long design or construction duration.
  - Any other risk the relocation of the facilities could pose to the project.
- Identify facilities to avoid, and facilities that may be relocated, without significant burdens to the utility or the project.
- Provide relocation durations of critical facilities as provided by the utility owners, even if identified as a facility to avoid in case project conditions prohibit avoidance.
- Identify whether construction of utility relocation may be necessary outside of the study area.

### Submit Utility Risk Analysis and Inventory

The Utilities Coordinator provides a Utility Risk Analysis and Inventory Report that:

- Provides an inventory of utilities and facilities in the study area.
- Includes the information provided by the utilities.
- Documents the analysis of budget and risk in each alternative/alignment.
- Makes recommendations to reduce risk or budget.

The Utilities Lead reviews the report and provides comments to the Utilities Coordinator, who updates the document.

The Utility Risk and Analysis Report is provided to the Project Manager and used by the project team to evaluate design alternatives/alignments. The report is also a guide to minimize the overall impact of utilities on the project.

### Determine Utility Relocations

After the alternative/alignment to be constructed has been selected, the Utilities Coordinator revises and condenses the Utility Risk Analysis and Inventory Report into a Utility Project Outline for the selected alternative/alignment. The revised report is to include:

## Identify Major Utility Conflicts and Relocation Impacts

To complete this task, the Utilities Coordinator is to:

- Review the plans to identify likely locations of conflicts.
- Document those conflicts on the Utilities Coordination Working Plans.
  - The Utilities Coordination Working Plans are to contain information on conflicts and proposed relocations for all utilities.
  - These plans also contain the information required by NCDOT to manage utilities within the project and are to be kept up-to-date and available to the project team at all times through the project SharePoint and ProjectWise sites.

The Utilities Coordinator consults with the Utilities Lead prior to the Utility Coordination Kickoff Meeting to agree on potential conflicts and guidance to be given to the utilities.

The Utilities Design Engineer then:

- Reviews the plans with the applicable utility companies for the facilities scoped for design.
- Identifies conflicts, proposes preliminary relocation designs or a plan to mitigate the conflicts, and secures approval from the owner.
- Provides this information to the Utilities Coordinator prior to the Utility Coordination Kickoff Meeting.
- Provides a Preliminary Relocation Schedule at the Kickoff Meeting including all activities necessary to facilitate completion of the required relocations.
  - If dependent on other utilities to perform their work first, such a joint- users, provide a duration for initiating work after notification of completion of required work by others and a duration for the completion of the relocation.
  - Durations should include all tasks necessary to take the impacted facilities out of service.
  - The Preliminary Relocation Schedule should be understood to be a baseline start for further refinement as the overall project design is developed.

If a Utilities Design Engineer has not been authorized at this point, the utility is responsible for providing this information at the Kickoff Meeting to the Utilities Coordinator.

## Conduct Utility Coordination Kickoff Meeting (All Utilities)

The Utilities Coordinator schedules and conducts a Utility Coordination Kickoff Meeting to share information and plans with the utilities and to begin coordination among the utilities on relocation issues. The invitees to this meeting are to include all utility company contacts, the Utilities Lead, Division utilities personnel, the Utilities Design Engineer, the Project Manager, the Hydraulics Design Engineer, and the Signals/ITS Lead.

At this meeting and with assistance from the Utilities Lead, the Utilities Coordinator is to:

- Provide information to the utility companies about the project.
- Review the presumptive cost responsibility and establish which utility companies believe they have a compensable interest.
- Discuss the project schedule, noting feedback from the utility companies about their design and relocation timeframes and the schedule they can meet.



- Elicit information about the risks the utilities believe they pose to the project.
- Discuss preliminary alignments for relocations.
- Inform utilities of their responsibilities under the Dig Once Policy. The Utilities Coordinator is responsible for administration of this policy on the project.
- Ask the utility companies to prepare preliminary plans and identify easement needs.
- Identify action items for NCDOT and the utility companies.

### Initiate Cost Responsibility Analysis

The Utilities Coordinator uses the information from the survey and information provided by the utilities to initiate the Cost Responsibility Analysis. To do this, the Utilities Coordinator:

- Investigates documents provided by the utility companies.
- Prepares opinions on the relevance of those documents to any claims of compensable interest.
- Begins preparation of the Cost Responsibility Analysis Report.

It is the responsibility of the utility companies to prove their claims of compensable interest. It is the responsibility of the Utilities Coordinator to review the claims and provide a recommendation to the Utilities Lead and the Project Manager on the merits of the claims.

### Receive Preliminary Utility Relocation Plans from Utility Owners

To complete this task, the Utilities Coordinator is to:

- Receive preliminary relocation plans from the utility companies and from the Utilities Design Engineer.
- Review the plans to ensure compliance with the *Utilities Accommodation Manual*.
- Incorporate the relocation plans into the Utilities Coordination Working Plans.

Preliminary relocation plans from the utilities are not final designs. Instead, these plans are to show the scope and alignment of the relocation. The design is to be complete enough to determine easement requirements and environmental impacts from the proposed alignment and construction.

Place preliminary relocation plans on the SharePoint project site.

### Submit Routing Plan

The Utilities Coordinator submits the Utilities Coordination Working Plans along with a description of important design decisions as Routing Plans. The purpose of the Utilities Coordination Working Plans is to plan utility relocations and share information about the relocations with NCDOT and the project team.

The Utilities Lead reviews the plan and provides comments to the Utilities Coordinator, including a review of the application of the *Utilities Accommodation Manual*, a constructability review, and a review of possible alternatives/alignments.

### Create Relocation Schedule

The Utilities Coordinator creates a Utilities Relocation Schedule (in Microsoft Project) **to be delivered initially after the Kickoff Meeting, concurrently with the Routing Plans, and after receipt and review of the relocation agreements** for use in guiding project scheduling and tracking relocation progress. This schedule is developed in consideration of:

- Utility work by others only.
- Important milestones in project completion, such as design time, relocation time, moratoria, acquisition of special materials, permitting, availability of right-of-way and easements, and construction staging.
- Information obtained from the utilities, the Right-of-Way Agents, project documents, and other sources, as needed.

The Utilities Coordinator maintains this schedule as conditions change and milestones are completed, coordinating this with the Project Manager and the larger project schedule. The project schedule delivery should be at the following milestones:

- Initial Schedule – Following the Kickoff Meeting with receipt of information obtained to date.
- Routing Plans Schedule – Further define and adjust the Initial Schedule with utility owner provided schedule submitted with the plans used to create the Routing Plans.
- Agreements Schedule – Further define and adjust the Routing Schedule with utility owner provided updates submitted with the relocation agreement applications. This schedule is intended to be included in the contract documents for contractor’s information for bidding.

The Utilities Lead reviews this schedule and provides comments to the Utilities Coordinator. The review includes the practicality of accomplishing the schedule.

### Submit Preliminary Utility Construction Plans

The Utilities Design Engineer submits the Preliminary Utility Construction Plans for review by the Utilities Lead. These plans are to:

- Show routing and major design elements.
- Identify any needed easements outside of existing right-of-way.
- Provide draft Special Provisions, especially including any requested pay items for review.

For utilities designed under the control of the utility owner, but to be constructed as part of the project’s contract, the Utilities Coordinator coordinates submission of these items to the Utilities Lead for review. The review of plans and special provisions is to address constructability, risk assessment, compliance with policy, and contractibility.

### Request Subsurface Utility Engineering (SUE) Level A

The Utilities Coordinator requests and compiles subsurface utility engineering (SUE) Level A requests from the designers of each of the utilities. To do this:

- Collaborate with the Utilities Lead to evaluate the need for each location.
- Create a final SUE request.

The Utilities Design Engineer submits this request to the Utilities Coordinator for aggregation with requests by other utilities.

### Request Geotechnical Investigation for Trenchless Utilities

A Geotechnical Investigation is used to identify underground conditions along the trenchless installation for the purposes of bidding. The Utilities Design Engineer identifies locations for the geotechnical

## 2UT2/3UT2 Prepare Utility Relocation and Construction Estimates

### Overview

Prepare both utility relocation and construction cost estimates to support the project development process at both the Alignment Defined Stage (prior to the Environmental Document being approved) and Plan-in-Hand Stage (prior to the Right-of-Way Plan Set being finalized).

### References

- [Utilities Accommodation Manual](#)
- [Estimates, Materials & Approved Products for Utilities Work](#)
- [Utility Cost Estimate Request Form](#)

### Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
Utility Relocation (PH 250) Estimate	<ul style="list-style-type: none"><li>Prepare Utility Relocation Estimate</li></ul>	Utilities Coordinator
Utility Construction (PH 300) Estimate	<ul style="list-style-type: none"><li>Prepare Construction Relocation Estimate</li></ul>	Utilities Design Engineer

### Prepare Utility Relocation Estimate

Per a request from the Project Manager (or Roadway Design Lead) using the Utility Cost Estimate Request Form for relocation costs, the Utilities Coordinator prepares the project’s utility relocation estimate, referencing the resources and process detailed on the Estimates, Materials & Approved Products for Utilities Work resource page. The Utilities Coordinator prices the relocation work using the Utilities Cookbook Database or by coordinating cost directly with the impacted utility owners.

The Utilities Coordinator works with the Project Manager (or assigned) to assist in drafting any justification or additional information, if there is a difference in cost between the current and previous estimate.

### Prepare Utility Construction Estimate

Per a request from the Project Manager (or assigned) using the Utility Cost Estimate Request Form for construction costs, the Utilities Design Engineer prepares the project’s utility construction estimate using ~~the Utilities Cookbook Database~~ [historic bid data adjusted for project conditions and expected price increases](#).

The Utilities Design Engineer works with the [Utilities Lead and](#) Project Manager (or assigned) to assist in drafting any justification or additional information, if there is a difference in cost between the current and previous estimate. The Utilities Design Engineer is to ensure that utility construction ~~(wet utility)~~ pay items and quantities are included in the construction estimate request, as required.

### Review Estimate

The Utilities Coordinator sends the two utilities cost estimate to the Utilities Lead, who reviews the estimate.

## 3UT1 Advance Utility Coordination

### Overview

Coordinate the final design of utilities and needs for environmental permitting.

### References

- [Utilities Accommodation Manual](#)
- [Dig Once Policy](#)
- [Utilities Connect Site](#)
- [NCDOT Quality Management Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utility Agreement Plans	▪ <i>Submit Utility Agreement Plans</i>	Utilities Design Engineer	Utilities Coordinator & Utilities Lead
	▪ <i>Initiate Utility Permits</i>		
Utility Environmental Permit Plans and Narrative	▪ <i>Provide Permit Related Utility Impacts</i>	Utilities Coordinator	Utilities Design Engineer & Utilities Lead
Cost Responsibility Analysis Report	▪ <i>Submit Cost Responsibility Analysis</i>	Utilities Coordinator	Utilities Lead
Final Utilities Coordination Working Plans	▪ <i>Submit Final Utility Coordination Working Plans</i>	Utilities Coordinator	Utilities Design Engineer & Utilities Lead

### Coordinate Service Acquisition for ITS and Signing

The Utilities Coordinator coordinates utility service acquisition for ITS, signing, and lighting along the project corridor as requested by those disciplines/Units.

### Complete Dig Once Policy Agreements

If any utilities enter into agreement under the Dig Once Policy, the Utility Coordinator completes the processing of these agreements according to the Dig Once Policy.

### Submit Utility Agreement Plans

The Utilities Design Engineer submits the Utility Construction Plans, Special Provisions, and draft quantities estimate for review by the Utilities Design Lead. This includes:

- Showing routing and major design elements.
- After receiving concurrence from the Utilities Lead, initiating the NC Department of Environmental Quality (DEQ) permitting process.

For utilities designed under the control of the utility owner, but to be constructed as part of the project’s contract, the Utilities Coordinator coordinates submission of these items to the Utilities Lead for review. The review of plans and Special Provisions is to address constructability, risk assessment, compliance with policy, and contractibility.

The Utilities Design Engineer or utility owner’s engineer is to address any comments and submit a set of Utility Agreement Plans.

## 4UT1 Complete Utility Coordination

### Overview

Facilitate the relocation of utilities being relocated by the utility owners.

### References

- [Utilities Accommodation Manual](#)
- [NCDOT Quality Management Manual](#)
- [Style Guide for Provisions](#)
- [Trns Port Pay Item List](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Utilities by Others Plans and Special Provisions	<ul style="list-style-type: none"> <li>▪ <i>Complete Utilities by Others Plans</i></li> </ul>	Utilities Coordinator	Utilities Lead
Utility Construction Plans (PS&E)	<ul style="list-style-type: none"> <li>▪ <i>Complete Utility Construction Plans</i></li> </ul>	Utilities Design Engineer	Utilities Lead
Water and Sewer Permits	<ul style="list-style-type: none"> <li>▪ <i>Receive Water and Sewer Permits</i></li> </ul>	Utilities Design Engineer	Utilities Lead
Executed Utility Agreements	<ul style="list-style-type: none"> <li>▪ <i>Submit Utility Agreements for Authorization</i></li> </ul>	Utilities Coordinator	Utilities Lead
	<ul style="list-style-type: none"> <li>▪ <i>Execute Utility Agreements</i></li> </ul>		
Utility Authorizations	<ul style="list-style-type: none"> <li>▪ <i>Issue Utility Construction Authorization</i></li> </ul>	Utilities Lead	Utilities Coordinator or Utilities Design Engineer
Utility Certification	<ul style="list-style-type: none"> <li>▪ <i>Issue Utility Certification</i></li> </ul>	Utilities Lead	Utilities Coordinator or Utilities Design Engineer

### Complete Utilities by Others Plans

The purpose of the Utilities by Others Plans is to convey information to the bidding contractors about the extent and timing of utility relocations and abandonments, performed by others, for use in developing the bid. The Utilities Coordinator uses the Utilities Coordination Working Plans and Authorized Relocation Plans to create Utilities by Others Plans and Special Provisions. The Utilities Coordinator:

- Creates the plans and special provisions in conformance with templates and guidance provided on the Utilities Connect site.
- Submits these plans and special provisions to the Utilities Lead (for action) and Project Manager (for information).

The Utilities Lead reviews the Utilities by Others Plans and Special Provisions. The review evaluates the information provided on owner, location, and schedule.

### Complete Utility Construction Plans

The Utilities Design Engineer submits final Utility Construction Plans, Special Provisions, and quantity estimates with cost breakdown by responsible party and betterment to the Utilities Lead (for action) and Project Manager (for information). The Utilities Design Engineer also submits an advisory cost estimate (see 4UT3 for additional detail on this estimate). If the utilities are designed under the control of the

owner, but to be constructed as part of the project's contract, the Utilities Coordinator is to coordinate submission of these items to the Utilities Lead for review.

The Utilities Lead reviews the plans, estimates, and special provisions and return comments.

### Receive Water and Sewer Permits

The Utilities Design Engineer receives the Authorizations to Construct from NC Department of Environmental Quality (DEQ) Public Water Supply Section and Division of Water Quality. After receiving the Authorizations, the Utilities Design Engineer:

- Places them on the project SharePoint site.
- Notifies the Utilities Lead (for action) and Project Manager (for information).

The same process is used for utilities designed under the control of the owner, but to be constructed as part of the project's contract.

### Submit Utility Agreements for Authorization

The Utilities Coordinator receives the utility agreements and plans from the utility company. From there, the Utilities Coordinator:

- Reviews the plans for conformity with the *Utilities Accommodation Manual*.
- Reviews the estimates, if needed for the agreement.
- Attaches a cover letter stating that the relocations plans and materials were reviewed and complies with the *Utilities Accommodations Manual* and other applicable policies or recommends that the plans be approved with enumerated exceptions.
- Justifies recommended exceptions.
- Submits to the Utilities Lead (for action) and Project Manager (for information).
- Updates utility relocation schedule with updated dates and/or durations provided by the utility owner with the agreement application. See Create Relocation Schedule in {2UT1 for related information}.

The Utilities Lead reviews the agreements for compliance with policy.

### Execute Utility Agreements

After review, the Utilities Lead submits the utility agreements to the authorized NCDOT official for signature.

### Issue Utility Construction Authorization

After execution of each utility agreement for construction by the utility, the Utilities Lead sends an authorization to the utility to begin construction.

### Issue Utility Certification

The Utilities Lead completes the Utility Certification and submits it to the authorized NCDOT official for signature. The certification is retained for the project files and as a key document in the utilities library.

## 4UT3 Prepare Final Utility Construction Estimate

### Overview

Prepare the final construction cost estimates at the time of finalizing the final PS&E package.

### References

- [Utilities Accommodation Manual](#)
- [Estimates, Materials & Approved Products for Utilities Work](#)
- [Utility Cost Estimate Request Form](#)
- [Trns Port Pay Item List](#)

### Deliverables

Deliverable	Task	Responsible Party
		Activity Leader
		Utilities Design Engineer
Final Utility Construction (PH 300) Estimate	▪ <i>Prepare Final Utility Construction Estimate</i>	X

### Prepare Final Utility Construction Estimate

As part of ~~his/her~~their efforts under 4UT1, the Utilities Lead reviews the plans, estimates, and special provisions and return comments. The Utilities Design Engineer enters the provided quantity estimates in the estimating system. The Utilities Lead then develops and enters prices for the estimate.

The Utilities Lead works with the Project Manager (or assigned) and Preliminary Estimates Section (for Central-let projects) or the appropriate Division staff (for Division-let projects) to adjust the estimate, as needed, when reviewing final pay items/quantities (see 4RD1 and 4CS1 for related information).



## 1VM1 Initiate CR-RAVE ~~and~~, CLEAR Activities, and Value Assessment Activities

### Overview

Ensure that initial Constructability Review, Risk Assessment, and Value Engineering (CR-RAVE) ~~activities are initiated, as well as~~ tasks begin in this Stage 1 to inform the ~~initiation of~~ Express Design and Project Scoping Report. Also initiate the Communicate Lessons, Exchange Advice, Record (CLEAR) ~~activities, including~~ Value Assessments (VA) tasks.

The major tasks of this Stage are defined as follows:

- a) Constructability Review (CR) – support review of constructability considerations as part of project scope development.
- b) Risk Assessment (RA) – support identification of potential issues (e.g., risks) that could jeopardize project delivery, including impacts to project scope, schedule, and budget goals.
- c) Value Engineering (VE) – support the determination if a VE Study is required (or recommended) for state or federal projects that meet or exceed ~~the~~ defined federal thresholds.
- d) Communicate Lessons, Exchange Advice, Record (CLEAR) – support identification of relevant lessons learned (~~L~~LLs) and best practices (~~BP~~, in order BPs), to leverage past successes and errors to deliver project more efficiently. Value Management Office (VMO) maintains the CLEAR database, which contains Department wide ~~L~~LLs and ~~BP~~BPs.
- e) Value Assessment (VA) – support cost-saving ideas such as time savings, reduction in impacts, and improved constructability to aid in alternative design selection and scope development.

While CR-RAVE ~~and~~, CLEAR ~~activities, and~~ Value Assessments tasks include separate items, starting the items together allows the outcomes to inform each other since they typically overlap.

**Note:** Actions during the Project Initiation Stage may be led and completed by staff from several different NCDOT groups. Any person who has overall responsibility for a project during this Stage is referred to as the “Project Lead.” This lead could be the Feasibility Studies Engineer, the Corridor Development Engineer, the Division Planning Engineer, or someone in a similar role as tasked by a state or local agency.

### References

- [Value Management Office](#)
  - [Value Management Guidelines](#)
- [Constructability Review Program](#)
  - [Constructability Review Checklist](#)
- [Risk Assessment Program](#)
  - [Risk Management Guide](#)
  - [Risk Assessment Worksheet](#)
- [Value Engineering Program](#)
  - [Value Engineering Checklist](#)
  - [Value Engineering Schedule](#)
- [ArcGIS STIP and NHS Maps](#)
- [CLEAR Program](#)
  - [CLEAR SharePoint Site](#)

- [Value Assessment](#)
  - [Value Assessment Worksheet](#)
  - [Value Assessment Worksheet SOP Video](#)
  - [Value Assessment Sample Scope of Work](#)
- [Project Management Guide](#)
- [NCDOT Quality Management Manual](#)

## Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
		Project Lead	
Constructability Review Checklist	<ul style="list-style-type: none"> <li>▪ Review Constructability Review Checklist</li> </ul>	X	<ul style="list-style-type: none"> <li>▪ Division Construction Engineer</li> <li>▪ Area Construction Engineer</li> <li>▪ Value Management Office</li> </ul>
Risk Assessment Worksheet	<ul style="list-style-type: none"> <li>▪ Conduct Risk Management Activities</li> </ul>	X	Value Management Office Program Manager
Risk Assessment Study <sup>A</sup>			Value Management Office Program Manager
Value Engineering (VE) Checklist	<ul style="list-style-type: none"> <li>▪ Determine if a Value Engineering Study is Needed (<a href="#">Available in ATLAS</a>)</li> </ul>	X	Value Management Office Program Manager
Value Engineering (VE) <del>Studies</del> Schedule	<ul style="list-style-type: none"> <li>▪ Develop the Value Engineering <del>Studies</del> Schedule</li> </ul>		Value Management Office Program Manager
CLEAR Database Search	<ul style="list-style-type: none"> <li>▪ Search and Share Relevant LL and BP (CLEAR Database Search) with Project Team</li> </ul>	X	Value Management Office Program Manager
<a href="#">Value Assessment</a>	<ul style="list-style-type: none"> <li>▪ <a href="#">Conduct Value Assessment Activities</a></li> </ul>	X	<ul style="list-style-type: none"> <li>▪ <a href="#">Value Assessment Consultant</a></li> <li>▪ <a href="#">Value Management Office Program Manager</a></li> </ul>
<a href="#">Value Assessment Worksheet</a>			

<sup>A</sup> indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench

## Review Constructability Review Checklist

The Project Lead reviews the project scope using the list of constructability considerations provided in the *Constructability Review Checklist*. Many of the items may not be able to be assessed at this stage of the project, but this gives the Project Lead an opportunity to consider the questions that should be reviewed as the scope is developed. If the Project Lead is unsure how to accommodate the construction impacts of a particular question, the Division Construction Engineer (DCE) or Area Construction Engineer (ACE) are contacted to optimize use of construction knowledge, methodology, and experience. VMO provides support as needed.

## Conduct Risk Management Activities

The Project Lead conducts an early risk management review to identify potential issues that could jeopardize project delivery, with identified risks documented in the Project Scoping Report (see 1FS3 for related information). If the risk review reveals potential fatal flaws, the project is reassessed with support from assigned technical leads/Units before a substantial part either during drafting of the Preliminary Engineering budget is spent, Project Scoping Report or during development of Design Recommendation Plan Set in Stage 1 (see 2RD1 for related information). VMO provides support as needed.

Per the *Risk Management Guidelines Guide*, risks are captured in the Project Scoping Report and transferred to the *Risk Assessment Worksheet (RAW)* around the time of the project is transferred to the

**Project Manager.** While a Risk Assessment Study is not required for every project, based on the severity of the risks, a Risk Assessment Study may be necessary to provide greater assurance that a project can maintain its scope, schedule, and budget goals. Therefore, the Project Lead is to coordinate with the VMO to determine if a Risk Assessment Study is appropriate.

During this stage, the VMO supports the Project Lead by providing guidance for the *Risk Assessment Worksheet (RAW)* and/or facilitating a Risk Assessment Study in accordance with the *Value Management Guidelines*. If a Risk Assessment Study is deemed necessary, the VMO Program Manager:

- Gathers a team of experts from the applicable technical disciplines/Units.
- Facilitates the Development of the Risk Response Strategy.
- Develops an Implementation Plan.

From there, the Project Lead monitors and controls the identified project risks following the process and procedures detailed in the *Risk Management Guidelines-Guide*. The Project Lead ~~transfer~~transfers this responsibility to the Project Manager ~~during~~right before notice to proceed (NTP) or early in the Alignment Defined Stage.

### ~~Cost Containment~~

~~The Project Lead works to contain the cost of the project including identifying any potential areas that could adversely affect the project estimates. These issues may be identified from the Risk Management Activities or identified by any member of the Project Team. The idea is to include cost containment while staying inside the purpose and need/scope and meet all safety parameters. Should these items result in a Design Exception, follow the procedure outlined in the Roadway Manual. The Project Lead Manager may choose to mitigate these areas or review them with the help of a VE Study, Constructability Review, and/or Risk Assessment Study.~~

### Determine if a Value Engineering Study is Needed

~~The~~As outlined in the Value Engineering (VE) Checklist, the Project Lead ~~determines~~or Project Manager (depending on the timing of when the determination is made) establishes if a VE study is required or recommended for state or federal projects that meet or exceed the following thresholds~~outlined in the Value Engineering (VE) Checklist~~. VMO provides support and guidance as needed.:

~~For projects that do not require a formal VE Study, the Project Lead may request a VE Study or an informal VE review. This may include a Project Lead's review of the project to determine if consultation with VMO may be beneficial.~~

- Any project on the National Highway System (NHS) that is \$50 million, or
- Any project on the NHS that is \$40 million or more for projects with structures, or
- Any project that is over \$500 million regardless of NHS designation.

### Develop the Value Engineering ~~Studies~~ Schedule

Based on the information in the State Transportation Improvement Program (STIP), the VMO Program Manager develops a preliminary VE Studies Schedule and is responsible for maintaining and managing the VE Studies Schedule. The VMO Program Manager prepares a preliminary list of projects that require a VE Study based on project information in the STIP. However, as a project develops, changes (to scope, total

project cost, schedule, or the project delivery method) may impact if a VE Study is required and the timing of when a VE Study is held. It is the responsibility of the Project Lead or Project Manager (depending on the timing of review) to review the monthly VE Study schedule and notify VMO if a project requiring a VE Study is missing from the schedule as well as if there is a **major change that triggers a required VE Study**, such as changes to a project's scope, total project cost, schedule, or the project delivery method.

### Search and Share Relevant BP and LL (CLEAR Database Search) with Project Team

VMO maintains the Communicate Lessons, Exchange Advice, Record (CLEAR) database (internal Knowledge Management tool), which contains lessons learned (LL) and best practices (BP) from across the Department. VMO provides support for searching the database, as well as connecting users to experts that provide input to find solutions and vet ideas.

The Project Lead and technical leads/Units can identify key words from the initial project documents (Project Initiation Form, Feasibility Study, etc.) and search the CLEAR portal to identify relevant LL and BP in order to leverage past successes and errors to deliver the project more efficiently. The outcomes of the search are then reviewed and vetted for applicability. Additional searches based on project location, type, and areas of concern by discipline are performed as needed. The ultimate goal is to produce a better Project Scoping Report; not limited to a better and safer project, but a more design-friendly scope.

### Conduct Value Assessments Activities

The Project Lead may utilize cost containment measures related to scoping and alternative design selection. This may include alignment, local agreements, and intersection treatment options, etc. These cost containment measures including cost savings amounts should be added to a Value Assessment Worksheet for the project.

The Project Lead will choose a VA Consultant to conduct a Value Assessment (VA) towards the end of this stage, to be conducted in Stage 2. The Project Lead should follow the *Sample Scope of Work for Value Assessments*.

The assessment should be completed by a Consultant not directly involved in the project. For an Urban project, the consultant must be prequalified for Urban Design. The VA Consultant Lead that conducts these workshop discussions are a multi-disciplined group of experts based on the primary design and construction elements of the project and assist in facilitating cost-containment recommendations. The teams should be tailored to expertise most critical for cost-containment design recommendations based on the specific project.

Once the VA Consultant is selected, the Project Lead should provide read access to project SharePoint site and project information with contributor access to Value Management Library to the VA Consultant. The VA Consultant Lead and Project Lead should review the project scope items and other project objectives in a pre-workshop meeting.

### Complete QC/QA Procedures

The Value Management Office Program Manager is to coordinate the applicable QC review following the NCDOT *Quality Management Manual* procedures and the respective QC Checklist before upload and distribution of all related deliverables.

## 2VM1 Complete CR-RAVE Studies/Reviews and, CLEAR Activities, and Conduct Value Assessment Activities

### Overview

Building off the work started in Stage 1, ensure Constructability Review, Risk Assessment, and Value Engineering (CR-RAVE) studies and reviews are held, continuing forward, along with continuing the Value Assessment (VA) and Communicate Lessons, Exchange Advice, Record (CLEAR) activities are continued from Stage 1 tasks.

The major tasks of this Stage are defined as follows:

- a) Constructability Review (CR) – support review of constructability considerations as part of project scope development.
- b) Risk Assessment (RA) – support identification or further assessment of potential issues (e.g., risks) that could jeopardize project delivery, including impacts to project scope, schedule, and budget goals.
- c) Value Engineering (VE) – when applicable for the project, complete the VE Study for state or federal projects that meet or exceed established federal thresholds.
- d) Communicate Lessons, Exchange Advice, Record (CLEAR) – support identification of relevant lessons learned (LL) and best practices (BP) to leverage past successes and errors to deliver project more efficiently. Value Management Office (VMO) maintains the CLEAR database, which contains Department wide LLs and BPs.
- e) Value Assessment (VA) – advance cost-saving ideas such as time savings, reduction in impacts, and improved constructability to aid in alternative design selection and scope development.

While CR-RAVE, CLEAR, and CLEAR activities Value Assessments tasks include separate items, considering advancing the items together allows the outcomes to inform each other since they typically overlap and may be joined combined (specifically for a Risk Assessment and VE Study).

### References

- [Value Management Office](#)
  - [Value Management Guidelines](#)
- [Constructability Review Program](#)
  - [Constructability Review Checklist](#)
- [Risk Assessment Program](#)
  - [Risk Management Guide](#)
  - [Risk Assessment Worksheet](#)
- [Value Engineering Program](#)
  - [Value Engineering Checklist](#)
  - [Value Engineering Schedule](#)
- [ArcGIS STIP and NHS Maps](#)
- [CLEAR Program](#)
  - [CLEAR SharePoint Site](#)
- [Value Assessment](#)

- [Value Assessment Worksheet](#)
- [Value Assessment Worksheet SOP Video](#)
- [Value Assessment Sample Scope of Work](#)
- [Project Management Guide](#)
- [NCDOT Quality Management Manual](#)
- [Project Knowledge Sharing](#)

## Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Constructability Review Checklist	<ul style="list-style-type: none"> <li>▪ <i>Complete Constructability Review Checklist</i></li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>▪ Division Construction Engineer</li> <li>▪ Area Construction Engineer</li> <li>▪ Value Management Office</li> </ul>
Constructability Review Minutes/CR Log <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ <i>Complete Constructability Review</i></li> </ul>	Value Management Office Program Manager	
Risk Assessment Worksheet	<ul style="list-style-type: none"> <li>▪ <i>Update Risk Assessment Worksheet and Hold Risk Assessment Study</i></li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>▪ Value Management Office Program Manager</li> <li>▪ <a href="#">Project Team</a></li> </ul>
Risk Assessment Study <sup>A</sup>		Value Management Office Program Manager	Project Manager
<a href="#">Value Assessment</a>	<ul style="list-style-type: none"> <li>▪ <i>Hold Value Assessment and complete VA worksheet</i></li> </ul>	<a href="#">Project Manager</a>	<ul style="list-style-type: none"> <li>▪ <a href="#">Value Management Office Program Manager</a></li> <li>▪ <a href="#">Division Engineer</a></li> </ul>
<a href="#">Value Assessment Worksheet</a>		<a href="#">VA Consultant</a> <a href="#">Project Manager</a>	
Value Engineering (VE) Study Report <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ <i>Hold Value Engineering Study and Review Report</i></li> </ul>	Value Management Office Program Manager	
Value Engineering (VE) Study <a href="#">Report (including VE recommendations) Recommendations</a>		Value Management Office Program Manager	
Final Dispositions (responses to recommendations)		Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager
CLEAR Database Search	<ul style="list-style-type: none"> <li>▪ <i>Conduct CLEAR Activities</i></li> </ul>	Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager

<sup>A</sup> indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench

## Complete Constructability Review Checklist

In accordance with the *Project Management Guide* and *Value Management Guidelines*, the Project Manager, in collaboration with the Roadway Design Lead or ~~other~~another assigned technical disciplines/Units, evaluates the project using the list of constructability considerations provided in the *Constructability Review Checklist*. The Checklist is completed (all items assessed) by the end of this stage to make sure the project team has considered constructability issues as the design progresses. ~~IfAs construction issues/risks are identified and documented,~~ the Project Manager or Roadway Design Lead is ~~unsure how to accommodate any construction impacts related to a particular question, the~~contact the ~~respective~~ Division Construction Engineer (DCE) or Area Construction Engineer (ACE) ~~is contacted to optimize use of~~to consult on their construction knowledge, methodology, and experience. VMO provides support as needed. The CR Checklist is to be uploaded to the Value Management Library in the Project SharePoint site under the topic Constructability Review.



## Complete Constructability Review

Following a discussion with the DCE or ACE, the Project Manager in collaboration with the Roadway Design Lead or other technical disciplines/Units, may contact the Value Management Office (VMO) to set up a formal or informal Constructability Review (CR) in accordance with the *Value Management Guidelines* and the *Project Management Guide*. Any member of the project team can alert the Project Manager of the need for a Constructability Review based on aspects of their technical discipline.

A CR can help improve the design to include the impacts to construction. By assessing construction impacts early, consideration for the environmental permits can help mitigate the risk of a permit modification later in the process. Additionally, ROW, Utility, and easement impacts can be reviewed more completely. If a CR is deemed necessary, a log with suggested design implementations (CR Log) and general notes is documented during the review then distributed as meeting minutes to the attendees, including the Project Manager, and are referenced throughout project development. [The CR Log is to be uploaded to the Project Site in the Value Management Library under the topic Constructability Review by the VMO Program Engineer.](#) From there, the Project Manager works with all applicable technical disciplines/Unit leads to address constructability issues as review comments and recommendations are addressed within the project's design documents and permit documents, if necessary.

## Update Risk Assessment Worksheet and Hold Risk Assessment Study

The Project Manager, with support from the VMO Program Manager (if needed), continues risk management review to identify potential issues that could jeopardize project delivery. Per the *Risk Management Guidelines* and the *Project Management Guide*, the Project Manager begins this step by identifying additional risks not captured in the Project Scoping Report on the *Risk Assessment Worksheet (RAW)*. If the project has a substantial change, it is beneficial to review the RAW and determine if the change elevates or diminishes project risks. The Project Manager initiates the review. If the risk review reveals potential fatal flaws, the project is reassessed with support from applicable technical disciplines/Units before a substantial part of the budget is spent. VMO provides support as needed.

While a Risk Assessment Study is not required for every project, based on the severity of the risks, a Risk Assessment Study may be necessary to provide greater assurance that a project can maintain its scope, schedule, and budget goals. Therefore, the Project Manager is to coordinate with the VMO to determine if a Risk Assessment Study is appropriate.

During this stage, the VMO supports the Project Manager by providing guidance for the *Risk Assessment Worksheet (RAW)* and/or facilitating a Risk Assessment Study in accordance with the *Value Management Guidelines* and the *Project Management Guide*. If a Risk Assessment Study is deemed necessary, the VMO Program Manager:

- Gathers a team of experts from the applicable technical disciplines/Units.
- Facilitates the development of the Risk Response Strategy.
- Develops an Implementation Plan.

From there, the Project Manager continually monitors and controls the identified project risks following the process and procedures detailed in the *Risk Management Guidelines* and the *Project Management Guide*. [Of note, as the project moves forward, the Project Manager and team should be aware that different risks may be encountered from one stage to the next, which is why it is critical to engage the](#)



~~various technical disciplines/Units when identifying and documenting risks related to each stage of delivery. The RAW is to be uploaded into the Value Management Library of the Project SharePoint site under the Risk Assessment Topic.~~

### ~~Cost Containment~~

~~At this stage, the Project Manager works to contain the cost of the project including identifying any potential areas that could adversely affect the project estimates. These issues may be identified from the Risk Management Activities or identified by any member of the Project Team. The idea is to include cost containment while staying inside the purpose and need/scope and meet all safety parameters. Should these items result in a Design Exception, follow the procedure outlined in the Roadway Manual. The Project Manager may choose to mitigate these areas or review them with the help of a VE Study, Constructability Review, and/or Risk Assessment Study.~~

### Hold Value Engineering Study and Review Report

As outlined in the *Value Engineering (VE) Checklist*, or as listed on the *VE Schedule*, the Project Manager establishes if a VE study is required or recommended for state or federal projects that meet or exceed the following thresholds:

- Any project on the National Highway System (NHS) that is \$50 million, or
- Any project on the NHS that is \$40 million or more for projects with structures, or
- Any project that is over \$500 million regardless of NHS designation.

If required (or recommended), the VE Study is scheduled as early as possible after notice to proceed (NTP) to maximize the opportunity to include recommendations into the ~~latest permitting and design plans in development.~~

Design Recommendation Plan Set. The VE Study is conducted pursuant to FHWA guidance and thresholds, where a multi-discipline team not currently involved with the project provides ideas for cost and process improvements. The VE Study requires initial input from the project team but is completed by the VMO (or VMO selected firm) in accordance with the *Value Management Guidelines*.

After the VE Study, the VMO (or VMO selected firm) prepares the VE Study Report, including VE recommendations, following the guidance defined in the *Value Management Guidelines*. Once prepared, the VE Report is submitted to the Project Manager and Roadway Design Lead to review with support from all applicable technical disciplines/Units leads, and final dispositions (responses to recommendations) are returned to the VMO. These documents are to be uploaded to the Project SharePoint site in the Value Management Library under the Value Engineering Topic.

The VMO records the dispositions in the VE Program Action Register, and the Project Manager works with all applicable technical disciplines/Units leads to implement the accepted recommendations into the project's design documents and permitting documents, if necessary.

### Revisit VE Threshold Requirements (As Needed)

As ~~the~~ project ~~develops~~progresses from one stage to the next, changes (to scope, total project cost, schedule, or the project delivery method) may impact if a VE Study is required and the timing of when a VE Study is held. The Project Manager reviews the monthly VE Study schedule and ~~notifies~~notify VMO if

a project requiring a VE Study is missing from the schedule, as well as if there is a **major change that triggers a required VE Study, such as changes** to a project's scope, total project cost, schedule, or the project delivery method.

### Conduct CLEAR Activities

VMO maintains the Communicate Lessons, Exchange Advice, Record (CLEAR) database (internal Knowledge Management tool), which contains lessons learned (LL) and best practices (BP) from across the Department. VMO provides support for searching the database as well as connecting users to experts that provide input to find solutions and vet ideas.

The Project Manager and technical leads/Units identify key words from the Project Scoping Report and **searches** the CLEAR portal to identify relevant LL and BP in order to leverage past successes and errors to deliver the project more efficiently. The outcomes of the search are then reviewed and vetted for applicability. Additional searches based on project location, type, and areas of concern by discipline are performed as needed. The ultimate goal is to produce better design documents; not limited to a better and safer design, but a more **comprehensive biddable contract, (i.e., more contractor-friendly bid package).**

Any LL or BP developed during any CR-RAVE activities (any ideas, recommendations, and solutions) should be submitted into the CLEAR portal so other Project Teams can leverage successes and errors to deliver other projects more efficiently. LL and BPs should include any ideas, recommendations and solutions generated during CR-RAVE activities. These submissions can include everything from communication to improved designed documents, **guidelines and standards** and are not limited to better and safer designs but also more Contractor-friendly bid packages.

External consultants (PEFs) can submit **any ideas, recommendations, and solutions** through the form found here: [Project Knowledge Sharing](#).

### Conduct Value Assessment

**During this stage, the VA Consultant identified in Stage 1, will conduct the VA and complete the VA Worksheet There may already be a VA Worksheet of cost saving ideas initially identified in Stage 1. This should be provided to the firm conducting the VA. The VA should be done early enough to allow sufficient time for the Project Team to incorporate changes into the project without impacting the project schedule. Based on the Cost-containment Guidance, the purpose of the Workshop is to evaluate the programmed purpose and need and scope and brainstorm cost saving ideas that would reduce the Construction, Utility, Right of Way, and future Maintenance Costs. The output from the VA is the VA Worksheet, directions on how to fill out the VA Worksheet, for consultant firms, Project Managers, and Division Engineers, can be found in the VA Worksheet SOP Video. Once the consultant firm completes the VA Worksheet it should be posted to the project SharePoint site in the Value Management Library under the Value Assessment topic.**

**The Project Manager will evaluate and review the ideas with the Project Team for feasibility, cost savings, and if the Project will still meet the original purpose and need. The Project Manager will then provide a final disposition of Accepted, Accepted as Modified, or Rejected. All rejected recommendations need to include a detailed explanation as to why the recommendation is rejected. The Division Engineer has an**

opportunity to provide comments in the VA Worksheet. Any cost savings identified may need to be included in the Cost Verification Memo (see *Project Management Guide* for related information).

**\*Note:** A Value Assessment will not take the place of a required Value Engineering Study.

### Complete QC/QA Procedures

The Value Management Office Program Manager is to coordinate the applicable QC review following the NCDOT *Quality Management Manual* procedures and the respective QC Checklist before upload and distribution of all related deliverables

## 3VM1 Incorporate CR-RAVE Outcomes ~~and Complete~~ CLEAR, Submit CLEAR Activities, and Implement Value Assessment Activities

### Overview

As applicable, ensure outcomes from the Constructability Review, Risk Assessment Study, Value Assessment, and Value Engineering Study (CR-RAVE) activities are incorporated into the design. Additionally, ensure Communicate Lessons, Exchange Advice, Record (CLEAR) activities continue.

While CR-RAVE and CLEAR activities include separate items, considering the items together allows the outcomes to inform each other since they typically overlap and may be joined (especially a Risk Assessment and VE Study).

### References

- [Value Management Office](#)
  - [Value Management Guidelines](#)
- [Constructability Review Program](#)
  - [Constructability Review Checklist](#)
- [Risk Assessment Program](#)
  - [Risk Management Guide](#)
  - [Risk Assessment Worksheet](#)
- [Value Engineering Program](#)
  - [Value Engineering Checklist](#)
  - [Value Engineering Schedule](#)
- [ArcGIS STIP and NHS Maps](#)
- [CLEAR Program](#)
  - [CLEAR SharePoint Site](#)
- [Value Assessment](#)
  - [Value Assessment Worksheet](#)
  - [Value Assessment Worksheet SOP Video](#)
  - [Value Assessment Sample Scope of Work](#)
- [Project Management Guide](#)
- [NCDOT Quality Management Manual](#)
- [Project Knowledge Sharing](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Constructability Review Checklist	<ul style="list-style-type: none"> <li>▪ <i>Incorporate Constructability Review Outcome</i></li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>▪ Division Construction Engineer</li> <li>▪ Area Construction Engineer</li> <li>▪ Value Management Office</li> </ul>
Constructability Review Minutes/CR Log <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ <i>Complete Constructability Review</i></li> </ul>	Value Management Office Program Manager	

3VM1 Incorporate CR-RAVE Outcomes ~~and Complete~~, Submit CLEAR Activities, & Implement Value Assessment Activities 11

~~June~~November 2021

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Risk Assessment Worksheet	<ul style="list-style-type: none"> <li>Update and Monitor Risk Assessment Worksheet <i>and implement mitigation strategies</i></li> </ul>	Project Manager	Value Management Office Program Manager
<a href="#">Risk Assessment Study Report ^</a>		<a href="#">Project Team</a>	<a href="#">Project Manager</a>
<a href="#">Risk Value Assessment Study Report ^ Recommendations</a>	<ul style="list-style-type: none"> <li>Implement recommendations from VA Worksheet</li> </ul>	<a href="#">Value Management Office Program Project Manager</a>	<ul style="list-style-type: none"> <li><a href="#">Project Team</a></li> <li><a href="#">Value Management Office Program Manager</a></li> </ul>
Value Engineering Study Report (including VE recommendation Forms) ^	<ul style="list-style-type: none"> <li>Implement Value Engineering Recommendations</li> </ul>	Value Management Office Program Manager	
CLEAR Database Submission	<ul style="list-style-type: none"> <li>Submit LL and BP from Project Design and Development (CLEAR Submissions)</li> </ul>	Project Manager or Other technical disciplines/Units	Value Management Office Program Manager

<sup>A</sup> indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench

### Incorporate Constructability Review Outcome

In accordance with the *Project Management Guide* and *Value Management Guidelines*, the Project Manager, in collaboration with the Roadway Design Lead or other technical disciplines/Units, continues to review/reference the list of constructability considerations assessed in the Constructability Review Checklist, as well as the CR Log and meeting minutes from the Constructability Review (if one was held). The Project Manager continues to work with all applicable technical disciplines/Unit leads to address constructability issues by updating the project’s design documents and permit documents, if necessary. If any additional construction impacts arise, the Division Construction Engineer (DCE) or Area Construction Engineer (ACE) are contacted to optimize use of construction knowledge, methodology, and experience. VMO provides support as needed.

### Complete Constructability Review (if needed)

~~If any additional~~ As construction impacts arise, the issues/risks are further identified or carried forward from previous assessments or reviews, the Project Manager or Roadway Design Lead is to contact the respective Division Construction Engineer (DCE) or Area Construction Engineer (ACE) ~~are contacted to optimize use of~~ to consult on their construction knowledge, methodology, and experience. Following a discussion with the DCE or ACE, the Project Manager, in collaboration with the Roadway Design Lead or other assigned technical disciplines/Units, may contact the Value Management Office (VMO) to set up a formal or informal Constructability Review (CR) regardless if one had been held during an earlier stage since multiple CRs can occur as the design develops.

### Update and Monitor Risk Assessment Worksheet

The Project Manager, with support from the VMO Program Manager (if needed), continually revises the risk register ~~(as needed)~~ and references the Risk Assessment Study Report (if a Study occurred) to continue to monitor and control project risks, all following the process and procedures detailed in the *Risk Management Guidelines Guide* and the *Project Management Guide*. Of note, as the project moves forward, the Project Manager and team should be aware that different risks may be encountered from one stage to the next, which is why it is critical to engage the various technical disciplines/Units when identifying and documenting risks related to each stage of delivery.

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### Complete Risk Assessment Study (if needed)

Based on project scope and risk assessment data, the Project Manager may request an additional Risk Assessment Study from the VMO, which is completed following the process defined in the *Value Management Guidelines*.

### ~~Cost Containment~~

~~At this stage, the Project Manager works to contain the cost of the project including identifying any potential areas that could adversely affect the project estimates. These issues may be identified from the Risk Management Activities or identified by any member of the Project Team. The idea is to include cost containment while staying inside the purpose and need/scope and meet all safety parameters. Should these items result in a Design Exception, follow the procedure outlined in the Roadway Manual. The Project Manager may choose to mitigate these areas or review them with the help of a VE Study, Constructability Review, and/or Risk Assessment Study.~~

### Implement Value Engineering Recommendations

If a VE Study was held, the Project Manager makes sure the VE Study Report (prepared by VMO) was reviewed with support from all applicable technical disciplines/Units leads and final dispositions (responses to recommendations) were returned to the VMO Program Manager.

The VMO Program Manager makes sure the dispositions were recorded in the VE Program Action Register, and the Project Manager continues to work with all applicable technical disciplines/Unit leads as the accepted recommendations are incorporated into the project's design documents, updating permit documents if necessary.

### Revisit VE Threshold Requirements (As Needed)

As a project develops, progresses from one stage to the next, changes (to scope, total project cost, schedule, or the project delivery method) may impact if a VE Study is required and per the thresholds listed in 1VM1 and 2VM1 as outlined in the Value Engineering (VE) Checklist. Changes may also impact the timing of when a VE Study is held. The Project Manager reviews the monthly VE Study schedule and notifies VMO if a project requiring a VE Study is missing from the schedule as well as if there is a major change to a project's scope, total project cost, schedule, or the project delivery method that would warrant a study.

### Submit LL and BP from Project Design and Development (CLEAR Submissions)

~~VMO maintains the Communicate Lessons, Exchange Advice, Record (CLEAR) database (internal Knowledge Management tool), which contains lessons learned (LL) and best practices (BP) from across the Department. VMO provides support for submitting to the database as well as coordinating review by experts that provide input and vet ideas.~~

The Project Manager (or assigned NCDOT employee) identifies/continues to identify any lessons learned (LL) and best practices (BP) to submit into the CLEAR portal (by a NCDOT employee) so other Project Managers and applicable technical disciplines/Units can leverage successes and errors to deliver other projects more efficiently. ~~LL and BPs should include any ideas, recommendations and solutions generated during CR-RAVE activities. These submissions can include everything from communication to improved~~

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~~designed documents and are not limited to better and safer designs but also more contractor-friendly bid packages.~~

External consultants (PEFs) can submit submission through the form found here: [Project Knowledge Sharing](#).

### Implement Value Assessment Recommendations

~~The accepted recommendations from the VA should be implemented into the design of the project. Prior to the conclusion of this stage, the Project Team should do an additional review to identify any additional cost containment changes that can be made based on new information discovered since the VA. Additional changes/recommendations should be added to the VA Worksheet and may need to be included in the Cost Verification Memo (see *Project Management Guide* for related information).~~

### Complete QC/QA Procedures

The Value Management Office Program Manager is to coordinate the applicable QC review following the NCDOT *Quality Management Manual* procedures and the respective QC Checklist before upload and distribution of all related deliverables

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## 4VM1 Complete CR-RAVE ~~and~~, CLEAR and Complete Value Assessment Activities

### Overview

As applicable, ensure outcomes from the Constructability Review, Risk Assessment Study, Cost- Value Assessment, and Value Engineering Study (CR-RAVE) activities are incorporated into the design. Additionally, ensure Communicate Lessons, Exchange Advice, Record (CLEAR) activities continue.

While CR-RAVE and CLEAR activities include separate items, considering the items together allows the outcomes to inform each other since they typically overlap and may be joined (specifically a Risk Assessment and VE Study).

### References

- [Value Management Office](#)
  - [Value Management Guidelines](#)
- [Constructability Review Program](#)
  - ~~Risk Assessment Program~~ [Constructability Review Checklist](#)
- [Risk Assessment Program](#)
  - [Risk Management Guide](#)
  - [Risk Assessment Worksheet](#)
- [Value Engineering Program](#)
  - [Value Engineering Checklist](#)
  - [Value Engineering Schedule](#)
- [ArcGIS STIP and NHS Maps](#)
- [CLEAR Program](#)
  - [CLEAR SharePoint Site](#)
- [Value Assessment](#)
  - [Value Assessment Worksheet](#)
  - [Value Assessment Worksheet SOP Video](#)
  - [Value Assessment Sample Scope of Work](#)
- [Project Management Guide](#)
- [NCDOT Quality Management Manual](#)
- [Project Knowledge Sharing](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Constructability Review Minutes/CR Log <sup>A</sup>	<ul style="list-style-type: none"> <li>▪ <i>Complete Constructability Review Implementation Check</i></li> </ul>	Value Management Office Program Manager	
Risk Assessment Worksheet	<ul style="list-style-type: none"> <li>▪ <i>Update and Monitor Risk Assessment Worksheet</i></li> </ul>	Project Manager	Value Management Office Program Manager
<a href="#">Value Assessment</a>	<ul style="list-style-type: none"> <li>▪ <i>Complete Value Assessment Implementation Check</i></li> </ul>	<a href="#">Project Manager</a>	<ul style="list-style-type: none"> <li>▪ <a href="#">Value Management Office Program Manager</a></li> <li>▪ <a href="#">Division Engineer</a></li> </ul>

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Value Engineering (VE) Study Report <sup>A</sup>	<ul style="list-style-type: none"> <li>Complete Value Engineering Recommendation Implementation Check</li> </ul>	Value Management Office Program Manager	
CLEAR Database Submissions	<ul style="list-style-type: none"> <li>Submit LL and BP from throughout Project Design and Development (CLEAR Submissions)</li> </ul>	Project Manager or Other Technical Disciplines/Units	Value Management Office Program Manager

<sup>A</sup> indicates that final document(s) or data set(s) must be uploaded to the ATLAS Workbench

### Complete Constructability Review Implementation Check

In accordance with the *Project Management Guide* and *Value Management Guidelines*, the Project Manager, in collaboration with the Roadway Design Lead or other technical disciplines/Units, reviews the list of constructability considerations assessed in the Constructability Review Checklist, as well as the CR Log and meeting minutes from the Constructability Review (if one was held) to make sure constructability issues have been addressed in the design package. If a Constructability Review was held, the action item log ([located in the Value Management Library on the Project SharePoint site](#)) should be updated to confirm which items have been implemented and noting reasons for any items that were not.

### Complete Constructability Review (if needed)

~~If any additional~~ As construction impacts arise, the issues/risks are further identified or carried forward from previous assessments or reviews, the Project Manager or Roadway Design Lead is to contact the respective Division Construction Engineer (DCE) or Area Construction Engineer (ACE) ~~should be contacted to optimize use of~~ to consult on their construction knowledge, methodology, and experience. Following a discussion with the DCE or ACE, the Project Manager may contact the VMO to set up a formal or informal Constructability Review (CR) regardless if one had been held during an earlier stage since multiple CRs can occur as the design develops.

### Update and Monitor Risk Assessment Worksheet

The Project Manager, with support as needed from the VMO Program Manager, continually revises the risk register (as needed) ), and references the Risk Assessment Study Report to continue to monitor and control project risks, all following the process and procedures detailed in the *Risk Management Guidelines Guide* and the *Project Management Guide*.

### Complete Risk Assessment Study (if needed)

Based on project scope and risk assessment data, the Project Manager may request an additional Risk Assessment Study from the Value Management Office (VMO), which is completed following the process defined in the *Value Management Guidelines*.

## Cost Containment

~~At this stage, the Project Manager works to contain the cost of the project including identifying any potential areas that could adversely affect the project estimates. These issues may be identified from the Risk Management Activities or identified by any member of the Complete Value Assessment Implementation Check~~

~~The Project Manager confirms implementation of accepted recommendations and completes the Value Assessment Implementation Check on the VA Worksheet. Any cost savings identified may need to be included in the Cost Verification Memo (see *Project Management Guide* for related information).~~

~~Project Team. The idea is to include cost containment while staying inside the purpose and need/scope and meet all safety parameters. Should these items result in a Design Exception, follow the procedure outlined in the Roadway Manual. The Project Manager may choose to mitigate these areas or review them with the help of a VE Study, Constructability Review, and/or Risk Assessment Study.~~

## Complete Value Engineering Recommendation Implementation Check

If a VE Study was held, the Project Manager confirms implementation of accepted recommendations, which is verified by VMO per FHWA requirements-

~~on the recommendation forms located in the Value Management Library on the Project SharePoint site.~~  
The VMO Program Manager records the implementation check in the VE Program Action Register.

## Revisit VE Threshold Requirements (As Needed)

~~As a project develops, progresses from one stage to the next, changes (to scope, total project cost, schedule, or the project delivery method) may impact if a VE Study is required and per the thresholds listed in 1VM1 and 2VM1 as outlined in the Value Engineering (VE) Checklist. Changes may also impact the timing of when a VE Study is held. The Project ~~Manger~~Manager reviews the monthly VE Study schedule and notifies VMO if a project requiring a VE Study is missing from the schedule as well as if there is a major change to a project's scope, total project cost, schedule, or the project delivery method that would warrant a study.~~

## Submit LL and BP from Project Design and Development (CLEAR Submissions)

~~VMO maintains the Communicate Lessons, Exchange Advice, Record (CLEAR) database (internal Knowledge Management tool), which contains lessons learned (LL) and best practices (BP) from across the Department. VMO provides support for submitting to the database as well as coordinating review by experts; that provide input and vet ideas.~~

The Project Manager (or assigned NCDOT employee) ~~identifies~~continues to identify any lessons learned (~~LLs~~) and best practices (~~BPBs~~) to submit into the CLEAR portal (by an NCDOT employee) so other Project Managers and applicable technical disciplines/Units can leverage successes and errors to deliver other projects more efficiently. ~~LL and BPs should include any ideas, recommendations and solutions generated during CR-RAVE activities. These submissions can include everything from communication to improved designed documents and are not limited to better and safer designs but also more Contractor-friendly bid packages.~~

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Project  
Initiation

Alignment  
Defined

Plan-in-Hand

PS&E/Letting

Post-Letting/  
Construction

External NCDOT personnel can submit submission through the form found here: [Project Knowledge Sharing](#).

### Complete QC/QA Procedures

The Value Management Office Program Manager is to coordinate the applicable QC review following the NCDOT Quality Management Manual procedures and the respective QC Checklist before upload and distribution of all related deliverables.

## 5VM1 Value Management Construction Support

### Overview

As applicable, ensure outcomes from the Constructability Review, Risk Assessment Study, and Value Engineering Study (CR-RAVE) [and Value Assessment](#) activities are incorporated during construction. Additionally, ensure Communicate Lessons, Exchange Advice, Record (CLEAR) activities continue.

~~**Note:** While CR-RAVE and CLEAR activities include separate items, considering the items together allows the outcomes to inform each other since, they typically overlap and may be joined (specifically a Risk Assessment and VE Study).~~

Complete Value Engineering Proposal activities if necessary.

### References

- [Value Management Office](#)
  - [Value Management Guidelines](#)
- [Constructability Review Program](#)
  - [Constructability Review Checklist](#)
- [Risk Assessment Program](#)
  - [Risk Management Guide](#)
  - [Risk Assessment Worksheet](#)
- [CLEAR Program](#)
  - [CLEAR SharePoint Site](#)
- [Project Knowledge Sharing](#)
- [Value Engineering Proposal Program](#)
- [Standard Specifications for Roads and Structures](#)
- [Construction Manual](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Risk Assessment Worksheet	<ul style="list-style-type: none"> <li>▪ <i>Update and Monitor Risk Assessment Worksheet</i></li> </ul>	Project Manager/ Resident Engineer	Value Management Office Program Manager
CLEAR Database Submissions	<ul style="list-style-type: none"> <li>▪ <i>Submit LL and BP from throughout Project Design and Development (CLEAR Submissions)</i></li> </ul>	Division Personnel	Value Management Office Program Manager
Value Engineering Proposal Memo	<ul style="list-style-type: none"> <li>▪ <i>Compile Value Engineering Proposal Memo</i></li> </ul>	Value Management Office Program Manager	<ul style="list-style-type: none"> <li>▪ CCU</li> <li>▪ Technical Disciplines/Units,</li> <li>▪ Resident Engineer</li> </ul>

### Update and Monitor Risk Assessment Worksheet

The Project Manager and Resident Engineer, with support as needed from the VMO Program Manager, continually revise the risk register (as needed), and reference the Risk Assessment Study Report (if a study occurred) to continue to monitor and control project risks, all following the process and procedures detailed in the *Risk Management [GuidelinesGuide](#)* and the *Project Management Guide*.

## Submit LL and BP during Construction (CLEAR Submissions)

VMO maintains the Communicate Lessons, Exchange Advice, Record (CLEAR) database (internal Knowledge Management tool), which contains lessons learned (LL) and best practices (BP) from across the Department. VMO provides support for submitting to the database as well as coordinating review by experts that provide input and vet ideas.

All NCDOT Employees can identify any lessons learned (LL) and best practices (BP) to submit into the CLEAR portal (by an NCDOT employee) so others can leverage successes and errors to deliver other projects more efficiently. These submissions can include everything from communication to improved designed documents and are not limited to better and safer designs, but also more contractor-friendly bid packages.

External NCDOT personnel can submit submission through the form found here: [Project Knowledge Sharing](#).

## Compile Value Engineering Proposal Memo

The purpose of the Value Engineering Proposal Program (VEPP) is to encourage contractors to develop Value Engineering ideas by utilizing their design and construction ingenuity, experience, and background. A Value Engineering Change Proposal (VEP) is a post-award proposal made by the construction contractor which includes any changes to work that may potentially result in cost or time savings, without impairing essential functions and characteristics of the project, such as: service life, safety, reliability, economy of operation, ease of maintenance, desired aesthetics, design, standardized features, and environmental

A contractor can submit a Value Engineering Proposal to the ~~Division office~~VMO at any time during construction. These proposals are to follow the guidelines in the *Standard Specifications and Construction Manual*. ~~Details on the proposal guidance and support are found on the Value Engineering page linked in the references above. Once afor Roads and Structures and Construction Manual.~~ The Contractor submits a conceptual proposal shown through sketches, mark-ups on existing plan sheets, a short description, and breakdown of costs associated with the proposal. The VMO sends the preliminary submittal for review to the Resident Engineer, Technical Disciplines, and Project Manager. The Department uses the Preliminary Submittal to review the merit of the conceptual proposal prior to the Contractor spending time and money developing a more detailed Final Proposal.

Upon the approval of the preliminary review, the contractor submits a final proposal. The initial Proposal must include: design calculations, contract plan sheet modifications, contract document changes, and a cost savings estimate based on contract line items, all at the Contractor's expense. VMO sends the final proposal to the Resident Engineer, Technical Disciplines, and Project Manager for review. Once the review is completed and a final decision made, the VMO prepares the Value Engineering Proposal memo, which is sent to the Resident Engineer to share with the contractor. The Resident Engineer is responsible for execution of any necessary Supplemental Agreements.

## 5VM2 Post Construction Assessment

### Overview

The Post Construction Assessment brings together the design team, NCDOT personnel, and contractors to review lessons learned and best practices related to the construction of these projects to improve delivery of future projects.

### References

- [Value Management Office](#)
  - [Value Management Guidelines](#)
  - [Risk Assessment Program](#)
    - [Risk Assessment Worksheet](#)
- [CLEAR Program](#)
- [Project Knowledge Sharing](#)

### Deliverables

Deliverable	Task	Responsible Party	
		Activity Leader	Additional Support
Post Construction Assessment Summary	<ul style="list-style-type: none"> <li>▪ Summary of discussion generated by VMO and shared.</li> </ul>	Value Management Office Program Manager	Project Team

### Project Selection

Projects that should have a Post Construction Assessment can be identified by any member of the Project Team. The Project Team should inform the VMO as soon as they have determined that the project benefits from a Post Construction Assessment at the completion of the project.

### Pre-Post Construction Assessment Meeting

The Value Management and internal Project Team define the topics that should be covered during the Post Construction Assessment. Topics should be focused on areas to capture lessons learned and best practices. Additionally, the group ensures all the right internal and external stakeholders are invited to make the assessment complete.

### Submit Lessons Learned and Best Practices

Following the Post Construction Assessment, the lessons learned and best practices generated from the discussion are submitted into the CLEAR database and routed to experts for vetting and implementation.